SITE-SPECIFIC HEALTH & SAFETY PLAN

Review Avenue Development Sites, RAD I and RAD II
Long Island City, Queens, New York
RAD I- BCA Site #C241089
RAD II - BCA Site #C24005

Project Number 3480140433

Prepared by:

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Hamilton, NJ 08619

December 2015

BEYOND ZERO

SITE-SPECIFIC HEALTH & SAFETY PLAN (HASP)

Project Name: Review Avenue Development Sites
Project Location: 37-80 Review Avenue, Long Island City, New York 11101
Project No.: 3480140433 Task No: 0106

This HASP, which must be kept on site, addresses the health and safety hazards of each task conducted by Amec Foster Wheeler employees for this project, including the requirements and procedures for worker protection (per 29 CFR 1910.120, the Amec Foster Wheeler Hazardous Waste Operations and Emergency Response Program, and the Integrated Health, Safety and Environment (HSE) Manual). The HASP was developed based on the hazards known or suspected to be present at the site, specifically as they relate to the work to be conducted by Amec Foster Wheeler employees. The hazards and controls within this HASP do not necessarily address all the hazards associated with subcontractor personnel. Subcontractors must provide their own HASP; however, they will be responsible for reviewing the Amec Foster Wheeler HASP.

The Site Health and Safety Officer (SHSO) can change or amend this document only with agreement from the Group Health, Safety and Environment Manager (GHSEM). The SHSO must initial any change made to the HASP at the relevant section and document the amendment date below.

Prepared by: Andrew Shust
Amec Foster Wheeler Managing Office: Hamilton, New Jersey

Approved by: Dan Berkowitz
SHSO Date

Tim Kessler
Field Lead Date

Kinjal Shah
Project Manager Date

Amendment(s):

All site workers shall read this HASP. A pre-entry briefing conducted by the SHSO shall be held prior to initiating this project. Items to be covered during the briefing can be found on the Site Safety Orientation form (Appendix F). All applicable sections of this HASP shall be reviewed during this briefing. The SHSO shall review the information covered in the pre-entry briefing meeting with any worker not in attendance at the initial meeting prior to commencing work. Brief meetings will be held at the beginning of each work day to discuss important safety and health issues concerning tasks performed on that day and documented on the Daily Safety Meeting checklist (Appendix G). After reading the HASP and attending a pre-entry briefing, workers shall sign the following acknowledgment statement:

Amec Foster Wheeler Field Team Review: I acknowledge that I have read the requirements of this HASP, and agree to abide by the procedures and limitations specified herein. I also acknowledge that I have been given an opportunity to have my questions regarding the HASP and its requirements answered prior to performing field activities. Health and safety training and medical surveillance requirements applicable to my field activities at this site are current and will not expire during on-site activities.

NAME	DATE	NAME	DATE

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1.0 SITE DESCRIPTION

The Site is divided into two sub sites, Review Avenue Development I (RAD I) and Review Avenue Development II (RAD II). RAD I consists of approximately 2.7 acres and was used for a variety of commercial and industrial purposes between 1898 and the present, including commercial vehicle and heavy equipment maintenance. The property is paved and contains one five-story brick building (Building No. 1), which is currently used as a warehouse and automotive repair business, and one three-story brick building (Building No. 2), which is currently occupied with multiple industrial and commercial uses. Portions of the RAD I property are used for parking and equipment storage.

RAD II consists of approximately 1.7 acres and was used for a variety of industrial purposes, including refining and later, recycling of crankcase oil, between the late 19th century and 1981. The structures previously existing on the property (buildings, tanks, containment areas) were demolished and removed in 2008 as an interim remedial action. Below-grade foundation structures, concrete pads, sumps and vaults and debris piles scattered throughout the RAD II property were also removed during the interim action. The RAD II property is currently leased by the Volunteer to an equipment rental company for storage and parking of equipment and vehicles.

The proposed scope of work is summarized below:

- Mobilization/site security/Decon Pad/Temporary Fencing
- Demolition/Clearing
  - Remove small concrete pad
  - Remove above grade small diameter conduit
  - Remove overhead wires (230 volt)
  - Clear brush/small trees from 1,500-2,000 sq.ft area
- Install 68 recovery wells
  - 4” diameter/25-30’ deep with hollow stem auger
- Install underground piping (SVE, Compressed Air, Fluids)
  - Excavate trenches
  - Install piping
  - Placement of bedding material
  - Backfill and compaction
  - Approx. 1,650 ft of piping at less than 5-foot depth
- Install concrete foundations for treatment equipment
  - Enclosures (6 piers with footings)
  - 8” concrete slabs for ASTs
- Set equipment enclosures and ASTs with Crane
  - Two 40’ C-Boxes (15 ton each)
  - Two 6,000-gal AST Dike tanks
- Final grade and asphalt paving, 1.7 acres
- Above grade piping (Trench piping to treatment equipment and tanks)
- Underground electrical service to equipment (120 ft)
- Start-up and Commissioning
- Operation & Maintenance of the product recovery system

The following tasks are to be performed at the site. Check the box to show if a task it to be conducted by either Amec Foster Wheeler or our Subcontractor and that an Activity Hazard Analysis (AHA) has been developed and included with this HASP.

Amec Foster Wheeler	**Sub**	**Tasks**	**AHA Developed**	**Initial Level of PPE**
☒	☒	▪ Field Mobilization	☒	D
☒	☒	▪ Utility Markout, Geophysical Survey, and Site Surveying – Amec Foster Wheeler Oversight	☒	D
☒	☒	▪ Subcontractor Oversight	☒	D
☐	☒	▪ Recovery Well Installation	☒	D
☐	☒	▪ Trench Excavation/Installation of Underground Piping	☒	D
☒	☐	▪ Operation & Maintenance (O&M) of product recover system	☒	D

The tasks listed above include the following hazardous activities (ensure documentation of training is listed in Table 3-1):

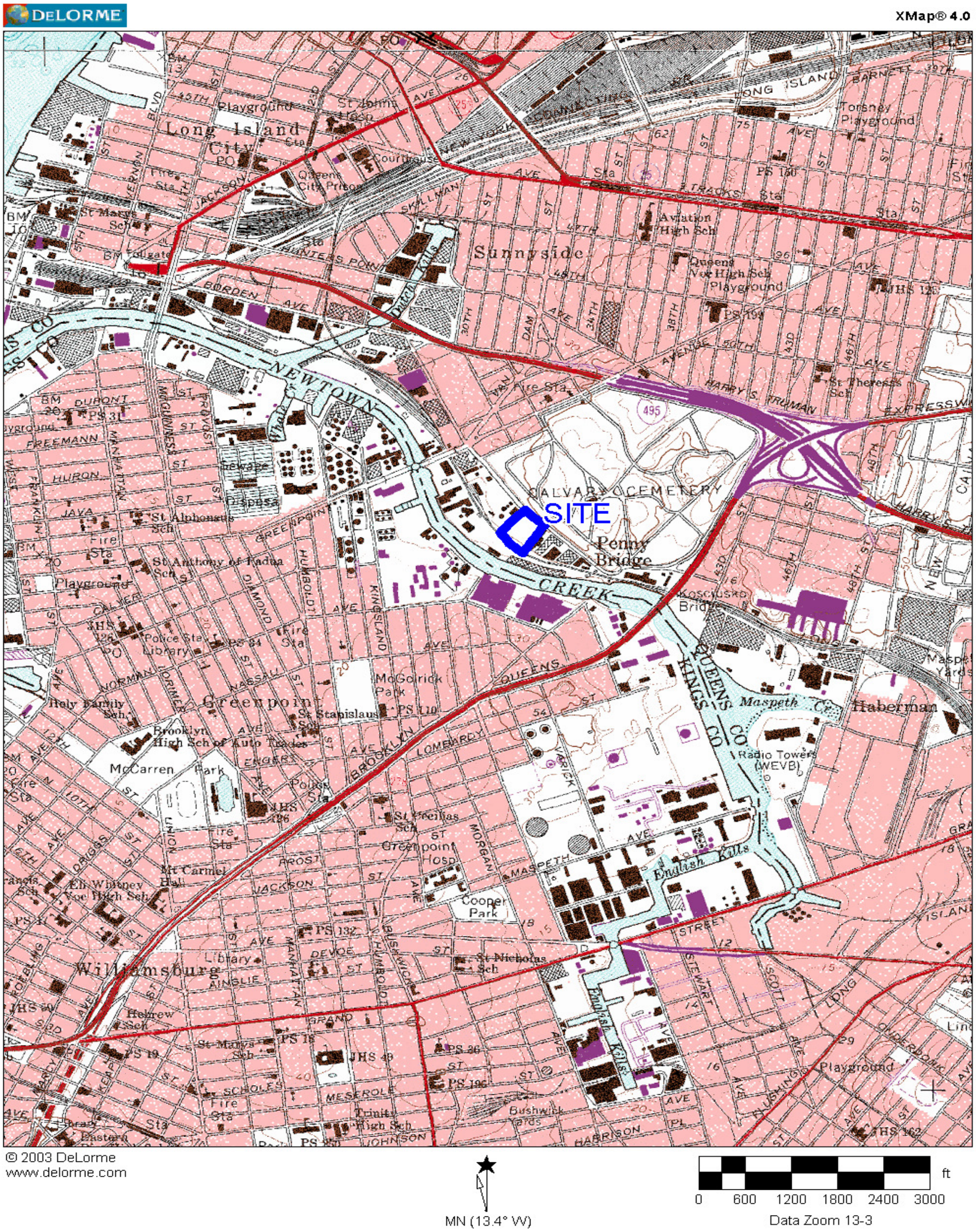
	Amec Foster Wheeler	Sub		Amec Foster Wheeler	Sub
Confined Space Entry	☐	☐	Operate Drill Rig	☐	☒
Entering Excavations	☐	☐	Operate other Heavy Equipment	☐	☐
Hot Work	☐	☐	Using Aerial Lift	☐	☐
Lockout/Tagout	☒	☐	Working from Scaffolding	☐	☐
Operate Forklift	☐	☐	Working at heights > 6 ft.	☐	☐

Expected start date: December 2015

Expected duration of project: 6 months (long term project, intermittent start/stop dates)

Expected average number of workers on site per day: 3 to 4 (including subs)

Figure 1-1


DeLorme
XMap® 4.0
SITE
Long Island City
Sunnyside
Calvary Cemetery
Penny Bridge
Newtown Creek
Kosciusko Bridge
Greenpoint
McCarren Park
McGolrick Park
Williamsburg
Maspeth Cr.
English Kills
Haberman
Radio Towers (WEVB)
Cooper Park
Dutch Kills
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2.0 KEY PERSONNEL AND HEALTH AND SAFETY RESPONSIBILITIES

Figure 2.1 shows the project organizational chart. Table 2.1 describes health and safety responsibilities for key project personnel.

Figure 2.1 - Project Organization Chart

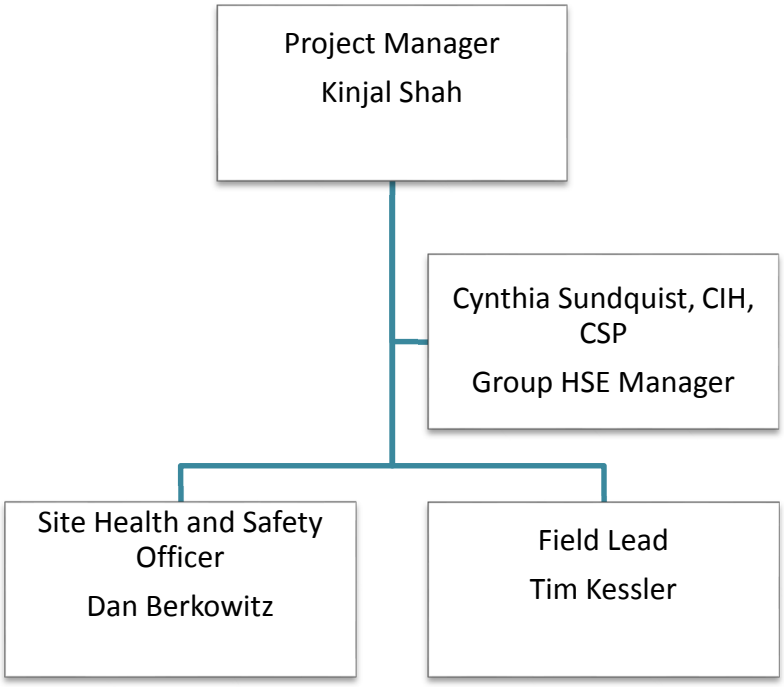


TABLE 2.1

KEY PERSONNEL HEALTH AND SAFETY RESPONSIBILITIES

GROUP HEALTH, SAFETY, ENVIRONMENT MANAGER Cindy Sundquist, CIH, CSP	FIELD LEAD (FL) Name: Tim Kessler	SITE HEALTH & SAFETY OFFICER (SHSO) Name: Dan Berkowitz	PROJECT PERSONNEL
▪ Implement appropriate corporate health and safety policies, or environmental projects ▪ Approve HASP and Amendments ▪ Maintain exposure monitoring records ▪ Notify Corporate VP of HSE in the event of an emergency situation ▪ Verify that corrective actions recommended on Incident Analysis Forms have been implemented	▪ See that personnel receive this plan, are aware of its provisions, and are aware of the potential hazards associated with site operations, are instructed in safe work practices, and are familiar with emergency procedures, and these actions are documented ▪ Determine that appropriate monitoring and personnel protective equipment are available ▪ Monitor the Field Logbooks to ensure the health and safety work practices are employed ▪ Coordinate with SHSO so that emergency response procedures are implemented ▪ Ensure corrective actions recommended on Incident Analysis Forms are implemented	▪ Implement project HASP; report to the Project Manager for action if any deviations from the anticipated conditions exist; and authorize the cessation of work at site investigations if necessary ▪ Confirm that prior to a hazardous waste site visit, site personnel meet the proper medical requirements and have the health and safety training to qualify them to perform their assigned tasks. Identify all site personnel with special medical conditions. ▪ Conduct pre-entry briefing and tailgate safety meetings. Document meetings on Daily Tailgate Safety Meeting Checklist (See Appendix G) ▪ Verify that all monitoring equipment and personal protective equipment is operating correctly according to manufacturer's instructions and such equipment is utilized by on-site personnel. Calibrate or verify calibration of all monitoring equipment and record results. ▪ Conduct weekly inspections of jobsite using the Weekly Site Safety And Health Checklist (See Appendix H) ▪ Implement site emergency and follow-up procedures	▪ Be familiar with and abide by the HASP ▪ Notify the SHSO of any special medical conditions (e.g., allergies) ▪ Immediately report any accidents and/or unsafe conditions to the SHSO ▪ No individual shall go on site where he/she does not have the required safety training

3.0 WORKER TRAINING

Upon designation of a specific project team, Table 3.1 will be completed to summarize the training experience of the project team with respect to 29 Code of Federal Regulations (CFR) 1910.120(e), 29 CFR 1910.38, and 29 CFR 1910.1200 and Amec Foster Wheeler Integrated HSE Manual. **For this project be sure to have the following certificates/documentation of training available at the Project site for both Amec Foster Wheeler employees and subcontractors**:

- 40-hour initial
- 8-hour refresher
- 8-hour supervisory
- First Aid/CPR
- Hazard Communication
- Medical Clearance
- Respiratory Clearance (if Level C or B PPE is to be used)
- Documentation of Annual Respirator Fit Test (if Level C or B PPE is to be used)
- Documentation of Annual Fire Extinguisher Training (if fire extinguishers are present at the site).
- Documentation of Fall Protection training (if working at elevations)
- Documentation of Confined Space Entry training (if working in confined spaces)
- Documentation of training on OSHA substance specific standards (e.g., Hexavalent Chromium, Lead, etc.) if applicable

4.0 MEDICAL SURVEILLANCE

Upon designation of a specific project team, Table 3.1 will be completed to indicate the workers who participate in the company's Medical Surveillance Program (29 CFR 1910.120(f)). All workers who could potentially be exposed to concentrations of contaminants above the Occupational Safety and Health Administration (OSHA) Permissible Exposure Limits (PELs) for 30 days per year or more must be included in the Medical Surveillance Program. Any site specific medical surveillance conducted for site workers will also be listed on the table.

TABLE 3.1

TRAINING/MEDICAL SURVEILLANCE/RESPIRATORY PROTECTION RECORDS

Role:	Required?	Names of Field Team Members					
		Field Operations Lead: Tim Kessler	Site Health and Safety Officer: Dan Berkowitz	Dennis Young			
Training/Medical		**Dates**	**Dates**	**Dates**	**Dates**	**Dates**	**Dates**
Medical Surveillance				7/1/2015			
Site Specific Medical Testing:_____							
40-Hour Initial	X	8/22/14	2/7/03				
8-Hour Supervisor [1]	X		5/19/04	10/24/2001			
8-Hour Refresher	X		2/21/14	8/11/15			
Hazard Communication	X	8/22/14	3/7/14				
Confined Space Entry [1]		NA	NA				
Fall Protection [1]		NA	NA				
Ladder Safety[1]		NA	NA				
Biological Hazards[1]		NA	NA				
Excavation Safety[1]		NA	NA				
Client Required [1]		NA	NA				

[1] If Applicable
[2] At least one worker must be trained in First Aid/CPR
[3] Required if acting as LF or SSHO

5.0 SITE CONTROL

Site control procedures, as required by 29 CFR 1910.120(d) and the Amec Foster Wheeler Hazardous Waste Operations and Emergency Response Program, will be implemented before the start of site tasks to control worker exposures to contaminants.

5.1 WORK ZONES

Work zones are to be determined at the site by the SHSO. At this time it is anticipated that the work zones will be defined relative to the location of the work activity. The Exclusion Zone is considered the area within a 10-foot diameter of the sampling location. The Contamination Reduction Zone is considered to be the area within a 20-foot diameter of the sampling location. The decontamination zone will be located upwind of the work area. Work zones will be maintained through the use of:

- ☒ Warning Tape
- ☒ Cones and/or Barricades
- ☐ Visual Observations

5.2 BUDDY SYSTEM

When required by contract or when conditions exist that could be dangerous to life and health, a buddy system shall be implemented.

Yes	No	
☒	☐	Buddy System required?

5.3 SITE ACCESS

Access to the site will be controlled using the following method(s):

☒	Sign in/sign out log	☐	Guard
☐	Identification badges	☐	Other: _____

5.4 GENERAL SAFE WORK PRACTICES

General safe work practices to be implemented during work activities at this site are included in Table 5.1.

TABLE 5.1

GENERAL SAFE WORK PRACTICES

- Workers have the right and responsibility to refuse work that he/she has reason to believe may cause injury or illness to himself/herself or any other person. If work is deemed unsafe, immediately notify the FOL and SHSO.
- Minimize contact with excavated or contaminated materials. Plan work areas, decontamination areas, and procedures accordingly. Do not place equipment or drums on the ground. Do not sit on drums or other materials. Do not sit or kneel on the ground in the Exclusion Zone or CRZ. Avoid standing in or walking through puddles or stained soil.
- Smoking, eating, or drinking after entering the work zone and before decontamination will not be allowed. Use of illegal drugs and alcohol are prohibited.
- Practice good housekeeping. Keep everything orderly and out of potentially harmful situations.
- In an unknown situation, always assume the worst conditions.
- Be observant of your immediate surroundings and the surroundings of others. It is a team effort to notice and warn of impending dangerous situations. Withdrawal from a hazardous situation to reassess procedures is the preferred course of action.
- Conflicting situations may arise concerning safety requirements and working conditions and must be addressed and resolved rapidly by the SHSO, Field Lead and Project Manager to relieve any motivations or pressures to circumvent established safety policies.
- Unauthorized breaches of specified safety protocol will not be allowed. Workers unwilling or unable to comply with the established procedures will be discharged.
- All work will be conducted during daylight hours unless proper lighting is provided in accordance with OSHA regulations.

6.0 HAZARD ANALYSIS

6.1 CONTAMINANTS OF CONCERN

Pertinent site information (e.g. records of chemicals used, records of disposal) and previous sampling data (e.g. groundwater, soil, sediment) have been reviewed to determine the contaminants of concern for this project. The known or suspected contaminants for the site are:

Contaminants of Concern (Attach Fact Sheets)	Maximum Concentrations		PEL/TLV
	Soil (mg/kg)	Water/Groundwater (µg/L)	
MTBE		270	50 ppm
TCE	3.5	21	100/10 ppm
Chloroform		7.9	10 ppm
1,2 dichloroethene		20	50/10 ppm
Vinyl Chloride	1.7	2.1	1/1 ppm
Benzene	0.63	7.8	1/0.5 ppm
Acetone	8.4		1000/500 ppm
1,2 Dichlorobenzene	11		25 ppm
1,1 Dichloroethane	13		5 ppm
Ethylbenzene	11		100/100 ppm
Methylene Chloride	1.1		25/50 ppm
Tetrachloroethene	5.5		100/25 ppm
Toluene	6.9		200/20 ppm
Xylene	33		100/100 ppm
Benzo(a)anthracene	21		0.15 ppm
Benzo(a,h)anthracene	0.14		
Benzo(a) pyrene	52	0.3	0.15 ppm
Benzo(b)fluoranthene	7.8	0.3	0.15 ppm
Benzo(k)fluoranthene	1.2	0.4	0.15 ppm
Chrysene	1.3	0.3	0.15 ppm
Indeno(1,2,3-cd)pyrene	12	0.3	0.15 ppm
2-Methylnaphthalene	56		0.15 ppm /
4-Methylphenol	2.3		5/5 ppm
Bis-(2-Ethylhexyl)phthalate	120		0.31 ppm
Dibenzo(1,2,3-cd)pyrene	12		0.15 ppm
Naphthalene	36		10/10 ppm
Phenol	3.7		5/5 ppm
PCBs	15		0.038 ppm (as Aroclor 1254)
Antimony	76.6		0.1 ppm
Arsenic	332		0.0091 ppm
Beryllium	6.5		0.0002 mg/m^3
Cadmium	16		0.005 mg/m^3
Calcium	37,800		5 mg/m^3 (as respirable dust)
Chromium	57.1		0.047 ppm
Copper	1,130		0.38 ppm
Iron		28,900	0.44 ppm
Lead	913		0.0059 ppm
Magnesium	11,800	66,600	5 mg/m^3 (as respirable dust)
Manganese		1,100	0.45 ppm
Mercury	27		0.012 ppm
Nickel	98.3		0.42 ppm
Selenium	125		0.062 ppm
Sodium		205,000	5 mg/m^3 (as respirable dust)
Zinc	1,310		1.5 ppm

Chemical concentrations highlighted in red exceed their respective PEL.
Appendix A contains Contaminant Fact Sheets for each of these contaminants of concern.

Health hazards shall be evaluated using air monitoring equipment (Section 7.0) and controlled by implementing personal protective equipment (Section 8.0).

6.2 ACTIVITY HAZARD ANALYSIS

Activity Hazard Analyses (AHA) have been conducted for each task associated with this project. The following AHAs can be found in Appendix B.

Activity Specific AHAs:

☒	Mobilization/Demobilization and Site Preparation
☒	Field Work - General
☒	Field Work - Oversight
☒	Decontamination
☒	Groundwater Sampling
☒	Soil Sampling
☒	Drilling Operation - Oversight
☒	Trench Excavation - Oversight
☒	Treatment Systems
☒	Product recovery system O&M
☐	
☐	

Hazard Specific AHAs:

☒	Insect Stings and Bites
☒	Working with Preservatives (Acids)
☐	Cold Stress
☐	
☐	
☐	
☐	
☐	
☐	
☐	
☐	
☐	

7.0 AIR MONITORING

Section 6.1 lists the known and suspected contaminant of concern at the site. Table 7-1 table lists the monitoring instruments and upgrade/action limits that will be used at the site:

Table 7-1
Action Levels per Monitoring Instrument

			Upgrade/Action Levels			
	Meter		**Level D**	**Level C**	**Level B**	**Action**
☒	Photoionization Detector [1]					
	☒	10.0-10.6 eV	< 5 ppm	≥ 5 ppm	≥ 75 ppm	Upgrade if concentrations are sustained >10 min.
	☐	11.0-11.7 eV		≥	≥	
☐	Flame Ionization Detector [1]			≥	≥	
☒	Detector Tubes [1]					
	☒	Benzene	< 0.5 ppm	≥ 0.5 ppm	≥ 5 ppm	
	☒	Vinyl Chloride	< 0.5 ppm	< 0.5 ppm	> 0.5 ppm	
☒	Dust Meter [1]					
	☒	Respirable	< 1.5 mg/m^3	≥ 1.5 mg/m^3	≥ 15 mg/m^3	
	☐	Total	< 5 mg/m^3	≥ 5 mg/m^3	≥ 50 mg/m^3	
☒	LEL/O_2 Meter					
	☒	LEL [2]				> 10% back off
	☒	Oxygen [1]	19.5% - 23.5%	19.5% - 23.5%	< 19.5% or > 23.5%	
☐	Hydrogen Sulfide Meter [1]		< 5 ppm	< 5 ppm	≥ 5 ppm	
☐	Carbon Monoxide [1]		< 12 ppm	< 12 ppm	≥ 12 ppm	
☐						

[1] Monitor breathing zone
[2] Monitor source (e.g., well, cuttings, borehole, etc.)

Periodic monitoring shall be conducted when the possibility of an Immediately Dangerous to Life and Health (IDLH) condition or flammable atmosphere has developed or when there is indication that exposures may have risen over permissible exposure limits or published exposure levels since prior monitoring. Situations where it shall be considered whether the possibility that exposures have risen are as follows:

- When work begins on a different portion of the site.
- When contaminants other than those previously identified are being handled.
- When a different type of operation is initiated (e.g., drum opening as opposed to exploratory well drilling.)
- When employees are handling leaking drums or containers or working in areas with obvious liquid contamination (e.g., a spill or lagoon.)

Each borehole, drill cuttings, well, etc., will be screened using the Photoionization Detector (PID) to give an indication of the potential for the presence of organic vapors. Detector tubes (DTs) for benzene and vinyl chloride and the PID will be used in the breathing zone upon the detection of PID readings above background levels in the immediate vicinity of the borehole, drill cuttings, well, etc. Action guides regarding the screening of the breathing zone and the required PPE are presented in the Table 7-2

If sustained PID readings exceed 5 ppm or benzene readings (as measured by detector tubes) exceed 4 ppm or vinyl chloride readings (as measured by detector tubes) exceed 0.5 ppm, work will be stopped, the area evacuated, and the SSHO notified. If work is stopped due to elevated levels of benzene or organic vapors, then consideration will be given to proceedings with the work using Level B PPE.

All monitoring equipment will be calibrated before each day of use. Results will be documented in the Field Logbook.

Areas of airborne dust and odor should be avoided. Skin contact with soil, sediment, surface water and ground water should be avoided.

Table 7-2
Air Monitoring Action Level Summary

PID/FID Reading[1,2]	Detector Tube[1] Benzene	Detector Tube[1] Vinyl Chloride	Dust Meter[1]	LEL[2]/O_2[1]	Action	Level of PPE
< 0.5 ppm[2]	--	--	< 1.5 mg/m^3		Continue to monitor with PID	Level D / Modified Level D
≥ 0.5 ppm[1]	< 0.5 ppm	< 0.5 ppm			Begin monitoring breathing zone with PID and benzene DT.	Level D / Modified Level D
0.5 – 5 ppm[1]	< 0.5 ppm	< 0.5 ppm	< 1.5 mg/m^3		Continue to monitor with PID and DT	Level D / Modified Level D
≥ 5 ppm[1] to 75 ppm	≥ 0.5 ppm to 5 ppm	< 0.5 ppm	≥ 1.5 mg/m^3		Continue to monitor with PID and DT	Level C
≥ 75 ppm[1]	≥ 5 ppm	≥ 0.5 ppm	≥ 15 mg/m^3		Stop work and evacuate area, Notify SSHO	Level B[3]
				> 10% LEL[2]	Stop work. Evacuate area. If action levels continue to be exceeded, contact SHSO, consider return with ventilation system and spark proof/intrinsically safe equipment.	Back Off
				< 19.5% O2[1] > 23.5% O2[1]	Stop work and evacuate area, Notify SSHO	Evacuate area

[1] Monitor breathing zone
[2] Monitor source (e.g., well, cuttings, borehole, etc.)
3 If Level B is required, additional training will be necessary for personnel using SCBAs

8.0 DUST CONTROL

A mini-ram air monitoring device will be continuously utilized during construction activities to monitor for dusty conditions. Dust control methods will be utilized, such as water spray from hydrants or possible use of water trucks. During winter operations, methods such as use of calcium chloride and non-water methods for dust control shall be utilized.

9.0 PERSONAL PROTECTIVE EQUIPMENT

The initial level of protection required for each task is provided in Section 1.0. The individual PPE required for each task is listed in the JHAs. The level of protection may be upgraded or downgraded according to the action guidelines provided in Section 7.0. Level of PPE used each day shall be indicated in the Field Logbook. When using PPE, workers must adhere to the company's Personal Protective Equipment Program and OSHA regulations (29 CFR 1910.120[g] and 29 CFR 1910 Subpart I).

If respirators are worn, workers must adhere to the company's Respiratory Protection Program and OSHA regulations (29 CFR 1910.134). Table 3.1 provides a record of the site workers' last annual fit test. Beards (e.g., facial hair interfering with the respirator seal) are not allowed when respirators are worn.

10.0 DECONTAMINATION

PPE shall be decontaminated as per 29 CFR 1910.120(k). The decontamination procedures, equipment, and decontamination solution required for each task are provided in Appendix C and the AHA – Decontamination.

Re-usable safety gear will be washed with soap and water prior to re-use or removing from the work zone. Sampling tools, etc. will be decontaminated as described in the W*ork Plan*, or as directed by the SHSO. All drilling fluids and cuttings will be handled in accordance with the *Work Plan*. The disposition of this material and disposable safety gear will be the responsibility of the site owner. Safety gear that cannot be decontaminated will be disposed of as an investigative derived waste (IDW) in accordance with the Work Plan.

11.0 EMERGENCY RESPONSE

The following emergency response information is provided as per 29 CFR 1910.120(j) and the Amec Foster Wheeler HAZWOPER Program.

11.1 HOSPITALS/CLINICS

A nearby Hospital (for emergency injuries needing immediate treatment) and a clinic (for non-emergency injuries) have been identified.

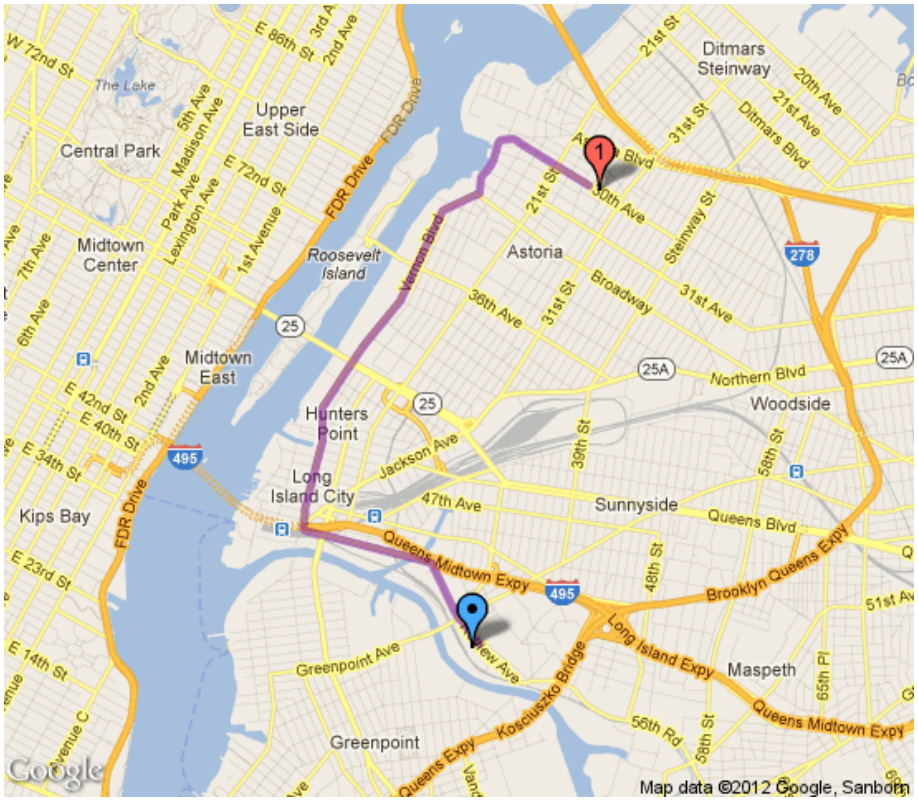
The hospital to be used for emergency treatment is (See Figure 11.1 for Route Map to Hospital):

HOSPITAL(for immediate emergency treatment):

Facility Name: Mt. Sinai Hospital Of Queens
Address: 25 10 30th Ave, Long Island City, NY 11102
Telephone Number: 718-932-1000

FIGURE 11.1

DIRECTIONS TO PRIMARY HOSPITAL (attach map):



1. Head **northwest** on **Review Ave** toward **37th St** 0.5 mi
2. Turn **left** onto **Borden Ave** 0.7 mi
3. Turn **right** onto **Vernon Blvd** 2.6 mi
4. Turn **right** onto **30th Ave** 0.5 mi

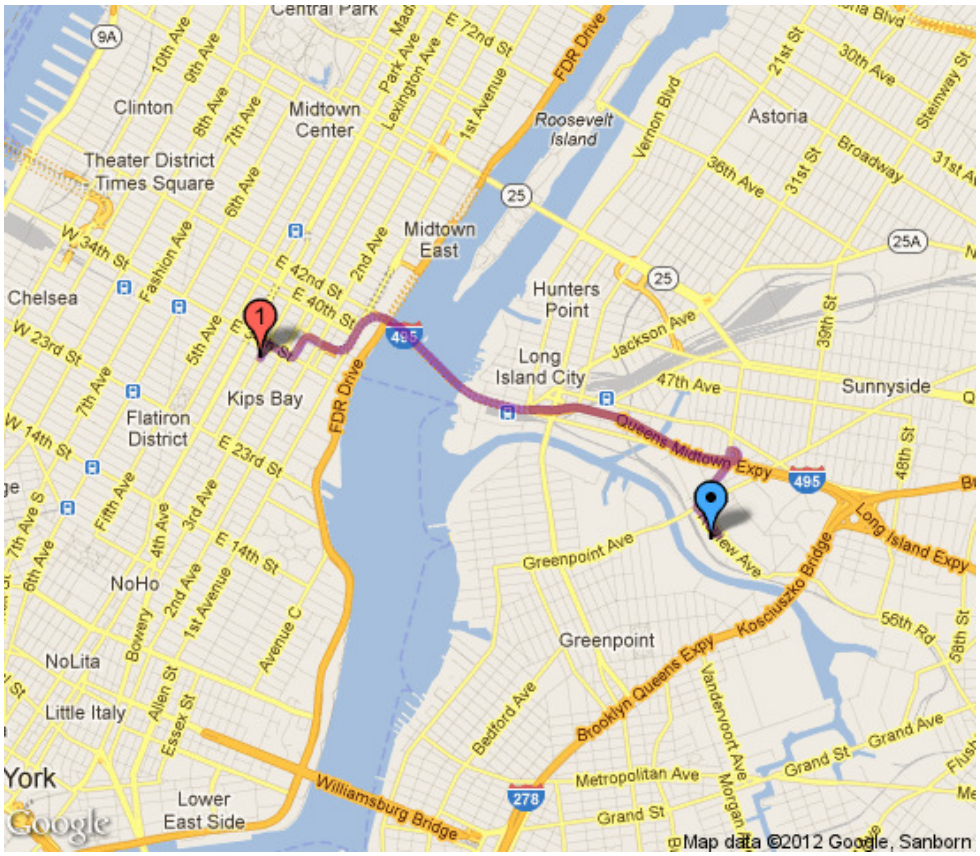
Destination will be on the right, Total 4.3 mi, Estimated driving time: 11 minutes

The clinic to be used for non-emergency treatment is (See Figure 11.2 for Route Map to Clinic):

Facility Name: Midtown New York Doctor's Urgent Care
Address: 205 Lexington Ave, Manhattan, NY 10016
Telephone Number: 212-684-4700

FIGURE 11.2

DIRECTIONS TO CLINIC (attach map):



1. Head **northwest** on **Review Ave** toward **37th St,** 0.2 mi
2. Turn **right** onto **Van Dam St**, 0.3 mi
3. Turn **right** to merge onto **I-495 W** toward **Midtown Turn/Manhattan,** 2.5 mi
4. Exit on the **left** onto **Tunnel Exit S,** 0.2 mi
5. Turn **right** onto **E 34th St**, 0.1 mi
6. Turn **left** at the 2nd cross street onto **Lexington Ave**, 423 ft

Destination will be on the left, Total 3.4 mi, Estimated driving time: 8 minutes

11.2 EMERGENCY CONTACTS

A list of contacts and telephone numbers for the applicable local off-site emergency responders is provided in Table 11.1. The nature of the site work and contaminants of concern should be reviewed and the ability of off-site responders to respond to reasonably anticipated emergencies should be confirmed. If there are any concerns with off-site responsibilities they should be contacted directly.

TABLE 11.1

EMERGENCY CONTACTS

NAME	TELEPHONE NUMBERS		DATE OF PRE-EMERGENCY NOTIFICATION (if applicable)
Fire Department:	911		
Hospital: Mt. Sinai Hospital Of Queens	718-932-1000		
Police Department:	911		
Poison Control	1-800-222-1222		
WorkCare (early injury case management)	1-888-449-7787		
	Office	**Cell**	
Site Health And Safety Officer: Dan Berkowitz	732-302-9500x173	516-384-6708	
Field Lead: Tim Kessler	609-631-2627	215-704-6592	
Client Contact: Craig Coslett	610-435-1151		
Project Manager: Kinjal Shah	609-689-6096	609-964-8450	
Group HSE Manager: Cindy Sundquist (See also Figure 11.3 – Incident Flow Chart)	207-828-3309	207-650-7593 (Cell) 207-892-4402 (Home)	
EPA (if applicable):			
OTHER: Ambulance	911		

11.3 EMERGENCY RESPONSE EQUIPMENT

The following emergency response equipment is required for this project and shall be readily available.

- ☒ Field First Aid Kit (including Bloodborne Pathogen kit/supplies)
- ☒ Fire Extinguisher
  - ☐ Type A (Combustible materials)

- ☐ Type B (Flammable liquids and gases)
- ☐ Type C (Doesn't conduct electricity – to be used on electrical equipment)
- ☒ Type ABC

☒ Eyewash (Note: 15 minutes of free-flowing fresh water

☐ SCBA

☐ Shower

☐ Other: Respirator

11.4 COMMUNICATIONS

On-site communications will be conducted through the use of:

☒ Verbal
☐ Two-way radio
☒ Cellular telephone
☒ Hand signals

- Hand gripping throat ..... Out of air, can't breathe
- Grip partner's wrist or both hands around waist ..... Leave area immediately
- Hands on top of head ..... Need assistance
- Thumbs up ..... OK, I am all right, I understand
- Thumbs down ..... No, negative

☐ Horn/Siren
☐ Other: _____

Off-site communications will be conducted through the use of:

☒ Cellular telephone
☐ Landline/Pay phone - location: _____
☐ Other: _____

11.5 EMERGENCY RESPONSE PROCEDURES

In the event that an on-site emergency develops, the procedures delineated in Table 11.2 are to be immediately followed.

TABLE 11.2

EMERGENCY PROCEDURES

- The SHSO (or alternate) should be immediately notified via the on-site communication system. The SHSO assumes control of the emergency response.
- The SHSO notifies the Project Manager and client contact of the emergency. The SHSO shall then contact the Eastern Group Health, Safety and Environment (HSE) Manager who will then contact the VP of HSE.
- If applicable, the SHSO shall notify off-site emergency responders (e.g. fire department, hospital, police department, etc.) and shall inform the response team as to the nature and location of the emergency on-site.
- If applicable, the SHSO evacuates the site. Site workers should move to the predetermined evacuation point (See Site Map).
- All fires should be handled by the local fire department.
- In an unknown situation evacuate the area and discuss upgrades with the SHSO/HSE manager.
- If chemicals are accidentally spilled or splashed into eyes or on skin, use eyewash and/or shower.
- If a worker is injured, first aid shall be administered by certified first aid provider.
- An injured worker shall be decontaminated appropriately.
- After the response, the SHSO shall follow-up with the required company reporting procedures, including the Incident Analysis Forms (Appendix D).

Injuries requiring medical treatment beyond first aid (as well as work-related vehicle incidents) will require the employee to submit a post incident drug test. It is the responsibility of the Supervisor/PM to ensure that the employee who has had an on-the-job incident as defined in Amec Foster Wheeler Human Resource Policy HR 3-04 - Drug and Alcohol-Free Workplace, submits to this required testing. Contact Cindy Sundquist, Eastern Group HSE Manager, at (207) 828-3309, or Collette Myers at 770-360-0607, if you have any questions on incident-related drug testing. The policy is located at http://amv2.amecnet.com/fn/HR/25445.aspx

11.5.1 Amec Foster Wheeler Early Injury Case Management Program

If the emergency involves an injury to an Amec Foster Wheeler employee, the HSE Coordinator or Field Lead are to implement the Amec Foster Wheeler Early Injury Case Management program. See procedures below:

<table>
<tr><th>NON-EMERGENCY INCIDENT</th><th>EMERGENCY INCIDENT</th></tr>
<tr><td>Steps 1 & 2 must be completed before seeking medical attention other then local first aid.

1. Provide first-aid as necessary. Report the situation to your immediate supervisor AND HSE coordinator (all incidents with the apparent starting event should be reported within 1 hour of occurrence).
2. Injured employee:</td><td>1. Provide emergency first aid. Supervisor on duty must immediately call 911 or local emergency number; no employee may respond to outside queries without prior authorization. Any outside media calls concerning this incident must be referred immediately to Lauren Gallagher at 602-757-3211.
2. Once medical attention is sought and provided, the supervisor must:</td></tr>
<tr><td colspan="2">Call WorkCare 24/7 Hotline*

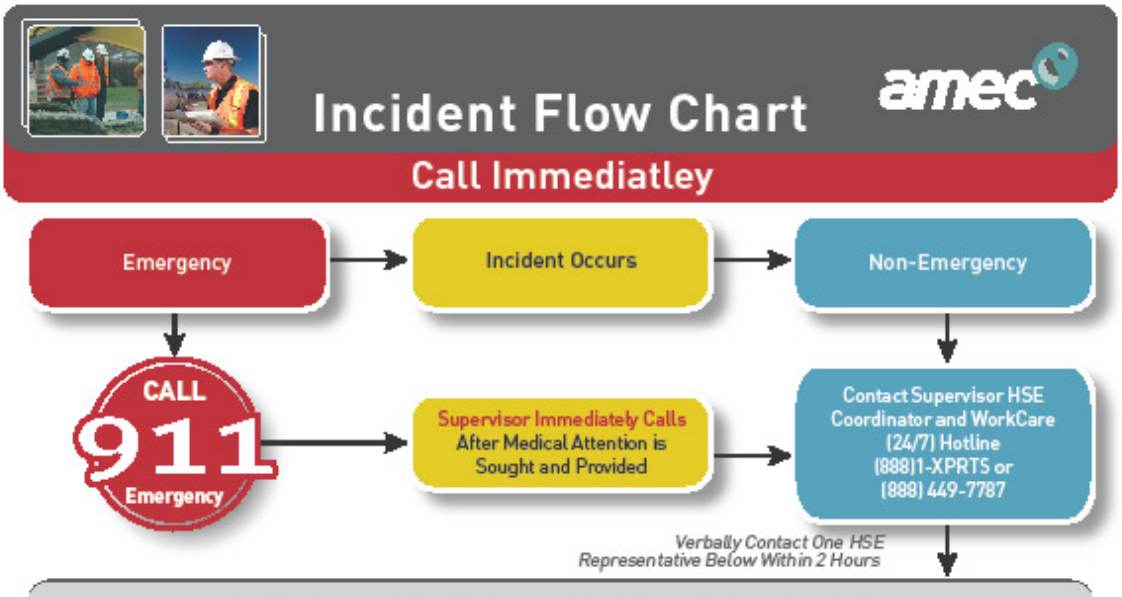
(888) II-XPRTS or (888) 449-7787</td></tr>
<tr><td>WorkCare will assess the situation and determine whether the incident requires further medical attention. During this process, WorkCare will perform the following:

• Explain the process to the caller.
• Determine the nature of the concern.
• Provide appropriate medical advice to the caller.
• Determine appropriate path forward with the caller.
• Maintain appropriate medical confidentiality.
• Help caller to execute path forward, including referral to the appropriate local medical facility.
• Send an email notification to the Corporate HSE Department.</td><td>WorkCare will be responsible for performing the following:

• Contact the treating physician.
• Request copies of all medical records from clinic.
• Send an email update to the Corporate HSE Department.</td></tr>
<tr><td colspan="2">3. IMMEDIATELY after contacting WorkCare send a brief email notification AND inform verbally (direct contact is required) ONE of HSE corporate representatives See Figure 11.3.
4. Make all other local notifications and client notifications.
5. Local Supervisor, HSE Coordinator, SSHO and any applicable safety committees to complete preliminary investigation, along with the initial Incident Report within 24 hours.
6. Corporate Loss Prevention Manager to complete Worker’s Compensation Insurance notifications as needed.
7. Corporate HSE to conduct further incident notifications, investigation, include in statistics, classify, and develop lessons learned materials.

* - NOTE: Step 2 is only applicable to the North-American operations and to incidents involving Amec Foster Wheeler personnel. High potential near misses, subcontractors’ incidents, regulatory inspections, spills and property damages above $1,000 should be reported immediately, following directions from Step 3.</td></tr>
</table>

FIGURE 11.3
INCIDENT FLOW CHART



E&I Corporate HSE Department Contact List

Name/Email	Office Location	Contact Information
Bruce Voss bruce.voss@amec.com	Catherdral City, CA	760.202.3737 (office) 951.897.6381 (cell)
Chad Barnes chad.barnes@amec.com	Phoenix, AZ	602.733.6000 (office) 480.495.9846 (cell)
Cindy Sundquist cynthia.sundquist@amec.com	Portland, ME	207.828.3309 (office) 207.650.7593 (cell) 207.892.4402 (home)
Don Kubik don.kubik@amec.com	Oakland, CA	510.663.4100 (office) 510.368.6433 (cell)
Gabe Sandholm gabe.sandholm@amec.com	Minneapolis, MN	612.252.3785 (office) 206.683.9190 (cell)
John Mazur john.mazur@amec.com	Wilmington, NC	910.452.1185 (office) 910.431.230 (cell) 910.681.0538 (home)
Lori Dowling lori.dowling@amec.com	Prince George, BC	250.564.3243 (office)
Philip Neville philip.neville@amec.com	Thorold, ON	905.687.6616 (office) 905.380.4465 (cell)
Tim Kihn tim.kihn@amec.com	Edmonton, AB	780.944.6363 (office) 780.717.5058 (cell)
Vlad Ivensky (can call 24/7) vlad.ivesky@amec.com	Plymouth Meeting, PA	610.877.6144 (office) 484.919.5175 (cell) 215.947.0393 (home)

**High potential near misses, subcontractor incidents, regulatory inspections, spills, and property damage greater than $1000, should be reported within 60 minutes to one of the above HSE Representatives.*

Revised 17 July 2012-hb

11.6 BLOODBORNE PATHOGENS

Provisions shall be made, prior to commencement of the project, for prompt medical attention in case of serious injury. All employees who work on a site where bloodborne pathogens are known to be present or who have been designated, as a part of their work duties at the site, to respond to all first aid injuries, will have received bloodborne pathogen training at the time of initial assignment and annually thereafter.

11.6.1 Universal Precautions

Universal precautions is a method of infection control, which operates on the assumption that all human blood and bodily fluids are to be treated as if they are known to be infectious for Human immunodeficiency Virus (HIV), Hepatitis B virus, Hepatitis C virus, or other bloodborne pathogens. Universal Precautions will be observed to prevent contact with blood or other potentially infectious materials. All body fluids are to be considered potentially infectious materials.

Universal precautions consist of the following practices:

- All workers will protect their skin and mucous membranes against contact with blood or other bodily fluids. At a minimum, gloves and safety glasses shall be donned prior to administering first aid or otherwise touching blood and body fluids, mucous membranes, or non-intact skin and for handling items or surfaces contaminated with blood or bodily fluids. Note: the gloves used selected to be used at this site to protect against chemical exposure will also protect against bloodborne pathogens.
- All first aid procedures involving blood or other potentially infectious materials will be performed in such a manner as to minimize splashing, spraying, spattering, and generation of droplets and aerosols of these substances.
- When there is a risk of exposure to the eyes, nose and mucous membranes from the generation of droplets of blood or other body fluids, masks and face shields shall be worn.
- Uncoated or polycoated Tyveks (or the suits provided in some bloodborne pathogen kits, shall be worn during procedures that are likely to generate splashes of blood or other body fluids.
- Hands and other skin surfaces shall be washed immediately and thoroughly if contaminated with blood or other bodily fluids. Flush mucous membranes with water immediately or as soon as feasible following contact of such body areas with blood or other potentially infectious materials.
- Hands must be washed with soap and water immediately or as soon as feasible after removal of gloves or other PPE used to perform first aid. When provision of hand washing facilities is not feasible, use appropriate antiseptic hand cleanser in conjunction with clean cloth/paper towels or antiseptic towelettes. When antiseptic hand cleansers or towelettes are used, hands shall be washed with soap and running water as soon as feasible.
- CPR masks or other ventilation devices will be available for use in areas in which the need for resuscitation is foreseeable.

All site first aid kits shall include bloodborne pathogen kits or supplies. These kits typically include, at a minimum, the CPR mask, gloves, safety glasses, and a red bag.

11.6.2 Decontamination/Laundering

If a garment(s) is penetrated by blood or other potentially infectious materials, the garment(s) shall be removed immediately or as soon as feasible. All PPE shall be removed prior to leaving the work area. When PPE is removed it shall be placed in an appropriately designated area or container for storage, washing, decontamination or disposal. In many States where waste is incinerated, if the blood doesn't drip from a material when compressed or if there is no risk of it flaking off during handling, the materials can be disposed of in the regular trash and does not need to be handled as bio-hazardous materials.

If personal clothing should become contaminated with blood or other body fluids, it shall be collected, bagged or containerized and appropriately labeled. Contaminated laundry shall be handled as little as possible with a minimum of agitation.

All equipment and environmental/working surfaces shall be cleaned and decontaminated with an appropriate disinfectant immediately after contact with blood or other potentially infectious materials or as soon as feasibly possible. A solution of one part bleach to nine parts water can be mixed and used as a disinfectant to clean/wipe down equipment and other surfaces.

Broken glassware or other sharps which may be contaminated shall not be picked up directly with the hands. It shall be cleaned up using mechanical means, such as a brush and dust pan, tongs, or forceps and disposed of in a sturdy container.

11.6.3 Vaccines, Evaluation, Follow-Up

Hepatitis B vaccines will be available to all Amec Foster Wheeler employees who may have an occupational exposure. Post-exposure evaluation and follow-up will be conducted on all employees who have had an exposure incident.

12.0 CONFINED SPACE ENTRY

Yes	No	
☐	☒	The task(s) for this project involve confined space entry.

If yes, see applicable JHA in Appendix B.

13.0 SPILL CONTAINMENT

Yes	No	
☒	☐	The task(s) for this project involve drum/tank/container sampling, excavation, transportation, etc.

If yes, see Appendix J for spill containment procedures.

14.0 HAZARD COMMUNICATION

The following procedures shall be followed for all chemicals brought on site (e.g., decontamination solution, sample preservatives, etc.):

- Chemical containers (primary and secondary) shall be correctly and clearly labeled with the name of the chemical and the hazard(s) associated with that chemical (e.g. flammable, corrosive, etc.).
- If chemicals are transferred to a secondary container, that container will be labeled with the name of the chemical and the hazard warnings.
- Workers will have received training on the hazards of these chemicals as indicated in Table 3.1.
- A Safety Data Sheet (SDS) for each chemical listed below is included in Appendix E.

Alconox	
Gasoline All Grades	
Hydrochloric Acid 33-40%	
Isobutylene	
Isopropyl Alcohol 70%	
Liquinox	
Nitric Acid 20-70%	
Portland Cement	
Sodium Hydroxide 30-50%	
Sulfuric Acid 96%	

When chemicals are used on site, workers must adhere to the Amec Foster Wheeler Hazard Communications Program and the OSHA regulation (29 CFR 1910.1200).

15.0 RECORDKEEPING

At the end of the project, the following items shall be maintained in the project file:

- ☒ HASP
- ☒ Incident Analysis/Vehicle Incident Forms (if applicable)
- ☒ Industrial Hygiene/Air Monitoring information (results and documentation - send copies to C. Sundquist)
- ☒ Log notebooks

APPENDIX A

CONTAMINANT FACT SHEETS

APPENDIX A

CONTAMINANT FACT SHEET

CONTAMINANT FACT SHEET

Chemical Name:
1,1-Dichloroethene

CAS Number: 75-35-4

Synonyms:
Vinylidene chloride, 1,1-Dichloroethylene (1,1-DCE)

HEALTH HAZARD DATA

Color: Colorless

Physical State: Solid ____
Liquid X
Gas X (above 89°F)

Odor: Chloroform-like

Odor Threshold 190 ppm

Vapor Density: 4.0 g/L

Ionization Potential (IP): 10.00 eV

IDLH: Unknown
(1,2-DCE = 1000 ppm)

Carcinogen: OSHA ____
IARC ____
NTP ____
ACGIH ____
NIOSH X

Skin absorbable: No

Skin corrosive: No

Signs/Symptoms of Acute Exposure:
Irritation of skin and eyes, dizziness, headache, nausea, drunkenness, and anesthesia

Source	TWA (units)	STEL (units)	C (units)
OSHA PELs			
ACGIH TLVs	5 ppm		
NIOSH RELs	Lowest Feasible		

AIR MONITORING

Type	Brand/Model No.	Calibrations Method/Media	Relative Response or Conversion Factor	Meter Specific Action Level
PID	Micro tip 10.6 eV	Isobutylene 100 ppm	0.99	4.95
PID	HNu w/ 10.2 eV	Isobutylene 100 ppm	0.64	3.2

Checked by: Emmet F. Curtis Date: 12/5/03

PERSONAL PROTECTIVE EQUIPMENT

Recommended Protective Clothing Materials:
Suits Teflon

Gloves Teflon, Polyvinyl Alcohol (do not use in water)

Boots Teflon

Service Limit Concentration (ppm): 1000 ppm
MUC 1/2 Mask APR = TWA x 10 = 25 ppm
MUC Full-Face APR = TWA x 50 = 25 ppm

FIRE/REACTIVITY DATA

Flash Point: -2°F
LEL/UEL: 6.5%/15.5%
Fire Extinguishing Media:
Dry Chemical X Foam X
Water Spray ____ CO_2 X

Incompatibilities:
Aluminum, sunlight, air, copper, heat

APPENDIX A

CONTAMINANT FACT SHEET

CONTAMINANT FACT SHEET

Chemical Name:
1,2- Dichlorobenzene
CAS Number: 95-50-1
Synonyms:
ortho-dichlorobenzene
o-dichlorobenzol

HEALTH HAZARD DATA

Color: Colorless to pale yellow
Physical State: Solid ____
Liquid X
Gas ____
Odor: aromatic
Odor Threshold 0.70 ppm
Vapor Density: 5.07 g/L
Ionization Potential (IP): 9.06 eV
IDLH: 200 ppm

Carcinogen: OSHA ____
IARC ____
NTP ____
ACGIH ____
NIOSH ____
Skin absorbable: No
Skin corrosive: No
Signs/Symptoms of Acute Exposure:
Irritation of nose and eyes, liver and kidney damage, skin blisters.

Source	TWA (units)	STEL (units)	C (units)
OSHA PELs	ppm		50 ppm
ACGIH TLVs	25 ppm	50 ppm	
NIOSH RELs	ppm		50 ppm

AIR MONITORING

Type	Brand/Model No.	Calibrations Method/Media	Relative Response or Conversion Factor	Meter Specific Action Level
PID	Micro tip 10.6 eV	Isobutylene 100 ppm	1.19	29.8
PID	HNu w/ 10.2 eV	Isobutylene Span 9.8/100 ppm		
FID	Century OVA	Methane		

PERSONAL PROTECTIVE EQUIPMENT

Recommended Protective Clothing Materials:
Suits Viton, PE/EVAL
Gloves Viton
Boots Viton
Service Limit Concentration (ppm): 1000
MUC 1/2 Mask APR = TWA x 10 = 125 ppm
MUC Full-Face APR = TWA x 50 = 125 ppm

FIRE/REACTIVITY DATA

Flash Point: 151 F
LEL/UEL: 2.2% / 9.2%
Fire Extinguishing Media:
Dry Chemical X Foam X
Water Spray X CO_2 X

Incompatibilities:
Strong oxidizers, aluminum, chlorides, acids and acid fumes.

Checked by: Date:

APPENDIX A

CONTAMINANT FACT SHEET

CONTAMINANT FACT SHEET

Chemical Name:
1,2-Dichloroethane

CAS Number: 107-06-1

Synonyms:
Ethylene Dichloride, ethylene chloride, glycol dichloride

HEALTH HAZARD DATA

Color: Colorless

Physical State: Solid ____ Liquid X Gas ____

Odor: Chloroform-like

Odor Threshold 6-185 ppm

Vapor Density: 4.0 g/L

Ionization Potential (IP): 11.05 eV

IDLH: 50 ppm

Carcinogen: OSHA ____ IARC X NTP X ACGIH ____ NIOSH X

Skin absorbable: Yes

Skin corrosive: No

Signs/Symptoms of Acute Exposure:

Central nervous system depression, nausea, vomiting, dermatitis, irritation of the eyes, and corneal opacity

Source	TWA (units)	STEL (units)	C (units)
OSHA PELs	50 ppm		100 ppm
ACGIH TLVs	10 ppm		
NIOSH RELs	1 ppm	2 ppm	

AIR MONITORING

Type	Brand/Model No.	Calibrations Method/Media	Relative Response or Conversion Factor	Meter Specific Action Level
PID	HNU w/ 11.7 eV	Isobutylene 100 ppm	1.06	1.06

PERSONAL PROTECTIVE EQUIPMENT

Recommended Protective Clothing Materials:

Suits Teflon, Viton, PE/EVAL, Barricade, CPF3, Tychem Responder

Gloves Viton, Teflon, Polyvinyl Alcohol (do not use in water)

Boots Teflon, Viton

Service Limit Concentration (ppm): 1000 ppm

MUC 1/2 Mask APR = TWA x 10 = 50 ppm

FIRE/REACTIVITY DATA

Flash Point: 56°F

LEL/UEL: 6.2%/16%

Fire Extinguishing Media:

Dry Chemical X Foam ____

Water Spray ____ CO_2 X

Incompatibilities:

Strong oxidizers and caustics, chemically-active metals, liquid ammonia

Checked by: Emmet F. Curtis Date: 12/5/03

APPENDIX A

CONTAMINANT FACT SHEET

CONTAMINANT FACT SHEET

Chemical Name:
2-Methylnaphthalene
CAS Number: ____
Synonyms:

HEALTH HAZARD DATA

Color: White or Light Yellow
Physical State: Solid X
Liquid
Gas
Odor: similar to naphthalene
Odor Threshold 10 ppb
Vapor Pressure: < 1 mm Hg @ 25° C
Ionization Potential (IP):
IDLH:

Carcinogen: OSHA
IARC
NTP
ACGIH
NIOSH
Skin absorbable: No
Skin corrosive: No
Signs/Symptoms of Acute Exposure:
May cause allergic skin reaction.,
Causes eye irritation. Causes skin irritation.
May be harmful if swallowed.
May cause respiratory and digestive tract irritation.

Source	TWA (units)	STEL (units)	C (units)
OSHA PELs	Use 0.2 mg/m3 (Coal Tar Pitch Volatiles)		50 ppm
ACGIH TLVs	25 ppm	50 ppm	
NIOSH RELs	ppm		50 ppm

AIR MONITORING

Type	Brand/Model No.	Calibrations Method/Media	Relative Response or Conversion Factor	Meter Specific Action Level
PID	Micro tip 10.6 eV	Isobutylene 100 ppm		
PID	HNu w/ 10.2 eV	Isobutylene Span 9.8/100 ppm		
FID	Century OVA	Methane		
**Action limit based on soil concentration. Contact C. Sundquist				

PERSONAL PROTECTIVE EQUIPMENT

Recommended Protective Clothing Materials:
Suits Polycoated Tyveks
Gloves Rubber (pure Chemical), Nitrile
Boots Rubber (pure Chemical)
Service Limit Concentration (ppm): **
MUC 1/2 Mask APR = TWA x 10 = **
MUC Full-Face APR = TWA x 50 = **

FIRE/REACTIVITY DATA

Flash Point:
LEL/UEL
Fire Extinguishing Media:
Dry Chemical Foam
Water Spray CO_2

Incompatibilities:
Strong oxidizing agents,

Checked by: Date:

APPENDIX A

CONTAMINANT FACT SHEET

CONTAMINANT FACT SHEET

Chemical Name:
4-Methylphenol
CAS Number:
Synonyms:
p-Cresol, 4-Cresol, p-Cresylic acid
1-Hydroxy-4-methylbenzene
4-hydroxytoluene

HEALTH HAZARD DATA

Color: Crystalline
Physical State: Solid X
Liquid X (above 95 F)
Gas
Odor: Sweet, tarry
Odor Threshold Unk
Vapor Density: 3.72
Ionization Potential (IP): 8.97 eV
IDLH:
250 ppm

Carcinogen: OSHA
IARC
NTP
ACGIH
NIOSH
Skin absorbable: Yes
Skin corrosive: No
Signs/Symptoms of Acute Exposure:
Irritates eyes, skin, and mucuous membranes. CNS effects, confusion, depression, respiratory failure, dyspenia, irregular rapid respiration weak pulse, eye, skin burns, dermatitis; lung, kidney, pancreas damage

Source	TWA (units)	STEL (units)	C (units)
OSHA PELs	5 ppm		
ACGIH TLVs	5 ppm	ppm	
NIOSH RELs	2.3 ppm		

AIR MONITORING

Type	Brand/Model No.	Calibrations Method/Media	Relative Response or Conversion Factor	Meter Specific Action Level
PID	Micro tip 10.6 eV	Isobutylene 100 ppm	0.03	0.15 ppm
PID	HNu w/ 10.2 eV	Isobutylene Span 9.8/100 ppm		
FID	Century OVA	Methane		

PERSONAL PROTECTIVE EQUIPMENT

Recommended Protective Clothing Materials:
Suits Butyl rubber, neoprene, viton, saranax
Gloves Butyl rubber, neoprene
Boots Butyl rubber, neoprene
Service Limit Concentration (ppm):
MUC 1/2 Mask APR = TWA x 10 = 50 ppm
MUC Full-Face APR = TWA x 50 = 50 ppm

FIRE/REACTIVITY DATA

Flash Point: 187º F
LEL/UEL: 1.1% (@ 300º F)- ??
Fire Extinguishing Media:
Dry Chemical X Foam X
Water Spray X CO_2 X

Incompatibilities:
Strong Oxidizers, Acids

Checked by: Date:

APPENDIX A

CONTAMINANT FACT SHEET

CONTAMINANT FACT SHEET

Chemical Name:
Acetone
CAS Number: 67-64-1
Synonyms:
Dimethyl ketone, ketone propane, 2-Propanone

HEALTH HAZARD DATA

Color: Colorless
Physical State: Solid
Liquid X
Gas X
Odor: Sweet, fragrant
Odor Threshold 3.6 - 653 ppm
Vapor Density: 2.37 g/L
Ionization Potential (IP): 9.69
IDLH: 2500

Carcinogen: OSHA
IARC
NTP
ACGIH
NIOSH
Skin absorbable: NO
Skin corrosive: NO
Signs/Symptoms of Acute Exposure:
Eye, nose, and throat irritant, headaches, dizziness, CNS depressant

Source	TWA (units)	STEL (units)	C (units)
OSHA PELs	1000 ppm		
ACGIH TLVs	500 ppm	750 ppm	
NIOSH RELs	250 ppm		

AIR MONITORING

Type	Brand/Model No.	Calibrations Method/Media	Relative Resonse or Conversion Factor	Meter Specific Action Level
PID	Micro tip 10.6 eV	Isobutylene 100 ppm	0.85	212
PID	HNu w/ 10.2 eV	Isobutylene Span 9.8/100 ppm	0.42	105
FID	Century OVA	Methane	0.6	150

Checked by: Date:

PERSONAL PROTECTIVE EQUIPMENT

Recommended Protective Clothing Materials:
Suits
Gloves Butyl Rubber, Teflon
Boots Rubber
Service Limit Concentration (ppm): 1000
MUC 1/2 Mask APR = TWA x 10 = 1000
MUC Full-Face APR = TWA x 50 = 1000

FIRE/REACTIVITY DATA

Flash Point: 0 F
LEL/UEL: 2.5/12.8%
Fire Extinguishing Media:
Dry Chemical X
Foam
Water Spray
CO_2 X
Incompatibilities:
Oxidizers, Acids

APPENDIX A

CONTAMINANT FACT SHEET

CONTAMINANT FACT SHEET

Chemical Name:
Antimony
CAS Number:
7440-36-0
Synonyms:
Antimony metal, Stibium

HEALTH HAZARD DATA

Color: Black of dark-brown

Physical State: Solid X
Liquid
Gas

Odor: NA

Odor Threshold NA

Vapor Density: NA

Ionization Potential (IP): NA

IDLH: 50 mg/m^3

Carcinogen: OSHA
IARC
NTP
ACGIH
NIOSH

Skin absorbable: YES

Skin corrosive: YES

Signs/Symptoms of Acute Exposure:

Irritant to eyes, skin, nose, throat, mouth; coughing; dizziness; headache; nausea; vomiting; diarrhea; stomach cramps; insomnia, anorexia, unable to smell properly

Source	TWA (units)	STEL (units)	C (units)
OSHA PELs	0.5 mg/m^3		
ACGIH TLVs	0.5 mg/m^3		
NIOSH RELs	0.5 mg/m^3		

AIR MONITORING

Type	Brand/Model No.	Calibrations Method/Media	Relative Response or Conversion Factor	Meter Specific Action Level
Not Applicable				

Checked by: Date:

PERSONAL PROTECTIVE EQUIPMENT

Recommended Protective Clothing Materials:
Suits

Gloves Any chemical-resistant

Boots

Service Limit Concentration (ppm): NA

MUC 1/2 Mask APR = TWA x 10 = 5 mg/m3
MUC Full-Face APR = TWA x 50 = 5 mg/m3

FIRE/REACTIVITY DATA

Flash Point: NA
LEL/UEL: NA*
Fire Extinguishing Media:
Dry Chemical X Foam
Water Spray CO_2 X

Incompatibilities:
Strong oxidizers, acids, halogenated acids
* Moderate explosive hazard when present in powdered form

APPENDIX A

CONTAMINANT FACT SHEET

CONTAMINANT FACT SHEET

Chemical Name:
Arsenic
CAS Number:
7440-38-2
Synonyms:

HEALTH HAZARD DATA

Color: Silver/dark gray, yellow

Physical State: Solid X
Liquid
Gas

Odor: NA

Odor Threshold NA

Vapor Density: NA

Ionization Potential (IP): NA

IDLH: 5 mg/m^3

Carcinogen: OSHA X
IARC X
NTP X
ACGIH X
NIOSH X

Skin absorbable: No

Skin corrosive: No

Signs/Symptoms of Acute Exposure:

Ulceration of nasal septum; dermatitis; gastrointestinal disturbances; peripheral neuropathy; respiratory irritation, hemolytic anemia, cardiovascular instability; bloody stools; facial and peripheral edema; acute encephalopathy; metallic taste, garlicky breath odor; fatigue, anorexia with weight loss; hair loss; hyperpigmentation and hyperkeratosis of skin

Source	TWA (units)	STEL (units)	C (units)
OSHA PELs	0.01 mg/m^3 (inorganic)		
ACGIH TLVs	0.01 mg/m^3 (inorganic)		
NIOSH RELs			0.002 mg/m^3

AIR MONITORING

Type	Brand/Model No.	Calibration Method/Media	Relative Response or Conversion Factor	Meter Specific Action Level
Collection on 0.87 micron MCEF filter at a maximum flow rate of 2 liters/minute until a collection volume of 480-960 liters is reached. Analysis by liquid chromatography	NA	NA	NA	NA

Checked by: Joanne Bacchus Date: 06/04/08

PERSONAL PROTECTIVE EQUIPMENT

Recommended Protective Clothing Materials:

Suits Any chemical-resistant

Gloves Any chemical-resistant

Boots Any chemical-resistant

Service Limit Concentration (ppm): NA

MUC 1/2 Mask APR = TWA x 10 = 0.1 mg/m^3

MUC Full-Face APR = TWA x 50 = 0.5 mg/m^3

FIRE/REACTIVITY DATA

Flash Point: NA

LEL/UEL: NA

Fire Extinguishing Media:

Dry Chemical X Foam X

Water Spray X CO_2 X

Incompatibilities:

Strong oxidizers, bromine azide

Hydrogen gas can react with arsenic to form the high toxic gas arsine

APPENDIX A

CONTAMINANT FACT SHEET

CONTAMINANT FACT SHEET

Chemical Name:
Benzene
CAS Number: 71-43-2
Synonyms:
Phenyl hydride Benzol

HEALTH HAZARD DATA

Color: Colorless
Physical State: Solid ____ Liquid X Gas ____
Odor: Aromatic
Odor Threshold 4.68 ppm
Vapor Density: 2.7 g/L
Ionization Potential (IP): 9.24 eV
IDLH: 500 ppm

Carcinogen: OSHA X
IARC X
NTP ____
ACGIH X
NIOSH X
Skin absorbable: YES
Skin corrosive: No
Signs/Symptoms of Acute Exposure:
Eye, skin and nose irritation; headache, nausea, staggered gait, drowsiness, dizziness, headaches, vomiting, convulsions and unconsciousness

Source	TWA (units)	STEL (units)	C (units)
OSHA PELs	1 ppm	5 ppm	
ACGIH TLVs	0.5 ppm	2.5 ppm	
NIOSH RELs	0.1 ppm	1 ppm	

AIR MONITORING

Type	Brand/Model No.	Calibrations Method/Media	Relative Response or Conversion Factor	Meter Specific Action Level
PID	Micro tip 10.6 eV	Isobutylene 100 ppm	0.5	2

Checked by: Joanne Bacchus Date: 06/04/08

PERSONAL PROTECTIVE EQUIPMENT

Recommended Protective Clothing Materials:
Suits Viton, Teflon, Barricade, CPF3, Responder Tychem
Gloves Viton, Teflon, Polyvinyl Alcohol (PVA) - do not use in water
Boots Teflon
Service Limit Concentration (ppm): 1000
MUC 1/2 Mask APR = TWA x 10 = 10 ppm
MUC Full-Face APR = TWA x 50 = 50 ppm

FIRE/REACTIVITY DATA

Flash Point: 12 °F
LEL/UEL: 1.2/ 7.8%
Fire Extinguishing Media:
Dry Chemical X Foam X
Water Spray X CO_2 X

Incompatibilities:
Reacts violently with oxidizers, halogens, sulfuric acid, nitric acid
Attacks plastic and rubber.

APPENDIX A

CONTAMINANT FACT SHEET

CONTAMINANT FACT SHEET

Chemical Name:
Benzo(a)anthracene

CAS Number: 56-55-3

Synonyms: Benz(a)anthracene; coal tar pitch volatile

HEALTH HAZARD DATA

Color: Colorless or yellow brown

Physical State: Solid Flakes or powder
Liquid
Gas

Odor: N/A

Odor Threshold N/A

Vapor Density: N/A

Ionization Potential (IP): N/A

IDLH: 80 mg/m^3 (as coal tar pitch volatile)

Carcinogen: OSHA X
IARC X
NTP X
ACGIH X
NIOSH

Skin absorbable: Yes

Skin corrosive: No

Signs/Symptoms of Acute Exposure:
Skin, eye and throat irritation; dermatitis, bronchitis

Source	TWA (units)	STEL (units)	C (units)
	Note: No specific TWA established for this chemical; use TWA for coal tar pitch volatiles		
OSHA PELs	0.2 mg/m^3		
ACGIH TLVs	0.2 mg/m^3		
NIOSH RELs	0.1mg/m^3		

AIR MONITORING

Type	Brand/Model No.	Calibrations Method/Media	Relative Response or Conversion Factor	Meter Specific Action Level
Collection on a 37 mm glass fiber filter at a maximum flow rate of 2 liters/minute until a maximum collection volume of 960 liters is reached. Analysis by liquid chromatography	NA	NA	NA	NA

Checked by: Natalie Warner Date: 03/21/12

PERSONAL PROTECTIVE EQUIPMENT

Recommended Protective Clothing Materials:

Suits Recommended; material not specified

Gloves Recommended; material not specified

Boots Recommended; material not specified

Service Limit Concentration (ppm): NA

MUC 1/2 Mask APR = TWA x 10 = 2 mg/m^3

MUC Full-Face APR = TWA x 50 = 10 mg/m^3

FIRE/REACTIVITY DATA

Flash Point: NA

LEL/UEL: NA

Fire Extinguishing Media:

Dry Chemical X Foam X

Water Spray CO_2 X

Incompatibilities:

Strong oxidizers; dust explosion possible if in powder or granular form, mixed with air

APPENDIX A

CONTAMINANT FACT SHEET

CONTAMINANT FACT SHEET

Chemical Name:
Benzo (a) pyrene
CAS Number:
Synonyms:
50-32-8

HEALTH HAZARD DATA

Color: Black of dark-brown

Physical State: Solid Residue
Liquid
Gas

Odor: NA

Odor Threshold NA

Vapor Density: NA

Ionization Potential (IP): NA

IDLH: 80 mg/m^3

Carcinogen: OSHA
IARC X
NTP X
ACGIH X
NIOSH X

Skin absorbable: NO

Skin corrosive: NO

Signs/Symptoms of Acute Exposure:
Dermatitis, bronchitis

Source	TWA (units)	STEL (units)	C (units)
OSHA PELs	.2 mg/m^3		
ACGIH TLVs	.2 mg/m^3		
NIOSH RELs	.1mg/m^3		

AIR MONITORING

Type	Brand/Model No.	Calibrations Method/Media	Relative Response or Conversion Factor	Meter Specific Action Level
Not Applicable				

Checked by: Date:

PERSONAL PROTECTIVE EQUIPMENT

Recommended Protective Clothing Materials:
Suits

Gloves Neoprene, Nitrile rubber

Boots

Service Limit Concentration (ppm): NA

MUC 1/2 Mask APR = TWA x 10 = 2mg/m^3

MUC Full-Face APR = TWA x 50 = 2mg/m^3

FIRE/REACTIVITY DATA

Flash Point: NA

LEL/UEL: NA

Fire Extinguishing Media:

Dry Chemical X Foam X

Water Spray CO_2 X

Incompatibilities:
Strong oxidizers

APPENDIX A

CONTAMINANT FACT SHEET

CONTAMINANT FACT SHEET

Chemical Name:
Benzo(b)fluoranthene

CAS Number: 205-99-2

Synonyms:
Benz[e]acephenanthrylene; B(b)F; coal tar pitch volatile

HEALTH HAZARD DATA

Color: Colorless

Physical State: Solid X
Liquid
Gas

Odor: NA

Odor Threshold NA

Vapor Density: NA

Ionization Potential (IP): NA

IDLH: 80 mg/m^3 (as coal tar pitch volatile)

Carcinogen: OSHA X
IARC X
NTP
ACGIH X
NIOSH X

Skin absorbable: Yes

Skin corrosive: No

Signs/Symptoms of Acute Exposure:

Eye, nose, and skin irritation; dermatitis, bronchitis

Source	TWA (units)	STEL (units)	C (units)
	Note: No specific TWA established for this chemical; use TWA for coal tar pitch volatiles		
OSHA PELs	0.2 mg/m^3		
ACGIH TLVs	0.2 mg/m^3 (listed as A2)		
NIOSH RELs	0.1 mg/m^3		

AIR MONITORING

Type	Brand/ Model No.	Calibrations Method/ Media	Relative Response or Conversion Factor	Meter Specific Action Level
Collection on a filter + sorbent tube at a flow rate of 1.5 to 2 liters/minute until a maximum collection volume of 1000 liters is reached. Analysis by liquid chromatography	NA	NA	NA	NA

Checked by: Joanne Bacchus Date: 06/04/08

PERSONAL PROTECTIVE EQUIPMENT

Recommended Protective Clothing Materials:

Suits Recommended; material not specified

Gloves Recommended; material not specified

Boots Recommended; material not specified

Service Limit Concentration (ppm): NA

MUC 1/2 Mask APR = TWA x 10 = 2 mg/m^3

MUC Full-Face APR = TWA x 50 = 10 mg/m^3

FIRE/REACTIVITY DATA

Flash Point: NA

LEL/UEL:

Fire Extinguishing Media:

Dry Chemical X Foam X

Water Spray X CO_2 X

Note: Emits toxic fumes under fire conditions

Incompatibilities:

Strong oxidizers

APPENDIX A

CONTAMINANT FACT SHEET

CONTAMINANT FACT SHEET

Chemical Name:
Benzo(k)fluoranthene
CAS Number: 207-08-9
Synonyms:
8,9-Benzfluoranthene;
11,12-Benzfluoranthene

HEALTH HAZARD DATA

Color: Pale yellow

Physical State: Solid X
Liquid
Gas

Odor: NA

Odor Threshold NA

Vapor Density: NA

Ionization Potential (IP): NA

IDLH: 80 mg/m^3 (as coal tar pitch volatile)

Carcinogen: OSHA X
IARC X
NTP
ACGIH X
NIOSH X

Skin absorbable: Yes

Skin corrosive: No

Signs/Symptoms of Acute Exposure:

Eye, nose, and skin irritation; dermatitis, bronchitis

Source	TWA (units)	STEL (units)	C (units)
	Note: No specific TWA established for this chemical; use TWA for coal tar pitch volatiles		
OSHA PELs	0.2 mg/m^3		
ACGIH TLVs	0.2 mg/m^3 (listed as B2)		
NIOSH RELs	0.1 mg/m^3		

AIR MONITORING

Type	Brand/ Model No.	Calibration Method/ Media	Relative Response or Conversion Factor	Meter Specific Action Level
Collection on a filter + sorbent tube at a flow rate of 1.5 to 2 liters/minute until a maximum collection volume of 1000 litersis reached. Analysis by liquid chromatography	NA	NA	NA	NA

Checked by: Joanne Bacchus Date: 06/04/08

PERSONAL PROTECTIVE EQUIPMENT

Recommended Protective Clothing Materials:

Suits Recommended; material not specified

Gloves Recommended; material not specified

Boots Recommended; material not specified

Service Limit Concentration (ppm):

MUC 1/2 Mask APR = TWA x 10 = 2 mg/m^3

MUC Full-Face APR = TWA x 50 = 10 mg/m^3

FIRE/REACTIVITY DATA

Flash Point: NA

LEL/UEL: NA

Fire Extinguishing Media:

Dry Chemical X Foam X

Water Spray CO_2 X

Note: Emits toxic fumes under fire conditions

Incompatibilities:

Strong oxidizers

APPENDIX A

CONTAMINANT FACT SHEET

CONTAMINANT FACT SHEET

Chemical Name: Beryllium

CAS Number: 7440-41-7

Synonyms: _____

HEALTH HAZARD DATA

Color: White, gray

Physical State: Solid X

Liquid _____

Gas _____

Odor: None

Odor Threshold N/A

Vapor Density: N/A

Ionization Potential (IP): N/A

IDLH: Carcinogen (previously 4 mg/m^3)

Carcinogen: OSHA _____

IARC X

NTP _____

ACGIH X

NIOSH X

Skin absorbable: Yes

Skin corrosive: No

Signs/Symptoms of Acute Exposure:

Eye, skin and respiratory irritant; beryllium disease, a granulomatous lung disease characterized by dyspnea, cough, reduced pulmonary function, and a variety of other symptoms, including weight loss

Source	TWA (units)	STEL (units)	C (units)
OSHA PELs	0.002 ppm		0.005 ppm
ACGIH TLVs	0.002 ppm	0.01 ppm	
NIOSH RELs	0.0005 ppm		

AIR MONITORING

Type	Brand/Model No.	Calibrations Method/Media	Relative Response or Conversion Factor	Meter Specific Action Level
	NA	NA	NA	NA

Checked by: Joanne Bacchus Date: 06/04/08

PERSONAL PROTECTIVE EQUIPMENT

Recommended Protective Clothing Materials:

Suits Recommended; material not specified

Gloves Recommended; material not specified

Boots Recommended; material not specified

Service Limit Concentration (ppm): N/A

MUC 1/2 Mask APR = TWA x 10 =

MUC Full-Face APR = TWA x 50 =

FIRE/REACTIVITY DATA

Flash Point: N/A

LEL/UEL: N/A

Fire Extinguishing Media:

Dry Chemical X Foam _____

Water Spray _____ CO_2 _____

Incompatibilities:

Acids, caustics, chlorinated hydrocarbons, oxidizers, molten lithium

APPENDIX A

CONTAMINANT FACT SHEET

CONTAMINANT FACT SHEET

Chemical Name:
Bis(2-ethylhexyl)phthalate
CAS Number: 117-81-7
Synonyms:
Di-(2ethylhexyl) phthalate (DEHP), Dioctylphthalate (DOP), Di-sec-octyl phthalate

HEALTH HAZARD DATA

Color: Colorless
Physical State: Solid ____ Liquid X Gas ____
Odor: Almost odorless
Odor Threshold Unknown
Vapor Density: 16.0 g/L
Ionization Potential (IP): Unknown
IDLH: 5000 mg/m^3

Carcinogen: OSHA ____ IARC X NTP X ACGIH X NIOSH X
Skin absorbable: Yes
Skin corrosive: No
Signs/Symptoms of Acute Exposure:
Irritates eyes and mucous membranes; cramps; nausea

Source	TWA (units)	STEL (units)	C (units)
OSHA PELs	5 mg/m^3		
ACGIH TLVs	5 mg/m^3		
NIOSH RELs	5 mg/m^3	10 mg/m^3	

AIR MONITORING

Type	Brand/Model No.	Calibrations Method/Media	Relative Resonse or Conversion Factor	Meter Specific Action Level
13 mm Tenax tube with glass fiber filter at a maximum flow rate of 1 liters/minute until a maximum collection volume of 240 liters is reached. Analysis by gas chromatography	NA	NA	NA	NA

Checked by: Joanne Bacchus Date: 06/04/08

PERSONAL PROTECTIVE EQUIPMENT

Recommended Protective Clothing Materials:
Suits Nitrile, butyl rubber
Gloves Nitrile, butyl rubber
Boots Nitrile, butyl rubber
Service Limit Concentration (ppm): NA
MUC 1/2 Mask APR = TWA x 10 = 50 mg/m^3
MUC Full-Face APR = TWA x 50 = 250 mg/m^3

FIRE/REACTIVITY DATA

Flash Point: 420°F
LEL/UEL: 0.3% (no UEL established)
Fire Extinguishing Media:
Dry Chemical X Foam ____
Water Spray ____ CO_2 X

Incompatibilities:
Nitrates, strong oxidizers, acids and alkalis

APPENDIX A

CONTAMINANT FACT SHEET

CONTAMINANT FACT SHEET

Chemical Name:
Cadmium
CAS Number:
Synonyms:

HEALTH HAZARD DATA

Color: Silver-white, blue-tinged, lustrous

Physical State: Solid X
Liquid
Gas

Odor: None

Odor Threshold N/A

Vapor Density: N/A

Ionization Potential (IP): N/A

IDLH: mg/m^3

Carcinogen: OSHA
IARC X
NTP
ACGIH X
NIOSH X

Skin absorbable: No

Skin corrosive: No

Signs/Symptoms of Acute Exposure:

headache, nausea, shortness of breath, chest pain, weakness, fever, kidney damage, liver damage, chronic bronchitis, emphysema, and pulmonary edema

Source	TWA (units)	STEL (units)	C (units)
OSHA PELs	0.2 ppm (dust) 0.1 ppm (fume)		0.6 ppm (dust) 0.3 ppm (fume)
ACGIH TLVs	0.01 ppm	ppm	
NIOSH RELs	ppm		

AIR MONITORING

Type	Brand/Model No.	Calibrations Method/Media	Relative Response or Conversion Factor	Meter Specific Action Level
	NA	NA	NA	NA

Checked by: Joanne Bacchus Date: 06/04/08

PERSONAL PROTECTIVE EQUIPMENT

Recommended Protective Clothing Materials:

Suits Recommended; material not specified

Gloves Recommended; material not specified

Boots Recommended; material not specified

Service Limit Concentration (ppm): N/A

MUC 1/2 Mask APR = TWA x 10 =

MUC Full-Face APR = TWA x 50 =

FIRE/REACTIVITY DATA

Flash Point: dust ignites spontaneously in air

LEL/UEL: N/A

Fire Extinguishing Media:

Dry Chemical X Foam X

Water Spray X CO_2 X

Incompatibilities:

Strong oxidizers; elemental sulfur, selenium & tellurium

APPENDIX A

CONTAMINANT FACT SHEET

CONTAMINANT FACT SHEET

Chemical Name: Calcium

CAS Number: 7440-70-2

Synonyms:

HEALTH HAZARD DATA

Color: Lustrous, silver-white, bluish gray

Physical State: Solid X

Liquid

Gas

Odor: None

Odor Threshold N/A

Vapor Density: N/A

Ionization Potential (IP): N/A

IDLH: N/A

Carcinogen: OSHA

IARC

NTP

ACGIH

NIOSH

Skin absorbable: No

Skin corrosive: Yes

Signs/Symptoms of Acute Exposure:

Eye, nose, and respiratory irritant

Source	TWA (units)	STEL (units)	C (units)
OSHA PELs	N/A		
ACGIH TLVs	N/A		
NIOSH RELs	N/A		

AIR MONITORING

Type	Brand/Model No.	Calibrations Method/Media	Relative Response or Conversion Factor	Meter Specific Action Level
	NA	NA	NA	NA

Checked by: Joanne Bacchus Date: 06/04/08

PERSONAL PROTECTIVE EQUIPMENT

Recommended Protective Clothing Materials:

Suits Recommended; material not specified

Gloves Recommended; material not specified

Boots Recommended; material not specified

Service Limit Concentration (ppm): N/A

MUC 1/2 Mask APR = TWA x 10 =

MUC Full-Face APR = TWA x 50 =

FIRE/REACTIVITY DATA

Flash Point:

LEL/UEL: Contact with alkali hydroxides or carbonates may cause detonation

Fire Extinguishing Media:

Dry Chemical X Foam

Water Spray CO_2

Incompatibilities:

Water, acids, halogens, alkali metal hydroxides or carbonates

APPENDIX A

CONTAMINANT FACT SHEET

CONTAMINANT FACT SHEET

Chemical Name: Chloroform

CAS Number: 67-66-3

Synonyms: Methane trichloride, trichloromethane

HEALTH HAZARD DATA

Color: Colorless

Physical State: Solid ____ Liquid X Gas ____

Odor: sweet, ethereal

Odor Threshold 133-276 ppm

Vapor Density: 4.9 g/L

Ionization Potential (IP): 11.42 eV

IDLH: 500 ppm

Carcinogen: OSHA ____ IARC X NTP X ACGIH X NIOSH X

Skin absorbable: No

Skin corrosive: No

Signs/Symptoms of Acute Exposure:

Dizziness, mental dullness, nausea, disorientation, headache, fatigue, anesthesia, irritation of the eyes and skin

Source	TWA (units)	STEL (units)	C (units)
OSHA PELs			50 ppm
ACGIH TLVs	10 ppm		
NIOSH RELs		2 ppm	

AIR MONITORING

Type	Brand/Model No.	Calibrations Method/Media	Relative Response or Conversion Factor	Meter Specific Action Level
Detector Tube	Draeger 6728861	2-10 ppm	0.7	1.4 ppm
PID	HNU w/ 11.7 eV	Isobutylene 100 ppm	0.315	3.15

PERSONAL PROTECTIVE EQUIPMENT

Recommended Protective Clothing Materials:

Suits Trellchem, PE/EVAL, Barricade, Tychem, Responder

Gloves Viton, Teflon, Polyvinyl Alcohol (do not use in water)

Boots

Service Limit Concentration (ppm): 1000 ppm

MUC 1/2 Mask APR = TWA x 10 = 50 ppm

FIRE/REACTIVITY DATA

Flash Point: NA

LEL/UEL: NA/NA

Fire Extinguishing Media:

Dry Chemical ____ Foam ____

Water Spray ____ CO_2 ____

Incompatibilities:

Strong oxidizers and caustics, chemically-active metals, liquid ammonia

Checked by: Emmet F. Curtis Date: 12/5/03

APPENDIX A

CONTAMINANT FACT SHEET

CONTAMINANT FACT SHEET

Chemical Name: Chromium

CAS Number: 7440-47-3

Synonyms: Chrome, Chromium metal

HEALTH HAZARD DATA

Color: Blue-white to steel-gray

Physical State: Solid X

Liquid

Gas

Odor: Odorless

Odor Threshold N/A

Vapor Density: N/A

Ionization Potential (IP): N/A

IDLH: 250 mg/m^3

Carcinogen: OSHA

IARC X

NTP X

ACGIH X

NIOSH X

Skin absorbable: No

Skin corrosive: No

Signs/Symptoms of Acute Exposure:

Irritates eyes and lungs

Source	TWA (units)	STEL (units)	C (units)
OSHA PELs	0.1 ppm (Cr); 0.005 (CrO3); 0.5 (CrII/III);	CrVI = 0.005 mg/m^3	
ACGIH TLVs	0.5 mg/m^3		
NIOSH RELs	0.5 ppm (Cr); 0.001 ppm(CrVI)		

AIR MONITORING

Type	Brand/Model No.	Calibrations Method/Media	Relative Resonse or Conversion Factor	Meter Specific Action Level
Not Applicable				

Checked by: Joanne Bacchus Date: 06/04/08

PERSONAL PROTECTIVE EQUIPMENT

Recommended Protective Clothing Materials:

Suits Any chemical -resistant

Gloves Any chemical -resistant

Boots Any chemical -resistant

Service Limit Concentration (ppm): NA

MUC 1/2 Mask APR = TWA x 10 = 0.05 mg/m^3

MUC Full-Face APR = TWA x 50 = 0.25 mg/m^3

FIRE/REACTIVITY DATA

Flash Point: NA

LEL/UEL: NA / NA

Fire Extinguishing Media:

Dry Chemical X Foam X

Water Spray X CO_2 X

Incompatibilities:

Strong oxidizers, alkalis

APPENDIX A

CONTAMINANT FACT SHEET

CONTAMINANT FACT SHEET

Chemical Name:
Chrysene
CAS Number: 218-01-9
Synonyms:
Benzo(a)phenanthrene

HEALTH HAZARD DATA

Color: White
Physical State: Solid X
Liquid
Gas
Odor: NA
Odor Threshold NA
Vapor Density: NA
Ionization Potential (IP): NA
IDLH: Listed as potential occupational carcinogen

Carcinogen: OSHA X
IARC X
NTP
ACGIH X
NIOSH X
Skin absorbable: Yes
Skin corrosive: No
Signs/Symptoms of Acute Exposure:
Skin irritation with possible rash or sunburn; may cause eye and respiratory irritation

Source	TWA (units)	STEL (units)	C (units)
OSHA PELs	0.2 mg/m^3		
ACGIH TLVs	NA		
NIOSH RELs	0.1 mg/m^3		

AIR MONITORING

Type	Brand/ Model No.	Calibration Method/ Media	Relative Response or Conversion Factor	Meter Specific Action Level
Collection on a filter + sorbent tube at a flow rate of 1.5 to 2 liters/minute until a maximum collection volume of 1000 liters	NA	NA	NA	NA
is reached. Analysis by liquid or gas chromatography				

Checked by: Date:

PERSONAL PROTECTIVE EQUIPMENT

Recommended Protective Clothing Materials:
Suits Recommended; material not specified
Gloves Recommended; material not specified
Boots Not reported
Service Limit Concentration (ppm):
MUC 1/2 Mask APR = TWA x 10 = 2 mg/m^3
MUC Full-Face APR = TWA x 50 = 10 mg/m^3

FIRE/REACTIVITY DATA

Flash Point: NA
LEL/UEL: NA
Fire Extinguishing Media:
Dry Chemical X Foam X
Water Spray X CO_2 X
Note: Emits toxic fumes under fire conditions

Incompatibilities:
Strong oxidizers

APPENDIX A

CONTAMINANT FACT SHEET

CONTAMINANT FACT SHEET

Chemical Name:
Copper
CAS Number: 7440-50-8
Synonyms:
Cu, copper metal dusts

HEALTH HAZARD DATA

Color: Reddish gold metallic

Physical State: Solid X
Liquid
Gas

Odor: NA

Odor Threshold NA

Vapor Density: NA

Ionization Potential (IP): NA

IDLH: 100 mg/m^3

Carcinogen: OSHA
IARC
NTP
ACGIH
NIOSH

Skin absorbable: Yes

Skin corrosive: No

Signs/Symptoms of Acute Exposure:

Fumes/dust may cause eye/upper respiratory irritation; may induce allergic contact dermatitits in susceptible individuals. Ingestion causes nausea, vomiting, abdominal pain, metallic taste, and diarrhea. Ingestion of large doses may cause stomach and intestine ulceration, jaundice, and kidney and liver damage.

Source	TWA (units)	STEL (units)	C (units)
OSHA PELs	1 mg/m^3		
ACGIH TLVs	1 mg/m^3		
NIOSH RELs	1 mg/m^3		

AIR MONITORING

Type	Brand/ Model No.	Calibration Method/ Media	Relative Response or Conversion Factor	Meter Specific Action Level
Collection on a Mixed Cellulose Ester Filter (MCEF) 0.8 microns at a flow rate of 2 liters/minute until a maximum collection volume of 960 liters is reached. Analysis via AAS or ICP	NA	NA	NA	NA

Checked by: Date:

PERSONAL PROTECTIVE EQUIPMENT

Recommended Protective Clothing Materials:

Suits Recommended; material not specified

Gloves Recommended; material not specified

Boots Not reported

Service Limit Concentration (ppm):

MUC 1/2 Mask APR = TWA x 10 = 10 mg/m^3

MUC Full-Face APR = TWA x 50 = 50 mg/m^3

FIRE/REACTIVITY DATA

Flash Point: NA

LEL/UEL: NA

Fire Extinguishing Media:

Dry Chemical X Foam X

Water Spray CO_2 X

Note: Do not allow molten copper to contact water

Incompatibilities:

Reacts violently with ammonium nitrate, bromates, chlorates, iodates, chloride, ethylene oxide, hydrazine mononitrate, hydrazoic acid, sodium azide, potassium oxide, acetylene gas and magnesium metal

APPENDIX A

CONTAMINANT FACT SHEET

CONTAMINANT FACT SHEET

Chemical Name: Dibenz(a,h)anthracene

CAS Number: 53-70-3

Synonyms: DB(A,H)A; dibenzo(a,h)anthracene

HEALTH HAZARD DATA

Color: Colorless

Physical State: Solid Crystals

Liquid

Gas

Odor: N/A

Odor Threshold N/A

Vapor Density: N/A

Ionization Potential (IP): N/A

IDLH: N/A

Carcinogen: OSHA

IARC X

NTP X

ACGIH

NIOSH

Skin absorbable: Yes

Skin corrosive: No

Signs/Symptoms of Acute Exposure:

Skin irritation and photosensitization; eye redness

Source	TWA (units)	STEL (units)	C (units)
OSHA PELs	N/A		
ACGIH TLVs	N/A		
NIOSH RELs	N/A		

AIR MONITORING

Type	Brand/Model No.	Calibrations Method/Media	Relative Response or Conversion Factor	Meter Specific Action Level
Collection on a 37 mm glass fiber filter at a maximum flow rate of 2 liters/minute until a maximum collection volume of 960 liters is reached. Analysis by liquid chromatography	NA	NA	NA	NA

Checked by: Joanne Bacchus Date: 06/04/08

PERSONAL PROTECTIVE EQUIPMENT

Recommended Protective Clothing Materials:

Suits Recommended; material not specified

Gloves Recommended; material not specified

Boots Recommended; material not specified

Service Limit Concentration (ppm): N/A

MUC 1/2 Mask APR = TWA x 10 = N/A

MUC Full-Face APR = TWA x 50 = N/A

FIRE/REACTIVITY DATA

Flash Point:

LEL/UEL:

Fire Extinguishing Media:

Dry Chemical X Foam

Water Spray X CO_2

Incompatibilities:

N/A

APPENDIX A

CONTAMINANT FACT SHEET

CONTAMINANT FACT SHEET

Chemical Name:
Ethylbenzene
CAS Number: 100-41-4
Synonyms:
Ethylbenzol, Phenylethane

HEALTH HAZARD DATA

Color: Colorless
Physical State: Solid ____
Liquid X
Gas ____
Odor: Aromatic
Odor Threshold 0.092 – 0.6 ppm
Vapor Density: 3.66 g/L
Ionization Potential (IP): 8.76 eV
IDLH: 800 ppm

Carcinogen: OSHA ____
IARC ____
NTP ____
ACGIH ____
NIOSH ____
Skin absorbable: No
Skin corrosive: UNK
Signs/Symptoms of Acute Exposure:
Irritant to eyes, skin and mucous membranes; dermatitis, and headache

Source	TWA (units)	STEL (units)	C (units)
OSHA PELs	100 ppm	UNK	UNK
ACGIH TLVs	100 ppm	125 ppm	UNK
NIOSH RELs	100 ppm	125 ppm	UNK

AIR MONITORING

Type	Brand/Model No.	Calibrations Method/Media	Relative Resonse or Conversion Factor	Meter Specific Action Level
PID	Microtip 10.6 eV	Isobutylene 100 ppm	1.63	163
PID	HNu 10.2 eV	Isobutylene		
FID	Foxboro TVA 1000 (10.6 eV)	Methane	3.7	370

Checked by: Emmet F. Curtis Date: 12/5/03

PERSONAL PROTECTIVE EQUIPMENT

Recommended Protective Clothing Materials:
Suits Viton, Barricade, Tychem, Responder, Teflon
Gloves Viton, Teflon
Boots Teflon
Service Limit Concentration (ppm): 1000
MUC 1/2 Mask APR = TWA x 10 = 800 ppm*
MUC Full-Face APR = TWA x 50 = 800 ppm*

*Not to exceed IDLH

FIRE/REACTIVITY DATA

Flash Point: 55 deg F
LEL/UEL: 0.8% / 6.7%
Fire Extinguishing Media:
Dry Chemical X Foam X
Water Spray ____ CO_2 X

Incompatibilities:
Bases, acid chlorides, acid anhydrides, oxidizing agents, corrodes: steel, brass, copper alloys

APPENDIX A

CONTAMINANT FACT SHEET

CONTAMINANT FACT SHEET

Chemical Name:
Iron
CAS Number: 7439-89-6
Synonyms:

HEALTH HAZARD DATA

Color: Silver-white or gray
Physical State: Solid X
Liquid
Gas
Odor: None
Odor Threshold N/A
Vapor Density: N/A
Ionization Potential (IP): N/A
IDLH: N/A

Carcinogen: OSHA
IARC
NTP
ACGIH
NIOSH
Skin absorbable: No
Skin corrosive: No
Signs/Symptoms of Acute Exposure:
Respiratory and gastrointestinal irritan; vomiting, hematemesis, abdominal pain, diarrhea, hematochezia, lethargy, shock, acidosis, and coagulopathy

Source	TWA (units)	STEL (units)	C (units)
OSHA PELs	1 ppm (soluble salt)		
ACGIH TLVs	5 ppm (fume)		
NIOSH RELs	ppm		

AIR MONITORING

Type	Brand/Model No.	Calibrations Method/Media	Relative Response or Conversion Factor	Meter Specific Action Level
	NA	NA	NA	NA

Checked by: Joanne Bacchus Date: 06/04/08

PERSONAL PROTECTIVE EQUIPMENT

Recommended Protective Clothing Materials:
Suits Recommended; material not specified
Gloves Recommended; material not specified
Boots Recommended; material not specified
Service Limit Concentration (ppm): N/A
MUC 1/2 Mask APR = TWA x 10 =
MUC Full-Face APR = TWA x 50 =

FIRE/REACTIVITY DATA

Flash Point: N/A
LEL/UEL: N/A
Fire Extinguishing Media:
Dry Chemical X Foam
Water Spray CO_2

Incompatibilities:
ammonium nitrate and heat, ammonium peroxodisulfate, chloric acid, chlorine trifluoride

APPENDIX A

CONTAMINANT FACT SHEET

CONTAMINANT FACT SHEET

Chemical Name:
Lead
CAS Number: 7439-92-1
Synonyms:
Lead Metal, Plumbum

HEALTH HAZARD DATA

Color: Gray

Physical State: Solid X
Liquid
Gas

Odor: NA

Odor Threshold NA

Vapor Density: NA

Ionization Potential (IP): NA

IDLH: 100 mg/m3

Carcinogen: OSHA
IARC X
NTP
ACGIH Confirmed for animals; unknown for humans
NIOSH

Skin absorbable: NO

Skin corrosive: NO

Signs/Symptoms of Acute Exposure:

Weak, insomnia, facial pallor, anorexia, low weight, constipation, abdominal pain, anemia, paralysis, (wrist and ankle), kidney disease, eye irritant, hypotension

Source	TWA (units)	STEL (units)	C (units)
OSHA PELs	0.05 mg/m3		
ACGIH TLVs	0.5 mg/m3		
NIOSH RELs	0.05 mg/m3		

AIR MONITORING

Type	Brand/Model No.	Calibrations Method/Media	Relative Resonse or Conversion Factor	Meter Specific Action Level
Not Applicable				

Checked by: Date:

PERSONAL PROTECTIVE EQUIPMENT

Recommended Protective Clothing Materials:

Suits Tyvek

Gloves Nitrile or Viton

Boots Rubber

Service Limit Concentration (ppm): NA

MUC 1/2 Mask APR = TWA x 10 = 0.25 mg/m3

MUC Full-Face APR = TWA x 50 = 0.25 mg/m3

FIRE/REACTIVITY DATA

Flash Point: NA; flammable as dust when heated

LEL/UEL: NA

Fire Extinguishing Media:

Dry Chemical X Foam X

Water Spray X CO_2 X

Incompatibilities:

Strong Oxidizers, hydrogen peroxide, acids

APPENDIX A

CONTAMINANT FACT SHEET

CONTAMINANT FACT SHEET

Chemical Name: Manganese

CAS Number: 7439-96-5

Synonyms:

HEALTH HAZARD DATA

Color: Gray

Physical State: Solid X

Liquid

Gas

Odor: None

Odor Threshold N/A

Vapor Density: N/A

Ionization Potential (IP): N/A

IDLH: 500 mg/m^3

Carcinogen: OSHA

IARC

NTP

ACGIH

NIOSH

Skin absorbable: No

Skin corrosive: No

Signs/Symptoms of Acute Exposure:

Irritation eyes, skin, respiratory system; eye, skin burns (from prolonged direct contact with dust or concentrated liquid); conjunctivitis; blindness; dermatitis; cough, chest tightness, dyspnea, rales; pulmonary edema; bronchitis, pneumonitis; anorexia, weakness, sleepiness; gait disturbances, clumsiness, tremor, speech disturbances, mask-like facial expression, and personality changes); kidney damage, liver damage; methemoglobinemia

Source	TWA (units)	STEL (units)	C (units)
OSHA PELs	N/A		5 ppm
ACGIH TLVs	0.2 ppm		
NIOSH RELs	1 ppm	3 ppm	

AIR MONITORING

Type	Brand/Model No.	Calibrations Method/Media	Relative Response or Conversion Factor	Meter Specific Action Level
	NA	NA	NA	NA

Checked by: Date:

PERSONAL PROTECTIVE EQUIPMENT

Recommended Protective Clothing Materials:

Suits Recommended; material not specified

Gloves Recommended; material not specified

Boots Recommended; material not specified

Service Limit Concentration (ppm): N/A

MUC 1/2 Mask APR = TWA x 10 = N/A

MUC Full-Face APR = TWA x 50 = N/A

FIRE/REACTIVITY DATA

Flash Point: Dust explosion possible if in powder or granular form, mixed with air; minimum explosive concentration is 125 oz/1000 cu feet

LEL/UEL: N/A

Fire Extinguishing Media:

Dry Chemical X Foam

Water Spray CO_2

Incompatibilities:

Oxidizers, water, steam

APPENDIX A

CONTAMINANT FACT SHEET

CONTAMINANT FACT SHEET

Chemical Name:
Mercury
CAS Number: 7439-97-6
Synonyms:
Mercury metal, quicksilver
Elemental mercury, colloidal mercury
Metallic mercury

HEALTH HAZARD DATA

Color: Silver-white
Physical State: Solid
Liquid X
Gas
Odor: odorless
Odor Threshold N/A
Vapor Density: N/A
Ionization Potential (IP): Unknown
IDLH: 10 mg/m^3

Carcinogen: OSHA
IARC
NTP
ACGIH
NIOSH
Skin absorbable: YES
Skin corrosive: YES
Signs/Symptoms of Acute Exposure:
Irritates eyes and skin, cough, chest pain, tremors, insomnia
Difficult breathing, headache, irritability, weakness,
Salivation, GI disturbance

Source	TWA (units)	STEL (units)	C (units)
OSHA PELs			0.1 mg/m^3
ACGIH TLVs	1.025 mg/m^3 (inorganic)		
NIOSH RELs	0.05 mg/m^3 (vapor)		0.1 mg/m^3

AIR MONITORING

Type	Brand/Model No.	Calibrations Method/Media	Relative Resonse or Conversion Factor	Meter Specific Action Level
Not Applicable				

Checked by: Joanne Bacchus Date: 06/04/08

PERSONAL PROTECTIVE EQUIPMENT

Recommended Protective Clothing Materials:
Suits Recommended; material not specified
Gloves Recommended; material not specified
Boots Recommended; material not specified
Service Limit Concentration (ppm): NA
MUC 1/2 Mask APR = TWA x 10 = 0.5 mg/m^3
MUC Full-Face APR = TWA x 50 = 2.5 mg/m^3

FIRE/REACTIVITY DATA

Flash Point: N/A
LEL/UEL: N/A / N/A /
Fire Extinguishing Media:
Dry Chemical X Foam X
Water Spray X CO_2 X

Incompatibilities:
Acetykene, ammonia, chlorine dioxide, azides, calcium,
Sodium carbide, lithium, rubidium, copper

APPENDIX A

CONTAMINANT FACT SHEET

CONTAMINANT FACT SHEET

Chemical Name: Methylene chloride

CAS Number: 75-09-2

Synonyms: Dichloromethane, methylene dichloride

HEALTH HAZARD DATA

Color: Colorless

Physical State: Solid ____ Liquid X ____ Gas ____

Odor: Chloroform-like

Odor Threshold 160 ppm

Vapor Density: 3.47 g/L

Ionization Potential (IP): 11.32 eV

IDLH: 2300 ppm

Carcinogen: OSHA ____ IARC X ____ NTP X ____ ACGIH X ____ NIOSH X

Skin absorbable: No

Skin corrosive: No

Signs/Symptoms of Acute Exposure:

Irritant to eyes and skin, fatigue, weakness, numbness, tingling limbs, nausea, lightheadedness, drowsiness

Source	TWA (units)	STEL (units)	C (units)
OSHA PELs	25 ppm	125 ppm	1000 ppm
ACGIH TLVs	50 ppm	ppm	
NIOSH RELs	Lowest Feasible		

AIR MONITORING

Type	Brand/Model No.	Calibrations Method/Media	Relative Response or Conversion Factor	Meter Specific Action Level
PID	Micro tip 10.6 eV	Isobutylene 100 ppm	0.03	1.5
PID	HNu w/ 10.2 eV	Isobutylene Span 9.8/100 ppm	0.87	43.5
FID	Century OVA	Methane		

Checked by: Date:

PERSONAL PROTECTIVE EQUIPMENT

Recommended Protective Clothing Materials:

Suits Responder, Trellchem,Tychem, PE/EVAL, Barricade

Gloves Polyvinyl Alcohol, Ethylene Vinyl Alcohol, Teflon, Barricade

Boots Teflon

Service Limit Concentration (ppm): 1000

MUC 1/2 Mask APR = TWA x 10 = 250 ppm

MUC Full-Face APR = TWA x 50 = 250 ppm

FIRE/REACTIVITY DATA

Flash Point: ____

LEL/UEL: ____

Fire Extinguishing Media:

Dry Chemical X ____ Foam X

Water Spray X ____ CO_2 X

Incompatibilities:

Strong oxidizers, caustics, chemically-active metals (such as aluminum, magnesium powder, potassium, sodium), conc. nitric acid

APPENDIX A

CONTAMINANT FACT SHEET

CONTAMINANT FACT SHEET

Chemical Name:
Methyl-t-Butyl Ether

CAS Number: 1634-04-4

Synonyms:
MTBE ; Methyl-tert-Butyl Ether; Methoxy-2-Methyl Propane

HEALTH HAZARD DATA

Color: _____

Physical State: Solid _____
Liquid _____
Gas _____

Odor: Aromatic, terpene-like

Odor Threshold 0.09-0.13 ppm

Vapor Density: 3.1 (air = 1)

Ionization Potential (IP): NA

IDLH: NA

Carcinogen: OSHA _____
IARC _____
NTP _____
ACGIH _____
NIOSH _____

Skin absorbable: Yes

Skin corrosive: No

Signs/Symptoms of Acute Exposure:

Drowsiness, dizziness, headache, weakness, unconsciousness; redness of skin and eyes; nausea, vomiting, abdominal pain; chemical pneumonitis (by aspiration)

Source	TWA (units)	STEL (units)	C (units)
OSHA PELs			
ACGIH TLVs	50 ppm		
NIOSH RELs			

AIR MONITORING

Type	Brand/ Model No.	Calibrations Method/ Media	Relative Response or Conversion Factor	Meter Specific Action Level
Collection via two charcoal tubes in series (Front is 400 mg/ Back is 200 mg; 20/40 mesh) at a flow rate of 0.2 liters/minute until a maximum collection volume of 960 liters is reached. Analysis via Gas Chromatography; GC/FID	NA	NA	NA	NA

Checked by: Date:

PERSONAL PROTECTIVE EQUIPMENT

Recommended Protective Clothing Materials:

Suits Viton, Teflon, Tychem, Barricade or equivalent

Gloves Nitrile, Neoprene , Viton, Teflon

Boots Teflon

Service Limit Concentration (ppm): _____

MUC 1/2 Mask APR = TWA x 10 =

MUC Full-Face APR = TWA x 50 =

FIRE/REACTIVITY DATA

Flash Point: -18°F

LEL/UEL: 1.6% / 8.4%

Fire Extinguishing Media:

Dry Chemical X Foam X

Water Spray _____ CO_2 X

Incompatibilities:
Oxidizers and acids

APPENDIX A

CONTAMINANT FACT SHEET

CONTAMINANT FACT SHEET

Chemical Name:
Naphthalene
CAS Number: 91-20-3
Synonyms:
Naphthalin, Tar camphor, White tar

HEALTH HAZARD DATA

Color: Colorless
Physical State: Solid ____
Liquid X
Gas ____
Odor: mint or acetone like
Odor Threshold 2-85 ppm
Vapor Density: 2.41
Ionization Potential (IP): 9.54 eV
IDLH: 3000 ppm

Carcinogen: OSHA ____
IARC ____
NTP ____
ACGIH ____
NIOSH ____
Skin absorbable: Yes
Skin corrosive: No
Signs/Symptoms of Acute Exposure:
Irritant to eyes; headache; malaise; nausea; vomiting; abdominal pain; profuse sweating; confusion; excitement; dermatitis; irritable bladder; jaundice.

Source	TWA (units)	STEL (units)	C (units)
OSHA PELs	10 ppm		
ACGIH TLVs	10 ppm	15 ppm	
NIOSH RELs	10 ppm	15 ppm	

AIR MONITORING

Type	Brand/Model No.	Calibrations Method/Media	Relative Response or Conversion Factor	Meter Specific Action Level
PID	HNu 10.2 eV	Benzene 100 ppm	1.62	16.2 ppm

Checked by: Natalie Warner Date: 3/21/12

PERSONAL PROTECTIVE EQUIPMENT

Recommended Protective Clothing Materials:
Suits Tyvek, Teflon
Gloves Rubber, Teflon
Boots Rubber, Teflon
Service Limit Concentration (ppm): 1000
MUC 1/2 Mask APR = TWA x 10 = 1000 ppm
MUC Full-Face APR = TWA x 50 = = 1000 ppm

FIRE/REACTIVITY DATA

Flash Point: 174°F
LEL/UEL: 0.9%/5.9%
Fire Extinguishing Media:
Dry Chemical X Foam X
Water Spray X CO_2 X

Incompatibilities:
Strong oxidizers, chromic anhydride

APPENDIX A

CONTAMINANT FACT SHEET

CONTAMINANT FACT SHEET

Chemical Name: Nickel

CAS Number: 7440-02-0

Synonyms: Ni, nickel metal dusts

HEALTH HAZARD DATA

Color: Silver metallic

Physical State: Solid X

Liquid

Gas

Odor: NA

Odor Threshold NA

Vapor Density: NA

Ionization Potential (IP): NA

IDLH: 10 mg/m^3

Carcinogen: OSHA

IARC X

NTP X

ACGIH

NIOSH X

Skin absorbable: Yes

Skin corrosive: No

Signs/Symptoms of Acute Exposure:

Fumes/dust may cause eye/upper respiratory irritation; may induce allergic contact dermatitits in susceptible individuals.

Source	TWA (units)	STEL (units)	C (units)
OSHA PELs	1 mg/m^3		
ACGIH TLVs	1.5 mg/m^3		
NIOSH RELs	0.015 mg/m^3		

AIR MONITORING

Type	Brand/ Model No.	Calibration Method/ Media	Relative Response or Conversion Factor	Meter Specific Action Level
Collection on a Mixed Cellulose Ester Filter (MCEF) 0.8 microns at a flow rate of 2 liters/minute until a maximum collection volume of 960 liters is reached. Analysis via AAS or ICP	NA	NA	NA	NA

Checked by: Date:

PERSONAL PROTECTIVE EQUIPMENT

Recommended Protective Clothing Materials:

Suits Recommended; material not specified

Gloves Recommended; material not specified

Boots Not reported

Service Limit Concentration (ppm):

MUC 1/2 Mask APR = TWA x 10 = 10 mg/m^3

MUC Full-Face APR = TWA x 50 = 50 mg/m^3

FIRE/REACTIVITY DATA

Flash Point: NA

LEL/UEL: NA

Fire Extinguishing Media:

Dry Chemical X Foam

Water Spray X CO_2

Note: Flammable as dust or fume and may release toxic vapors; dusts may combust spontaneously

Incompatibilities:

Strong acids, sulfur, selenium, wood & other combustibles, nickel nitrate

APPENDIX A

CONTAMINANT FACT SHEET

CONTAMINANT FACT SHEET

Chemical Name:
Aroclors-General 1336-36-3,
CAS Number: 11097-69-1, 53469-21-9
Synonyms:
Chlorodiphenyls
Polychlorinated biphenyls (PCBs)

HEALTH HAZARD DATA

Color: Colorless to pale yellow

Physical State: Solid X Below 50 F
Liquid Viscous
Gas

Odor: Hydrocarbon like

Odor Threshold NA

Vapor Density: NA

Ionization Potential (IP): Unknown

IDLH: 5 mg/m3

Carcinogen: OSHA
IARC X
NTP X
ACGIH X
NIOSH X

Skin absorbable: Yes

Skin corrosive: Yes

Signs/Symptoms of Acute Exposure:

Irritant to eyes, chloracne, liver damage

Source	TWA (units)	STEL (units)	C (units)
OSHA PELs	0.5 mg/m3 (1254)		
ACGIH TLVs	0.5 mg/m3 (1254)	ppm	
NIOSH RELs	0.001 mg/m3 (1254)		

AIR MONITORING

Type	Brand/Model No.	Calibrations Method/Media	Relative Response or Conversion Factor	Meter Specific Action Level
PID	Micro tip 10.6 eV	Isobutylene 100 ppm		
PID	HNu w/ 10.2 eV	Isobutylene Span 9.8/100 ppm		
FID	Century OVA	Methane		

PERSONAL PROTECTIVE EQUIPMENT

Recommended Protective Clothing Materials:

Suits Saranex, Butyl Rubber, Neoprene, Viton, Teflon, Barricade, Responder

Gloves Viton, Butyl Rubber, Viton, Butyl Rubber

Boots Butyl Rubber, Neoprene

Service Limit Concentration (ppm): NA

MUC 1/2 Mask APR = TWA x 10 = 2.5 mg/m3

MUC Full-Face APR = TWA x 50 = 2.5 mg/m3

FIRE/REACTIVITY DATA

Flash Point: NA

LEL/UEL: NA/NA

Fire Extinguishing Media:

Dry Chemical X Foam X

Water Spray X CO_2 X

Incompatibilities:

Strong Oxidizers

Checked by: Date:

APPENDIX A

CONTAMINANT FACT SHEET

CONTAMINANT FACT SHEET

Chemical Name:
Phenol

CAS Number: 108-95-2

Synonyms:
Carbolic acid; Hydroxybenzene; Phenyl alcohol; Monohydroxybenzene; Phenyl hydroxide

HEALTH HAZARD DATA

Color: Colorless to lt. pink

Physical State: Solid X
Liquid X
Gas

Odor: Sweet, tarry

Odor Threshold 0.05 ppm

Vapor Density: N/A

Ionization Potential (IP): 8.50 eV

IDLH: 250 ppm

Carcinogen: OSHA
IARC
NTP
ACGIH
NIOSH

Skin absorbable: No

Skin corrosive: No

Signs/Symptoms of Acute Exposure:
Eye, nose, and throat irritant, headaches, dizziness, CNS depressant

Source	TWA (units)	STEL (units)	C (units)
OSHA PELs	5 ppm - Skin		
ACGIH TLVs	5 ppm		
NIOSH RELs	5 ppm - Skin		15.6 ppm

AIR MONITORING

Type	Brand/Model No.	Calibrations Method/Media	Relative Response or Conversion Factor	Meter Specific Action Level
PID	Micro tip with 10.6 eV lamp	Isobutylene 100 ppm	1.0	5 ppm
Detector Tube	Dräeger 8101641	1 -20 ppm	0.85	4.25 ppm

PERSONAL PROTECTIVE EQUIPMENT

Recommended Protective Clothing Materials:
Suits Butyl rubber, Neoprene
Gloves Butyl rubber, Neoprene, Teflon
Viton, PE/EVAL
Boots Butyl rubber, Neoprene

Service Limit Concentration (ppm): 1000
MUC 1/2 Mask APR = TWA x 10 = 50 ppm
MUC Full-Face APR = TWA x 50 = 50 ppm

FIRE/REACTIVITY DATA

Flash Point: 175°F
LEL/UEL: 1.8%/8.6%
Fire Extinguishing Media:
Dry Chemical X Foam X
Water Spray X CO_2 X

Incompatibilities:
Strong oxidizers, calcium hypochlorite, aluminum chloride, acids

Checked by: Date:

APPENDIX A

CONTAMINANT FACT SHEET

CONTAMINANT FACT SHEET

Chemical Name:
Trichloroethene
CAS Number: 67-64-1
Synonyms:
Ethylene trichloride, TCE
Trichloroethylene, Trilene

HEALTH HAZARD DATA

Color: Colorless
Physical State: Solid ____
Liquid X
Gas ____
Odor: Chloroform-like
Odor Threshold 82 ppm
Vapor Density: 4.5 g/L
Ionization Potential (IP): 9.69 eV
IDLH: 1000 ppm

Carcinogen: OSHA ____
IARC ____
NTP ____
ACGIH ____
NIOSH X
Skin absorbable: NO
Skin corrosive: NO
Signs/Symptoms of Acute Exposure:
Irritant to eyes and skin, headache, nausea, vomiting, dermatitis, vertigo, visual disturbance, fatigue, giddiness, sleepiness

Source	TWA (units)	STEL (units)	C (units)
OSHA PELs	100 ppm		200 ppm
ACGIH TLVs	10 ppm	100 ppm	
NIOSH RELs	25 ppm		

AIR MONITORING

Type	Brand/Model No.	Calibrations Method/Media	Relative Resonse or Conversion Factor	Meter Specific Action Level
PID	Micro tip 10.6 eV	Isobutylene 100 ppm	0.92	23
PID	HNu w/ 10.2 eV	Isobutylene 100 ppm	0.90	22.5
Detector Tube	Drager 6828541	2 – 50 ppm	0.6	25

Checked by: Date:

PERSONAL PROTECTIVE EQUIPMENT

Recommended Protective Clothing Materials:
Suits Viton, PE/EVAL, Tychem, Barricade, Trellchem, Teflon, Responder
Gloves Teflon, Viton, Polyvinyl Alcohol (do not use in water)
Boots Teflon, Viton
Service Limit Concentration (ppm): 1000
MUC 1/2 Mask APR = TWA x 10 = 250 ppm
MUC Full-Face APR = TWA x 50 = 250 ppm

FIRE/REACTIVITY DATA

Flash Point: Unknown
LEL/UEL: 8%/10.5%
Fire Extinguishing Media:
Dry Chemical X Foam X
Water Spray X CO_2 X

Incompatibilities:
Strong caustics and alkalis, chemically-active metals(such as barium, lithium, sodium, magnesium, titanium, and beryllium)

APPENDIX A

CONTAMINANT FACT SHEET

CONTAMINANT FACT SHEET

Chemical Name: Tetrachloroethene

CAS Number: 127-18-4

Synonyms: Tetrachloroethylene, Perchloroethylene (Perc)

HEALTH HAZARD DATA

Color: Colorless

Physical State: Solid ____ Liquid X ____ Gas ____

Odor: Chloroform-like

Odor Threshold 47 ppm

Vapor Density: 6.8 g/L

Ionization Potential (IP): 9.32 eV

IDLH: 150 ppm

Carcinogen: OSHA ____ IARC ____ NTP X ____ ACGIH X ____ NIOSH X

Skin absorbable: No

Skin corrosive: No

Signs/Symptoms of Acute Exposure:

Irritation of eyes, nose, and throat; nausea; flushing of the face and neck; vertigo; dizziness; incoherence; headache; sleepiness, and skin irritation

Source	TWA (units)	STEL (units)	C (units)
OSHA PELs	100 ppm		
ACGIH TLVs	25 ppm	100 ppm	
NIOSH RELs	Lowest Feasible		

AIR MONITORING

Type	Brand/Model No.	Calibrations Method/Media	Relative Response or Conversion Factor	Meter Specific Action Level
PID	Micro tip 10.6 eV	Isobutylene 100 ppm	1.04 ppm	26 ppm
PID	HNu w/ 10.2 eV	Isobutylene Span 9.8/100 ppm	0.86	21.5 ppm
FID	Century OVA	Methane		25 ppm

Checked by: Date:

PERSONAL PROTECTIVE EQUIPMENT

Recommended Protective Clothing Materials:

Suits Teflon, Viton, CPF3, Barricade, Responder, Trellchem, Tychem

Gloves Viton, Teflon, and Polyvinyl Alcohol (do not use in water)

Boots Nitrile Rubber

Service Limit Concentration (ppm): 1000

MUC 1/2 Mask APR = TWA x 10 = 125 ppm

MUC Full-Face APR = TWA x 50 = 125 ppm

FIRE/REACTIVITY DATA

Flash Point: NA

LEL/UEL: NA

Fire Extinguishing Media:

Dry Chemical X ____ Foam X

Water Spray X ____ CO_2 X

Incompatibilities: Strong oxidizers, chemically-active metals, caustic soda, sodium hydroxide, and potash

APPENDIX A

CONTAMINANT FACT SHEET

CONTAMINANT FACT SHEET

Chemical Name:
Toluene

CAS Number: 108-88-3

Synonyms:
Methylbenzene, Methyl benzol, Phenyl methane, Toluol

HEALTH HAZARD DATA

Color: Colorless

Physical State: Solid ____ Liquid X ____ Gas ____

Odor: Sweet, pungent

Odor Threshold 0.16 - 37 ppm

Vapor Density: 3.7 g/L

Ionization Potential (IP): 8.82 eV

IDLH: 500 ppm

Carcinogen: OSHA X ____ IARC ____ NTP ____ ACGIH ____ NIOSH X

Skin absorbable: Yes

Skin corrosive: No

Signs/Symptoms of Acute Exposure:

Eye and nose irritant, headaches, dizziness, fatigue, confusion, weakness, dilated pupils, dermatitits, lacrimation, nervousness

Source	TWA (units)	STEL (units)	C (units)
OSHA PELs	200 ppm		300 ppm
ACGIH TLVs	20 ppm		
NIOSH RELs	100 ppm	150 ppm	

AIR MONITORING

Type	Brand/Model No.	Calibrations Method/Media	Relative Response or Conversion Factor	Meter Specific Action Level
PID	Micro tip 10.6 eV	Isobutylene 100 ppm	0.5	100
PID	HNU 10.2 eV	Isobutylene 100 ppm	0.928	46.4
PID	HNU 11.7 eV	Isobutylene 100 ppm	1.14	57

Checked by: Date:

PERSONAL PROTECTIVE EQUIPMENT

Recommended Protective Clothing Materials:

Suits Teflon, Viton, CPF3, PE/EVAL, Barricade, Responder, Tychem, Trellchem

Gloves Viton, Teflon, Polyvinyl alcohol (do not use in water)

Boots Teflon, Viton

Service Limit Concentration (ppm): 1000

MUC 1/2 Mask APR = TWA x 10 = 500 ppm

MUC Full-Face APR = TWA x 50 = 500 ppm

*Not to exceed IDLH

FIRE/REACTIVITY DATA

Flash Point: 40 °F

LEL/UEL: 1.1% / 7.1%

Fire Extinguishing Media:

Dry Chemical X Foam X

Water Spray X CO_2 X

Incompatibilities:

Strong oxidizers

APPENDIX A

CONTAMINANT FACT SHEET

CONTAMINANT FACT SHEET

Chemical Name:
Vinyl Chloride

CAS Number: 75-01-4

Synonyms:
Chloroethene, chloroethylene, ethylene monochloride, VC, monochloroethene

HEALTH HAZARD DATA

Color: Colorless

Physical State: Solid ____
Liquid X <7 F
Gas X

Odor: Pleasant

Odor Threshold 10 - 20 ppm

Vapor Density: 2.15 g/L

Ionization Potential (IP): 9.99 eV

IDLH: Not determined

Carcinogen: OSHA X
IARC X
NTP X
ACGIH X
NIOSH X

Skin absorbable: NO

Skin corrosive: NO

Signs/Symptoms of Acute Exposure:

Weakness, abdominal pain, frostbite, paleness or blueness of extremities.

Source	TWA (units)	STEL (units)	C (units)
OSHA PELs	1 ppm		5 ppm
ACGIH TLVs	1 ppm		
NIOSH RELs	Lowest feasible		

AIR MONITORING

Type	Brand/Model No.	Calibrations Method/Media	Relative Resonse or Conversion Factor	Meter Specific Action Level
PID	Micro tip 10.6 eV	Isobutylene 100 ppm	0.67	0.67
PID	HNu w/ 10.2 eV	Isobutylene Span 9.8/100 ppm	0.32	0.32
PID	Century OVA	Methane	0.78	0.78

Checked by: Date:

PERSONAL PROTECTIVE EQUIPMENT

Recommended Protective Clothing Materials:

Suits Tychem, Teflon

Gloves Teflon, Tychem, Nitrile Rubber

Boots Nitrile Rubber, Teflon

Service Limit Concentration (ppm): 1000

MUC 1/2 Mask APR = TWA x 10 = 5 ppm

MUC Full-Face APR = TWA x 50 = 5 ppm

FIRE/REACTIVITY DATA

Flash Point: NA

LEL/UEL: 3.6/33%

Fire Extinguishing Media:

Dry Chemical X Foam X

Water Spray X CO_2 X

Incompatibilities:

Copper, oxidizers, aluminum, peroxides, iron, teel,(polymerizes in air, sunlight, or heat unless stabilized by inhibitors). Attacks iron and steel in presense of moisture.

APPENDIX A

CONTAMINANT FACT SHEET

CONTAMINANT FACT SHEET

Chemical Name:
m-Xylene
CAS Number: 108-38-3
Synonyms:
1,3-Dimethylbenzene; meta-Xylene; m-Xylol

HEALTH HAZARD DATA

Color: Colorless

Physical State: Solid X (below 56°F)
Liquid X
Gas

Odor: Aromatic

Odor Threshold 20 ppm

Vapor Density: 4.3 g/L

Ionization Potential (IP): 8.56 eV

IDLH: 900 ppm

Carcinogen: OSHA
IARC
NTP
ACGIH
NIOSH

Skin absorbable: NO

Skin corrosive: NO

Signs/Symptoms of Acute Exposure:

Eye, nose, skin, and throat irritant, dizziness, drowsiness, excitement, staggering gait, nausea, vomiting, abdominal pain, dermatitis

Source	TWA (units)	STEL (units)	C (units)
OSHA PELs	100 ppm		
ACGIH TLVs	100 ppm	150 ppm	
NIOSH RELs	100 ppm	150 ppm	

AIR MONITORING

Type	Brand/Model No.	Calibrations Method/Media	Relative Resonse or Conversion Factor	Meter Specific Action Level
PID	Micro tip 10.6 eV	Isobutylene 100 ppm	0.4	80
PID	HNu w/ 10.2 eV	Isobutylene Span 9.8/100 ppm	1.04	104	

Checked by: Date:

PERSONAL PROTECTIVE EQUIPMENT

Recommended Protective Clothing Materials:

Suits Teflon, Viton, PE/EVAL

Gloves Teflon, Viton, Polyvinyl alcohol (do not use in water)

Boots Teflon, Viton

Service Limit Concentration (ppm): 1000

MUC 1/2 Mask APR = TWA x 10 = 900 ppm*

MUC Full-Face APR = TWA x 50 = 900 ppm*

*Not to exceed IDLH

FIRE/REACTIVITY DATA

Flash Point: 82°F

LEL/UEL: 1.1% / 7.0%

Fire Extinguishing Media:

Dry Chemical X Foam X

Water Spray X CO_2 X

Incompatibilities:

Strong oxidizers and strong acids

APPENDIX A

CONTAMINANT FACT SHEET

CONTAMINANT FACT SHEET

Chemical Name:
Zinc

CAS Number: 7440-66-6

Synonyms:
Zn, zinc metal dusts

HEALTH HAZARD DATA

Color: Silver/bluish white metallic

Physical State: Solid X
Liquid
Gas

Odor: NA

Odor Threshold NA

Vapor Density: NA

Ionization Potential (IP): NA

IDLH: NA

Carcinogen: OSHA
IARC
NTP
ACGIH
NIOSH

Skin absorbable: Yes

Skin corrosive: No

Signs/Symptoms of Acute Exposure:

Fumes/dust may cause eye/upper respiratory irritation; may cause acute lung damage/edema.

Source	TWA (units)	STEL (units)	C (units)
OSHA PELs	NA		
ACGIH TLVs	NA		
NIOSH RELs	NA		

AIR MONITORING

Type	Brand/ Model No.	Calibration Method/ Media	Relative Response or Conversion Factor	Meter Specific Action Level
Collection on a Mixed Cellulose Ester Filter (MCEF) 0.8 microns at a flow rate of 2 liters/minute until a maximum collection volume of 960 liters is reached. Analysis via AAS or ICP	NA	NA	NA	NA

Checked by: Date:

PERSONAL PROTECTIVE EQUIPMENT

Recommended Protective Clothing Materials:

Suits Recommended; material not specified

Gloves Recommended; material not specified

Boots Not reported

Service Limit Concentration (ppm):

MUC 1/2 Mask APR = TWA x 10 = NA

MUC Full-Face APR = TWA x 50 = NA

FIRE/REACTIVITY DATA

Flash Point: NA

LEL/UEL: NA

Fire Extinguishing Media:

Dry Chemical X Foam

Water Spray CO_2

Note: Powder is very flammable; reacts chemically with halon and CO_2 gas extinguishers

Incompatibilities:

Incompatible with NH_4NO_3, barium oxide, $Ba(NO_3)_2$, Cadmium, CS_2, chlorates, Cl_2, CrO_3, (ethyl acetoacetate + tribromoneopentyl alcohol), F_2, hydrazine mononitrate, hydroxylamine, $Pb(N_3)_2$, (Mg + $Ba(NO_3)_2$ + BaO_2), $MnCl_2$, HNO_3, performic acid, $KClO_3$, KNO_3, K_2O_2, Selenium, $NaClO_3$, Na_2O_2, Sulfur, Te, water, $(NH_4)2S$, As_2O_3, CS_2, $CaCl_2$, NaOH, chlorinated rubber, catalytic metals, halocarbons, o-nitroanisole, nitrobenzene, nonmetals

APPENDIX B

ACTIVITY HAZARD ANALYSIS PER TASK(S)

AHA - Mobilization/Demobilization and Site Preparation

Activity/Work Task:	Mobilization/Demobilization and Site Preparation		
Project Location:	Long Island City, Queens, NY		
Contract Number:			
Date Prepared:	9/8/2014	**Date Accepted:**	**9/8/2014**
Prepared by (Name/Title):	Andrew Shust, Sr Associate Scientist		
Reviewed by (Name/Title):			

Notes: (Field Notes, Review Comments, etc.)

This AHA involves the following:

- Establishing site specific measures
-

This AHA is not an exhaustive summary of all hazards associated with the Site. Refer to the site HASP for additional requirements. Contractor to follow general site safety controls for Slips Trips and Falls, Biological hazards, cuts lacerations and pinch points, and emergency procedures.

Overall Risk Assessment Code (RAC) (Use highest code) **M**

Risk Assessment Code (RAC) Matrix

Severity	Probability				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)

"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible

Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.

RAC Chart

- **E = Extremely High Risk**
- **H = High Risk**
- **M = Moderate Risk**
- **L = Low Risk**

Job Steps	Hazards	Controls	RAC
1. Prepare for Site Visit	1A) N/A	Prior to leaving for site: ▪ Obtain and review HASP prior to site visit, if possible ▪ Determine PPE needs – bring required PPE to the site, if not otherwise being provided at the site (e.g., steel toed boots) ▪ Determine training and medical monitoring needs and ensure all required Health and Safety training and medical monitoring has been received and is current ▪ Ensure all workers are fit for duty (alert, well rested, and mentally and physically fit to perform work assignment) ▪ If respiratory protection is required/potentially required, ensure that training and fit-testing has occurred within the past year. ▪ Familiarize yourself with route to the site	**L**

AHA - Mobilization/Demobilization and Site Preparation

Job Steps	Hazards	Controls	RAC
	1b) Vehicle defects	Inspect company owned/leased vehicle for defects such as: ▪ Flat tires ▪ Windshield wipers worn or torn ▪ Oil puddles under vehicle ▪ Headlights, brake lights, turn signals not working	**L**
	1c) Insufficient emergency equipment, unsecured loads	Insufficient emergency equipment, unsecured loads: ▪ Ensure vehicle has first aid kit and that all medications are current (if first aid kits are not provided at the site) ▪ Ensure vehicle is equipped with warning flashers and/or flares and that the warning flashers work ▪ Cell phones are recommended to call for help in the event of an emergency ▪ Vehicles carrying tools must have a safety cage in place. All tools must be properly secured ▪ Vehicles must be equipped with chocks if the vehicle is to be left running, unattended. ▪ Ensure sufficient gasoline is in the tank	**M**
2. Operating vehicles	2a) Collisions, unsafe driving conditions	Drive Defensively!: ▪ Seat belts must be used at all times when operating any vehicle on company business. ▪ Drive at safe speed for road conditions ▪ Maintain adequate following distance ▪ Pull over and stop if you have to look at a map ▪ Try to park so that you don't have to back up to leave. ▪ If backing in required, walk around vehicle to identify any hazards (especially low level hazards that may be difficult to see when in the vehicle) that might be present. Use a spotter if necessary	**M**
3. Driving to the jobsite (mobilization)	3a) Dusty, winding, narrow roads	Dusty, winding, narrow roads ▪ Drive confidently and defensively at all times. ▪ Go slow around corners, occasionally clearing the windshield.	**M**
	3b) Rocky or one-lane roads	Rocky or one-lane roads: ▪ Stay clear of gullies and trenches, drive slowly over rocks. ▪ Yield right-of-way to oncoming vehicles---find a safe place to pull over.	**M**
	3c) Stormy weather, near confused tourists	Stormy weather, near confused tourists: ▪ Inquire about conditions before leaving the office. ▪ Be aware of oncoming storms. ▪ Drive to avoid accident situations created by the mistakes of others.	**M**

AHA - Mobilization/Demobilization and Site Preparation

Job Steps	Hazards	Controls	RAC
	3d) When angry or irritated	When angry or irritated: ▪ Attitude adjustment; change the subject or work out the problem before driving the vehicle. Let someone else drive.	**M**
	3e) Turning around on narrow roads	Turning around on narrow roads: ▪ Safely turn out with as much room as possible. ▪ Know what is ahead and behind the vehicle. ▪ Use a backer if available.	**M**
	3f) Sick or medicated	Sick or medicated: ▪ Let others on the crew know you do not feel well. ▪ Let someone else drive.	**M**
	3g) On wet or slimy roads	On wet or slimy roads ▪ Drive slow and safe, wear seatbelts. ▪	**M**
	3h) Animals on road	Animals on road ▪ Drive slowly, watch for other animals nearby. ▪ Be alert for animals darting out of wooded areas	**M**
4. Gain permission to enter site	4a) Hostile landowner, livestock, pets	Hostile landowner, livestock, pets ▪ Talk to land owner, be courteous and diplomatic ▪ Ensure all animals have been secured away from work area	**M**
5. Mobilization/ Demobilization of Equipment and Supplies	5a) Struck by Heavy Equipment/Vehicles	Struck by heavy equipment: ▪ Be aware of heavy equipment operations. ▪ Keep out of the swing radius of heavy equipment. ▪ Ground personnel in the vicinity of heavy equipment operations will be within the view of the operator at all times ▪ Employees shall wear a high visibility vest or T-shirt (reflective vest required if working at night). ▪ Ground personnel will be aware of the counterweight swing and maintain an adequate buffer zone. ▪ Ground personnel will not stand directly behind heavy equipment when it is in operation.	**M**
	5b) Struck by Equipment/Supplies	Struck by Equipment/Supplies: ▪ Workers will maintain proper space around their work area, if someone enters it, stop work. ▪ When entering another worker's work space, give a verbal warning so they know you are there.	**M**

AHA - Mobilization/Demobilization and Site Preparation

Job Steps	Hazards	Controls	RAC
	5c) Overexertion Unloading/Loading Supplies	Overexertion Unloading/Loading Supplies: ▪ Train workers on proper body mechanics, do not bend or twist at the waist while exerting force or lifting. ▪ Tightly secure all loads to the truck bed to avoid load shifting while in transit.	**M**
	5d) Overexertion Unloading/Loading Supplies	Caught in/on/between: ▪ Do not place yourself between two vehicles or between a vehicle and a fixed object.	**M**
	5e) Slip/Trip/Fall	Slip/Trip/Fall: ▪ Mark all holes and low spots in area with banner tape. Instruct personnel to avoid these areas. ▪ Drivers will maintain 3 point contact when mounting/dismounting vehicles/equipment. ▪ Drivers will check surface before stepping, not jumping down.	**M**
	5f) Vehicle accident	Vehicle accident: ▪ Employees should follow Amec Foster Wheeler vehicle operation policy and be aware of all stationary and mobile vehicles.	**M**
6. Site Preparation	6a) Slip/Trip/Fall	Slip/Trip/Fall: ▪ Mark all holes and low spots in area with banner tape. Instruct personnel to avoid these areas	**M**
7. Installation of soil erosion and sediment controls	7a) Overexertion	Overexertion: ▪ Workers will be trained in the proper method of placing erosion controls. ▪ Do not bend and twist at the waist while lifting or exerting force.	**M**
	7b) Struck by Equipment/Supplies	Struck by Equipment/Supplies: ▪ Workers will maintain proper space around their work area, if someone enters it, stop work. ▪ When entering another worker's work space, give a verbal warning so they know you are there.	**M**
8. Driving back from the jobsite	7c) See hazards listed under item #3	**See safe work practices under item #3**	**M**

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
PPE (, Hard Hat, safety glasses, gloves, steel toe work boots, high visibility safety vest, hearing protection) Note: When initially entering the site the following PPE must be donned:	**Competent / Qualified Personnel:** Name – Position/Employer **Training requirements:** List specific certification (as applicable) Site Specific HASP Orientation	Daily inspection of equipment per manufacturer's instructions. Tag tools that are defective and remove from service. Inspect power cord sets prior to use.

AHA - Mobilization/Demobilization and Site Preparation

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
• Work Uniform or Work Clothes • Hard Hat • Safety Glasses • Steel Toe Boots • Reflective Vests	Toolbox safety meeting Task kick-off meeting	Inspect all PPE prior to use

AHA – Field Work - General

Activity/Work Task:	Field Work General		
Project Location:	Long Island City, Queens NY		
Contract Number:			
Date Prepared:	8-15-12	**Date Accepted:**	8-15-12
Prepared by (Name/Title):	Kendra Bavor		
Reviewed by (Name/Title):	Kendra Bavor, CSP		

Notes: (Field Notes, Review Comments, etc.)

This AHA involves the following:

- Establishing site specific measures
-

This AHA is not an exhaustive summary of all hazards associated with the Site. Refer to the site HASP for additional requirements. Contractor to follow general site safety controls for Slips Trips and Falls, Biological hazards, cuts lacerations and pinch points, and emergency procedures.

Overall Risk Assessment Code (RAC) (Use highest code): **L**

Risk Assessment Code (RAC) Matrix

Severity	Probability				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)

"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible

Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.

RAC Chart

- **E = Extremely High Risk**
- **H = High Risk**
- **M = Moderate Risk**
- **L = Low Risk**

Job Steps	Hazards	Controls	RAC
1. Mobilization/ See Mobilization/Demobilization and Site Preparation JHA Demobilization and Site Preparation	1A) See Mobilization/Demobilization and Site Preparation JHA	See Mobilization/Demobilization and Site Preparation JHA	L
2. Communication	2A) Safety, crew unity	Talk to each other. ▪ Let other crewmembers know when you see a hazard. ▪ Avoid working near known hazard trees (trees that are rotten, dead, damaged, etc.). ▪ Always know the wherabouts of fellow crewmembers. ▪ Carry a radio and spare batteries or cell phone. ▪ Review Emergency Evacuation Procedures (see below).	L

AHA – Field Work - General

Job Steps	Hazards	Controls	RAC
3. Walking and working in the field	3A) Falling down, twisted ankles and knees, poor footing	Always watch your footing. ▪ Slow down and use extra caution around logs, rocks, and animal holes. ▪ Extremely steep slopes (>50%) can be hazardous under wet or dry conditions; consider an alternate route. ▪ Wear laced boots with a minimum 8" high upper and non-skid Vibram-type soles for ankle support and traction.	**L**
	3B) Falling objects	Protect head agains falling objects. ▪ Wear your hardhat for protection from falling limbs and pinecones, and from tools and equipment carried by other crewmembers. ▪ Stay out of the woods during extremely high winds.	**L**
	3C) Damage to eyes	Protect eyes: ▪ Watch where you walk, ecpecially around trees and brush with limbs sticking out. ▪ Exercise caution when clearing limbs from tree trunks. Advise wearing eye protection. ▪ Ultraviolet light from the sun can be damaging to the eyes; look for sunglasses that specify significant protection from UV-A and UV-B radiation. If safety glasses require, use one's with tinted lenses	**L**
	3D) Bee and wasp stings	See JHA for Insect Stings and Bites	**L**
	3E) Ticks and infected mosquitos	See JHA for Insect Stings and Bites	**L**
	3A) Lifting Injuries (e.g., Back Injuries)	Lifting Injuries (e.g., Back Injuries) ▪ Site personnel will be instructed on proper lifting techniques. ▪ Perform warm-up excercises before starting work. ▪ **DO NOT EXCEED THE AMEC FOSTER WHEELER LIFTING LIMIT OF 50 POUNDS.** ▪ Use two people to lift, lower, or carry equipment or materials heavier than 50 pounds. ▪ Mechanical devices should be used to reduce manual handling of materials. ▪ Drive the field vehicle as close to the point that the heavy equipment/material will be used as long as the area is safe to drive into and you do not create hazards to you, your co-worker, or the vehicle.	**L**
	3F) Slips/Trips/Falls	Slips/Trips/Falls ▪ Maintain work areas safe and orderly; unloading areas should be on even terrain; mark or repair possible tripping hazards. ▪ Site SHSO inspect the entire work area to identify and mark hazards. ▪ Be aware of work area conditions that can cause slip hazards such as ponding of water on concrete surfaces. Ponding of water on smooth surfaces, such as	**L**

AHA – Field Work - General

Job Steps	Hazards	Controls	RAC
		concrete, coupled with the warm or freezing weather conditions has the potential to cause slippery condiitons such as growth of scum or ice, as applicable. Adding a layer of clean fill to the surface may prevent the growth of scum, and/or create a non-slippery walking surface.	
	3G) Vehicular Traffic	Vehicular Traffic ▪ Spotters will be used when backing up trucks and heavy equipment and when moving equipment. ▪ High visibility vests will be worn when workers are exposed to vehicular traffic at the site or on public roads.	**L**
	3H) Overhead Hazards	Overhead Hazards ▪ Personnel will be required to wear hard hats that meet ANSI Standard Z89.1. ▪ All ground personnel will stay clear of suspended loads. ▪ All equipment will be provided with guards, canopies or grills to protect the operator from falling or flying objects. ▪ All overhead hazards will be identified prior to commencing work operations.	**L**
	3I) Dropped Objects	Dropped Objects ▪ Safety toed boots meeting ANSI Standard Z41 will be worn.	**L**
	3J) Noise	Noise ▪ Hearing protection will be worn with a noise reduction rating capable of maintaining personal exposure below 85 dBA (ear muffs or plugs); all equipment will be equipped with manufacturer's required mufflers. Hearing protection shall be worn by all personnel working in or near heavy equipment.	**L**
	3K) Eye Injuries	Eye Injuries ▪ Safety glasses meeting ANSI Standard Z87 will be worn.	**L**
	3L) Heavy Equipment (overhead hazards, spills, struck by or against)	Heavy Equipment ▪ Equipment will have seat belts. ▪ Operators will wear seat belts when operating equipment. ▪ Do not operate equipment on grades that exceed manufacturer's recommendations. ▪ Equipment will have guards, canopies or grills to protect from flying objects. ▪ Ground personnel will stay clear of all suspended loads. ▪ Ground personnel will wear high visibility vests ▪ Spill and absorbent materials will be readily available. ▪ Drip pans, polyethylene sheeting or other means will be used for secondary containment. ▪ Ground personnel will stay out of the swing radius of excavators.	**L**

AHA – Field Work - General

Job Steps	Hazards	Controls	RAC
		▪ Eye contact with operators will be made before approaching equipment. ▪ Operator will acknowledge eye contact by removing his hands from the controls. ▪ Equipment will not be approached on blind sides. ▪ All equipment will be equipped with backup alarms and use spotters when significant physical movement of equipment occurs on-site, (i.e., other than in place excavation or truck loading).	
	3M) Struck by vehicle/equipment	Struck by vehicle/equipment ▪ Be aware of heavy equipment operations. ▪ Keep out of the swing radius of heavy equipment. ▪ Ground personnel in the vicinity of heavy equipment operations will be within the view of the operator at all times and will wear high visibility vests. ▪ Ground personnel will be aware of the counterweight swing and maintain an adequate buffer zone. ▪ Ground personnel will not stand directly behind heavy equipment when it is in operation. ▪ Drivers will keep workers on foot in their vision at all times, if you lose sight of someone, Stop!	**L**
	3N) Struck/cut by tools	Struck/cut by tools ▪ Cut resistant work gloves will be worn when dealing with sharp objects. ▪ All hand and power tools will be maintained in safe condition. ▪ Guards will be kept in place while using hand and power tools.	**L**
	3O) Caught in/on/between	Caught in/on/between ▪ Workers will not position themselves between equipment and a stationary object. ▪ Workers will not wear long hair down (place in pony-tail and tuck into shirt) or jewelry if working with tools/machinery.	**L**
	3P) Contact with Electricity/Lightning	Contact with Electricity/Lighting ▪ All electrical tools and equipment will be equipped with GFCI. ▪ Electrical extension cords will be of the “Hard” or “Extra Hard” service type. ▪ All extension cords shall have a three-blade grounding plug. ▪ Personnel shall not use extension cords with damaged outer covers, exposed inner wires, or splices. ▪ Electrical cords shall not be laid across roads where vehicular traffic may damage the cord without appropriate guarding. ▪ All electrical work will be conducted by a licensed electrician. ▪ All utilities will be marked prior to excavation activities.	**L**

AHA – Field Work - General

Job Steps	Hazards	Controls	RAC
		▪ All equipment will stay a minimum of 10 feet from overhead energized electrical lines (50 kV). This distance will increase by 4 inches for each 10 kV above 50 kV. Rule of Thumb: Stay 10 feet away from all overhead powerlines known to be 50 kV or less and 35 feet from all others.) ▪ The SHSO shall halt outdoor site operations whenever lightning is visible, outdoor work will not resume until 30 minutes after the last sighting of lightning.	
	3Q) Equipment failure	Equipment failure ▪ All equipment will be inspected before use. If any safety problems are noted, the equipment should be tagged and removed from service until repaired or replaced.	**L**
	3R) Hand & power tool usage, cuts, burns, etc.	Hand & power tool usage ▪ Inspect the tool daily. ▪ Remove broken or damaged tools from service. ▪ Use the tool for its intended purpose. ▪ Use in accordance with manufacturers instructions.	**L**
	3S) Burns and Exposure to Exhaust from Portable Propane Torch Use	Portable propane torch usage ▪ Read the manual to become familiar with the propane torch and follow all safety precautions. Don PPE (safety glasses, heavy leather gloves) before using the torch. ▪ Inspect the propane cylinder and the torch tip to ensure there are no defects, damage, etc. ▪ Assemble the torch kit per instruction manual. The torch is designed to be used with the small propane cylinder, do not attempt to attach the torch to any other gas cylinder. ▪ Do not use the torch in areas where gasoline or other liquids having flammable vapors are stored or used. ▪ Do not smoke while igniting or operating the propane torch. ▪ Have an ABC type fire extinguisher readily accessible to the work area. ▪ Be sure the torch tip has a tight seal to the cylinder. If you smell gas, do not try to light the torch. Check the seal between the cylinder and torch. Do not attempt to light the torch until the seal is secure and no gas is leaking. ▪ To ignite the torch flame, first position the point of the torch tip away from you. ▪ If the unit requires a striker to ignite the torch, only use the striker provided with the unit. Never use a match or lighter to ignite torch. Do not place hand or any part of your body in the path of the flame while lighting or operating the propane torch. ▪ Never leave an ignited torch unattended while in operation. When not in use, the torch tip must be removed from the propane cylinder.	**L**

AHA – Field Work - General

Job Steps	Hazards	Controls	RAC
		▪ Be aware of the weather conditions. On bright sunny days, the torch flame may be barely visible. On windy days, the wind may carry the torch's heat back towards you. ▪ The torch can produce combustion products such as carbon monoxide. Do not breathe in the exhaust. Propane vapors are heavier than air and can accumulate in low or confined areas. Use the torch only in a well ventilated area. ▪ Heating a surface may cause heat to be conducted to adjoining surfaces that may be combustible or become pressurized when heated. Always check to make sure no unintended parts or materials are being heated. ▪ Torch will be extremely hot, allow the torch to cool before touching it to remove it from the cylinder. ▪ Never store a torch that is still hot. ▪ When cooled, disconnect the torch from the cylinder for storage, and store them in a safe manner to prevent damage.	

4. Environmental health considerations	4A) HEAT Stress	Take precautions to prevent heat stress
		▪ Remain constantly aware of the four basic factors that determine the degree of heat stress (air temperature, humidity, air movement, and heat radiation) relative to the surrounding work environmental heat load.
		▪ Know the signs and symptoms of heat exhaustion, heat cramps, and heat stroke. Heat stroke is a true medical emergency requiring immediate emergency response action.
		NOTE: The severity of the effects of a given environmental heat stress is decreased by reducing the work load, increasing the frequency and/or duration of rest periods, and by introducing measures which will protect employees from hot environments.
		▪ Maintain adequate water intake by drinking water periodically in small amounts throughout the day (flavoring water with citrus flavors or extracts enhances palatability).
		▪ Allow approximately 2 weeks with progressive degrees of heat exposure and physical exertion for substantial acclimatization.
		▪ Acclimatization is necessary regardless of an employee's physical condition (the better one's physical condition, the quicker the acclimatization). Tailor the work schedule to fit the climate, the physical condition of employees, and mission requirements.
		  ▪ A reduction of work load markedly decreases total heat stress.
		  ▪ Lessen work load and/or duration of physical exertion the first days of heat exposure to allow gradual acclimatization.
		▪ Alternate work and rest periods. More severe conditions may require longer rest periods and electrolyte fluid replacement.
			L

AHA – Field Work - General

Job Steps	Hazards	Controls	RAC
	4B) Wet Bulb Globe Temperature (WBGT) Index	WBGT ▪ Curtail or suspend physical work when conditions are extremely severe (see attached Heat Stress Index). ▪ Compute a Wet Bulb Globe Temperature Index to determine the level of physical activity (take WBGT index measurements in a location that is similar or closely approximates the environment to which employees will be exposed).	L
		WBGT THRESHOLD VALUES FOR INSTITUTING PREVENTIVE MEASURES 80-90 degrees F — Fatigue possible with prolonged exposure and physical activity. 90-105 degrees F — Heat exhaustion and heat stroke possible with prolonged exposure and physical activity. 105-130 degrees F — Heat exhaustion and heat stroke are likely with prolonged heat exposure and physical activity.	.
	4C) Cold Extremes	Take precautions to prevent cold stress injuries ▪ Cover all exposed skin and be aware of frostbite. While cold air will not freeze the tissues of the lungs, slow down and use a mask or scarf to minimize the effect of cold air on air passages. ▪ Dress in layers with wicking garments (those that carry moisture away from the body – e.g., cotton) and a weatherproof slicker. A wool outer garment is recommended. ▪ Take layers off as you heat up; put them on as you cool down. ▪ Wear head protection that provides adequate insulation and protects the ears. ▪ Maintain your energy level. Avoid exhaustion and over-exertion which causes sweating, dampens clothing, and accelerates loss of body heat and increases the potential for hypothermia. ▪ Acclimate to the cold climate to minimize discomfort. ▪ Maintain adequate water/fluid intake to avoid dehydration.	L
	4D) Wind	Effects of the wind ▪ Wind chill greatly affects heat loss (see attached Wind Chill Index). ▪ Avoid marking in old, defective timber, especially hardwoods, during periods of high winds due to snag hazards.	L

AHA – Field Work - General

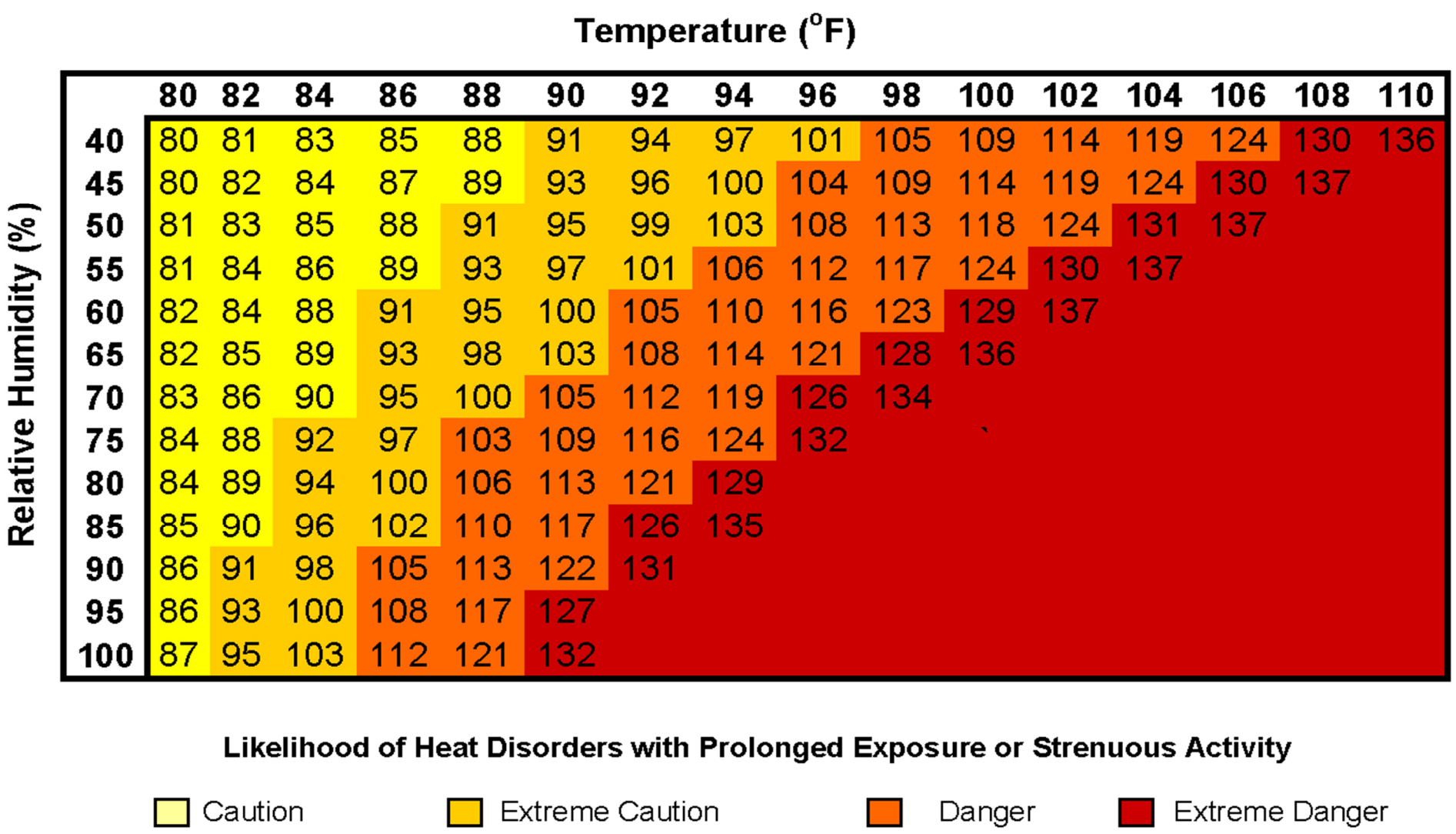
Job Steps	Hazards	Controls	RAC
	4E) Thunderstorms	Thunderstorms ▪ Monitor weather channels to determine if electrical storms are forcased. ▪ Plan ahead and identify safe locations to be in the event of a storm. (e.g., sturdy building, vehicle, etc.) ▪ Suspend all field work at the first sound of thurnder. You should be in a safe place when the time between the lightning and thunder is less than 30 seconds. ▪ Only return to work 30 minutes after the after the last strike or sound of thunder	**L**
5. Check and calibrate industrial hygiene and other field instruments and equipment as required and as recommended by the manufacturer	5A) Exposure to Calibration Gases/Chemicals due to: • Use of damaged instruments.	Verify proper operation of the instrument prior to calibration. Calibrate instruments in an area with adequate ventilation and follow the manufacturer's recommendations. ▪ Wear appropriate PPE to conduct calibrations as specified in the instrument manual.	**L**
	5B) Exposure to Site contaminants due to: • Improper instrument calibration; • Misinterpretation of calibration results; • Improper instrument repair; • Improper use of instrument due to lack of training.	5A) Calibrate the instrument in accordance with the manufacturer's recommendations (see instrument manual) using the applicable calibration standard and calibration procedure. ▪ Perform calibrations at a frequency recommended by the manufacturer. Be aware of the instrument's limitations (e.g., detection limit, maximum sensitivity) and the conditions (e.g., humidity) that may affect correct operation or accuracy of that equipment. Possible sources of error that may affect the correct calibration of the instrument. ▪ Use only calibration materials recommended by the manufacturer for calibration. Do not use substitutions. ▪ Confirm that the connections between the instrument and the calibration gas/material is leak-free. ▪ Record all instrument calibrations in the field logbook. Include the instrument ID (type/manufacture/serial number/lamp eV, etc.), calibration gas used (chemical and concentration), and instrument result. ▪ Do not attempt to repair instrument. Return to the vendor for replacement. Report any damaged or malfunctioning instrument to the vendor. ▪ All personnel must be familiar with operation of the instrument and understand: - Theroy of its operation including any alarms and their setpoints - Materials the instrument can and cannot detect, - Instrument's limitations - The expected responses to calibration gases/materials - Interfering gases/chemicals and their affects on the instrument readings - When re-zeroing is appropriate.	**L**

AHA – Field Work - General

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
PPE (1/2 face respirator with P-100 cartridge (upgrade), Hard Hat, safety glasses, gloves (per HASP), steel toed work boots, high visibility safety vest, hearing protection)	**Competent / Qualified Personnel:** Names provided in HASP (Position/Employer) **Training requirements:** Site Specific HASP Orientation Toolbox safety meeting Task kick-off meeting	Daily inspection of equipment per manufacturer's instructions. Tag tools that are defective and remove from service. Inspect power cord sets prior to use. Inspect all PPE prior to use

NOAA's National Weather Service

Heat Index



Wind Chill Chart

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

Frostbite Times — 30 minutes — 10 minutes — 5 minutes

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

Where, T= Air Temperature (°F) V= Wind Speed (mph)

Effective 11/01/01

AHA – Treatment System Inspection/Maintenance

Activity/Work Task:	**Treatment System General Inspection and Maintenance**			Overall Risk Assessment Code (RAC) (Use highest code)					**M**
Project Location:	**Review Ave., Long Island City, NY**			**Risk Assessment Code (RAC) Matrix**					
Contract Number:									
Date Prepared:	**11/27/2014**	**Date Accepted:**	**11/27/2014**		Frequent	Likely	Occasional	Seldom	Unlikely
Prepared by (Name/Title):	Laurie Gneiding Associate Toxicologist					E	H	H	M
				Critical	E	H	H	M	L
Reviewed by (Name/Title):	Chad Barnes, Mtn. Group Safety Manager			Marginal	H	M	M	L	L
				Negligible	M	L	L	L	L

Notes: (Field Notes, Review Comments, etc.)

This AHA involves the following:

- Establishing general inspection and maintenance measures for treatment system operations.

This AHA is not an exhaustive summary of all hazards associated with the Site. Refer to the site HASP for additional requirements. Contractor to follow general site safety controls for Slips Trips and Falls, Biological hazards, cuts lacerations and pinch points, and emergency procedures.

Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)

"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible

Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.

RAC Chart
E = Extremely High Risk
H = High Risk
M = Moderate Risk
L = Low Risk

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
Hard Hat, safety glasses, gloves, safety work boots, high visibility safety vest, hearing protection.	**Competent / Qualified Personnel:** Dennis Young – Amec Foster Wheeler SHSO/Lead Operator Dan Berkowitz – alternate operator **Training requirements:** 40-Hr HAZWOPER Hazard Communications Site-Specific HASP Orientation Toolbox safety meeting Task kick-off meeting	Daily inspection of equipment per manufacturer's instructions. Tag tools that are defective and remove from service. Inspect power cord sets prior to use. Inspect all PPE prior to use.

AHA – Treatment System Inspection/Maintenance

Job Steps	Hazards	Controls	RAC
1. Prepare For Site Visit	**N/A**	▪ Obtain and review HASP prior to site visit. ▪ Determine PPE needs – bring required PPE to the site, if not otherwise being provided at the site (e.g., safety boots). ▪ Determine training and medical monitoring needs and ensure all required Health and Safety training and medical monitoring has been received and is current. ▪ Complete site specific/ client required training. ▪ Ensure all workers are fit for duty (alert, well rested, and mentally and physically fit to perform work assignment). ▪ First aid kits and fire extinguishers shall be available at the work site and on each transport vehicle. ▪ Familiarize yourself with route to the site. ▪ Check weather forecast. Pack appropriate clothing for anticipated weather conditions. ▪ Verify that subsurface utilities have been identified.	**NA**
2. Traveling To The Site By Vehicle		See AHA - Mobilization, Demobilization and Site Preparation	**L**
3. Open Access Cover Or Hatch And Allow Well To Ventilate.	3A) Chemical Hazards	3A) Chemical Hazards ▪ See HASP for appropriate level of PPE. ▪ Use monitoring equipment, as outlined in HASP, to monitor breathing zone. ▪ Read chemical hazard summaries within HASP and SDSs for all chemicals brought to the site. ▪ Ensure that all containers are properly labelled in accordance with GHS ▪ Have spill kit available. ▪ Decon thoroughly prior to consumption of food, beverage or tobacco.	**L**
	3B) Hand Injury	3B) Hand Injury ▪ Cut resistant work gloves will be worn when dealing with sharp objects or glass bottles.	**L**
	3C) Insect/Animal Bites and Stings	3C) Insect and Animal Bites and Stings See AHA - Noxious Insects and Animals.	**L**
	3D) Lifting	▪ 3D) Good lifting techniques (lift with legs not back). ▪ Mechanical devices (e.g., hand truck, cart, forklift, etc.) should be used to reduce manual handling of materials and drums.	**M**

AHA – Treatment System Inspection/Maintenance

Job Steps	Hazards	Controls	RAC
		▪ Team lifting should be utilized if mechanical devices are not available. (mandatory for items over 50 lbs). ▪ Split heavy loads in to smaller loads. ▪ Make sure that path is clear prior to lift. ▪ Redesign work area to avoid low lifts. ▪ Stretch prior to lifting.	
4. Working Around Blowers and Other Process Equipment	**4A) Noise**	4A) Noise ▪ Hearing protection will be worn with a noise reduction rating (NRR) >30 or capable of maintaining personal exposure below 85 dBA (ear muffs or plugs) or when workers need to shout when standing two feet away from each other. ▪ All equipment will be equipped with manufacturer's required mufflers. ▪ Segregate noisy equipment from the operators if possible. ▪ Use sound dampening around noisy equipment if possible.	**L**
	4B) Exhaust	4B) Exhaust ▪ Only work in properly vented work areas. ▪ If fumes are present, leave work area and allow fumes to dissipate prior to return.	**L**
	4C) Slips / Trips / Falls	4C) Slips / Trips / Falls ▪ Site SHSO will inspect the entire work area to identify and mark hazards. ▪ Clear area of trip hazards; mark or barricade those that cannot be moved. ▪ Horseplay is strictly prohibited. ▪ Wear slip resistant footwear preferably laced boots with a minimum 8" high upper for ankle support and traction. ▪ Pay attention to where you place your feet. Be aware of surroundings. Avoid wet areas if possible.	**L**
	4D) Head Injury	4D) Head Injury ▪ Where process piping or other overhead obstructions are present, don hard hat.	
5. Process Sampling	5A) Chemical Hazards	5A) Chemical Hazards	**L**

AHA – Treatment System Inspection/Maintenance

Job Steps	Hazards	Controls	RAC
		See Section 3A above.	
	5B) Back Injury	5B) Back Injury ▪ Good lifting techniques (lift with legs not back). ▪ Mechanical devices (e.g., hand truck, cart, forklift, etc.) should be used to reduce manual handling of materials and drums. ▪ Team lifting should be utilized if mechanical devices are not available. (mandatory for items over 50 lbs). ▪ Split heavy loads in to smaller loads. ▪ Make sure that path is clear prior to lift. ▪ Redesign work area to avoid low lifts. ▪ Stretch prior to lifting. ▪ Maintain a healthy life style and level of physical fitness.	**L**
	5C) Hand Injury from Use of Hand Tools	5C) Hand Injury from Use of Hand Tools ▪ Cut resistant work gloves will be worn when working with sharp objects. ▪ All hand and power tools will be maintained in safe condition. ▪ Do not drop or throw tools. Tools shall be placed on the ground or work surface or handed to another employee in a safe manner. ▪ Ensure guards are in place and are in good condition. ▪ Daily inspections will be performed. ▪ Remove broken or damaged tools from service and tag out as defective. ▪ Tampering with electrical equipment is not allowed (e.g., splicing cords, cutting the grounding prong off plug, etc.). ▪ Use tool in accordance with manufacturers instructions and for its intended purpose. Ensure all workers are trained in proper use of the tool. ▪ Remove broken or damaged tools from service.	**L**
	5D) Personnel Decontamination	5D) Personnel Decontamination See AHA - Decontamination.	**L**
	5E) Contact With Electricity	5E) Contact With Electricity ▪ All electrical tools and equipment will be equipped with GFCI.	**M**

AHA – Treatment System Inspection/Maintenance

Job Steps	Hazards	Controls	RAC
		▪ All electrical equipment will be UL-listed ▪ Electrical extension cords will be of the "Hard" or "Extra Hard" service type. ▪ All extension cords shall have a three-blade grounding plug. ▪ Personnel shall not use extension cords with damaged outer covers, exposed inner wires, or splices. ▪ Electrical cords shall not be laid across roads where vehicular traffic may damage the cord without appropriate guarding. ▪ All electrical work will be conducted by a licensed electrician. ▪ All equipment will be locked out and tagged out and rendered in a zero energy state prior to commencing any operation that may exposed workers to energy (electrical, mechanical, hydraulic, etc.) hazards. ▪ All utilities will be marked prior to excavation activities. ▪ All equipment will stay a minimum of 10 feet from overhead energized electrical lines (50 kV). This distance will increase by 4 inches for each 10 kV above 50 kV. Rule of Thumb: Stay 10 feet away from all overhead powerlines known to be 50 kV or less and a minimum of 35 feet from all others.).	
	5F) Equipment Failure	5F) Equipment Failure ▪ All equipment will be inspected before use to ensure proper working order. ▪ If equipment is in disrepair, tag and remove from service until repaired or replaced.	**L**
	5G) Fire Protection	5G) Fire Protection ▪ Ensure that adequate number and type of fire extinguishers are present at the site. ▪ Inspect fire extinguishers on a monthly basis – document tag on each extinguisher. ▪ All employees who are expected to use fire exinguishers will have received training on an annual basis. ▪ Obey no-smoking policy. ▪ Open fires are prohibited.	**L**

AHA – Treatment System Inspection/Maintenance

Job Steps	Hazards	Controls	RAC
		▪ Maintain good housekeeping. Keep rubbish and combustibles to a minimum.	
	5H) Confined Space Entry	5H) Confined Space Entry **Confined Space Entry is not a scheduled activity for this project. Contact Cynthia Sundquist before entering any confined space**.	L
	5I) Injury from Heavy Equipment or Vehicles	5I) Injury from Heavy Equipment or Vehicles See Section 4I of AHA - Field Work Oversight.	L
	5J) Personnel Decontamination	5J) Personnel Decontamination See AHA - Decontamination.	L
6. Typical Daily / Routine Tasks	**6A) Operations Conducted At An Active Facility**	▪ Stay well clear of operations being conducted at the facility ▪ Keep alert for moving materials, equipment or vehicles. ▪ Determine client specific PPE needs prior to arriving at the site. ▪ Determine client specific emergency response procedures and follow as appropriate. ▪ Participate in client required safety training. ▪ Get copies of Client/Subcontractor SDSs for any chemicals that Amec Foster Wheeler may be exposed to. ▪ Provide SDSs to client for all chemicals brought to the site.	L
	6B) Remote Locations or Working Alone	6B) Remote Locations or Working Alone ▪ Carry a two-way radio or cell phone with clear signal ▪ Make sure your project manager knows your whereabouts and when you are expected back in the office or at home. ▪ Carry a first aid kit.	L
	6C) Slips, Trips, Falls	6C) Slips, Trips, Falls See Section 4C above.	L
	6D) Chemical Hazards	6D) Chemical Hazards	L

AHA – Treatment System Inspection/Maintenance

Job Steps	Hazards	Controls	RAC
		See Section 3A above.	
7. Environmental Health Considerations	7A) Insect, Spider and Animal Bites and Stings	7A) Insect, Spider and Animal Bites and Stings See - AHA Noxious Insects and Animals.	L
	7B) Poisonous Plants	7B) Poisonous Plants See Section 3C of AHA - Field Work Oversight.	L
	7C) Heat related or cold related injuries, Weather related hazards	7C) Heat related or cold related injuries, Weather related hazards See Section 7 of AHA - Field Work Oversight.	L
8. Inspection of Various Equipment a. Air compressors b. Drain valves c. Transfer pumps d. OWS e. Extraction manifolds f. Tanks/piping integrity	8A) Chemical Hazards	See 3A above	L
	8B) Pressurized Liquids	Wear safety glasses/goggles	
	8C) Hot equipment	Wear long sleeves and leather work gloves to prevent thermal burns if necessary to touch equipment	
9. Changing Bag Filters	9A) Chemical Hazards	See 3A above	L
	9B) Inhalation of Dusts	See 3A above. Wear N95/N100 dust mask during removal.	M
	9C) Hand Injury for using hand tools	See 5C above	L

AHA – Treatment System Inspection/Maintenance

Job Steps	Hazards	Controls	RAC
	9D) Head injury	See 4D above	L
	9E) slips, trips, falls	See 4C above	L
	9F) exposure to electricity	See 5E above	
	9G) falls from ladders	Use a fiberglass ladder. Use three points of contact when going up/down Do not place ladder in water or other slippery material. If using an "A" frame ladder: • Do not stand on top two steps. • Ensure braces are locked in place • If using an extension ladder: • Ensure ladder is placed correctly with 1:4 ratio	L
	9H) cuts/abrasions/lacerations	Wear leather work gloves over chemical resistant gloves.	
10. Cleaning flow meters, totalizers/filters	10A) chemical hazards	See 3A above.	L
	10B) Hand Injury for using hand tools	See 5C above	L
	10C) head injury	See 4D above	L

AHA – Treatment System Inspection/Maintenance

Job Steps	Hazards	Controls	RAC
	10D) slips, trips, falls	See 4C above	L
	10E) exposure to electricity	See 5E above	L
	10F) falls from ladders	Use a fiberglass ladder. Use three points of contact when going up/down Do not place ladder in water or other slippery material. If using an "A" frame ladder: • Do not stand on top two steps. • Ensure braces are locked in place • If using an extension ladder: • Ensure ladder is placed correctly with 1:4 ratio	L
	10G) cuts/abrasions/lacerations	Wear leather work gloves over chemical resistant gloves.	
11. Cleaning equipment a. pre-separation tanks/OWS b. TF pumps c. Skimmer pumps	11A) Chemical Hazards	See 3A above	L
	11B) pinch points	Ensure lock-out/tag out procedures are in place prior to opening equipment and re-energizing.	H
	11C) injury	See 4D above	L
	11D) slips, trips, falls	See 4C above	

AHA – Treatment System Inspection/Maintenance

Job Steps	Hazards	Controls	RAC
	11E) Back injury	See 3D above	**M**
	11F) exposure to electricity	See 5E above	**L**
	11G) falls from ladders	Use a fiberglass ladder. Use three points of contact when going up/down Do not place ladder in water or other slippery material. If using an "A" frame ladder: • Do not stand on top two steps. • Ensure braces are locked in place • If using an extension ladder: • Ensure ladder is placed correctly with 1:4 ratio	**L**
	11H) cuts/abrasions/lacerations	Wear leather work gloves over chemical resistant gloves.	**L**
12. Inspection of emergency lighting, exit signs, fire extinguishers, eyewash, roof, siding, doors, insulation, heat trace	12A) slips, trips, falls	See 4C above	**L**
13. Return to office/home		**See AHA - Mobilization/ Demobilization and Site Preparation.**	**L**

AHA – Decontamination

Activity/Work Task:	Decontamination		
Project Location:	Long Island City, Queens, NY		
Contract Number:			
Date Prepared:	8-15-12	**Date Accepted:**	8-15-12
Prepared by (Name/Title):	Kendra Bavor		
Reviewed by (Name/Title):	Kendra Bavor, CSP		

Notes: (Field Notes, Review Comments, etc.)

This AHA involves the following:

- Establishing site specific measures
-

This AHA is not an exhaustive summary of all hazards associated with the Site. Refer to the site HASP for additional requirements. Contractor to follow general site safety controls for Slips Trips and Falls, Biological hazards, cuts lacerations and pinch points, and emergency procedures.

Overall Risk Assessment Code (RAC) (Use highest code) **M**

Risk Assessment Code (RAC) Matrix

Severity	Probability				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)

"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible

Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.

RAC Chart

- **E = Extremely High Risk**
- **H = High Risk**
- **M = Moderate Risk**
- **L = Low Risk**

Job Steps	Hazards	Controls	RAC
1. Establish Decontamination Station	1A) Materials Handling	1A) Materials Handling ▪ Use proper lifting techniques ▪ Use mechanical aids, if available, to move heavy items.	L
2. Decontamination / Steam cleaning.	2A) Struck by steam/hot water/pressure washing	2A) Struck by steam/hot water ▪ Workers not directly engaged in steam cleaning operations must stay clear. ▪ Workers using steam cleaning equipment must be trained on operation and safety devices/procedures using the owners/operators manual. ▪ Use face shield **and** safety glasses or goggles, if steam cleaning. ▪ Stay out of the splash/steam radius. ▪ Pressure washer must have dead man switch. ▪ Do not direct steam at anyone. ▪ Do not hold objects with your feet or hands. ▪ Ensure that direction of spray minimizes spread of contaminants of concern. ▪ Use shielding as necessary.	M

AHA – Decontamination

Job Steps	Hazards	Controls	RAC
	2B) Exposure to contaminants	2B) Exposure to contaminants ▪ Conduct air monitoring (see HASP). ▪ Wear proper PPE (see HASP). ▪ See MSDSs for hazards associated with the decon solutions used (if other than water alone us used).	**L**
	2C) Slips/Trips/Falls	2C) Slips/Trips/Falls ▪ Be cautious as ground/plastic can become slippery ▪ Use boots or boot covers with good traction	**L**
3. Vehicle Decontamination	3A) Vehicle traffic in and out of the CRZ	3A) Large Vehicle Traffic ▪ Always wear a hard hat, steel toe boots, and a high visibility vest (unless Tyveks are used and are high visibility). ▪ Vehicle drivers are not to exit the vehicle in the CRZ. ▪ Identify an individual to communicate with vehicle drivers and maintain order ▪ Trucks will be lined with plastic and kept out of direct contact with any contaminated materials during loading. Wear PPE when removing plastic lining from truck beds. ▪ If not in the vehicle, obtain eye contact with the driver, so he is aware of your presence and location in the CRZ. ▪ If you are driving the vehicle, be aware of personnel in the CRZ and maintain communication with the identified personnel.	**L**
	3B) Exposure to contaminants	3B) Exposure to contaminants ▪ Use safety glasses or goggles, Polycoated Tyvek (if level of contamination poses dermal hazard or to keep work clothes dry), high visibility vest (if high visibility Tyveks are not used) hard hats, steel toe boots, and gloves while cleaning contaminated materials. ▪ Do not doff PPE until decontamination of the vehicle is complete and a decontamination certificate has been issued by the HSO. ▪ Conduct air monitoring (see HASP). ▪ See MSDSs for hazards associated with the decon solutions (if other than water alone is used).	**L**
	3C) Slips/Trips/Falls	3C) Slips/Trips/Falls ▪ Be cautious as ground/plastic can become slippery ▪ Use boots or boot covers with good traction	**L**
4. Equipment and Sample Decontamination	4A) Chemical exposure when handling contaminated sample jars and equipment	4A) Chemical exposure ▪ Wear PPE as outlined in the HASP. ▪ Refer to MSDS for specific hazards associated with decon solutions	**M**

AHA – Decontamination

Job Steps	Hazards	Controls	RAC
		▪ Monitor breathing zone for contaminants ▪ Monitor breathing zone for decon solutions (e.g., methanol, hexane, etc.) if appropriate (see HASP)	
	4B) Materials Handling related injuries	4B) Materials Handling related injuries ▪ Use proper lifting techniques when lifting heavy equipment ▪ Use two person lift for heavy coolers	**L**
5. Personal Decontamination	4C) Exposure to contaminants	4C) Exposure to contaminants ▪ Avoid bringing contaminated materials via shoes and clothing into the CRZ by examining such prior to exiting the EZ. ▪ Removal of PPE will be performed by the following tasks in the listed order: ▪ Gross boot wash and rinse and removal ▪ Outer glove removal ▪ Suit removal ▪ Respirator removal (if worn). ▪ Inner glove removal ▪ Contaminated PPE is to be placed in the appropriate, provided receptacles. ▪ Respirators will be removed and decontaminated at a specified location within the CRZ by a designated technician, then placed in storage bag. ▪ Employees will wash hands, face, and any other exposed areas with soap and water. ▪ Portable eyewash stations and showers will be available should employees come into direct contact with contaminated materials. ▪ See MSDSs for hazards associated with the decontamination solutions used. ▪ Decon solutions will be disposed of according to the work plan.	**M**

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
PPE (Safety glasses, gloves (HASP), steel toe work boots, high visibility safety vest, hearing protection.)	**Competent / Qualified Personnel:** See HASP - Name – Position/Employer **Training requirements:** Site Specific HASP Orientation Toolbox safety meeting Task kick-off meeting	Daily inspection of equipment per manufacturer's instructions. Tag tools that are defective and remove from service. Inspect power cord sets prior to use. Inspect all PPE prior to use

APPENDIX C

DECONTAMINATION PROCEDURES & EQUIPMENT PER TASK(S)

APPENDIX C1

DECONTAMINATION PROCEDURES & EQUIPMENT

Decontamination Solution: Detergent and Water

LEVEL D		
Station 1:	Equipment Drop	Deposit equipment used on-site (tools, sampling devices and containers, monitoring instruments, radios, etc. on plastic drop cloths. Segregation at the drop reduces the probability of cross contamination. During hot weather operations, a cool-down station may be set up within this area.
Station 2:	Outer Boots, and Gloves Wash and Rinse (if worn)	Scrub outer boots, and outer gloves decon solution or detergent water. Rinse off using copious amounts of water.
Station 3:	Outer Boot and Glove Removal (if worn)	Remove outer boots and gloves. Deposit in plastic bag.
Station 4:	Inner glove removal	Remove inner gloves and place in plastic bag.
Station 5:	Field Wash	Hands and face are thoroughly washed. Shower as soon as possible.

APPENDIX C2

DECONTAMINATION PROCEDURES & EQUIPMENT

Decontamination Solution: Detergent and Water

MODIFIED LEVEL D & LEVEL C		
Station 1:	Equipment Drop	Deposit equipment used on-site (tools, sampling devices and containers, monitoring instruments, radios, etc. on plastic drop cloths. Segregation at the drop reduces the probability of cross contamination. During hot weather operations, a cool-down station may be set up within this area.
Station 2:	Outer Garment, Boots, and Gloves Wash and Rinse	Scrub outer boots, outer gloves, and splash suit with decon solution or detergent water. Rinse off using copious amounts of water.
Station 3:	Outer Boot and Glove Removal	Remove outer boots and gloves. Deposit in container with plastic liner.
Station 4: (Level C only)	Canister or Mask Change	If worker leaves exclusion zone to change canister (or mask), this is the last step in the decontamination procedure. Worker's canister is exchanged, new outer gloves and boot covers are donned, joints are taped, and worker returns to duty.
Station 5:	Boot, Gloves and Outer Garment Removal	Boots, chemical resistant splash suit, and inner gloves are removed and deposited in separate containers lined with plastic.
Station 6: (Level C only)	Face Piece Removal	Facepiece is removed. Avoid touching face with fingers. Facepiece is deposited on plastic sheet.
Station 7:	Field Wash	Hands and face are thoroughly washed. Shower as soon as possible.

APPENDIX C3

DECONTAMINATION PROCEDURES AND EQUIPMENT

Decontamination Solution: Detergent and Water

LEVEL B		
Station 1:	Equipment Drop	Deposit equipment used on site (tools, sampling devices and containers, monitoring instruments, radios, etc.) on plastic drop cloths. Segregation at the drop reduces the probability of cross contamination. During hot weather operations, a cool-down station may be set up within this area.
Station 2:	Outer Garment, Boots, and Gloves Wash and Rinse	Scrub outer boots, outer gloves, and splash suit with decon solution or detergent water. Rinse off using copious amounts of water.
Station 3:	Outer Boot and Glove Removal	Remove outer boots and gloves. Deposit in container with plastic liner.
Station 4:	Tank Change	If worker leaves exclusion zone to change air tank, this is the last step in the decontamination procedure. Worker's air tank is exchanged, new outer gloves and boot covers are donned, joints are taped, and worker returns to duty.
Station 5:	SCBA Backpack, Boot, Gloves and Outer Garment Removal	SCBA backpack is removed and placed on plastic sheets. Boots, chemical resistant splash suit, and inner gloves are removed and deposited in separate containers lined with plastic.
Station 6:	Face Piece Removal	SCBA facepiece is removed. Avoid touching face with fingers. Facepiece is deposited on plastic sheet.
Station 7:	Field Wash	Hands and face are thoroughly washed. Shower as soon as possible.

APPENDIX D

INCIDENT ANALYSIS FORMS

Attach the following forms:

- **Incident Analysis Report**
- **Vehicle Incident Report**
- **Ground Disturbance Incident Report**

APPENDIX E

SAFETY DATA SHEETS

NOTE:

The Safety Data Sheets which apply to this field activity are to be kept with this HASP in the field support vehicle/office.

Safety Data Sheet
according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), and GHS

Printing date: 31.12.2013 **Revision:** 31.12.2013

1 Identification of the substance/mixture and of the company/undertaking

· **1.1 Product identifier**

· **Trade name: ALCONOX**

· **1.2 Relevant identified uses of the substance or mixture and uses advised against**
No further relevant information available.

· **Application of the substance / the mixture:** Cleaning material/ Detergent

· **1.3 Details of the supplier of the Safety Data Sheet**
· **Manufacturer/Supplier:**
Alconox, Inc.
30 Glenn St., Suite 309
White Plains, NY 10603
Phone: 914-948-4040
· **Further information obtainable from:** Product Safety Department

· **1.4 Emergency telephone number:**
ChemTel Inc.
(800)255-3924, +1 (813)248-0585

2 Hazards identification

· **2.1 Classification of the substance or mixture**
· **Classification according to Regulation (EC) No 1272/2008**


GHS05 corrosion
Eye Dam. 1; H318: Causes serious eye damage.


GHS07
Skin Irrit. 2; H315: Causes skin irritation.

· **Classification according to Directive 67/548/EEC or Directive 1999/45/EC**


Xi; Irritant
R38-41: Irritating to skin. Risk of serious damage to eyes.
· **Information concerning particular hazards for human and environment:**
The product has to be labelled due to the calculation procedure of the "General Classification guideline for preparations of the EU" in the latest valid version.
· **Classification system:**
The classification is according to the latest editions of the EU-lists, and extended by company and literature data.
The classification is in accordance with the latest editions of international substances lists, and is supplemented by information from technical literature and by information provided by the company.

· **2.2 Label elements**
· **Labelling according to Regulation (EC) No 1272/2008**
The product is classified and labelled according to the CLP regulation.

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Safety Data Sheet
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· **Hazard pictograms**

GHS05

· **Signal word:** Danger

· **Hazard-determining components of labelling:**
sodium dodecylbenzene sulfonate
· **Hazard statements**
H315: Causes skin irritation.
H318: Causes serious eye damage.
· **Precautionary statements**
P280 Wear protective gloves/protective clothing/eye protection/face protection.
P264: Wash thoroughly after handling.
P305+P351+P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P310: Immediately call a POISON CENTER or doctor/physician.
P321: Specific treatment (see on this label).
P362: Take off contaminated clothing and wash before reuse.
P332+P313: If skin irritation occurs: Get medical advice/attention.
P302+P352: IF ON SKIN: Wash with plenty of soap and water.
· **Hazard description:**
· **WHMIS-symbols:**
D2B - Toxic material causing other toxic effects

· **NFPA ratings (scale 0 - 4)**

Health = 1
Fire = 0
Reactivity = 0

· **HMIS-ratings (scale 0 - 4)**

Health = 1
Fire = 0
Reactivity = 0

· **HMIS Long Term Health Hazard Substances**
None of the ingredients is listed.

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

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Safety Data Sheet
according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), and GHS

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3 Composition/information on ingredients

· **3.2 Mixtures**
· **Description:** Mixture of substances listed below with nonhazardous additions.

· **Dangerous components:**		
CAS: 68081-81-2	sodium dodecylbenzene sulfonate Xn R22; Xi R36 Acute Tox. 4, H302; Eye Irrit. 2, H319	10-25%
CAS: 497-19-8 EINECS: 207-838-8 Index number: 011-005-00-2	Sodium Carbonate Xi R36 Eye Irrit. 2, H319	2,5-10%
CAS: 7722-88-5 EINECS: 231-767-1	tetrasodium pyrophosphate substance with a Community workplace exposure limit	2,5-10%
CAS: 151-21-3 EINECS: 205-788-1	sodium dodecyl sulphate Xn R21/22; Xi R36/38 Acute Tox. 4, H302; Acute Tox. 4, H312; Skin Irrit. 2, H315; Eye Irrit. 2, H319	2,5-10%

· **Additional information:** For the wording of the listed risk phrases refer to section 16.

4 First aid measures

· **4.1 Description of first aid measures**
· **After inhalation:** Supply fresh air; consult doctor in case of complaints.
· **After skin contact:**
Immediately wash with water and soap and rinse thoroughly.
If skin irritation continues, consult a doctor.
· **After eye contact:**
Remove contact lenses if worn.
Rinse opened eye for several minutes under running water. If symptoms persist, consult a doctor.
· **After swallowing:**
Rinse out mouth and then drink plenty of water.
Do not induce vomiting; call for medical help immediately.
· **4.2 Most important symptoms and effects, both acute and delayed**
No further relevant information available.
· **4.3 Indication of any immediate medical attention and special treatment needed**
No further relevant information available.

5 Firefighting measures

· **5.1 Extinguishing media**
· **Suitable extinguishing agents:**
CO2, powder or water spray. Fight larger fires with water spray or alcohol resistant foam.

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· **5.2 Special hazards arising from the substance or mixture:** No further relevant information available.
· **5.3 Advice for firefighters**
· **Protective equipment:**
Wear self-contained respiratory protective device.
Wear fully protective suit.
· **Additional information:** No further relevant information available.

6 Accidental release measures

· **6.1 Personal precautions, protective equipment and emergency procedures**
Product forms slippery surface when combined with water.
· **6.2 Environmental precautions:** Do not allow to enter sewers/ surface or ground water.
· **6.3 Methods and material for containment and cleaning up:**
Pick up mechanically.
Clean the affected area carefully; suitable cleaners are:
Warm water
· **6.4 Reference to other sections**
See Section 7 for information on safe handling.
See Section 8 for information on personal protection equipment.
See Section 13 for disposal information.

7 Handling and storage

· **7.1 Precautions for safe handling**
Prevent formation of dust.
Keep receptacles tightly sealed.
· **Information about fire - and explosion protection:** No special measures required.

· **7.2 Conditions for safe storage, including any incompatibilities**
· **Storage:**
· **Requirements to be met by storerooms and receptacles:** No special requirements.
· **Information about storage in one common storage facility:** Not required.
· **Further information about storage conditions:** Protect from humidity and water.
· **7.3 Specific end use(s):** No further relevant information available.

8 Exposure controls/personal protection

· **Additional information about design of technical facilities:** No further data; see item 7.

· **8.1 Control parameters**

· **Ingredients with limit values that require monitoring at the workplace:**	
7722-88-5 tetrasodium pyrophosphate	
REL (USA)	5 mg/m³
TLV (USA)	TLV withdrawn
EV (Canada)	5 mg/m³

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· **Additional information:** The lists valid during the making were used as basis.

· **8.2 Exposure controls**
· **Personal protective equipment:**
· **General protective and hygienic measures:**
Keep away from foodstuffs, beverages and feed.
Immediately remove all soiled and contaminated clothing.
Wash hands before breaks and at the end of work.
Avoid contact with the skin.
Avoid contact with the eyes and skin.
· **Respiratory protection:**
Not required under normal conditions of use.
In case of brief exposure or low pollution use respiratory filter device. In case of intensive or longer exposure use self-contained respiratory protective device.
· **Protection of hands:**

Protective gloves

The glove material has to be impermeable and resistant to the product/ the substance/ the preparation.
Due to missing tests no recommendation to the glove material can be given for the product/ the preparation/ the chemical mixture.
Selection of the glove material on consideration of the penetration times, rates of diffusion and the degradation.
· **Material of gloves**
Butyl rubber, BR
Nitrile rubber, NBR
Natural rubber, NR
Neoprene gloves
The selection of the suitable gloves does not only depend on the material, but also on further marks of quality and varies from manufacturer to manufacturer. As the product is a preparation of several substances, the resistance of the glove material cannot be calculated in advance and has therefore to be checked prior to the application.
· **Penetration time of glove material**
The exact break through time has to be found out by the manufacturer of the protective gloves and has to be observed.
· **Eye protection:**

Safety glasses

· **Body protection:** Protective work clothing

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9 Physical and chemical properties

· **9.1 Information on basic physical and chemical properties**	
· **General Information**	
· **Appearance:**	
Form:	Powder
Colour:	White
· **Odour:**	Odourless
· **Odour threshold:**	Not determined.
· **pH-value (10 g/l) at 20 °C:**	9,5 (- NA for Powder form)
· **Change in condition**	
Melting point/Melting range:	Not Determined.
Boiling point/Boiling range:	Undetermined.
· **Flash point:**	Not applicable.
· **Flammability (solid, gaseous):**	Not determined.
· **Ignition temperature:**	
Decomposition temperature:	Not determined.
· **Self-igniting:**	Product is not self-igniting.
· **Danger of explosion:**	Product does not present an explosion hazard.
· **Explosion limits:**	
Lower:	Not determined.
Upper:	Not determined.
· **Vapour pressure:**	Not applicable.
· **Density at 20 °C:**	1,1 g/cm³
· **Relative density**	Not determined.
· **Vapour density**	Not applicable.
· **Evaporation rate**	Not applicable.
· **Solubility in / Miscibility with water:**	Soluble.
· **Partition coefficient (n-octanol/water):**	Not determined.
· **Viscosity:**	
Dynamic:	Not applicable.
Kinematic:	Not applicable.
· **Solvent content:**	
Organic solvents:	0,0 %
Solids content:	100 %
· **9.2 Other information**	No further relevant information available.

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10 Stability and reactivity

· **10.1 Reactivity**
· **10.2 Chemical stability**
· **Thermal decomposition / conditions to be avoided:**
No decomposition if used according to specifications.
· **10.3 Possibility of hazardous reactions**
Reacts with acids.
Reacts with strong alkali.
Reacts with strong oxidizing agents.
· **10.4 Conditions to avoid:** No further relevant information available.
· **10.5 Incompatible materials:** No further relevant information available.
· **10.6 Hazardous decomposition products:**
Carbon monoxide and carbon dioxide
Phosphorus compounds
Sulphur oxides (SOx)

11 Toxicological information

· **11.1 Information on toxicological effects**
· **Acute toxicity:**
· **Primary irritant effect:**
· **On the skin:** Irritant to skin and mucous membranes.
· **On the eye:** Strong irritant with the danger of severe eye injury.
· **Sensitization:** No sensitizing effects known.
· **Additional toxicological information:**
The product shows the following dangers according to the calculation method of the General EU Classification Guidelines for Preparations as issued in the latest version:
Irritant
Swallowing will lead to a strong caustic effect on mouth and throat and to the danger of perforation of esophagus and stomach.

12 Ecological information

· **12.1 Toxicity**
· **Aquatic toxicity:** No further relevant information available.
· **12.2 Persistence and degradability:** No further relevant information available.
· **12.3 Bioaccumulative potential:** Not worth-mentioning accumulating in organisms
· **12.4 Mobility in soil:** No further relevant information available.
· **Additional ecological information:**
· **General notes:**
Water hazard class 2 (German Regulation) (Self-assessment): hazardous for water.
Do not allow product to reach ground water, water course or sewage system.
Danger to drinking water if even small quantities leak into the ground.
· **12.5 Results of PBT and vPvB assessment**
· **PBT:** Not applicable.

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· **vPvB:** Not applicable.
· **12.6 Other adverse effects:** No further relevant information available.

13 Disposal considerations

· **13.1 Waste treatment methods**
· **Recommendation**
Smaller quantities can be disposed of with household waste.
Small amounts may be diluted with plenty of water and washed away. Dispose of bigger amounts in accordance with Local Authority requirements.
The surfactant used in this product complies with the biodegradability criteria as laid down in Regulation (EC) No. 648/2004 on detergents. Data to support this assertion are held at the disposal of the competent authorities of the Member States and will be made available to them, at their direct request or at the request of a detergent manufacturer.

· **Uncleaned packaging:**
· **Recommendation:** Disposal must be made according to official regulations.
· **Recommended cleansing agents:** Water, if necessary together with cleansing agents.

14 Transport information

· **14.1 UN-Number** · **DOT, ADR, IMDG, IATA, ICAO**	Not Regulated
· **14.2 UN proper shipping name** · **DOT, ADR, IMDG, IATA, ICAO**	Not Regulated
· **14.3 Transport hazard class(es)** · **DOT, ADR, IMDG, IATA, ICAO** · **Class**	Not Regulated
· **14.4 Packing group** · **DOT, ADR, IMDG, IATA, ICAO**	Not Regulated
· **14.5 Environmental hazards:** · **Marine pollutant:**	No
· **14.6 Special precautions for user**	Not applicable.
· **14.7 Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code**	Not applicable.
· **UN "Model Regulation":**	Not Regulated

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15 Regulatory information

· **15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture**
· **United States (USA)**
· **SARA**

· **Section 355 (extremely hazardous substances):**
None of the ingredients is listed.
· **Section 313 (Specific toxic chemical listings):**
None of the ingredients is listed.
· **TSCA (Toxic Substances Control Act):**
All ingredients are listed.

· **Proposition 65 (California):**

· **Chemicals known to cause cancer:**
None of the ingredients is listed.
· **Chemicals known to cause reproductive toxicity for females:**
None of the ingredients is listed.
· **Chemicals known to cause reproductive toxicity for males:**
None of the ingredients is listed.
· **Chemicals known to cause developmental toxicity:**
None of the ingredients is listed.

· **Carcinogenic Categories**

· **EPA (Environmental Protection Agency)**
None of the ingredients is listed.
· **IARC (International Agency for Research on Cancer)**
None of the ingredients is listed.
· **TLV (Threshold Limit Value established by ACGIH)**
None of the ingredients is listed.
· **NIOSH-Ca (National Institute for Occupational Safety and Health)**
None of the ingredients is listed.
· **OSHA-Ca (Occupational Safety & Health Administration)**
None of the ingredients is listed.

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· **Canada**

· **Canadian Domestic Substances List (DSL)**	
All ingredients are listed.	
· **Canadian Ingredient Disclosure list (limit 0.1%)**	
None of the ingredients is listed.	
· **Canadian Ingredient Disclosure list (limit 1%)**	
497-19-8	Sodium Carbonate
7722-88-5	tetrasodium pyrophosphate
151-21-3	sodium dodecyl sulphate

· **15.2 Chemical safety assessment:** A Chemical Safety Assessment has not been carried out.

16 Other information

This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

· **Relevant phrases**
H302: Harmful if swallowed.
H312: Harmful in contact with skin.
H315: Causes skin irritation.
H319: Causes serious eye irritation.

R21/22: Harmful in contact with skin and if swallowed.
R22: Harmful if swallowed.
R36: Irritating to eyes.
R36/38: Irritating to eyes and skin.

· **Abbreviations and acronyms:**
ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road) IMDG: International Maritime Code for Dangerous Goods DOT: US Department of Transportation
IATA: International Air Transport Association
GHS: Globally Harmonized System of Classification and Labelling of Chemicals
ACGIH: American Conference of Governmental Industrial Hygienists
NFPA: National Fire Protection Association (USA)
HMIS: Hazardous Materials Identification System (USA)
WHMIS: Workplace Hazardous Materials Information System (Canada)

Safety Data Sheet

Material Name: Gasoline All Grades

SDS No. 9950
US GHS

Synonyms: Hess Conventional (Oxygenated and Non-oxygenated) Gasoline; Reformulated Gasoline (RFG); Reformulated Gasoline Blendstock for Oxygenate Blending (RBOB); Unleaded Motor or Automotive Gasoline

* * * Section 1 - Product and Company Identification * * *

Manufacturer Information

Hess Corporation
1 Hess Plaza
Woodbridge, NJ 07095-0961

Phone: 732-750-6000 Corporate EHS
Emergency # 800-424-9300 CHEMTREC
www.hess.com (Environment, Health, Safety Internet Website)

* * * Section 2 - Hazards Identification * * *

GHS Classification:

Flammable Liquid - Category 2
Skin Corrosion/Irritation - Category 2
Germ Cell Mutagenicity - Category 1B
Carcinogenicity - Category 1B
Toxic to Reproduction - Category 1A
Specific Target Organ Toxicity (Single Exposure) - Category 3 (respiratory irritation, narcosis)
Specific Target Organ Toxicity (Repeat Exposure) - Category 1 (liver, kidneys, bladder, blood, bone marrow, nervous system)
Aspiration Hazard - Category 1
Hazardous to the Aquatic Environment – Acute Hazard - Category 3

GHS LABEL ELEMENTS

Symbol(s)

Signal Word

DANGER

Hazard Statements

Highly flammable liquid and vapour.
Causes skin irritation.
May cause genetic defects.
May cause cancer.
May damage fertility or the unborn child.
May cause respiratory irritation.
May cause drowsiness or dizziness.
Causes damage to organs (liver, kidneys, bladder, blood, bone marrow, nervous system) through prolonged or repeated exposure.
May be fatal if swallowed and enters airways.
Harmful to aquatic life.

Precautionary Statements

Prevention

Keep away from heat/sparks/open flames/hot surfaces. No smoking
Keep container tightly closed.
Ground/bond container and receiving equipment.
Use explosion-proof electrical/ventilating/lighting/equipment.
Use only non-sparking tools.
Take precautionary measures against static discharge.
Wear protective gloves/protective clothing/eye protection/face protection.
Wash hands and forearms thoroughly after handling.
Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Do not breathe mist/vapours/spray.
Use only outdoors or in well-ventilated area.
Do not eat, drink or smoke when using this product.
Avoid release to the environment.

Response

In case of fire: Use water spray, fog, dry chemical fire extinguishers or hand held fire extinguisher.
IF ON SKIN (or hair): Wash with plenty of soap and water. Remove/Take off immediately all contaminated clothing and wash before reuse. If skin irritation occurs, get medical advice/attention.
IF exposed or concerned: Get medical advice/attention.
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a poison center or doctor/physician if you feel unwell.
Get medical advice/attention if you feel unwell.
IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician. Do not induce vomiting.

Storage

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

Disposal

Dispose of contents/container in accordance with local/regional/national/international regulations.

* * * Section 3 - Composition / Information on Ingredients * * *

CAS #	Component	Percent
86290-81-5	Gasoline, motor fuel	100
108-88-3	Toluene	1-25
106-97-8	Butane	<10
1330-20-7	Xylenes (o-, m-, p- isomers)	1-15
95-63-6	Benzene, 1,2,4-trimethyl-	<6
64-17-5	Ethyl alcohol	0-10
100-41-4	Ethylbenzene	<3
71-43-2	Benzene	0.1-4.9

110-54-3	Hexane	0.5-4

A complex blend of petroleum-derived normal and branched-chain alkane, cycloalkane, alkene, and aromatic hydrocarbons. May contain antioxidant and multifunctional additives. Non-oxygenated Conventional Gasoline and RBOB do not have oxygenates (Ethanol). Oxygenated Conventional and Reformulated Gasoline will have oxygenates for octane enhancement or as legally required.

* * * Section 4 - First Aid Measures * * *

First Aid: Eyes

In case of contact with eyes, immediately flush with clean, low-pressure water for at least 15 min. Hold eyelids open to ensure adequate flushing. Seek medical attention.

First Aid: Skin

Remove contaminated clothing. Wash contaminated areas thoroughly with soap and water or with waterless hand cleanser. Obtain medical attention if irritation or redness develops.

First Aid: Ingestion

DO NOT INDUCE VOMITING. Do not give liquids. Obtain immediate medical attention. If spontaneous vomiting occurs, lean victim forward to reduce the risk of aspiration. Monitor for breathing difficulties. Small amounts of material which enter the mouth should be rinsed out until the taste is dissipated.

First Aid: Inhalation

Remove person to fresh air. If person is not breathing, provide artificial respiration. If necessary, provide additional oxygen once breathing is restored if trained to do so. Seek medical attention immediately.

* * * Section 5 - Fire Fighting Measures * * *

General Fire Hazards

See Section 9 for Flammability Properties.

Vapors may be ignited rapidly when exposed to heat, spark, open flame or other source of ignition. Flowing product may be ignited by self-generated static electricity. When mixed with air and exposed to an ignition source, flammable vapors can burn in the open or explode in confined spaces. Being heavier than air, vapors may travel long distances to an ignition source and flash back. Runoff to sewer may cause fire or explosion hazard.

Hazardous Combustion Products

Carbon monoxide, carbon dioxide and non-combusted hydrocarbons (smoke). Contact with nitric and sulfuric acids will form nitrocresols that can decompose violently.

Extinguishing Media

SMALL FIRES: Any extinguisher suitable for Class B fires, dry chemical, CO2, water spray, fire fighting foam, or gaseous extinguishing agent.

LARGE FIRES: Water spray, fog or fire fighting foam. Water may be ineffective for fighting the fire, but may be used to cool fire-exposed containers.

Firefighting foam suitable for polar solvents is recommended for fuel with greater than 10% oxygenate concentration.

Unsuitable Extinguishing Media

None

Fire Fighting Equipment/Instructions

Small fires in the incipient (beginning) stage may typically be extinguished using handheld portable fire extinguishers and other fire fighting equipment. Firefighting activities that may result in potential exposure to high heat, smoke or toxic by-products of combustion should require NIOSH/MSHA- approved pressure-demand self-contained breathing apparatus with full facepiece and full protective clothing. Isolate area around container involved in fire. Cool tanks, shells, and containers exposed to fire and excessive heat with water. For massive fires the use of unmanned hose holders or monitor nozzles may be advantageous to further minimize personnel exposure. Major fires may require withdrawal, allowing the tank to burn. Large storage tank fires typically require specially trained personnel and equipment to extinguish the fire, often including the need for properly applied fire fighting foam.

* * * Section 6 - Accidental Release Measures * * *

Recovery and Neutralization

Carefully contain and stop the source of the spill, if safe to do so.

Materials and Methods for Clean-Up

Take up with sand or other oil absorbing materials. Carefully shovel, scoop or sweep up into a waste container for reclamation or disposal. Caution, flammable vapors may accumulate in closed containers.

Emergency Measures

Evacuate nonessential personnel and remove or secure all ignition sources. Consider wind direction; stay upwind and uphill, if possible. Evaluate the direction of product travel, diking, sewers, etc. to confirm spill areas. Spills may infiltrate subsurface soil and groundwater; professional assistance may be necessary to determine the extent of subsurface impact.

Personal Precautions and Protective Equipment

Response and clean-up crews must be properly trained and must utilize proper protective equipment (see Section 8).

Environmental Precautions

Protect bodies of water by diking, absorbents, or absorbent boom, if possible. Do not flush down sewer or drainage systems, unless system is designed and permitted to handle such material. The use of fire fighting foam may be useful in certain situations to reduce vapors. The proper use of water spray may effectively disperse product vapors or the liquid itself, preventing contact with ignition sources or areas/equipment that require protection.

Prevention of Secondary Hazards

None

* * * Section 7 - Handling and Storage * * *

Handling Procedures

USE ONLY AS A MOTOR FUEL.
DO NOT SIPHON BY MOUTH

Handle as a flammable liquid. Keep away from heat, sparks, and open flame! Electrical equipment should be approved for classified area. Bond and ground containers during product transfer to reduce the possibility of static-initiated fire or explosion.

Special slow load procedures for "switch loading" must be followed to avoid the static ignition hazard that can exist when higher flash point material (such as fuel oil) is loaded into tanks previously containing low flash point products (such as this product) - see API Publication 2003, "Protection Against Ignitions Arising Out Of Static, Lightning and Stray Currents."

Storage Procedures

Keep away from flame, sparks, excessive temperatures and open flame. Use approved vented containers. Keep containers closed and clearly labeled. Empty product containers or vessels may contain explosive vapors. Do not pressurize, cut, heat, weld or expose such containers to sources of ignition.

Store in a well-ventilated area. This storage area should comply with NFPA 30 "Flammable and Combustible Liquid Code". Avoid storage near incompatible materials. The cleaning of tanks previously containing this product should follow API Recommended Practice (RP) 2013 "Cleaning Mobile Tanks In Flammable and Combustible Liquid Service" and API RP 2015 "Cleaning Petroleum Storage Tanks".

Incompatibilities

Keep away from strong oxidizers.

* * * Section 8 - Exposure Controls / Personal Protection * * *

Component Exposure Limits

Gasoline, motor fuel (86290-81-5)

ACGIH: 300 ppm TWA
500 ppm STEL

Toluene (108-88-3)

ACGIH: 20 ppm TWA
OSHA: 200 ppm TWA; 375 mg/m3 TWA
150 ppm STEL; 560 mg/m3 STEL
NIOSH: 100 ppm TWA; 375 mg/m3 TWA
150 ppm STEL; 560 mg/m3 STEL

Butane (106-97-8)

ACGIH: 1000 ppm TWA (listed under Aliphatic hydrocarbon gases: Alkane C1-4)
OSHA: 800 ppm TWA; 1900 mg/m3 TWA
NIOSH: 800 ppm TWA; 1900 mg/m3 TWA

Xylenes (o-, m-, p- isomers) (1330-20-7)

ACGIH: 100 ppm TWA
150 ppm STEL
OSHA: 100 ppm TWA; 435 mg/m3 TWA
150 ppm STEL; 655 mg/m3 STEL

Benzene, 1,2,4-trimethyl- (95-63-6)

NIOSH: 25 ppm TWA; 125 mg/m3 TWA

Ethyl alcohol (64-17-5)

ACGIH: 1000 ppm STEL
OSHA: 1000 ppm TWA; 1900 mg/m3 TWA
NIOSH: 1000 ppm TWA; 1900 mg/m3 TWA

Ethylbenzene (100-41-4)

ACGIH: 20 ppm TWA
OSHA: 100 ppm TWA; 435 mg/m3 TWA
125 ppm STEL; 545 mg/m3 STEL
NIOSH: 100 ppm TWA; 435 mg/m3 TWA
125 ppm STEL; 545 mg/m3 STEL

Benzene (71-43-2)

ACGIH: 0.5 ppm TWA
2.5 ppm STEL
Skin - potential significant contribution to overall exposure by the cutaneous route
OSHA: 5 ppm STEL (Cancer hazard, Flammable, See 29 CFR 1910.1028, 15 min); 0.5 ppm Action Level; 1 ppm TWA
NIOSH: 0.1 ppm TWA
1 ppm STEL

Hexane (110-54-3)

ACGIH: 50 ppm TWA
Skin - potential significant contribution to overall exposure by the cutaneous route
OSHA: 500 ppm TWA; 1800 mg/m3 TWA
NIOSH: 50 ppm TWA; 180 mg/m3 TWA

Engineering Measures

Use adequate ventilation to keep vapor concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces.

Personal Protective Equipment: Respiratory

A NIOSH/MSHA-approved air-purifying respirator with organic vapor cartridges or canister may be permissible under certain circumstances where airborne concentrations are or may be expected to exceed exposure limits or for odor or irritation. Protection provided by air-purifying respirators is limited.

Use a positive pressure, air-supplied respirator if there is a potential for uncontrolled release, exposure levels are not known, in oxygen-deficient atmospheres, or any other circumstance where an air-purifying respirator may not provide adequate protection.

Personal Protective Equipment: Hands

Gloves constructed of nitrile, neoprene, or PVC are recommended.

PERSONAL PROTECTIVE EQUIPMENT

Personal Protective Equipment: Eyes

Safety glasses or goggles are recommended where there is a possibility of splashing or spraying.

Personal Protective Equipment: Skin and Body

Chemical protective clothing such as of E.I. DuPont TyChem®, Saranex® or equivalent recommended based on degree of exposure. Note: The resistance of specific material may vary from product to product as well as with degree of exposure. Consult manufacturer specifications for further information.

* * * Section 9 - Physical & Chemical Properties * * *

Appearance:	Translucent, straw-colored or light yellow	**Odor:**	Strong, characteristic aromatic hydrocarbon odor. Sweet-ether like
Physical State:	Liquid	**pH:**	ND
Vapor Pressure:	6.4 - 15 RVP @ 100 °F (38 °C) (275-475 mm Hg @ 68 °F (20 °C)	**Vapor Density:**	AP 3-4
Boiling Point:	85-437 °F (39-200 °C)	**Melting Point:**	ND
Solubility (H2O):	Negligible to Slight	**Specific Gravity:**	0.70-0.78
Evaporation Rate:	10-11	**VOC:**	ND
Percent Volatile:	100%	**Octanol/H2O Coeff.:**	ND
Flash Point:	-45 °F (-43 °C)	**Flash Point Method:**	PMCC
Upper Flammability Limit (UFL):	7.6%	**Lower Flammability Limit (LFL):**	1.4%
Burning Rate:	ND	**Auto Ignition:**	>530°F (>280°C)

* * * Section 10 - Chemical Stability & Reactivity Information * * *

Chemical Stability

This is a stable material.

Hazardous Reaction Potential

Will not occur.

Conditions to Avoid

Avoid high temperatures, open flames, sparks, welding, smoking and other ignition sources.

Incompatible Products

Keep away from strong oxidizers.

Hazardous Decomposition Products

Carbon monoxide, carbon dioxide and non-combusted hydrocarbons (smoke). Contact with nitric and sulfuric acids will form nitrocresols that can decompose violently.

* * * Section 11 - Toxicological Information * * *

Acute Toxicity

A: General Product Information

Harmful if swallowed.

B: Component Analysis - LD50/LC50

Gasoline, motor fuel (86290-81-5)

Inhalation LC50 Rat >5.2 mg/L 4 h; Oral LD50 Rat 14000 mg/kg; Dermal LD50 Rabbit >2000 mg/kg

Toluene (108-88-3)

Inhalation LC50 Rat 12.5 mg/L 4 h; Inhalation LC50 Rat >26700 ppm 1 h; Oral LD50 Rat 636 mg/kg; Dermal LD50 Rabbit 8390 mg/kg; Dermal LD50 Rat 12124 mg/kg

Butane (106-97-8)

Inhalation LC50 Rat 658 mg/L 4 h

Xylenes (o-, m-, p- isomers) (1330-20-7)
Inhalation LC50 Rat 5000 ppm 4 h; Inhalation LC50 Rat 47635 mg/L 4 h; Oral LD50 Rat 4300 mg/kg; Dermal LD50 Rabbit >1700 mg/kg

Benzene, 1,2,4-trimethyl- (95-63-6)
Inhalation LC50 Rat 18 g/m3 4 h; Oral LD50 Rat 3400 mg/kg; Dermal LD50 Rabbit >3160 mg/kg

Ethyl alcohol (64-17-5)
Oral LD50 Rat 7060 mg/kg; Inhalation LC50 Rat 124.7 mg/L 4 h

Ethylbenzene (100-41-4)
Inhalation LC50 Rat 17.2 mg/L 4 h; Oral LD50 Rat 3500 mg/kg; Dermal LD50 Rabbit 15354 mg/kg

Benzene (71-43-2)
Inhalation LC50 Rat 13050-14380 ppm 4 h; Oral LD50 Rat 1800 mg/kg

Hexane (110-54-3)
Inhalation LC50 Rat 48000 ppm 4 h; Oral LD50 Rat 25 g/kg; Dermal LD50 Rabbit 3000 mg/kg

Potential Health Effects: Skin Corrosion Property/Stimulativeness

Practically non-toxic if absorbed following acute (single) exposure. May cause skin irritation with prolonged or repeated contact. Liquid may be absorbed through the skin in toxic amounts if large areas of skin are repeatedly exposed.

Potential Health Effects: Eye Critical Damage/ Stimulativeness

Moderate irritant. Contact with liquid or vapor may cause irritation.

Potential Health Effects: Ingestion

Ingestion may cause gastrointestinal disturbances, including irritation, nausea, vomiting and diarrhea, and central nervous system (brain) effects similar to alcohol intoxication. In severe cases, tremors, convulsions, loss of consciousness, coma, respiratory arrest, and death may occur.

Potential Health Effects: Inhalation

Excessive exposure may cause irritations to the nose, throat, lungs and respiratory tract. Central nervous system (brain) effects may include headache, dizziness, loss of balance and coordination, unconsciousness, coma, respiratory failure, and death.

WARNING: the burning of any hydrocarbon as a fuel in an area without adequate ventilation may result in hazardous levels of combustion products, including carbon monoxide, and inadequate oxygen levels, which may cause unconsciousness, suffocation, and death.

Respiratory Organs Sensitization/Skin Sensitization

This product is not reported to have any skin sensitization effects.

Generative Cell Mutagenicity

This product may cause genetic defects.

Carcinogenicity

A: General Product Information

May cause cancer.

IARC has determined that gasoline and gasoline exhaust are possibly carcinogenic in humans. Inhalation exposure to completely vaporized unleaded gasoline caused kidney cancers in male rats and liver tumors in female mice. The U.S. EPA has determined that the male kidney tumors are species-specific and are irrelevant for human health risk assessment. The significance of the tumors seen in female mice is not known. Exposure to light hydrocarbons in the same boiling range as this product has been associated in animal studies with effects to the central and peripheral nervous systems, liver, and kidneys. The significance of these animal models to predict similar human response to gasoline is uncertain.

This product contains benzene. Human health studies indicate that prolonged and/or repeated overexposure to benzene may cause damage to the blood-forming system (particularly bone marrow), and serious blood disorders such as aplastic anemia and leukemia. Benzene is listed as a human carcinogen by the NTP, IARC, OSHA and ACGIH.

B: Component Carcinogenicity

Gasoline, motor fuel (86290-81-5)

ACGIH: A3 - Confirmed Animal Carcinogen with Unknown Relevance to Humans

Toluene (108-88-3)

ACGIH: A4 - Not Classifiable as a Human Carcinogen
IARC: Monograph 71 [1999]; Monograph 47 [1989] (Group 3 (not classifiable))

Xylenes (o-, m-, p- isomers) (1330-20-7)

ACGIH: A4 - Not Classifiable as a Human Carcinogen
IARC: Monograph 71 [1999]; Monograph 47 [1989] (Group 3 (not classifiable))

Ethyl alcohol (64-17-5)

ACGIH: A3 - Confirmed Animal Carcinogen with Unknown Relevance to Humans
IARC: Monograph 100E [in preparation] (in alcoholic beverages); Monograph 96 [2010] (in alcoholic beverages) (Group 1 (carcinogenic to humans))

Ethylbenzene (100-41-4)

ACGIH: A3 - Confirmed Animal Carcinogen with Unknown Relevance to Humans
IARC: Monograph 77 [2000] (Group 2B (possibly carcinogenic to humans))

Benzene (71-43-2)

ACGIH: A1 - Confirmed Human Carcinogen
OSHA: 5 ppm STEL (Cancer hazard, Flammable, See 29 CFR 1910.1028, 15 min); 0.5 ppm Action Level; 1 ppm TWA
NIOSH: potential occupational carcinogen
NTP: Known Human Carcinogen (Select Carcinogen)
IARC: Monograph 100F [in preparation]; Supplement 7 [1987]; Monograph 29 [1982] (Group 1 (carcinogenic to humans))

Reproductive Toxicity

This product is suspected of damaging fertility or the unborn child.

Specified Target Organ General Toxicity: Single Exposure

This product may cause drowsiness or dizziness.

Specified Target Organ General Toxicity: Repeated Exposure

This product causes damage to organs through prolonged or repeated exposure.

Aspiration Respiratory Organs Hazard

The major health threat of ingestion occurs from the danger of aspiration (breathing) of liquid drops into the lungs, particularly from vomiting. Aspiration may result in chemical pneumonia (fluid in the lungs), severe lung damage, respiratory failure and even death.

* * * Section 12 - Ecological Information * * *

Ecotoxicity

A: General Product Information

Very toxic to aquatic life with long lasting effects. Keep out of sewers, drainage areas and waterways. Report spills and releases, as applicable, under Federal and State regulations.

B: Component Analysis - Ecotoxicity - Aquatic Toxicity

Gasoline, motor fuel (86290-81-5)

Test & Species		Conditions
96 Hr LC50 Alburnus alburnus	119 mg/L [static]	
96 Hr LC50 Cyprinodon variegatus	82 mg/L [static]	
72 Hr EC50 Pseudokirchneriella subcapitata	56 mg/L	
24 Hr EC50 Daphnia magna	170 mg/L	

Toluene (108-88-3)

Test & Species		Conditions
96 Hr LC50 Pimephales promelas	15.22-19.05 mg/L [flow-through]	1 day old
96 Hr LC50 Pimephales promelas	12.6 mg/L [static]	
96 Hr LC50 Oncorhynchus mykiss	5.89-7.81 mg/L [flow-through]	
96 Hr LC50 Oncorhynchus mykiss	14.1-17.16 mg/L [static]	
96 Hr LC50 Oncorhynchus mykiss	5.8 mg/L [semi-static]	
96 Hr LC50 Lepomis macrochirus	11.0-15.0 mg/L [static]	
96 Hr LC50 Oryzias latipes	54 mg/L [static]	
96 Hr LC50 Poecilia reticulata	28.2 mg/L [semi-static]	
96 Hr LC50 Poecilia reticulata	50.87-70.34 mg/L [static]	
96 Hr EC50 Pseudokirchneriella subcapitata	>433 mg/L	
72 Hr EC50 Pseudokirchneriella subcapitata	12.5 mg/L [static]	
48 Hr EC50 Daphnia magna	5.46 - 9.83 mg/L [Static]	
48 Hr EC50 Daphnia magna	11.5 mg/L	

Xylenes (o-, m-, p- isomers) (1330-20-7)

Test & Species		Conditions
96 Hr LC50 Pimephales promelas	13.4 mg/L [flow-through]	

96 Hr LC50 Oncorhynchus mykiss	2.661-4.093 mg/L [static]
96 Hr LC50 Oncorhynchus mykiss	13.5-17.3 mg/L
96 Hr LC50 Lepomis macrochirus	13.1-16.5 mg/L [flow-through]
96 Hr LC50 Lepomis macrochirus	19 mg/L
96 Hr LC50 Lepomis macrochirus	7.711-9.591 mg/L [static]
96 Hr LC50 Pimephales promelas	23.53-29.97 mg/L [static]
96 Hr LC50 Cyprinus carpio	780 mg/L [semi-static]
96 Hr LC50 Cyprinus carpio	>780 mg/L
96 Hr LC50 Poecilia reticulata	30.26-40.75 mg/L [static]
48 Hr EC50 water flea	3.82 mg/L
48 Hr LC50 Gammarus lacustris	0.6 mg/L

Benzene, 1,2,4-trimethyl- (95-63-6)

Test & Species	Conditions
96 Hr LC50 Pimephales promelas	7.19-8.28 mg/L [flow-through]
48 Hr EC50 Daphnia magna	6.14 mg/L

Ethyl alcohol (64-17-5)

Test & Species	Conditions
96 Hr LC50 Oncorhynchus mykiss	12.0 - 16.0 mL/L [static]
96 Hr LC50 Pimephales promelas	>100 mg/L [static]
96 Hr LC50 Pimephales promelas	13400 - 15100 mg/L [flow-through]
48 Hr LC50 Daphnia magna	9268 - 14221 mg/L
24 Hr EC50 Daphnia magna	10800 mg/L
48 Hr EC50 Daphnia magna	2 mg/L [Static]

Ethylbenzene (100-41-4)

Test & Species	Conditions
96 Hr LC50 Oncorhynchus mykiss	11.0-18.0 mg/L [static]
96 Hr LC50 Oncorhynchus mykiss	4.2 mg/L [semi-static]
96 Hr LC50 Pimephales promelas	7.55-11 mg/L [flow-through]
96 Hr LC50 Lepomis macrochirus	32 mg/L [static]
96 Hr LC50 Pimephales promelas	9.1-15.6 mg/L [static]
96 Hr LC50 Poecilia reticulata	9.6 mg/L [static]
72 Hr EC50 Pseudokirchneriella subcapitata	4.6 mg/L
96 Hr EC50 Pseudokirchneriella subcapitata	>438 mg/L
72 Hr EC50 Pseudokirchneriella subcapitata	2.6 - 11.3 mg/L [static]

96 Hr EC50 Pseudokirchneriella subcapitata	1.7 - 7.6 mg/L [static]
48 Hr EC50 Daphnia magna	1.8 - 2.4 mg/L

Benzene (71-43-2)

Test & Species	Conditions
96 Hr LC50 Pimephales promelas	10.7-14.7 mg/L [flow-through]
96 Hr LC50 Oncorhynchus mykiss	5.3 mg/L [flow-through]
96 Hr LC50 Lepomis macrochirus	22.49 mg/L [static]
96 Hr LC50 Poecilia reticulata	28.6 mg/L [static]
96 Hr LC50 Pimephales promelas	22330-41160 µg/L [static]
96 Hr LC50 Lepomis macrochirus	70000-142000 µg/L [static]
72 Hr EC50 Pseudokirchneriella subcapitata	29 mg/L
48 Hr EC50 Daphnia magna	8.76 - 15.6 mg/L [Static]
48 Hr EC50 Daphnia magna	10 mg/L

Hexane (110-54-3)

Test & Species	Conditions
96 Hr LC50 Pimephales promelas	2.1-2.98 mg/L [flow-through]
24 Hr EC50 Daphnia magna	>1000 mg/L

Persistence/Degradability

No information available.

Bioaccumulation

No information available.

Mobility in Soil

No information available.

* * * Section 13 - Disposal Considerations * * *

Waste Disposal Instructions

See Section 7 for Handling Procedures. See Section 8 for Personal Protective Equipment recommendations.

Disposal of Contaminated Containers or Packaging

Dispose of contents/container in accordance with local/regional/national/international regulations.

* * * Section 14 - Transportation Information * * *

Component Marine Pollutants

This material contains one or more of the following chemicals required by US DOT to be identified as marine pollutants.

Component	CAS #	
Gasoline, motor fuel	86290-81-5	DOT regulated marine pollutant

DOT Information

Shipping Name: Gasoline
UN #: 1203 **Hazard Class:** 3 **Packing Group:** II
Placard:

* * * Section 15 - Regulatory Information * * *

Regulatory Information

A: Component Analysis

This material contains one or more of the following chemicals required to be identified under SARA Section 302 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65) and/or CERCLA (40 CFR 302.4).

Toluene (108-88-3)
SARA 313: 1.0 % de minimis concentration
CERCLA: 1000 lb final RQ; 454 kg final RQ

Xylenes (o-, m-, p- isomers) (1330-20-7)
SARA 313: 1.0 % de minimis concentration
CERCLA: 100 lb final RQ; 45.4 kg final RQ

Benzene, 1,2,4-trimethyl- (95-63-6)
SARA 313: 1.0 % de minimis concentration

Ethylbenzene (100-41-4)
SARA 313: 0.1 % de minimis concentration
CERCLA: 1000 lb final RQ; 454 kg final RQ

Benzene (71-43-2)
SARA 313: 0.1 % de minimis concentration
CERCLA: 10 lb final RQ (received an adjusted RQ of 10 lbs based on potential carcinogenicity in an August 14, 1989 final rule); 4.54 kg final RQ (received an adjusted RQ of 10 lbs based on potential carcinogenicity in an August 14, 1989 final rule)

Hexane (110-54-3)

SARA 313: 1.0 % de minimis concentration
CERCLA: 5000 lb final RQ; 2270 kg final RQ

SARA Section 311/312 – Hazard Classes

Acute Health	Chronic Health	Fire	Sudden Release of Pressure	Reactive
X	X	X	--	--

Component Marine Pollutants

This material contains one or more of the following chemicals required by US DOT to be identified as marine pollutants.

Component	CAS #	
Gasoline, motor fuel	86290-81-5	DOT regulated marine pollutant

State Regulations

Component Analysis - State

The following components appear on one or more of the following state hazardous substances lists:

Component	**CAS**	**CA**	**MA**	**MN**	**NJ**	**PA**	**RI**
Gasoline, motor fuel	86290-81-5	No	No	No	No	Yes	No
Toluene	108-88-3	Yes	Yes	Yes	Yes	Yes	No
Butane	106-97-8	Yes	Yes	Yes	Yes	Yes	No
Xylenes (o-, m-, p- isomers)	1330-20-7	Yes	Yes	Yes	Yes	Yes	No
Benzene, 1,2,4-trimethyl-	95-63-6	No	Yes	Yes	Yes	Yes	No
Ethyl alcohol	64-17-5	Yes	Yes	Yes	Yes	Yes	No
Ethylbenzene	100-41-4	Yes	Yes	Yes	Yes	Yes	No
Benzene	71-43-2	Yes	Yes	Yes	Yes	Yes	No
Hexane	110-54-3	No	Yes	Yes	Yes	Yes	No

The following statement(s) are provided under the California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65):

WARNING! This product contains a chemical known to the state of California to cause cancer.
WARNING! This product contains a chemical known to the state of California to cause reproductive/developmental effects.

Component Analysis - WHMIS IDL

The following components are identified under the Canadian Hazardous Products Act Ingredient Disclosure List:

Component	CAS #	Minimum Concentration
Toluene	108-88-3	1 %
Butane	106-97-8	1 %
Benzene, 1,2,4-trimethyl-	95-63-6	0.1 %
Ethyl alcohol	64-17-5	0.1 %
Ethylbenzene	100-41-4	0.1 %
Benzene	71-43-2	0.1 %
Hexane	110-54-3	1 %

Additional Regulatory Information

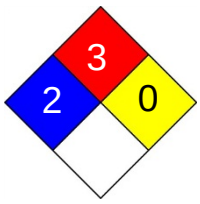
Component Analysis - Inventory

Component	CAS #	TSCA	CAN	EEC
Gasoline, motor fuel	86290-81-5	No	DSL	EINECS
Toluene	108-88-3	Yes	DSL	EINECS
Butane	106-97-8	Yes	DSL	EINECS
Xylenes (o-, m-, p- isomers)	1330-20-7	Yes	DSL	EINECS
Benzene, 1,2,4-trimethyl-	95-63-6	Yes	DSL	EINECS
Ethyl alcohol	64-17-5	Yes	DSL	EINECS
Ethylbenzene	100-41-4	Yes	DSL	EINECS
Benzene	71-43-2	Yes	DSL	EINECS
Hexane	110-54-3	Yes	DSL	EINECS

* * * Section 16 - Other Information * * *

NFPA® Hazard Rating

Health	2
Fire	3
Reactivity	0



HMIS® Hazard Rating

Health	2	Moderate
Fire	3	Serious
Physical	0	Minimal
		*Chronic

Key/Legend

EPA = Environmental Protection Agency; TSCA = Toxic Substance Control Act; ACGIH = American Conference of Governmental Industrial Hygienists; IARC = International Agency for Research on Cancer; NIOSH = National Institute for Occupational Safety and Health; NTP = National Toxicology Program; OSHA = Occupational Safety and Health Administration., NJTSR = New Jersey Trade Secret Registry.

Literature References

None

Other Information

Information presented herein has been compiled from sources considered to be dependable, and is accurate and reliable to the best of our knowledge and belief, but is not guaranteed to be so. Since conditions of use are beyond our control, we make no warranties, expressed or implied, except those that may be contained in our written contract of sale or acknowledgment.

Vendor assumes no responsibility for injury to vendee or third persons proximately caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Additionally, vendor assumes no responsibility for injury to vendee or third persons proximately caused by abnormal use of the material, even if reasonable safety procedures are followed. Furthermore, vendee assumes the risk in their use of the material.

End of Sheet

PURITAN PRODUCTS

Effective Date: 01/01/13
Replaces Revision: 06/25/10

NON-EMERGENCY TELEPHONE
610-866-4225

24-HOUR CHEMTREC EMERGENCY TELEPHONE
800-424-9300

SDS – SAFETY DATA SHEET

1. Identification

Product Identifier: HYDROCHLORIC ACID 33-40%
Synonyms: Muriatic acid, Hydrogen Chloride, Aqueous
Chemical Formula: HCl
Recommended Use of the Chemical and Restrictions On Use: Laboratory Reagent
Manufacturer / Supplier: Puritan Products; 2290 Avenue A, Bethlehem, PA 18017 **Phone:** 610-866-4225
Emergency Phone Number: 24-Hour Chemtrec Emergency Telephone 800-424-9300

2. Hazard(s) Identification

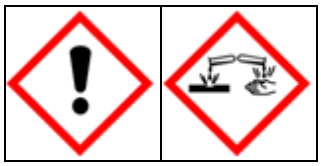
Classification of the Substance or Mixture:
Acute toxicity - Gases (Category 4)
Skin corrosion / Irritation (Category 1)
Serious eye damage / Eye irritation (Category 1)
Specific target organ systemic toxicity (single exposure) (Category 3)

Risk and Safety Phrases:
Symbol: C
R34: Causes burns.
R37: Irritating to respiratory system.

Label Elements:

Trade Name: HYDROCHLORIC ACID 33-40%

Signal Word: Danger



Hazard Statements:
H314: Causes severe skin burns and eye damage.
H335+H336: May cause respiratory irritation. May cause drowsiness or dizziness.

Precautionary Statements:
P261: Avoid breathing dust / fume / gas / mist / vapors / spray.
P280: Wear protective gloves / protective clothing / eye protection/ face protection.
P305 + P351 + P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P310: Immediately call a POISON CENTER or doctor / physician.

3. Composition / Information on Ingredients

CAS Number: 7647-01-0
EC Number: 231-595-7
Index Number: 017-002-01-X
Molecular Weight: 36.46 g/mol

Ingredient	CAS Number	EC Number	Percent	Hazardous	Chemical Characterization
Hydrogen Chloride	7647-01-0	231-595-7	33 - 40%	Yes	Substance
Water	7732-18-5	231-791-2	60 - 67%	No	Mixture

4. First-aid Measures

Inhalation: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give Oxygen. Get medical attention immediately.

Ingestion: DO NOT INDUCE VOMITING! Give large quantities of water or milk, if available. Never give anything by mouth to an unconscious person. Get medical attention immediately.

Skin Contact: In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

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

5. Fire-fighting Measures

Fire: Extreme heat or contact with metals can release flammable Hydrogen gas.

Explosion: Not considered to be an explosion hazard.

Fire Extinguishing Media: If involved in a fire, use water spray. Neutralize with soda ash or slaked lime.

Special Information: In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full face piece operated in the pressure demand or other positive pressure mode. Structural firefighter's protective clothing is ineffective for fires involving Hydrochloric Acid. Stay away from ends of tanks. Cool tanks with water spray until well after fire is out.

6. Accidental Release Measures

Personal Precautions, Protective Equipment and Emergency Procedures: Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering.

Environmental Precautions and Methods and Materials for Containment and Cleaning Up: Contain and recover liquid when possible. Do not let product enter drains. Neutralize with alkaline material (soda ash, lime,) then absorb with an inert material (e. g., vermiculite, dry sand, earth,) and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

7. Handling and Storage

Precautions for Safe Handling and Conditions for Safe Storage, Including Any Incompatibilities: Store in a cool, dry, ventilated storage area with acid resistant floors and good drainage. Protect from physical damage. Keep out of direct sunlight and away from heat, water, and incompatible materials. Do not wash out container and use it for other purposes. When diluting, the acid should always be added slowly to water and in small amounts. Never use hot water and never add water to the acid. Water added to acid can cause uncontrolled boiling and splashing. When opening metal containers, use non-sparking tools because of the possibility of Hydrogen gas being present. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid.) Observe all warnings and precautions listed for the product.

8. Exposure Controls / Personal Protection

Airborne Exposure Limits:
OSHA Permissible Exposure Limit (PEL): 5 ppm (Ceiling)
ACGIH Threshold Limit Value (TLV): 2 ppm (Ceiling), A4 Not classifiable as a human carcinogen

Ventilation System: A system of local and / or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved): If the exposure limit is exceeded, a full face piece respirator with an acid gas cartridge may be worn up to 50 times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full face piece positive-pressure, air supplied respirator. WARNING: Air purifying respirators do not protect workers in Oxygen deficient atmospheres.

Skin Protection: Rubber or neoprene gloves and additional protection including impervious boots, apron, or coveralls, as needed in areas of unusual exposure to prevent skin contact.

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

9. Physical and Chemical Properties

Appearance: Colorless, fuming liquid
Odor: Pungent odor of Hydrogen chloride
Odor Threshold: Not determined
pH: For HCL solutions: 0.1 (1.0 N), 1.1 (0.1 N), 2.02 (0.01 N)
% Volatiles by volume @ 21C (70F): 100
Melting Point: -74C (-101F)
Boiling Point / Boiling Range: 53C (127F) Azeotrope (20.2%) boils at 109C (228F)
Flash Point: Not applicable
Evaporation Rate (BuAC=1): Not determined
Flammability: Not applicable
Upper / Lower Flammability or Explosive Limits: Not applicable
Vapor Pressure (mm Hg): 190 @ 25C (77F)
Vapor Density (Air=1): No information found
Relative Density: 1.2 g/cm3 at 25 °C (77 °F)
Solubility: Soluble
Partition Coefficient: n-octanol / water: No data available
Auto-ignition Temperature: No data available
Decomposition Temperature: No data available
Viscosity: 2.3 mPa.s at 15 °C (59 °F)

10. Stability and Reactivity

Reactivity and / or Chemical Stability: Stable under ordinary conditions of use and storage. Containers may burst when heated.

Possibility of Hazardous Reactions and Conditions to Avoid: No dangerous reactions known.

Incompatible Materials: A strong mineral acid, concentrated Hydrochloric Acid is highly reactive with strong bases, metals, metal oxides, hydroxides, amines, carbonates and other alkaline materials. Incompatible with materials such as cyanides, sulfides, sulfites, and Formaldehyde.

Hazardous Decomposition Products: Thermal oxidative decomposition produces toxic chlorine fumes and explosive Hydrogen gas.

11. Toxicological Information

Emergency Overview: POISON! DANGER! CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR INHALED. INHALATION MAY CAUSE LUNG DAMAGE.

Potential Health Effects:

Inhalation: Corrosive! Inhalation of vapors can cause coughing, choking, inflammation of the nose, throat, and upper respiratory tract, and in severe cases, pulmonary edema, circulatory failure, and death.

Ingestion: Corrosive! Swallowing Hydrochloric Acid can cause immediate pain and burns of the mouth, throat, esophagus and gastrointestinal tract. May cause nausea, vomiting, and diarrhea. Swallowing may be fatal.

Skin Contact: Corrosive! Can cause redness, pain, and severe skin burns. Concentrated solutions cause deep ulcers and discolor skin.

Eye Contact: Corrosive! Vapors are irritating and may cause damage to the eyes. Contact may cause severe burns and permanent eye damage.

Chronic Exposure: Long-term exposure to concentrated vapors may cause erosion of teeth. Long term exposures seldom occur due to the corrosive properties of the acid.

Aggravation of Pre-existing Conditions: Persons with pre-existing skin disorders or eye disease may be more susceptible to the effects of this substance.

Specific Target Organ Toxicity - Single Exposure (Globally Harmonized System:) The substance or mixture is classified as specific target organ toxicant, single exposure, Category 3 with respiratory tract irritation.

Specific Target Organ Toxicity - Repeated Exposure (Globally Harmonized System:) No data available.

Numerical Measures of Toxicity: Cancer Lists: NTP Carcinogen

Ingredient	Known	Anticipated	IARC Category
Hydrogen Chloride (7647-01-0)	No	No	3
Water (7732-18-5)	No	No	None

Acute Toxicity:
Hydrochloric Acid:
Inhalation rat LC50: 3124 ppm / 1 h; Oral rabbit LD50: 900 mg/kg
Investigated as a tumorigen, mutagen, reproductive effecter.

12. Ecological Information

Ecotoxicity: This material is expected to be toxic to aquatic life. / LC50 862 mg/l (Orfe, golden (Leuciscus Idus))

Persistence and Degradability: When released into the soil, this material is not expected to biodegrade.

Bioaccumulative Potential: No further relevant information available.

Mobility in Soil: When released into the soil, this material may leach into groundwater.

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

13. Disposal Considerations

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

14. Transport Information

UN Number: UN1789
UN Proper Shipping Name: HYDROCHLORIC ACID
Packing Group: II

DOT **IMDG** **IATA**

Land Transport ADR/RID and GGVS/GGVE (Cross Border / Domestic)
Transport Hazard Class(es): 8 (C1) Corrosive substances

Maritime Transport IMDG/GGVSea
Transport Hazard Class(es): 8
Marine Pollutant: No

Air Transport ICAO-TI and IATA-DGR
Transport Hazard Class(es): 8

Transport in Bulk (According to Annex II of MARPOL 73/78 and the IBC Code): Not Applicable

Special Precautions for User: Warning: Corrosive Substances

15. Regulatory Information

Chemical Inventory Status – Part 1

Ingredient	TSCA	EC	Japan	Australia
Hydrogen Chloride (7647-01-0)	Yes	Yes	Yes	Yes
Water (7732-18-5)	Yes	Yes	Yes	Yes

Chemical Inventory Status – Part 2

Ingredient	Korea	Canada		Phil.
		DSL	NDSL	
Hydrogen Chloride (7647-01-0)	Yes	Yes	No	Yes
Water (7732-18-5)	Yes	Yes	No	Yes

Federal, State & International Regulations - Part 1

	SARA 302		SARA 313	
Ingredient	RQ	TPQ	List Chemical	Catg.
Hydrogen Chloride (7647-01-0)	5000	500*	Yes	No
Water (7732-18-5)	No	No	No	No

Federal, State & International Regulations - Part 2

	RCRA		TSCA
Ingredient	CERCLA	261.33	8(d)
Hydrogen Chloride (7647-01-0)	5000	No	No
Water (7732-18-5)	No	No	No

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

Australian Hazchem Code: 2R

Poison Schedule: None allocated

16. Other Information

THE INFORMATION CONTAINED IN THIS DATA SHEET IS BASED ON THE DATA AVAILABLE TO PURITAN PRODUCTS AT THIS TIME. WHILE BELIEVED TO BE ACCURATE, PURITAN PRODUCTS DOES NOT CLAIM IT TO BE ALL INCLUSIVE. IT IS PROVIDED INDEPENDENT OF ANY SALE OF THE PRODUCT, FOR THE PURPOSE OF HAZARD COMMUNICATION, AND AS A GUIDE FOR THE APPROPRIATE PRECAUTIONARY HANDLING OF THE PRODUCT BY PROPERLY TRAINED INDIVIDUALS. IT IS NOT INTENDED TO PROVIDE PRODUCT PERFORMANCE OR APPLICABILITY INFORMATION, AND NO EXPRESS OR IMPLIED WARRANTY OF ANY KIND IS MADE WITH RESPECT TO THE PRODUCT, THE UNDERLYING PRODUCT DATA, OR THE INFORMATION CONTAINED HEREIN.

YOU ARE URGED TO OBTAIN MATERIAL SAFETY DATA SHEETS FOR ALL PRODUCTS YOU BUY, PROCESS, USE OR DISTRIBUTE, AND ARE ENCOURAGED TO ADVISE THOSE WHO MAY COME IN CONTACT WITH SUCH PRODUCTS OF THE INFORMATION CONTAINED THEREIN.

TO DETERMINE THE APPLICABILITY OR EFFECT OF ANY LAW OR REGULATION WITH RESPECT TO THE PRODUCT, YOU SHOULD CONSULT WITH YOUR LEGAL ADVISOR OR THE APPROPRIATE GOVERNMENT AGENCY. WE WILL NOT PROVIDE ADVICE ON SUCH MATTERS, OR BE RESPONSIBLE FOR ANY INJURY OR DAMAGE RESULTING FROM THE USE OF THE PRODUCT DESCRIBED HEREIN.

SAFETY DATA SHEET

SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

PRODUCT

Product Name: **ISOBUTYLENE**
Product Description: Olefin, Gas or Liquefied Gas
Chemical Formula: CH2=CCH32
Recommended Use: Chemical feedstock

COMPANY IDENTIFICATION

Supplier: **Tonen Chemical Corporation**
W BUILDING
1-8-15, KONAN, MINATOKU
TOKYO 108-8005 Japan

Emergency Phone Number	81-367134121
Supplier General Contact	+81 3 5495 6000

SECTION 2 HAZARDS IDENTIFICATION

This material is hazardous according to regulatory guidelines (see SDS Section 15).

GHS CLASSIFICATION:

Flammable gas: Category 1. Gas under pressure: Liquefied gas.
Acute aquatic toxicant: Category 3.

GHS Label Elements:
Pictogram:

Signal Word: Danger

Hazard Statements:

Physical: H220: Extremely flammable gas. H280: Contains gas under pressure; may explode if heated.
Environmental: H402: Harmful to aquatic life.

Precautionary Statements:

Prevention: P210: Keep away from heat/sparks/open flames/hot surfaces. -- No smoking. P273: Avoid release to the environment.
Response: P377: Leaking gas fire: Do not extinguish, unless leak can be stopped safely. P381: Eliminate all ignition sources if safe to do so.
Storage: P410 + P403: Protect from sunlight. Store in a well-ventilated place.

Disposal: P501: Dispose of contents and container in accordance with local regulations.

Contains: 2-methylpropene

Other hazard information:

PHYSICAL / CHEMICAL HAZARDS

Contact with liquefied gas can cause damage (frostbite) due to rapid evaporative cooling. Inert gas and/or simple asphyxiant. Reduces oxygen available for breathing. Extremely flammable. Material can accumulate static charges which may cause an ignition. Material can release vapors that readily form flammable mixtures. Vapor accumulation could flash and/or explode if ignited. Frostbite hazard - rapidly expanding gas or liquid may cause frostbite.

HEALTH HAZARDS

Excessive exposure may result in eye, skin, or respiratory irritation.

ENVIRONMENTAL HAZARDS

No additional hazards.

NOTE: This material should not be used for any other purpose than the intended use in Section 1 without expert advice. Health studies have shown that chemical exposure may cause potential human health risks which may vary from person to person.

SECTION 3 COMPOSITION / INFORMATION ON INGREDIENTS

This material is defined as a substance.

Hazardous Substance(s) or Complex Substance(s) required for disclosure

Name	CAS#	Concentration*	GHS Hazard Codes
2-methylpropene	115-11-7	> 95 %	H220, H280, H402

Hazardous Constituent(s) Contained in Complex Substance(s) required for disclosure

Name	CAS#	Concentration*	GHS Hazard Codes
BUTENE	25167-67-3	0 - 5%	H224

* All concentrations are percent by weight unless material is a gas. Gas concentrations are in percent by volume. Concentration values may vary.

JAPANESE COMPOSITION INFORMATION

Industrial Safety and Health Law: Article 57, Chemical substances to be labelled: None.

Industrial Safety and Health Law: Article 57-2, Chemical substances to be notified: None.

ISHL Enforcement Order, Table 3-1, Manufacturing Permit Chemical Substances: None.

PRTR Class 1 Designated Chemical Substances: None.

PRTR Class 2 Designated Chemical Substances: None.

PDSCL Chemical Substances: None.

SECTION 4 FIRST AID MEASURES

INHALATION

Immediately remove from further exposure. Get immediate medical assistance. For those providing assistance, avoid exposure to yourself or others. Use adequate respiratory protection. Give supplemental

oxygen, if available. If breathing has stopped, assist ventilation with a mechanical device.

SKIN CONTACT

If frostbite occurs, immerse involved area in water at body temperature. Keep immersed for 20 to 40 minutes. Seek medical assistance.

EYE CONTACT

If liquid contacts eyes, flush thoroughly with water. If irritation occurs, get medical assistance.

INGESTION

Not Applicable

NOTE TO PHYSICIAN

This light hydrocarbon material, or a component, may be associated with cardiac sensitization following very high exposures (well above occupational exposure limits) or with concurrent exposure to high stress levels or heart-stimulating substances like epinephrine. Administration of such substances should be avoided.

SECTION 5 FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA

Appropriate Extinguishing Media: Use water fog, dry chemical or carbon dioxide (CO2) to extinguish flames.

Inappropriate Extinguishing Media: Straight Streams of Water

FIRE FIGHTING

Fire Fighting Instructions: Do not extinguish flames at leak because possibility of uncontrolled explosive reignition exists. Stop leak if you can do it without risk. Evacuate area. If a leak or spill has not ignited, use water spray to disperse the vapors and to protect personnel attempting to stop a leak. Prevent runoff from fire control or dilution from entering streams, sewers, or drinking water supply. Firefighters should use standard protective equipment and in enclosed spaces, self-contained breathing apparatus (SCBA). Use water spray to cool fire exposed surfaces and to protect personnel.

Unusual Fire Hazards: Incomplete combustion may create large amounts of soot. Flammable Gas. Vapors are flammable and heavier than air. Vapors may travel across the ground and reach remote ignition sources causing a flashback fire danger. Hazardous material. Firefighters should consider protective equipment indicated in Section 8.

Hazardous Combustion Products: Smoke, Fume, Incomplete combustion products, Oxides of carbon

FLAMMABILITY PROPERTIES

Flash Point [Method]: <-20C (-4F) [ASTM D-56]
Flammable Limits (Approximate volume % in air): LEL: 1.8 UEL: 9.6
Autoignition Temperature: 324°C (615°F) - 465°C (869°F) [In-house method]

SECTION 6 ACCIDENTAL RELEASE MEASURES

NOTIFICATION PROCEDURES

In the event of a spill or accidental release, notify relevant authorities in accordance with all applicable regulations.

PERSONAL PRECAUTIONS

Avoid contact with spilled material. Warn or evacuate occupants in surrounding and downwind areas if required due to toxicity or flammability of the material. See Section 5 for fire fighting information. See the

Hazard Identification Section for Significant Hazards. See Section 4 for First Aid Advice. See Section 8 for advice on the minimum requirements for personal protective equipment. Additional protective measures may be necessary, depending on the specific circumstances and/or the expert judgment of the emergency responders.

SPILL MANAGEMENT

Land Spill: Eliminate all ignition sources (no smoking, flares, sparks or flames in immediate area). Stop leak if you can do it without risk. Allow liquid to evaporate from the surface. All equipment used when handling the product must be grounded. Do not direct water at spill or source of leak. Do not touch or walk through spilled material. If possible, turn leaking containers so that gas escapes rather than liquid. Isolate area until gas has dispersed. Prevent spreading of vapors through sewers, ventilation systems and confined areas. Use water spray to reduce vapors or divert vapor cloud drift. Avoid allowing water runoff to contact spilled material.

Water Spill: Eliminate all ignition sources (no smoking, flares, sparks or flames in immediate area). Allow liquid to evaporate from the surface. See Land Spill section of the (M)SDS for advice for gases.

Water spill and land spill recommendations are based on the most likely spill scenario for this material; however, geographic conditions, wind, temperature, (and in the case of a water spill) wave and current direction and speed may greatly influence the appropriate action to be taken. For this reason, local experts should be consulted. Note: Local regulations may prescribe or limit action to be taken.

ENVIRONMENTAL PRECAUTIONS

Prevent entry into waterways, sewers, basements or confined areas.

SECTION 7 HANDLING AND STORAGE

HANDLING

Avoid breathing material. Prevent exposure to ignition sources, for example use non-sparking tools and explosion-proof equipment. Use proper bonding and/or ground procedures. However, bonding and grounds may not eliminate the hazard from static accumulation. Material can accumulate static charges which may cause an electrical spark (ignition source). Auto-refrigeration: Drains can be plugged and valves may become inoperable because of the formation of ice when expanding vapors or vaporizing liquids cause temperatures to drop below the freezing point of water.

Loading/Unloading Temperature: [Ambient]

Transport Temperature: <= [Ambient]
Transport Pressure: >= [Ambient]

Static Accumulator: This material is a static accumulator.

STORAGE

Ample fire water supply should be available. A fixed sprinkler/deluge system is recommended. Store under pressure at ambient temperatures or as a refrigerated liquid. The container choice, for example storage vessel, may effect static accumulation and dissipation. Keep container closed. Handle containers with care. Open slowly in order to control possible pressure release. Store in a cool, well-ventilated area. Outside or detached storage preferred. Storage containers should be grounded and bonded.
Storage Temperature: <= [Ambient]
Storage Pressure: >= [Ambient]

Suitable Containers/Packing: Barges; Tank Trucks; Pipelines; Railcars; Tank Vessel
Suitable Materials and Coatings (Chemical Compatibility): Vinyl Coatings; Steel; Zinc; PTFE
Unsuitable Materials and Coatings: Natural Rubber; Butyl Rubber; Aluminum; Plastics

SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE LIMIT VALUES

Exposure limits/standards (Note: Exposure limits are not additive)

Substance Name	Form	Limit / Standard			NOTE	Source
2-methylpropene		TWA	250 ppm			ACGIH
BUTENE		TWA	250 ppm			ACGIH

Biological limits

No biological limits allocated.

NOTE: Limits/standards shown for guidance only. Follow applicable regulations.

ENGINEERING CONTROLS

The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Control measures to consider:
Adequate ventilation should be provided so that exposure limits are not exceeded.

PERSONAL PROTECTION

Personal protective equipment selections vary based on potential exposure conditions such as applications, handling practices, concentration and ventilation. Information on the selection of protective equipment for use with this material, as provided below, is based upon intended, normal usage.

Respiratory Protection: If engineering controls do not maintain airborne contaminant concentrations at a level which is adequate to protect worker health, an approved respirator may be appropriate. Respirator selection, use, and maintenance must be in accordance with regulatory requirements, if applicable. Types of respirators to be considered for this material include:
Half-face filter respirator Type AX filter material.

For high airborne concentrations, use an approved supplied-air respirator, operated in positive pressure mode. Supplied air respirators with an escape bottle may be appropriate when oxygen levels are inadequate, gas/vapor warning properties are poor, or if air purifying filter capacity/rating may be exceeded.

Hand Protection: Any specific glove information provided is based on published literature and glove manufacturer data. Glove suitability and breakthrough time will differ depending on the specific use conditions. Contact the glove manufacturer for specific advice on glove selection and breakthrough times for your use conditions. Inspect and replace worn or damaged gloves. The types of gloves to be considered for this material include:
Thermally protective, chemical resistant gloves are recommended. If contact with forearms is likely, wear gauntlet style gloves.

Eye Protection: If contact with material may occur, safety glasses and face shield are recommended.

Skin and Body Protection: Any specific clothing information provided is based on published literature or manufacturer data. The types of clothing to be considered for this material include:
If prolonged or repeated contact is likely, chemical, and oil resistant clothing is recommended.

Specific Hygiene Measures: Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Discard contaminated clothing and footwear that cannot be cleaned. Practice good housekeeping.

ENVIRONMENTAL CONTROLS

See Sections 6, 7, 12, 13.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Note: Physical and chemical properties are provided for safety, health and environmental considerations only and may not fully represent product specifications. Contact the Supplier for additional information.

GENERAL INFORMATION

Physical State: Gas
Form: Compressed or Liquified
Color: Colorless
Odor: Odorless
Odor Threshold: N/A

IMPORTANT HEALTH, SAFETY, AND ENVIRONMENTAL INFORMATION

Relative Density (at 20 °C): 0.61 [In-house method]
Density: 555 kg/m³ (4.63 lbs/gal, 0.56 kg/dm³) - 616 kg/m³ (5.14 lbs/gal, 0.62 kg/dm³) [In-house method]
Flash Point [Method]: <-20C (-4F) [ASTM D-56]
Flammable Limits (Approximate volume % in air): LEL: 1.8 UEL: 9.6
Flammability (Solid, Gas): N/D
Autoignition Temperature: 324°C (615°F) - 465°C (869°F) [In-house method]
Boiling Point / Range: -6°C (21°F) - 4°C (39°F) [In-house method]
Vapor Density (Air = 1): 1.9 at 101 kPa [In-house method]
Vapor Pressure: [N/D at 20 °C] | 460 kPa (3450 mm Hg) at 38C [In-house method]
Evaporation Rate (n-butyl acetate = 1): N/D
pH: N/A
Log Pow (n-Octanol/Water Partition Coefficient): 2.31 - 2.4 [In-house method]
Solubility in Water: Negligible
Viscosity: [N/D at 40 °C] | 0.33 cSt (0.33 mm2/sec) at -18C | 0.23 cSt (0.23 mm2/sec) at 27C [In-house method]
Decomposition Temperature: N/D
Oxidizing Properties: See Hazards Identification Section.

OTHER INFORMATION

Freezing Point: -106°C (-159°F) - -186°C (-303°F) [In-house method]
Melting Point: N/D
Pour Point: -106°C (-158°F) - -185°C (-302°F) [In-house method]
Molecular Weight: 56

SECTION 10 STABILITY AND REACTIVITY

STABILITY: Material is stable under normal conditions.

CONDITIONS TO AVOID: See Footnote

MATERIALS TO AVOID: See Footnote

HAZARDOUS DECOMPOSITION PRODUCTS: Material does not decompose at ambient temperatures.

POSSIBILITY OF HAZARDOUS REACTIONS: Hazardous polymerization will not occur.

[Footnote: This product is intended for industrial use. Exposure to heat, air, oxidizing agents and other chemicals

not part of an industrial process should be avoided.]

SECTION 11 TOXICOLOGICAL INFORMATION

ACUTE TOXICITY

Route of Exposure	Conclusion / Remarks
Inhalation	
Toxicity (Rat): LC50 > 10000 ppm	Minimally Toxic. Based on test data for the material.
Irritation: No end point data.	Negligible hazard at ambient/normal handling temperatures.
Ingestion	
Toxicity: No end point data.	N/A
Skin	
Toxicity: No end point data.	N/A
Irritation: No end point data.	Negligible irritation to skin at ambient temperatures.
Eye	
Irritation: No end point data.	May cause mild, short-lasting discomfort to eyes.

OTHER HEALTH EFFECTS FROM SHORT AND LONG TERM EXPOSURE
Anticipated health effects from sub-chronic, chronic, respiratory or skin sensitization, mutagenicity, reproductive toxicity, carcinogenicity, target organ toxicity (single exposure or repeated exposure), aspiration toxicity and other effects based on human experience and/or experimental data.

For the product itself:
Simple asphyxiant: Acts by displacing oxygen in the lungs thereby diminishing the supply of oxygen available to the blood and tissues. Symptoms include shortness of breath, rapid heart rate, incoordination, lethargy, headaches, nausea, vomiting, and disorientation. Continued lack of oxygen may result in convulsions, loss of consciousness and death. Since exercise increases the tissue need for oxygen, symptoms will occur more quickly during exertion in an oxygen-deficient environment. Oxygen in enclosed spaces should be maintained at 21 percent by volume.
Vapor concentrations above recommended exposure levels are irritating to the eyes and the respiratory tract, may cause headaches and dizziness, are anesthetic and may have other central nervous system effects. Exposure to rapidly expanding gas or vaporizing liquid may cause frostbite (cold burn). Very high exposure (confined spaces / abuse) to light hydrocarbons may result in abnormal heart rhythm (arrhythmias). Concurrent high stress levels and/or co-exposure to high levels of hydrocarbons (above occupational exposure limits), and to heart-stimulating substances like epinephrine, nasal decongestants, asthma drugs, or cardiovascular drugs may initiate arrhythmias.

IARC Classification:
The following ingredients are cited on the lists below: None.

--REGULATORY LISTS SEARCHED--
1 = IARC 1 2 = IARC 2A 3 = IARC 2B

SECTION 12 ECOLOGICAL INFORMATION

The information given is based on data available for the material, the components of the material, and similar materials.

ECOTOXICITY
Material -- Not expected to be harmful to aquatic organisms.
Material -- Not expected to demonstrate chronic toxicity to aquatic organisms.

MOBILITY

Material -- Highly volatile, will partition rapidly to air. Not expected to partition to sediment and wastewater solids.

PERSISTENCE AND DEGRADABILITY

Hydrolysis:

Material -- Transformation due to hydrolysis not expected to be significant.

Photolysis:

Material -- Transformation due to photolysis not expected to be significant.

Atmospheric Oxidation:

Material -- Expected to degrade rapidly in air

ECOLOGICAL DATA

Persistence, Degradability and Bioaccumulation Potential

Media	Test Type	Duration	Test Results
Air	Photolysis		Half-life (t1/2) 0.5 day(s)
Octanol-Water	Calculated		log Kow 2.3 : a component

SECTION 13 DISPOSAL CONSIDERATIONS

DISPOSAL METHODS

Disposal recommendations based on material as supplied. Disposal must be in accordance with current applicable laws and regulations, and material characteristics at time of disposal.

DISPOSAL RECOMMENDATIONS

Suitable routes of disposal are supervised incineration, preferentially with energy recovery, or appropriate recycling methods in accordance with applicable regulations and material characteristics at the time of disposal.

Empty Container Warning Empty Container Warning (where applicable): Empty containers may contain residue and can be dangerous. Do not attempt to refill or clean containers without proper instructions. Empty drums should be completely drained and safely stored until appropriately reconditioned or disposed. Empty containers should be taken for recycling, recovery, or disposal through suitably qualified or licensed contractor and in accordance with governmental regulations. DO NOT PRESSURISE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND, OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION. THEY MAY EXPLODE AND CAUSE INJURY OR DEATH.

SECTION 14 TRANSPORT INFORMATION

LAND - Precautionary Transportation Measures & Conditions:

Do not co-load together with dangerous goods specifed by Fire Service Law.

NOTE: Comply with applicable laws and regulations.

SEA (IMDG)

Proper Shipping Name: ISOBUTYLENE
Hazard Class & Division: 2.1
EMS Number: F-D, S-U
UN Number: 1055
Packing Group: (N/A)

Marine Pollutant: No
Label(s): 2.1
Transport Document Name: UN1055, ISOBUTYLENE, 2.1, (-20°C c.c.)

AIR (IATA)

Proper Shipping Name: ISOBUTYLENE
Hazard Class & Division: 2.1
UN Number: 1055
Packing Group: (N/A)
Label(s) / Mark(s): 2.1
Transportation Limitations: CARGO AIRCRAFT ONLY
Transport Document Name: UN1055, ISOBUTYLENE, 2.1

SECTION 15 REGULATORY INFORMATION

This material is considered hazardous according to the Classification of Chemicals based on Globally Harmonized System of Classification and Labelling of Chemicals (GHS) (JIS Z 7252–2009).

REGULATORY STATUS AND APPLICABLE LAWS AND REGULATIONS

National Laws and Regulations:

Aviation Law: Regulated
Chemical Substances Control Law: Existing Chemicals
High Pressure Gas Safety Law: High Pressure Gasses, Article 2
ISHL (Occupational Hazard) : Combustible Gases
Poisonous and Deleterious Substances Control Law (PDSCL): Not Regulated
Port Regulation Law: Dangerous Goods
Pollutant Release and Transfer Register (PRTR): Not Regulated
Ship Safety Law: Regulated

SECTION 16 OTHER INFORMATION

N/D = Not determined, N/A = Not applicable
KEY TO THE H-CODES CONTAINED IN SECTION 3 OF THIS DOCUMENT (for information only):
H220: Extremely flammable gas; Flammable Gas, Cat 1
H224: Extremely flammable liquid and vapor; Flammable Liquid, Cat 1
H280: Contains gas under pressure; may explode if heated; Pressurized Gas
H402: Harmful to aquatic life; Acute Env Tox, Cat 3

COLUMBUS CHEMICAL INDUSTRIES INC.

Safety Data Sheet

Isopropyl Alcohol 70%

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name: Isopropyl Alcohol 70%

Synonyms/Generic Names: 2-Propanol, 70%; Isoprpanol, 70%; Isopropyl Rubbing Alcohol

Product Number: 2875

Product Use: Industrial, Manufacturing or Laboratory use

Manufacturer: Columbus Chemical Industries, Inc.
N4335 Temkin Rd.
Columbus, WI. 53925

For More Information Call: 920-623-2140 (Monday-Friday 8:00-4:30)

In Case of Emergency Call: CHEMTREC - 800-424-9300 or 703-527-3887 (24 Hours/Day, 7 Days/Week)

2. HAZARDS IDENTIFICATION

OSHA Hazards: Flammable liquid, Target organ effect, Irritant

Target Organs: Nerves, Kidneys, Cardiovascular system, Gastrointestinal tract, Liver

Signal Word: Danger

Pictograms:

GHS Classification:

Flammable liquids	Category 2
Skin irritation	Category 3
Eye irritation	Category 2A
Specific target organ toxicity-single exposure	Category 3

GHS Label Elements, including precautionary statements:

Hazard Statements:

H225	Highly flammable liquid and vapor
H316	Causes mild skin irritation.
H319	Causes serious eye irritation.
H336	May cause drowsiness or dizziness.

Precautionary Statements:

P210	Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
P261	Avoid breathing dust/ fume/ gas/ mist/ vapors/ spray.
P305+P351+P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

Potential Health Effects

Eyes	Causes eye irritation.
Inhalation	May be harmful if inhaled. Causes respiratory tract irritation. Vapors may cause drowsiness and dizziness.
Skin	May be harmful if absorbed through skin. Causes skin irritation.
Ingestion	May be harmful if swallowed.

NFPA Ratings

Health	1
Flammability	3
Reactivity	0
Specific hazard	Not Available

HMIS Ratings

Health	1
Fire	3
Reactivity	0
Personal	E

3. COMPOSITION/INFORMATION ON INGREDIENTS

Component	Weight %	CAS #	EINECS# / ELINCS#	Formula	Molecular Weight
Isopropyl Alcohol	70	67-63-0	200-661-7	$CH_3CHOHCH_3$	60.10 g/mol
Water	30	7732-18-5	231-791-2	H_2O	18.00 g/mol

4. FIRST-AID MEASURES

Eyes	In case of eye contact, rinse with plenty of water and seek medical attention.
Inhalation	Move casualty to fresh air and keep at rest. If breathing is difficult, give oxygen. If not breathing, give artificial respiration. Get medical attention.
Skin	Immediately flush with plenty of water for at least 15 minutes while removing contaminated clothing and wash using soap. Get medical attention.
Ingestion	**Do Not Induce Vomiting!** Never give anything by mouth to an unconscious person. If conscious, wash out mouth with water. Get medical attention.

5. FIRE-FIGHTING MEASURES

Suitable (and unsuitable) extinguishing media	Flammable in the presence of a source of ignition when the temperature is above the flash point. Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide. Use appropriate media for adjacent fire. Cool containers with water.
Special protective equipment and precautions for firefighters	Wear self-contained, approved breathing apparatus and full protective clothing, including eye protection and boots.
Specific hazards arising from the chemical	Emits toxic fumes (carbon oxides) under fire conditions. (See also Stability and Reactivity section).

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures	See section 8 for recommendations on the use of personal protective equipment.
Environmental precautions	Prevent spillage from entering drains. Any release to the environment may be subject to federal/national or local reporting requirements.
Methods and materials for containment and cleaning up	Neutralize spill. Absorb spill with noncombustible absorbent material, then place in a suitable container for disposal. Clean surfaces thoroughly with water to remove residual contamination. Dispose of all waste and cleanup materials in accordance with regulations.

7. HANDLING AND STORAGE

Precautions for safe handling
See section 8 for recommendations on the use of personal protective equipment. Use with adequate ventilation. Wash thoroughly after using. Keep container closed when not in use. Avoid formation of aerosols.

Conditions for safe storage, including any incompatibilities
Store in cool, dry well ventilated area. Keep away from incompatible materials (see section 10 for incompatibilities).

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Occupational exposure controls:

Component	Exposure Limits	Basis	Entity
Isopropyl Alcohol	200 ppm 492 mg/m^3	TLV	ACGIH
	400 ppm 984 mg/m^3	STEL	ACGIH
	400 ppm 980 mg/m^3	PEL	OSHA
	400 ppm 980 mg/m^3	REL	NIOSH
	500 ppm 1225 mg/m^3	STEL	NIOSH

TWA: Time Weighted Average over 8 hours of work.
TLV: Threshold Limit Value over 8 hours of work.
REL: Recommended Exposure Limit
PEL: Permissible Exposure Limit
STEL: Short Term Exposure Limit during x minutes.
IDLH: Immediately Dangerous to Life or Health
WEEL: Workplace Environmental Exposure Levels
CEIL: Ceiling

Personal Protection

Eyes	Wear chemical safety glasses or goggles.
Inhalation	Provide local exhaust, preferably mechanical. If exposure levels are excessive, use an approved respirator.
Skin	Wear nitrile or rubber gloves, apron or lab coat.
Other	Not Available

Other Recommendations
Provide eyewash stations, quick-drench showers and washing facilities accessible to areas of use and handling.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance (physical state, color, etc.)	Clear, colorless liquid.
Odor	Alcohol-like.
Odor threshold	Highest known value: 22 ppm
pH	Neutral
Melting point/freezing point	-88.5°C (-127.3°F)
Initial boiling point and boiling range	82.5°C (180.5°F)
Flash point	CLOSED CUP: 18.3°C (64.9°F)
Evaporation rate	Not Available
Flammability (solid, gas)	Flammable
Upper/lower flammability or explosive limit	LOWER: 2% UPPER: 12.7%
Vapor pressure	Not Available
Vapor density	Not Available
Density	0.84 (Water = 1)
Solubility (ies)	Easily soluble in cold water, hot water, methanol, diethyl ether, n-octanol, acetone.
Partition coefficient: n-octanol/water	Not Available
Auto-ignition temperature	399°C (750.2°F)
Decomposition temperature	Not Available

10. STABILITY AND REACTIVITY

Chemical Stability	Stable
Possibility of Hazardous Reactions	Will not occur.
Conditions to Avoid	Heat, flames and sparks. Extremes of temperature and direct sunlight.
Incompatible Materials	Aluminum, acids, oxidizing agents, halogenated compounds, acid anhydrides.
Hazardous Decomposition Products	Carbon oxides.

11. TOXICOLOGICAL INFORMATION

Acute Toxicity

Skin	LD50 – rabbit – 18,286 mg/kg
Eyes	Not Available
Respiratory	Not Available
Ingestion	LD50 – mouse – 5,143 mg/kg

Carcinogenicity

IARC	3-Group 3: Not classifiable as to its carcinogenicity to humans (Isopropyl Alcohol).
ACGIH	A4: Not classifiable as a human carcinogen (Isopropyl Alcohol).
NTP	No components of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA	No components of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Signs & Symptoms of Exposure

Skin	Irritation, redness, itchiness.
Eyes	Irritation, redness, watering eyes, itchiness.
Respiratory	Irritation, coughing, wheezing, dizziness, drowsiness.
Ingestion	Irritation, nausea, vomiting, diarrhea, dizziness, drowsiness.

Chronic Toxicity	May cause damage to the following organs: kidneys, liver, skin, central nervous system.
Teratogenicity	Not Available
Mutagenicity	Not Available
Embryotoxicity	Not Available
Specific Target Organ Toxicity	Not Available
Reproductive Toxicity	Classified Reproductive system/toxin/female. Development toxin.
Respiratory/Skin Sensitization	Not Available

12. ECOLOGICAL INFORMATION

Ecotoxicity

Aquatic Vertebrate	Not Available
Aquatic Invertebrate	Not Available
Terrestrial	Not Available

Persistence and Degradability	Not Available
Bioaccumulative Potential	Not Available
Mobility in Soil	Not Available
PBT and vPvB Assessment	Not Available
Other Adverse Effects	Not Available

13. DISPOSAL CONSIDERATIONS

Waste Residues	Users should review their operations in terms of the applicable federal/national or local regulations and consult with appropriate regulatory agencies if necessary before disposing of waste product container.
Product Containers	Users should review their operations in terms of the applicable federal/national or local regulations and consult with appropriate regulatory agencies if necessary before disposing of waste product container.

The information offered in section 13 is for the product as shipped. Use and/or alterations to the product may significantly change the characteristics of the material and alter the waste classification and proper disposal methods.

14. TRANSPORTATION INFORMATION

US DOT	UN1219, Isopropanol, 3, pg II
TDG	UN1219, ISOPROPANOL, 3, pg II
IMDG	UN1219, ISOPROPANOL, 3, pg II
Marine Pollutant	No
IATA/ICAO	UN1219, Isopropanol, 3, pg II

15. REGULATORY INFORMATION

TSCA Inventory Status	All ingredients are listed on the TSCA inventory.
DSCL (EEC)	All ingredients are listed on the DSCL inventory.
California Proposition 65	Not Listed
SARA 302	Not Listed
SARA 304	Not listed
SARA 311	Isopropyl Alcohol
SARA 312	Isopropyl Alcohol
SARA 313	Listed: Isopropyl Alcohol
WHMIS Canada	CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F). CLASS D-2B: Material causing other toxic effects(TOXIC).

16. OTHER INFORMATION

Revision	Date
Revision 1	07-25-2012

Safety Data Sheet
according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), and GHS

Printing date 25.05.2012 Revision: 24.05.2012

1 Identification of the Substance/mixture and of the Company/Undertaking

1.1 Product identifier
Trade name: LIQUINOX
Application of the substance / the preparation: Hand detergent
1.3 Details of the supplier of the Safety Data Sheet
Manufacturer/Supplier:
Alconox, Inc.
30 Glenn St., Suite 309
White Plains, NY 10603
Phone: 914-948-4040
Further information obtainable from: Product Safety Department

1.4 Emergency telephone number:
ChemTel Inc.
(800)255-3924, +1 (813)248-0585

2 Hazards Identification

2.1 Classification of the substance or mixture
Classification according to Regulation (EC) No 1272/2008

GHS07

Skin Irrit. 2: H315: Causes skin irritation.
Eye Irrit. 2: H319: Causes serious eye irritation.

Classification according to Directive 67/548/EEC or Directive 1999/45/EC

Xi; Irritant

R36/38: Irritating to eyes and skin.
Information concerning particular hazards for human and environment:
The product has to be labelled due to the calculation procedure of the "General Classification guideline for preparations of the EU" in the latest valid version.
Classification system:
The classification is according to the latest editions of the EU-lists, and extended by company and literature data

2.2 Label elements
Labelling according to Regulation (EC) No 1272/2008
The product is classified and labelled according to the CLP regulation.

Hazard pictograms

GHS07

Signal word: Warning

Hazard-determining components of labelling:
Benzenesulfonic Acid, Sodium Salts
Hazard statements:
H315 Causes skin irritation.
H319 Causes serious eye irritation.

(Contd. on page 2)

Safety Data Sheet
according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), and GHS

Printing date 25.05.2012 Revision: 23.05.2012

Trade name: LIQUINOX

(Contd. of page 1)

Precautionary statements:
P280 Wear protective gloves/protective clothing/eye protection/face protection.
P264 Wash thoroughly after handling.
P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P321 Specific treatment (see on this label).
P362 Take off contaminated clothing and wash before reuse.
P332+P313 If skin irritation occurs: Get medical advice/attention.
P337+P313 If eye irritation persists: Get medical advice/attention.
P302+P352 IF ON SKIN: Wash with plenty of soap and water.

Hazard description:
WHMIS-symbols:
D2B - Toxic material causing other toxic effects

NFPA ratings (scale 0 - 4)

Health = 1
Fire = 0
Reactivity = 0

HMIS-ratings (scale 0 - 4)

HEALTH	1
FIRE	0
REACTIVITY	0

Health = 1
Fire = 0
Reactivity = 0

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

3 Composition/Information on Ingredients

3.2 Mixtures
Description: Mixture of substances listed below with nonhazardous additions.

Dangerous components:		
CAS: 68081-81-2	Benzenesulfonic Acid, Sodium Salts Xi R38-41 Eye Dam. 1, H318 Skin Irrit. 2, H315	10-25%
CAS: 1300-72-7 EINECS: 215-090-9	Sodium xylenesulphonate Xi R36/37/38 Skin Irrit. 2, H315; Eye Irrit. 2, H319; STOT SE 3, H335	2.5-10%
CAS: 84133-50-6	Alcohol Ethoxylate Xi R36/38 Skin Irrit. 2, H315	2.5-10%

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Safety Data Sheet
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CAS: 68603-42-9 EINECS: 271-657-0	Coconut diethanolamide Xi R36/38	2.5-10%
CAS: 17572-97-3 EINECS: 241-543-5	Ethylenediaminetetraacetic acid, tripotassium salt Xi R36/37/38	2.5-10%

Additional information: For the wording of the listed risk phrases refer to section 16.

4 First Aid Measures

4.1 Description of first aid measures

General information:
Take affected persons out into the fresh air.

After inhalation:
Supply fresh air; consult doctor in case of complaints.

After skin contact:
Immediately wash with water and soap and rinse thoroughly.
If skin irritation continues, consult a doctor.

After eye contact:
Remove contact lenses if worn.
Rinse opened eye for several minutes under running water. If symptoms persist, consult a doctor.

After swallowing:
Do not induce vomiting; call for medical help immediately.
Rinse out mouth and then drink plenty of water.
A person vomiting while laying on their back should be turned onto their side.

4.2 Most important symptoms and effects, both acute and delayed:
No further relevant information available.

4.3 Indication of any immediate medical attention and special treatment needed:
No further relevant information available.

5 Firefighting Measures

5.1 Extinguishing media:

Suitable extinguishing agents:
CO2, powder or water spray. Fight larger fires with water spray or alcohol resistant foam.

5.2 Special hazards arising from the substance or mixture:
No further relevant information available.

5.3 Advice for firefighters:

Protective equipment:
Wear self-contained respiratory protective device.
Wear fully protective suit.

6 Accidental Release Measures

6.1 Personal precautions, protective equipment and emergency procedures:
Ensure adequate ventilation
Particular danger of slipping on leaked/spilled product.

6.2 Environmental precautions:
Dilute with plenty of water.
Do not allow to enter sewers/ surface or ground water.

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Safety Data Sheet
according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), and GHS

Printing date 25.05.2012 Revision: 23.05.2012

Trade name: LIQUINOX

(Contd. of page 3)

6.3 Methods and material for containment and cleaning up:
Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders, sawdust). Clean the affected area carefully; suitable cleaners are:
Warm water

6.4 Reference to other sections:
See Section 7 for information on safe handling.
See Section 8 for information on personal protection equipment.
See Section 13 for disposal information

7 Handling and Storage

7.1 Precautions for safe handling:
No special measures required.

Information about fire - and explosion protection:
No special measures required.

7.2 Conditions for safe storage, including any incompatibilities:

Storage:

Requirements to be met by storerooms and receptacles: No special requirements.

Information about storage in one common storage facility: Not required.

Further information about storage conditions: None

7.3 Specific end use(s): No further relevant information available.

8 Exposure Controls/Personal Protection

Additional information about design of technical facilities: No further data; see item 7.

8.1 Control parameters

Ingredients with limit values that require monitoring at the workplace:
The product does not contain any relevant quantities of materials with critical values that have to be monitored at the workplace.

Additional information: The lists valid during the making were used as basis.

8.2 Exposure controls:

Personal protective equipment:

General protective and hygienic measures:
Keep away from foodstuffs, beverages and feed.
Immediately remove all soiled and contaminated clothing.
Wash hands before breaks and at the end of work.
Avoid contact with the eyes and skin.

Respiratory protection:
Not required.

Protection of hands:

Protective gloves

The glove material has to be impermeable and resistant to the product/ the substance/ the preparation.
Due to missing tests no recommendation to the glove material can be given for the product/ the preparation/ the chemical mixture.
Selection of the glove material on consideration of the penetration times, rates of diffusion and the degradation

(Contd. on page 5)

Safety Data Sheet
according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), and GHS

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Trade name: LIQUINOX

(Contd. of page 4)

Material of gloves:
Natural rubber, NR
Nitrile rubber, NBR
Neoprene gloves
The selection of the suitable gloves does not only depend on the material, but also on further marks of quality and varies from manufacturer to manufacturer. As the product is a preparation of several substances, the resistance of the glove material cannot be calculated in advance and has therefore to be checked prior to the application.

Penetration time of glove material:
The exact break through time has to be found out by the manufacturer of the protective gloves and has to be observed.

Eye protection:

Safety glasses

Goggles recommended during refilling

9 Physical and Chemical Properties

9.1 Information on basic physical and chemical properties:

General Information:

Appearance:

Form:	Liquid
Colour:	Light yellow
Odour:	Odourless
Odour threshold:	Not determined.
pH-value at 20°C:	8.5
Change in condition:	
Melting point/Melting range:	Undetermined.
Boiling point/Boiling range:	100°C
Flash point:	Not applicable.
Flammability (solid, gaseous):	Not applicable.
Ignition temperature:	
Decomposition temperature:	Not determined.
Self-igniting:	Product is not selfigniting.
Danger of explosion:	Product does not present an explosion hazard.
Explosion limits:	
Lower:	Not determined.
Upper:	Not determined.
Vapour pressure at 20°C:	23 hPa
Density at 20°C:	1.08 g/cm³
Relative density:	Not determined.
Vapour density:	Not determined.
Evaporation rate:	Not determined.

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Safety Data Sheet
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Trade name: LIQUINOX

(Contd. of page 5)

Solubility in / Miscibility with water:	Fully miscible.
Segregation coefficient (n-octanol/water):	Not determined.
Viscosity:	
Dynamic:	Not determined.
Kinematic:	Not determined.
9.2 Other information:	No further relevant information available

10 Stability and Reactivity

10.1 Reactivity:
10.2 Chemical stability:
Thermal decomposition / conditions to be avoided:
No decomposition if used according to specifications.
10.3 Possibility of hazardous reactions:
Reacts with strong oxidizing agents.
Reacts with strong acids.
10.4 Conditions to avoid:
No further relevant information available.
10.5 Incompatible materials:
No further relevant information available.
10.6 Hazardous decomposition products:
Carbon monoxide and carbon dioxide
Sulphur oxides (SOx)
Nitrogen oxides

11 Toxicological Information

11.1 Information on toxicological effects:
Acute toxicity:
Primary irritant effect:
On the skin: Irritant to skin and mucous membranes.
On the eye: Strong irritant with the danger of severe eye injury.
Sensitization: No sensitizing effects known.
Additional toxicological information:
The product shows the following dangers according to the calculation method of the General EU Classification Guidelines for Preparations as issued in the latest version:
Irritant

12 Ecological Information

12.1 Toxicity:
Aquatic toxicity: No further relevant information available.
12.2 Persistence and degradability: No further relevant information available.
12.3 Bioaccumulative potential: No further relevant information available.
12.4 Mobility in soil: No further relevant information available.
Additional ecological information:
General notes:
Water hazard class 1 (German Regulation) (Self-assessment): slightly hazardous for water.
Do not allow undiluted product or large quantities of it to reach ground water, water course or sewage system.
Must not reach sewage water or drainage ditch undiluted or unneutralized.

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Safety Data Sheet
according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), and GHS

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Trade name: LIQUINOX

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12.5 Results of PBT and vPvB assessment:
PBT: Not applicable.
vPvB: Not applicable.
12.6 Other adverse effects: No further relevant information available.

13 Disposal Considerations

13.1 Waste treatment methods:
Recommendation:
Smaller quantities can be disposed of with household waste.
Small amounts may be diluted with plenty of water and washed away. Dispose of bigger amounts in accordance with Local Authority requirements.
The surfactant used in this product complies with the biodegradability criteria as laid down in Regulation (EC) No. 648/2004 on detergents. Data to support this assertion are held at the disposal of the competent authorities of the Member States and will be made available to them, at their direct request or at the request of a detergent manufacturer.
Uncleaned packaging:
Recommendation: Disposal must be made according to official regulations.
Recommended cleansing agents: Water, if necessary together with cleansing agents.

14 Transport Information

14.1 UN-Number: **DOT, ADR, ADN, IMDG, IATA, ICAO:**	Not Regulated
14.2 UN proper shipping name: **DOT, ADR, ADN, IMDG, IATA, ICAO:**	Not Regulated
14.3 Transport hazard class(es): **DOT, ADR, ADN, IMDG, IATA, ICAO:**	Not Regulated
14.4 Packing group: **DOT, ADR, AND, IMDG, IATA, ICAO:**	Not Regulated
14.5 Environmental hazards: **Marine pollutant:**	No
14.6 Special precautions for user:	Not applicable.
14.7 Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code:	Not applicable.
UN "Model Regulation":	Not Regulated

15 Regulatory Information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture:
United States (USA):
SARA:

Section 355 (extremely hazardous substances):
None of the ingredients is listed.
Section 313 (Specific toxic chemical listings):
None of the ingredients is listed.
TSCA (Toxic Substances Control Act):
All ingredients are listed.

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Safety Data Sheet
according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), and GHS

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Trade name: LIQUINOX

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Proposition 65 (California):

Chemicals known to cause cancer:
None of the ingredients is listed.
Chemicals known to cause reproductive toxicity for females:
None of the ingredients is listed.
Chemicals known to cause reproductive toxicity for males:
None of the ingredients is listed.
Chemicals known to cause developmental toxicity:
None of the ingredients is listed.

Carcinogenic Categories:

EPA (Environmental Protection Agency):
None of the ingredients is listed.
TLV (Threshold Limit Value established by ACGIH):
None of the ingredients is listed.
NIOSH-Ca (National Institute for Occupational Safety and Health):
None of the ingredients is listed.
OSHA-Ca (Occupational Safety & Health Administration):
None of the ingredients is listed.

Canadá:

Canadian Domestic Substances List (DSL):
All ingredients are listed.
Canadian Ingredient Disclosure list (limit 0.1%):
None of the ingredients is listed.
Canadian Ingredient Disclosure list (limit 1%):
None of the ingredients is listed.

15.2 Chemical safety assessment: A Chemical Safety Assessment has not been carried out.

16 Other Information

This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

Relevant phrases:

H315 Causes skin irritation.
H318 Causes serious eye damage.
H319 Causes serious eye irritation.
H335 May cause respiratory irritation.

R36/37/38 Irritating to eyes, respiratory system and skin.
R36/38 Irritating to eyes and skin.
R38 Irritating to skin.
R41 Risk of serious damage to eyes.

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Safety Data Sheet
according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), and GHS

Printing date 25.05.2012 Revision: 23.05.2012

Trade name: LIQUINOX

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Abbreviations and Acronyms
ADR: European Agreement concerning the International Carriage of Dangerous Goods by Road
IMDG: International Maritime Code for Dangerous Goods
DOT: US Department of Transportation
IATA: International Air Transport Association
GHS: Globally Harmonized System of Classification and Labelling of Chemicals
ACGIH: American Conference of Governmental Industrial Hygienists
NFPA: National Fire Protection Association (USA)
HMIS: Hazardous Materials Identification System (USA)
WHMIS: Workplace Hazardous Materials Information System (Canada)
VOC: Volatile Organic Compounds (USA, EU)
LC50: Lethal concentration, 50 percent
LD50: Lethal dose, 50 percent

MATERIAL SAFETY DATA SHEET

1. IDENTIFICATION of the SUBSTANCE or PREPARATION

Trade/Material Name: **NITRIC ACID 20-70%**
Chemical Names, Common Names: Concentrated Nitric Acid
Synonyms: Azotic Acid; Engraver's Acid; Aqua Fortis; Hydrogen Nitrate; Nitral Hydroxide
Product Use: Various
Molecular Formula: HNO_3
Product Catalog Numbers: ACN-.5; ACN-.5-1; ACN-1; ACN-10; ACN-10-1; ACN-2; ACN-2-1; ACN-5; ACN-5-1; PP150-01W/5NA; PP150-01WN5NA; PP156-125W/.5NA; PP156-125WN/.5NA; PP157-250W/1NA; PP157-250WN/1NA; SVCN-.5; SVCN-.5-1; SVCN-1; SVCN-10; SVCN-10-1; SVNC-2; SVCN-2-1; SVCN-5; SVCN-5-1

COMPANY/UNDERTAKING IDENTIFICATION:

U.S. Manufacturer's Name: EP Scientific Products, LLC.-ThermoFisher Scientific
Address: 520 N. MAIN STREET
Miami, OK 74354
Business Phone: 1-(800) 331-4425
Emergency Phone: CHEMTREC: 1-800-424-9300 (U.S./Canada/Puerto Rico) [24-hours]
CHEMTREC: +1-703-527-3887 (Outside North America) [24-hours]

EMAIL ADDRESS FOR PRODUCT INFORMATION:

ALL WHMIS required information is included in appropriate sections based on the ANSI Z400.1-2004 format. This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR. The product is also classified per all applicable EU Directives through EC 1907: 2006, the European Union CLP EC 1272/2008 and the Global Harmonization Standard.

2. HAZARD IDENTIFICATION

GLOBAL HARMONIZATION CLASSIFICATION: This product has been classified in accordance with the Global Harmonization Standard.

Classification: Oxidizing Liquid, Category 3, Skin Corrosion, Category 1A
Hazard Statement Codes: H: 272, H314

See Section 15 for full text of Precautionary Statements and Hazard Symbol Codes

EU LABELING AND CLASSIFICATION 67/548/EEC: This product meets the definition of hazardous, as defined by the European Community Council Directive 67/548/EEC or subsequent Directives.

EU CLASSIFICATION: O [Oxidizer], C [Corrosive] EU RISK PHRASES: R: 8, R: 35
EU SAFETY PHRASES: S: (1/2-); S: 23, S: 26; S: 36; S: 45

See Section 15 for full text of Ingredient Risk and Safety Phrases

EMERGENCY OVERVIEW: Product Description: This product is a clear to yellow liquid with strong, acrid odor. **Health Hazards: DANGER!** This product is corrosive and can cause severe irritation or burns by all routes of exposure. May be fatal by inhalation or ingestion. Symptoms by inhalation may be delayed. Repeated inhalation of low level concentrations may cause reduced lung capacity. Chronic skin exposure to low concentration may result in dermatitis. **Flammability Hazards:** Nitric Acid is a strong oxidizer and may cause fire in contact with combustible materials. If involved in a fire it may generate irritating fumes and toxic gases (e.g., nitric oxides). **Reactivity Hazards:** Concentrated Nitric Acid reacts with water. May react violently or explosively and/or ignite spontaneously with many organic and inorganic chemicals. Nitric Acid is corrosive to many metals and contact may produce flammable hydrogen gas. Hygroscopic (absorbs moisture from the air). **Environmental Hazards:** This product may cause harm to organisms if accidentally released. **Emergency Considerations:** Emergency responders should wear appropriate protection for situation to which they respond.

3. COMPOSITION and INFORMATION ON INGREDIENTS

CHEMICAL NAME	CAS #	EINECS#	WT%	EU Hazard Symbol (67/548/EEC)	GHS/EU Hazard Symbol (1272/2008 EC)	EU Classification (67/548/EEC) GHS & EU Classification (1272/2008 EC) Risk Phrases/Hazard Statements
Nitric Acid	7697-37-2	231-714-2	20-70%			EU 67/548 Hazard Classification: O (Oxidizer), C (Corrosive) EU 67/548 Risk Phrases: R: 8, R: 35 GHS & EU 1272/2008 Classification: Oxidizing Liquid Category 3, Skin Corrosion, Category 1A GHS & EU 1272/2008 Hazard Statement Codes: H272, H314
Water	7732-18-5	231-791-2	Balance	Not Applicable	Not Applicable	EU 67/548 Hazard Classification: Not Applicable GHS & EU 1272/2008 Classification: Not Applicable

See Section 15 for full text of Ingredient Risk Phrases and Precautionary Statements

4. FIRST-AID MEASURES

DESCRIPTION OF FIRST AID MEASURES: Take a copy of label and MSDS to physician or health professional with the contaminated individual.

4. FIRST-AID MEASURES (Continued)

IMMEDIATE MEDICAL ATTENTION NEEDED: Yes.

SKIN EXPOSURE: If this product contaminates the skin, flush with running water for 20 minutes. Seek medical attention if adverse effect occurs after flushing.

EYE EXPOSURE: If this product contaminates the eyes, rinse eyes under gently running water. Do NOT allow victim to rub eyes or keep eyes closed. Use sufficient force to open eyelids and then "roll" eyes while flushing. Do not interrupt flushing. Extensive irrigation with water is required (at least 30 minutes). The contaminated individual must seek immediate medical attention.

INHALATION: If mists, vapors or sprays are inhaled, causing irritation, remove victim to fresh air. If necessary, use artificial respiration to support vital functions. 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. Seek medical attention if adverse effect continues after removal to fresh air.

INGESTION: If this product is swallowed, CALL PHYSICIAN OR POISON CONTROL CENTER FOR MOST CURRENT INFORMATION. If professional advice is not available, DO NOT INDUCE VOMITING. Never induce vomiting or give diluents (milk or water) to someone who is unconscious, having convulsions, or unable to swallow. If victim is convulsing, maintain an open airway and obtain immediate medical attention.

PROTECTION OF FIRST AID RESPONDERS: See Sections 6 (Accidental Release Measures) and 8 (Exposure Controls-Personal Protection).

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Pre-existing skin or respiratory disorders may be aggravated by overexposures to this product.

INDICATION OF IMMEDIATE MEDICAL ATTENTION AND SPECIAL TREATMENT IF NEEDED: Treat symptoms and eliminate exposure. Monitor arterial blood gases, chest x-ray, and pulmonary function tests if respiratory tract irritation or respiratory depression is evident. Treat dermal irritation or burns with standard topical therapy. Effects may be delayed. Do NOT use sodium bicarbonate in an attempt to neutralize the acid.

5. FIRE-FIGHTING MEASURES

FLASH POINT: Not applicable.

AUTOIGNITION TEMPERATURE: Not applicable.

FLAMMABLE LIMITS (in air by volume, %): Not applicable.

FIRE EXTINGUISHING MEDIA: Use extinguishing agents suitable for the surrounding fire. Use water only to keep non-leaking, fire-exposed containers cool. If water is used, care should be taken, since it can generate heat and cause spattering if applied directly to Nitric Acid.

UNSUITABLE FIRE EXTINGUISHING MEDIA: DO NOT use dry chemical powders containing sodium bicarbonate, potassium bicarbonate, sodium carbonate, calcium carbonate, ammonium phosphate or ammonium sulfate. Nitric acid can react violently with these extinguishing agents. Water should be used in flooding quantities only.

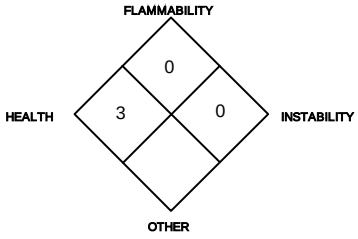
SPECIAL FIRE AND EXPLOSION HAZARDS: Nitric Acid is a strong oxidizer which can cause ignition of combustible materials. During a fire, irritating/toxic Nitric oxides may be generated. Fire may result due to the heat generated by contact of concentrated Nitric Acid with combustible materials. Nitric Acid reacts with many metals. This reaction produces highly flammable hydrogen gas, which may explode if ignited, particularly in confined spaces. Containers may explode in the heat of a fire.

Explosion Sensitivity to Mechanical Impact: Not sensitive.

Explosion Sensitivity to Static Discharge: Not sensitive.

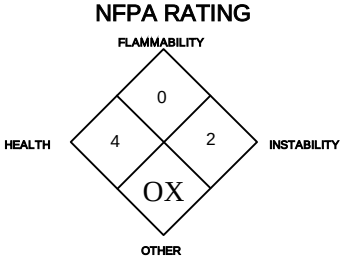
Less than or Equal to 40% Nitric Acid

NFPA RATING



Greater than 40% Nitric Acid

NFPA RATING



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

ADVICE TO FIRE-FIGHTERS: Incipient fire responders should wear eye protection. Structural firefighters must wear Self-Contained Breathing Apparatus (SCBA) and full protective equipment. Evacuate area and fight fire from a safe distance or protected location. Approach fire from upwind to avoid hazardous decomposition products. Closed containers may rupture violently when exposed to the heat of fire and suddenly release large amounts of product. If possible, isolate materials not yet involved in the fire and move containers from fire area if this can be done without risk. Protect personnel. Otherwise, cool fire-exposed containers, tanks or equipment by applying hose streams. Cooling should begin as soon as possible (within several minutes) and should concentrate on any un-wetted portions of the container. Apply water from the side and a safe distance. Cooling should continue until well after the fire is out. If this is not possible, use unmanned monitor nozzles and immediately evacuate the area. Use water spray in large quantities to knock down fumes. The resulting Nitric Acid solutions are very corrosive. Dike fire control water for appropriate disposal. DO NOT direct water at open or leaking containers and take precautions not to get water into containers.

5. FIRE-FIGHTING MEASURES (Continued)

ADVICE TO FIRE-FIGHTERS (continued): If protective equipment is contaminated by this product, it should be thoroughly washed with soapy water prior to removal of SCBA respiratory protection. Firefighters whose protective equipment becomes contaminated should thoroughly shower with warm, soapy water and should receive medical evaluation if they experience any adverse effects.

6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS, PROTECTIVE EQUIPMENT AND EMERGENCY PROCEDURES: Trained personnel using pre-planned procedures should respond to uncontrolled releases. In case of a spill, clear the affected area and protect people. Do not touch or walk through spilled material. Stop leak if you can do it without risk. Avoid allowing water runoff to contact spilled material. Call CHEMTREC (1-800-424-9300) for emergency assistance. Or if in Canada, call CANUTEC (613-996-6666). The atmosphere must have levels of components lower than those listed in Section 8, (Exposure Controls and Personal Protective Equipment), if applicable, and have at least 19.5 percent oxygen before personnel can be allowed into the area without Self-Contained Breathing Apparatus.

PROTECTIVE EQUIPMENT: Proper protective equipment should be used.

Small Spills: Wear double-gloves (rubber over latex gloves), rubber apron, and splash goggles or safety glasses.

Large Spills: Trained personnel following pre-planned procedures should handle non-incidental releases. Minimum Personal Protective Equipment should be rubber gloves, rubber boots, face shield, and Tyvek suit**.** Minimum level of personal protective equipment for releases in which the level of oxygen is less than 19.5% or is unknown must be **Level B: triple-gloves (rubber gloves and nitrile gloves over latex gloves), chemical resistant suit and boots, hard hat, and Self-Contained Breathing Apparatus.**

METHODS FOR CLEAN-UP AND CONTAINMENT:

Small Spills: Neutralize spill area with sodium bicarbonate or other material appropriate for acidic materials. Absorb spilled liquid with polypads, or other suitable absorbent materials. Absorb spilled liquid with polypads, or other suitable absorbent materials. Do not use sawdust or other organic material. Wash contaminated area with soap and water, absorb with polypads or other appropriate material, and rinse with water.

Large Spills: Neutralize spill area with sodium bicarbonate or other material appropriate for acidic materials. Absorb spilled liquid with polypads, or other suitable absorbent materials. Neutralizing spill with sodium bicarbonate, sodium carbonate or calcium carbonate will produce large amounts of carbon dioxide gas. Ensure adequate ventilation. Prevent material from entering sewer or confined spaces, waterways, soil or public waters. Monitor area and confirm levels are bellow exposure limits given in Section 8 (Exposure Controls-Personal Protection), if applicable, before non-response personnel are allowed into the spill area.

All Spills: Place all spill residue in a double plastic bag or other containment and seal, place in appropriate container and dispose of properly. Decontaminate the area thoroughly. After all spill residue has been removed from the area, rinse the area with flooding quantities of water. Do not mix with wastes from other materials. If necessary, discard all stained response equipment or rinse with soapy water before returning such equipment to service.

ENVIRONMENTAL PRECAUTIONS: Prevent material from entering sewer or confined spaces, waterways, soil or public waters. Do not flush to sewer.

REFERENCE TO OTHER SECTIONS: See Section 13, Disposal Considerations for more information.

7. HANDLING and USE

PRECAUTIONS FOR SAFE HANDLING: As with all chemicals, avoid getting this product ON YOU or IN YOU. Do not eat, drink, smoke, or apply cosmetics while handling this product. Wash hands thoroughly after handling this product or equipment and containers of this compound. Follow SPECIFIC USE INSTRUCTIONS supplied with product. All employees who handle this product should be trained to handle it safely. Avoid breathing vapors or mists generated by this product. Use in a well-ventilated location. Open containers slowly on a stable surface. Containers of this product must be properly labeled. Empty containers may contain residual liquid or vapors; therefore, empty containers should be handled with care. Avoid contact with clothing and other combustible materials. Discard contaminated shoes. Do not use with metal spatula or other metal items. Never add water to Nitric Acid; always add Nitric Acid to water; severe spattering and generation of significant heat can occur. When mixing with water, stir small amounts in slowly. Use cold water to prevent excessive heat generation.

CONDITIONS FOR SAFE STORAGE: Always store in original labeled container, or in the type of container recommended by the manufacturer/supplier. Inspect all incoming containers before storage to ensure containers are properly labeled and not damaged. Material should be stored in secondary containers or in a diked area, as appropriate. Store containers in a cool, dry location, away from direct sunlight, sources of intense heat, or where freezing is possible. Store away from incompatible materials (see Section 10, Stability and Reactivity). Keep container tightly closed when not in use. Storage areas should be made of fire and corrosion resistant materials. If appropriate, post warning signs in storage and use areas. Empty containers may contain residual liquid or vapors; therefore, empty containers should be handled with care. Containers may develop pressure after prolonged storage. Drums may need to be vented. Venting should only be performed by trained personnel. Follow supplier/manufacturer recommendations. If drums are swollen, contact the manufacturer/supplier immediately for assistance. Handling swollen drums requires special procedures and equipment.

SPECIFIC END USE(S): This product has various uses in different industries. Follow all industry standards for use of this product.

7. HANDLING and USE (Continued)

PROTECTIVE PRACTICES DURING MAINTENANCE OF CONTAMINATED EQUIPMENT: When cleaning non-disposable equipment, wear latex or butyl rubber (double gloving is recommended), goggles, and lab coat. Wash equipment with soap and water. Wipe equipment down with damp sponge or polypad. Collect all rinsates and dispose of according to applicable Federal, State, and local procedures standards.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

VENTILATION AND ENGINEERING CONTROLS: This product should be used areas with adequate ventilation. Use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits provided in this section, if applicable. Use a non-sparking, grounded, explosion-proof ventilation system separate from other exhaust ventilation systems. Exhaust directly to the outside, taking necessary precautions for environmental protection. An eyewash and safety shower should be readily accessible.

EXPOSURE LIMITS/CONTROL PARAMETERS:

CHEMICAL NAME	CAS #	EXPOSURE LIMITS IN AIR							
		ACGIH-TLVs		OSHA-PELs		NIOSH-RELs		NIOSH	OTHER
		TWA ppm	STEL ppm	TWA ppm	STEL ppm	TWA ppm	STEL ppm	IDLH ppm	ppm
Nitric Acid	7697-37-2	2	4	2	4 (vacated 1989 PEL)	2	4	25	NE

NE = Not Established. T = Measured as Thoracic Fraction of the Aerosol

INTERNATIONAL EXPOSURE LIMITS: Currently, the following international exposure limits are in place for Nitric Acid. This may not be a complete list and exposure limits change and should be checked for currency.

ARAB Republic of Egypt: TWA = 2 ppm (5 mg/m^3), JAN 1993
Australia: TWA = 2 ppm (5.2 mg/m^3), STEL = 4 ppm (10 mg/m^3), JUL 2008
Belgium: STEL = 1 ppm (2.6 mg/m^3), MAR 2002
Denmark: TWA = 2 ppm (5 mg/m^3), OCT 2002
EC: STEL = 2.6 mg/m^3 (1 ppm), FEB 2006
Finland: TWA = 0.5 ppm (1.3 mg/m^3), STEL = 1 ppm (2.6 mg/m^3), SEP 2009
France: VME = 2 ppm (5 mg/m^3), VLE = 4 ppm (10 mg/m^3), FEB 2006
Germany: MAK = 5.2 mg/m^3 (2 mL/m^3), 2005
Hungary: TWA = 5 mg/m^3, STEL = 5 mg/m^3, SEP 2000
Japan: OEL = 2 ppm (5.2 mg/m^3), APR 2007
Korea: TWA = 2 ppm (5 mg/m^3), STEL = 4 ppm (10 mg/m^3), 2006
Mexico: TWA = 2 ppm (5 mg/m^3); STEL = 4 ppm (10 mg/m^3), 2004
New Zealand: TWA = 2 ppm (5.2 mg/m^3), STEL = 4 ppm (10 mg/m^3), JAN 2002
Norway: TWA = 2 ppm (5 mg/m^3), JAN 1999
The Philippines: TWA = 2 ppm (5 mg/m^3), JAN1993
Poland: MAC(TWA) = 5 mg/m^3, MAC(STEL) = 10 mg/m^3, JAN 1999
Russia: STEL = 2 mg/m^3, Skin, JUN 2003
Sweden: TWA = 2 ppm (5 mg/m^3); STEL = 5 ppm (13 mg/m^3), JUN 2005
Switzerland: MAK-W = 2 ppm (5 mg/m^3), KZG-W = 2 ppm (5 mg/m^3), DEC 2006
Thailand: TWA = 2 ppm (5 mg/m^3), JAN 1993
Turkey: TWA = 2 ppm (5 mg/m3), JAN 1993
United Kingdom: TWA = 2 ppm (5.2 mg/m^3); STEL = 4 ppm (10 mg/m^3), 2005
In Argentina, Bulgaria, Colombia, Jordan, Singapore, Vietnam check ACGIH TLV

The following information on appropriate Personal Protective Equipment is provided to assist employers in complying with OSHA regulations found in 29 CFR Subpart I (beginning at 1910.132), equivalent standards of Canada (including CSA Standard Z94.4-02 and CSA Standard Z94.3-07) and CR 13464:1999 for face/eye protection). Please reference applicable regulations and standards for relevant details.

RESPIRATORY PROTECTION: If airborne mists or sprays from this product are created during use, use appropriate respiratory protection. If respiratory protection is needed, use only protection authorized in the U.S. Federal OSHA Respiratory Protection Standard (29 CFR 1910.134) and equivalent U.S. State standards, Canadian CSA Standard Z94.4-93 and the European Standard EN 529:2005 and Respiratory Protection Standards of EU member states. In such atmospheres, use of a full-facepiece pressure/demand SCBA or a full facepiece, supplied air respirator with auxiliary self-contained air supply is required under U.S. Federal OSHA's Respiratory Protection Standard (1910.134-1998). The following are NIOSH respiratory protection equipment guidelines for Nitric Acid and are provided for additional information on the selection of respiratory protection equipment.

NITRIC ACID

CONCENTRATION	RESPIRATORY PROTECTION
Up to 25 ppm:	Any Supplied-Air Respirator (SAR) operated in a continuous-flow mode, or any Chemical Cartridge Respirator with a full facepiece and cartridge(s), (only non-oxidizable sorbents are allowed (not charcoal), or any Air-Purifying, Full-Facepiece Respirator (gas mask) with a chin-style, front- or back-mounted canister (only non-oxidizable sorbents are allowed (not charcoal), or any Self-Contained Breathing Apparatus (SCBA) with a full facepiece, or any SAR with a full facepiece.
Emergency or Planned Entry into Unknown Concentrations or IDLH Conditions:	Any SCBA that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode, or any that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary SCBA operated in pressure-demand or other positive-pressure mode.
Escape:	Any Air-Purifying, Full-Facepiece Respirator (gas mask) with a chin-style, front- or back-mounted canister (only non-oxidizable sorbents are allowed (not charcoal), or any appropriate escape-type, SCBA.

EYE PROTECTION: Splash goggles or safety glasses should be worn during operations in which airborne mists or sprays may be generated. A faceshield may be necessary under certain circumstances and if large quantity is being handled. If necessary, refer to U.S. OSHA 29 CFR 1910.133, the Canadian CSA Standard Z94.3-M1982, *Industrial Eye and Face Protectors,* or the European Standard CR 13464:1999 for further information.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION (Continued)

HAND PROTECTION: Wear butyl rubber gloves for routine industrial use. Use triple gloves for spill response. If necessary, refer to U.S. OSHA 29 CFR 1910.138, appropriate Standards of Canada, or the European Standard CEN/TR 15419:2006.

BODY/SKIN PROTECTION: Use body protection appropriate for task (e.g., lab coat, coveralls, Tyvek suit). When chemical contact is possible, use splash apron, work uniform, and shoes or coverlets to prevent skin contact. Full-body chemical protective clothing is recommended for emergency response procedures. If necessary, refer to the OSHA Technical Manual (Section VII: Personal Protective Equipment) or refer to appropriate Standards of Canada, or the European Standard CEN/TR 15419:2006, for further information. If a hazard of injury to the feet exists due to falling objects, rolling objects, where objects may pierce the soles of the feet or where employee's feet may be exposed to electrical hazards, use foot protection, as described in U.S. OSHA 29 CFR 1910.136 and the Canadian CSA Standard Z195-M1984, *Protective Footwear*.

9. PHYSICAL and CHEMICAL PROPERTIES

BOILING POINT: 86°C (186.8°F)
FREEZING/MELTING POINT: -42°C (-43.6°F)
EVAPORATION RATE (water = 1): Not available.
SOLUBILITY IN WATER: Soluble in all proportions.
VAPOR PRESSURE (air = 1) @ 25°C: 51 mmHg
VAPOR DENSITY (air= 1): 2.17
SPECIFIC GRAVITY/DENSITY: 1.4
VISCOSITY @ 25°C: 0.761 cPs
MOLECULAR WEIGHT: 63.01
MOLECULAR FORMULA: HNO_3
DECOMPOSITION TEMPERATURE: Not available.
pH: 1.0 (0.1M solution)

OXIDIZING PROPERTIES: The NFPA lists Nitric Acid (40% or less) as a Class 1 oxidizer and Nitric Acid (more than 40% but less than 80%) as a Class 2 oxidizer. A Class 1 oxidizer meets the definition of an oxidizer (any material that readily yields oxygen or other oxidizing gas, or that readily reacts to promote or initiate combustion of combustible materials) and does not moderately increase the burning rate of combustible materials with which it comes into contact. A Class 2 oxidizer will cause a moderate increase in the burning rate of combustible materials with which it comes into contact.

ODOR THRESHOLD: 0.29-0.98 ppm (cited as 0.75 to 2.5 mg/m^3) (detection)

COEFFICIENT WATER/OIL DISTRIBUTION: Log P(oct) = 0.21 (estimated)

APPEARANCE AND COLOR: This product is clear yellow liquid with strong, acrid odor.

HOW TO DETECT THIS SUBSTANCE (identification properties): Litmus paper will turn red in contact with this product and may assist in identification in event of accidental release. The odor is not a reliable method to identify Nitric Acid as the odor threshold is of nearly the same magnitude as the TLV.

10. STABILITY and REACTIVITY

REACTIVITY: Contact with metals can produce highly flammable hydrogen gas. Heat is generated when concentrated Nitric Acid is mixed with water. The acid must be added slowly to water with stirring to avoid possible splattering.

CHEMICAL STABILITY: This product is stable when properly stored (see Section 7, Handling and Storage) at normal temperature. Decomposes when in contact with air, light, or organic matter. Nitric Acid has a tendency to slowly decompose at room temperature to form nitrogen oxides, which may color the acid yellow or red. The decomposition is accelerated by exposure to light and increases in temperature.

DECOMPOSITION PRODUCTS: *Combustion:* If exposed to extremely high temperatures, thermal decomposition may generate irritating fumes and toxic gases (e.g. sulfur oxides). *Hydrolysis*: None.

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: Nitric Acid is incompatible with most metals; particularly powdered metals (e.g. antimony, bismuth, germanium, manganese or titanium), alkali metals (e.g. lithium or sodium) or alkaline earth metals (e.g. magnesium or calcium), organic chemicals (e.g., alcohols, acids, anhydrides, aldehydes, ketones, amines, ethers, hydrocarbons, alkanethiols, nitriles, nitroalkanes and nitroaromatics), arsenic, boron, finely divided carbon, phosphorus or silicon, non-metal hydrides (e.g. arsine, phosphine, stibine or tetraborane), reducing agents (e.g. potassium phosphinate), crotonaldehyde, hydrazine, dimethylhydrazine, divinyl ether, pyrocatechol, ammonia, aniline, diborane, furfuryl alcohol or terpenes, sulfides, carbides (e.g. cesium carbide), fluorine, phosphorus halides (e.g. phosphorus trichloride) or other phosphorus compounds (e.g. cadmium phosphide), metal cyanides (e.g. sodium cyanide, potassium cyanide or calcium cyanide), sulfur halides. Nitric Acid (5-70%) is corrosive (corrosion rate greater than 1.25 mm/year) to most metals at 21°C, including carbon steel (e.g. types 1010, 1020, 1075 and 1095), type 3003 aluminum, cast iron (e.g. gray, ductile and high nickel cast iron), nickel, nickel-base alloys (e.g. Monel and Hastelloy B and D), copper, copper-nickel, bronze (unspecified), aluminum bronze, silicon bronze, brass (unspecified), admiralty brass, naval brass and lead. Nitric Acid (5-100%) at 21°C attacks plastics, such as acrylonitrile-butadiene-styrene (ABS), nylon, styrene-acrylonitrile, polystyrene and polyurethane; and elastomers, such as nitrile Buna N (NBR), natural rubber, isoprene, neoprene, chloroprene, polyester, styrene butadiene (SBR), polyurethane, chlorinated polyethylene, ethylene-propylene, ethylene-propylene terpolymer and low density polyethylene. (

POSSIBILITY OF HAZARDOUS REACTION OR POLYMERIZATION: Will not occur.

CONDITIONS TO AVOID: Avoid extreme temperatures and contact with water and incompatible chemicals.

11. TOXICOLOGICAL INFORMATION

SYMPTOMS OF OVEREXPOSURE BY ROUTE OF EXPOSURE: The health hazard information provided below is pertinent to employees using this product in an occupational setting. The following paragraphs describe the symptoms of exposure by route of exposure.

INHALATION: If vapors, mists or sprays of this solution are inhaled, symptoms of exposure may include breathing difficulty, irritation of the mucus membranes, coughing, nasal congestion, and a sore throat. Damage to the tissues of the respiratory system may also occur, especially after prolonged exposures or exposures to high concentrations of this solution. Severe inhalation over-exposures can lead to chemical pneumonitis, pulmonary edema, and death. Chronic inhalation exposures may result in dental erosion and perforation of the nasal septum. Exposure may impair lung function and cause mucostasis (reduced mucous clearance).

CONTACT WITH SKIN or EYES: Contact with the eyes will cause severe irritation, pain, reddening, watering, and possibly, blindness. Causes skin burns. May cause deep, penetrating ulcers of the skin. Concentrated Nitric Acid dyes human skin yellow on contact. Repeated skin-overexposures to low concentrations can result in dermatitis (inflammation and reddening of the skin). Dilute solutions cause mild irritation of the skin and can harden the skin

SKIN ABSORPTION: Skin absorption is not a significant route of overexposure for this product.

INGESTION: Ingestion is not anticipated to be a likely route of occupational exposure to this product. If ingestion does occur, severe irritation and burns of the mouth, throat, esophagus, and other tissues of the digestive system will occur immediately upon contact. Symptoms of such over-exposure can include nausea, vomiting, diarrhea. Ingestion of large volumes of this product may be fatal.

HAZARDOUS MATERIAL IDENTIFICATION SYSTEM

HEALTH HAZARD (BLUE)	3/4
FLAMMABILITY HAZARD (RED)	0
PHYSICAL HAZARD (YELLOW)	1

PROTECTIVE EQUIPMENT

EYES	RESPIRATORY	HANDS	BODY
SEE SECTION 8			

For Routine Industrial Use and Handling Applications

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

INJECTION: Though not anticipated to be a significant route of overexposure for this product, injection (via punctures or lacerations by contaminated objects) may cause redness at the site of injection.

HEALTH EFFECTS OR RISKS FROM EXPOSURE: An Explanation in Lay Terms. Overexposure to this product may cause the following health effects:

ACUTE: This product is corrosive and may cause severe irritation or burns by all routes of exposure. Eye contact may cause tissue damage or blindness. Ingestion may be harmful or fatal.

CHRONIC: Chronic inhalation of vapors, mists or spray from this product may cause reduction in lung capacity, bronchitis and erosion of the teeth. Repeated, low concentration skin contact of this product may cause dermatitis. Occupational exposure to strong inorganic acid mists containing Nitric Acid is carcinogenic to humans.

TARGET ORGANS: ACUTE: Eyes, respiratory system, skin. CHRONIC: Respiratory system, skin.

TOXICITY DATA: Currently, the following toxicity data are available for Nitric Acid.

LDLo (Oral-Human) 430 mg/kg
LDLo (Unreported-Man) 110 mg/kg
LC_{50} (Inhalation-Rat) 260 mg/m^3/30 minutes
LC_{50} (Inhalation-Rat) 130 mg/m^3/4 hours
TCLo (Inhalation-Rat) 460 ppm/1 hour: Nutritional and Gross Metabolic: weight loss or decreased weight gain
TCLo (Inhalation-Rat) 50 µg/m3/4 hours/3 days-intermittent: Lungs, Thorax, or Respiration: respiratory depression
TCLo (Inhalation-Rat) 919 ppm/1 hour
TCLo (Inhalation-Rat) 1071 µg/m3/24 hours/84 days-continuous: Behavioral: muscle contraction or spasticity; Kidney/Ureter/Bladder: other changes in urine composition; Biochemical: Enzyme inhibition, induction, or change in blood or tissue levels: true cholinesterase
TCLo (Inhalation-Cat) 300 mg/m^3/2 hours: Lungs, Thorax, or Respiration: acute pulmonary edema
TCLo (Inhalation-Cat) 500 mg/m^3
TDLo (Skin-Rat) 150 mL/kg: Blood: methemoglobinemia-carboxyhemoglobin
TDLo (Oral-Rat) 21,150 mg/kg: female 1-21 day(s) after conception: Reproductive: Effects on Embryo or Fetus: fetotoxicity (except death, e.g., stunted fetus)
TDLo (Oral-Rat) 2345 mg/kg: female 18 day(s) after conception: Reproductive: Effects on Newborn: biochemical and metabolic

IRRITANCY OF PRODUCT: This product may cause severe irritation or burns by all routes of exposure.

SENSITIZATION OF PRODUCT: Nitric Acid is not known to cause human skin or respiratory sensitization.

CARCINOGENIC POTENTIAL: Nitric Acid is not found on the following lists: U.S. OSHA, U.S. EPA, NIOSH, NTP, IARC, and GERMAN MAK and therefore is neither considered to be nor suspected to be a cancer causing agent by these agencies.

SYNERGISTIC MATERIALS: None known.

REPRODUCTIVE TOXICITY INFORMATION: Listed below is information concerning the effects of Nitric Acid on human and animal reproductive systems.

Mutagenicity: Nitric Acid is not reported to cause human mutagenic effects.
Embryotoxicity: Nitric Acid is not reported to cause human embryotoxic effects.
Teratogenicity: Nitric Acid is not reported to cause human teratogenic effects.
Reproductive Toxicity: Nitric Acid is not reported to cause human reproductive effects.

11. TOXICOLOGICAL INFORMATION (Continued)

REPRODUCTIVE TOXICITY INFORMATION (continued):

A mutagen is a chemical that causes permanent changes to genetic material (DNA) such that the changes will propagate through generation lines. An embryo toxin is a chemical that 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 that causes damage to a developing fetus, but the damage does not propagate across generational lines. A reproductive toxin is any substance that interferes in any way with the reproductive process.

ACGIH BIOLOGICAL EXPOSURE INDICES (BEIs): Currently, ACGIH Biological Exposure Indices (BEIs) have not been determined for Nitric Acid.

12. ECOLOGICAL INFORMATION

ALL WORK PRACTICES MUST BE AIMED AT ELIMINATING ENVIRONMENTAL CONTAMINATION.

MOBILITY IN SOIL: During transport through the soil, Nitric Acid will dissolve some of the soil material, in particular the carbonate based materials. The acid will be neutralized to some degree with adsorption of the proton also occurring on clay materials. However, significant amounts of acid are expected to remain for transport down toward the ground water table. Upon reaching the ground water table, the acid will continue to move, now in the direction of the ground water flow.

PERSISTENCE AND BIODEGRADABILITY: Nitric acid will be gradually neutralized by hardness minerals (calcium and magnesium) in water. The nitrate ion may persist longer but will ultimately be consumed as a plant nutrient.

BIO-ACCUMULATION POTENTIAL: Nitric Acid does not bioconcentrate.

ECOTOXICITY: This product has not been tested for aquatic or animal toxicity. All release to terrestrial, atmospheric, and aquatic environments should be avoided. The following aquatic toxicity data are available for Nitric Acid:

LC_{50} (Shore crab) 48 hours = 180 mg/L/Static, aerated water conditions

LC_{50} (Cockle) 48 hours = 330-1000 mg/L/Aerated water conditions

LC_{50} (Starfish) 48 hours = 100-300 mg/L/Aerated water conditions

OTHER ADVERSE EFFECTS: This material is not listed or expected to have having ozone depletion potential.

ENVIRONMENTAL EXPOSURE CONTROLS: Controls should be engineered to prevent release to the environment, including procedures to prevent spills, atmospheric release and release to waterways.

13. DISPOSAL CONSIDERATIONS

WASTE TREATMENT/DISPOSAL METHODS: It is the responsibility of the generator to determine at the time of disposal whether the product meets the criteria of a hazardous waste per regulations of the area in which the waste is generated and/or disposed of. Waste disposal must be in accordance with appropriate Federal, State, and local regulations. This product, if unaltered by use, may be disposed of by treatment at a permitted facility or as advised by your local hazardous waste regulatory authority. Shipment of wastes must be done with appropriately permitted and registered transporters.

DISPOSAL CONTAINERS: Waste materials must be placed in and shipped in appropriate 5-gallon or 55-gallon poly or metal waste pails or drums. Permeable cardboard containers are not appropriate and should not be used. Ensure that any required marking or labeling of the containers be done to all applicable regulations.

PRECAUTIONS TO BE FOLLOWED DURING WASTE HANDLING: Wear proper protective equipment when handling waste materials. Dispose of in accordance with applicable Federal, State, and local procedures and standards.

EPA WASTE NUMBER: Wastes from this product should be tested to see if they meet D002 (Waste Characteristic-Corrosivity).

EUROPEAN WASTE CODES: 16 05 08: Discarded Organic Chemicals Consisting of or Containing Dangerous Substances.

14. TRANSPORTATION INFORMATION

Depending on the concentration of Nitric Acid, the classification is as follows:

U.S. DEPARTMENT OF TRANSPORTATION REGULATIONS: This product is classified as dangerous goods, per U.S. DOT regulations, under 49 CFR 172.101. For Nitric Acid

Nitric Acid at equal to or greater than 65% and equal to or less than 70%:

PROPER SHIPPING NAME:	Nitric acid *other than red fuming, with at least 65 percent, but not more than 70 percent nitric acid*
HAZARD CLASS NUMBER and DESCRIPTION:	8 (Corrosive), 5.1 (Oxidizer)
UN IDENTIFICATION NUMBER:	UN 2031
PACKING GROUP:	PG II
DOT LABEL(S) REQUIRED:	Class 8 (Corrosive), Class 5.1 (Oxidizer)

Nitric Acid at less than 65%:

PROPER SHIPPING NAME:	Nitric acid*, other than red fuming, with less than 65 percent nitric acid*
HAZARD CLASS NUMBER and DESCRIPTION:	8 (Corrosive)
UN IDENTIFICATION NUMBER:	UN 2031
PACKING GROUP:	PG II
DOT LABEL(S) REQUIRED:	Class 8 (Corrosive)

NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER (2008): 157

MARINE POLLUTANT: No component of this product meets the criteria of the DOT as Marine Pollutant (as defined by 49 CFR 172.101, Appendix B).

14. TRANSPORTATION INFORMATION (Continued)

U.S. DEPARTMENT OF TRANSPORTATION REGULATIONS (continued):

NOTE: Shipments of this product may be shipped under small quantity and limited quantity exceptions as indicated under 49 CFR §173.4 and 49 CFR §173.154, if all requirements are met.

Small Quantity Exception (49 CFR 173.4): Small quantities of Class 8 material are not subjected to other requirements of the Hazardous Materials Regulations (Subchapter C) when the maximum quantity per inner receptacle is limited to 30 mL (liquids). Refer to 49 CFR 173.4 for specific information in packaging small quantity materials.

Limited Quantity Exceptions [49 CFR 173.154(b)(2)]: Limited quantities for Class 8, Packing Group II materials have inner packagings not over 1.0 L (liquids) net capacity each, packed in strong outer packaging.

TRANSPORT CANADA TRANSPORTATION OF DANGEROUS GOODS REGULATIONS: This product is classified as Dangerous Goods, per regulations of Transport Canada.

PROPER SHIPPING NAME: Nitric acid, other than red-fuming with not more than 70% nitric acid
HAZARD CLASS NUMBER and DESCRIPTION: 8 (Corrosive)
UN IDENTIFICATION NUMBER: UN 2031
PACKING GROUP: PG II
HAZARD SHIPPING LABEL(S) REQUIRED: Class 8 (Corrosive)
SPECIAL PROVISIONS: None
EXPLOSIVE LIMIT & LIMITED QUANTITY INDEX: 0.5
ERAP INDEX: Forbidden
PASSENGER CARRYING SHIP INDEX: Forbidden
PASSENGER CARRYING ROAD OR RAIL VEHICLE INDEX: Forbidden

INTERNATIONAL AIR TRANSPORT ASSOCIATION SHIPPING INFORMATION (IATA): This product is classified as dangerous goods, per the International Air Transport Association.

Nitric Acid at equal to or greater than 65% and equal to or less than 70%:

UN IDENTIFICATION NUMBER: UN 2031
PROPER SHIPPING NAME/DESCRIPTION: Nitric acid *other than red fuming, with at least 65 percent, but not more than 70 percent nitric acid*
HAZARD CLASS or DIVISION: 8 (Corrosive)
SUBSIDIARY CLASS or DIVISION: 5.1 (Oxidizer)
HAZARD LABEL(S) REQUIRED: Class 8 (Corrosive), Class 5.1 (Oxidizer)
PACKING GROUP: II
PASSENGER and CARGO AIRCRAFT PACKING INSTRUCTION: Forbidden
PASSENGER and CARGO AIRCRAFT MAXIMUM NET QUANTITY PER PKG: Forbidden
PASSENGER and CARGO AIRCRAFT LIMITED QUANTITY PACKING INSTRUCTION: None
PASSENGER and CARGO AIRCRAFT LIMITED QUANTITY MAXIMUM NET QUANTITY PER PKG: None
CARGO AIRCRAFT ONLY PACKING INSTRUCTION: 813
CARGO AIRCRAFT ONLY MAXIMUM NET QUANTITY PER PKG: 30 L
SPECIAL PROVISIONS: A1
ERG CODE: 8L

Nitric Acid at less than 65%:

UN IDENTIFICATION NUMBER: UN 2031
PROPER SHIPPING NAME/DESCRIPTION: Nitric acid *other than red fuming, with less than 65 percent nitric acid*
HAZARD CLASS or DIVISION: 8 (Corrosive)
SUBSIDIARY CLASS or DIVISION: None
HAZARD LABEL(S) REQUIRED: Class 8 (Corrosive)
PACKING GROUP: II
PASSENGER and CARGO AIRCRAFT PACKING INSTRUCTION: Forbidden
PASSENGER and CARGO AIRCRAFT MAXIMUM NET QUANTITY PER PKG: Forbidden
PASSENGER and CARGO AIRCRAFT LIMITED QUANTITY PACKING INSTRUCTION: None
PASSENGER and CARGO AIRCRAFT LIMITED QUANTITY MAXIMUM NET QUANTITY PER PKG: None
CARGO AIRCRAFT ONLY PACKING INSTRUCTION: 813
CARGO AIRCRAFT ONLY MAXIMUM NET QUANTITY PER PKG: 30 L
SPECIAL PROVISIONS: None
ERG CODE: 8L

INTERNATIONAL MARITIME ORGANIZATION SHIPPING INFORMATION (IMO): This product is classified as dangerous goods, per the International Maritime Organization.

Nitric Acid at equal to or greater than 65% and equal to or less than 70%:

UN No.: 2031
PROPER SHIPPING NAME: Nitric acid *other than red fuming, with at least 65 percent, but not more than 70 percent nitric acid*
HAZARD CLASS NUMBER: 8
SUBSIDIARY RISK: 5.1
PACKING GROUP: II
SPECIAL PROVISIONS: None

14. TRANSPORTATION INFORMATION (Continued)

INTERNATIONAL MARITIME ORGANIZATION SHIPPING INFORMATION (IMO) [continued]:

Nitric Acid at equal to or greater than 65% and equal to or less than 70% (continued):

LIMITED QUANTITIES: LQ: 1 L; EQ: E2
PACKING INSTRUCTIONS: P001
EmS: F-A, S-Q
STOWAGE CATEGORY: Category D. Segregation as for class 5.1, but 'Separated from 4.1, 5.1 and 7.

Nitric Acid at less than 65%:

UN No.: 2031
PROPER SHIPPING NAME: Nitric acid *other than red fuming, with less than 65 percent nitric acid*
HAZARD CLASS NUMBER: 8
SUBSIDIARY RISK: None
PACKING GROUP: II
SPECIAL PROVISIONS: None
LIMITED QUANTITIES: LQ: 1 L; EQ: E2
PACKING INSTRUCTIONS: P001
EmS: F-A, S-B
STOWAGE CATEGORY: Category D.
MARINE POLLUTANT: This material does not meet the criteria of a Marine Pollutant under UN criteria.

EUROPEAN AGREEMENT CONCERNING THE INTERNATIONAL CARRIAGE OF DANGEROUS GOODS BY ROAD (ADR): This product is classified by the Economic Commission for Europe to be dangerous goods.

Nitric Acid at equal to or greater than 65% and equal to or less than 70%:

UN NO.: 2031
NAME and DESCRIPTION: Nitric acid *other than red fuming, with at least 65 percent, but not more than 70 percent nitric acid*
CLASS: 8 + 5.1
CLASSIFICATION CODE: C01
PACKING GROUP: II
LABELS: 8, 5.1
SPECIAL PROVISIONS: None
LIMITED QUANTITIES: LQ22
PACKING INSTRUCTIONS: P001, IBC02
MIXED PACKING PROVISIONS: MP15
HAZARD IDENTIFICATION No.: 85

Nitric Acid at less than 65%:

UN NO.: 2031
NAME and DESCRIPTION: Nitric acid *other than red fuming, with less than 65 percent nitric acid*
CLASS: 8
CLASSIFICATION CODE: C1
PACKING GROUP: II
LABELS: 8
SPECIAL PROVISIONS: None
LIMITED QUANTITIES: LQ22
EXCEPTED QUANTITIES: E2
PACKING INSTRUCTIONS: P001, IBC02
MIXED PACKING PROVISIONS: MP15
HAZARD IDENTIFICATION No.: 80

15. REGULATORY INFORMATION

ADDITIONAL UNITED STATES REGULATIONS:

U.S. SARA REPORTING REQUIREMENTS: Nitric Acid is subject to the reporting requirements of Sections 302, 304, and 313 of Title III of the Superfund Amendments and Reauthorization Act, as follows.

CHEMICAL NAME	SARA 302 (40 CFR 355, Appendix A)	SARA 304 (40 CFR Table 302.4)	SARA 313 (40 CFR 372.65)
Nitric Acid	Yes	Yes	Yes

U.S. SARA SECTION 302 THRESHOLD PLANNING QUANTITY (TPQ): 1000 lb (454 kg)
U.S. SARA SECTION 304 REPORTABLE QUANTITY (TPQ): 1000 lb (454 kg)
U.S. CERCLA REPORTABLE QUANTITY (RQ): 1000 lb (454 kg)
U.S. TSCA INVENTORY STATUS: Nitric Acid is listed on the TSCA Inventory.
OTHER U.S. FEDERAL REGULATIONS: Nitric Acid has requirements under additional U.S. regulations, as follows:

NITRIC ACID:

CLEAN WATER ACT REQUIREMENTS: Nitric Acid is designated as a hazardous substance under section 311(b)(2)(A) of the Federal Water Pollution Control Act and further regulated by the Clean Water Act Amendments of 1977 and 1978. These regulations apply to discharges of this substance.

CERCLA: Releases of CERCLA hazardous substances are subject to the release reporting requirement of CERCLA section 103, codified at 40 CFR part 302, in addition to the requirements of 40 CFR part 355. Nitric acid is an extremely hazardous substance (EHS) subject to reporting requirements when stored in amounts in excess of its threshold planning quantity (TPQ) of 1,000 lb (454 kg).

15. REGULATORY INFORMATION (Continued)

ADDITIONAL UNITED STATES REGULATIONS (continued):

OTHER U.S. FEDERAL REGULATIONS (continued):

CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65): Nitric Acid is not on the California Proposition 65 Lists.

U.S. ANSI STANDARD LABELING (Precautionary Statements): DANGER! CORROSIVE. STRONG OXIDIZER. CAUSES BURNS BY ALL ROUTES OF EXPOSURE. MAY BE HARMFUL OR FATAL IF SWALLOWED. CHRONIC, LOW-LEVEL INHALATION MAY CAUSE REDUCED LUNG FUCTION. CHRONIC, LOW-LEVEL SKIN EXPOSURE MAY CAUSE DERMATITIS. CONTACT WITH COMBUSTIBLE MATERIALS MAY CAUSE FIRE. Do not taste or swallow. Do not get on skin or in eyes. Avoid breathing vapors or mist. Keep container closed. Use only with adequate ventilation. Wash thoroughly after handling. Wear gloves, goggles, faceshields, suitable body protection, and NIOSH-approved respiratory protection, as appropriate. **FIRST-AID:** In case of contact, immediately flush skin or eyes with plenty of water for at least 30 minutes while removing contaminated clothing and shoes. If inhaled, remove to fresh air. If ingested, do not induce vomiting. Get medical attention. **IN CASE OF FIRE:** Use water fog, dry chemical, CO_2, or "alcohol" foam. **IN CASE OF SPILL:** Absorb spill with inert material or neutralizing agent for acids. Place residue in suitable container. Consult Material Safety Data Sheet for additional information.

ADDITIONAL CANADIAN REGULATIONS:

CANADIAN DSL/NDSL STATUS: This material is listed on the DSL inventory.

CANADIAN ENVIRONMENTAL PROTECTION AGENCY (CEPA) PRIORITIES SUBSTANCES LIST: Nitric Acid is not on the Priorities Substances Lists.

CANADIAN WHMIS CLASSIFICATION and SYMBOLS: Class C: Oxidizer, **Class E**: Corrosive Material

GLOBAL HARMONIZATION CLASSIFICATION: This product has been classified in accordance with the Global Harmonization Standard.

Classification: Oxidizing Liquid, Category 3, Skin Corrosion, Category 1A

Hazard Statements: H272: May intensify fire; oxidiser. H314: Causes severe skin burns and eye damage

Precautionary Statements:

Prevention: P210: Keep away from heat/sparks/open flames/hot surfaces. — No smoking. P220: Keep/Store away from clothing/combustible materials. P221: Use personal protective equipment as required.P260: Do not breathe gas/mist/vapours/spray. P264: Wash thoroughly after handling. P280: Wear protective gloves/protective clothing/eye protection/face protection.

Response: P301 + P330 + P331: IF SWALLOWED: Rinse mouth. Do NOT induce vomiting. P303 + P361 + P353: IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower. P304 + P340: IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Immediately call a POISON CENTER or doctor/physician. P305 + P351 + P338: IF IN EYES: Rinse cautiously with water for several minutes. P310: Remove contact lenses, if present and easy to do. Continue rinsing. P370 + P378: In case of fire: Use materials appropriate for surrounding fire for extinction. Do not use carbonated materials, ammonium phosphate or ammonium sulfate. P363: Wash contaminated clothing before reuse.

Storage: P405: Store locked up.

Disposal: P501: Dispose of contents/containers in accordance with all local, regional, national and international regulations.

Signal Words: Danger

Hazard Symbols: GHS03, GHS05

EU LABELING AND CLASSIFICATION: This product meets the definition of hazardous as defined by the European Community Council Directives.

EU Classification: C [Corrosive], Oxidizer [Oxidizer]

EU Risk Phrases: R: 8: Contact with combustible material may cause fire. R: 35: Causes severe burns.

EU Safety Phrases: S: (1/2-)*: Keep locked up and out of the reach of children.* S: 23: Do not breathe fumes/vapour/spray. S: 26: In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. S: 36: Wear suitable protective clothing. S: 45: In case of accident or if you feel unwell, seek medical advice immediately (show label where possible).

*This safety phrase can be omitted from the label when the substance or preparation is sold for industrial use only.

European Community Annex II Hazard Symbols: C [Corrosive]; O [Oxidizer]

16. OTHER INFORMATION

PREPARED BY: CHEMICAL SAFETY ASSOCIATES, Inc.
PO Box 1961, Hilo, HI 96721 • (808) 969-4846 • (800) 441-3365

DATE OF PRINTING: September 10, 2014

Safety Data Sheet

Material Name: Portland Cement (ASTM Type I/II, ASTM Type III, ASTM Type V, Block, Plastic, Fast Set, Low Heat of Hydration)
Synonyms: Portland Cement; also known as Cement or Hydraulic Cement, Mortar, Class G

* * * Section 1 - Product and Company Identification * * *

Manufacturer Information

CALPORTLAND COMPANY
2025 E. Financial Way
Glendora, CA 91741
Phone: 626-852-6200
www.calportland.com

* * * Section 2 - Hazards Identification * * *

GHS Classification:

Acute Toxicity Oral - Category 4
Acute Toxicity Dermal - Category 4
Acute Toxicity Inhalation - Category 3
Skin Corrosion/Irritation - Category 1B
Eye Damage - Category 1
Respiratory Sensitization - Category 1
Skin Sensitization - Category 1
Carcinogenicity - Category 1A
Specific Target Organ Toxicity Repeat Exposure - Category 1

GHS LABEL ELEMENTS

Symbol(s)

Signal Word

Danger

Hazard Statements

Harmful if swallowed.
Harmful in contact with skin.
Toxic if inhaled.
Causes severe skin burns and eye damage.
Causes serious eye damage.
May cause allergy or asthma symptoms or breathing difficulties if inhaled.
May cause an allergic skin reaction.
May cause cancer.
Causes damage to organs through prolonged or repeated exposure (lungs).

Precautionary Statements

Prevention

Wash thoroughly after handling.
Do not eat, drink or smoke when using this product.
Wear protective gloves/protective clothing/eye protection/face protection.
Contaminated work clothing must not be allowed out of the workplace.
Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Do not breathe dust/fume/gas/mist/vapors/spray.
Use only outdoors or in a well-ventilated area.
In case of inadequate ventilation wear respiratory protection.

Response

If swallowed: Rinse mouth. Do NOT induce vomiting. Immediately call a poison center/doctor.
If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower. Immediately call a poison center or doctor/physician. Wash contaminated clothing before reuse.
If inhaled: Remove victim to fresh air and keep at rest in a position comfortable for breathing. If experiencing respiratory symptoms: Call a poison center or doctor/physician.
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/doctor.

Storage

Store in a well-ventilated place.
Store in an appropriate container or containment structure.

Disposal

Dispose of contents/container in accordance with local/regional/international regulations.

* * * Section 3 - Composition / Information on Ingredients * * *

CAS #	Component	Percent
65997-15-1	Cement, portland, chemicals	78-95
1317-65-3	Limestone	0-15
13397-24-5	Gypsum (Ca(SO4).2H2O)	5-7
14808-60-7	Quartz	0-0.3

Component Information/Information on Non-Hazardous Components

General Product Information

Trace Elements: Portland cement is made from materials mined from the earth and is processed using energy provided by fuels. Trace amounts of naturally occurring, potentially harmful chemical might be detected during chemical analysis. For example, Portland cement may contain up to 1.50 % insoluble residue, some of which may be free crystalline silica. Other trace constituents may include calcium oxide, free magnesium oxide, potassium and sodium sulfate compounds, and trace metal compounds.

* * * Section 4 - First Aid Measures * * *

First Aid: Eyes

Immediately flush eyes thoroughly with water. Continue flushing eye for at least 15 minutes, including under lids, to remove all particles. Call physician immediately.

First Aid: Skin

Wash skin with cool water and pH-neutral soap or a mild detergent intended for use on skin. Seek medical treatment in all cases of prolonged exposure to wet cement, cement mixtures, liquids from fresh cement products, or prolonged wet skin exposure to the dry cement.

First Aid: Ingestion

Do not induce vomiting. If conscious, have the victim drink plenty of water and call a physician immediately.

First Aid: Inhalation

Remove to fresh air. Seek medical help if coughing and other symptoms do not subside. (Inhalation of gross amounts of Portland cement requires immediate medical attention.)

* * * Section 5 - Fire Fighting Measures * * *

General Fire Hazards

See Section 9 for Flammability Properties.

Non-combustible.

Hazardous Combustion Products

None

Extinguishing Media

Use appropriate extinguishing media for surrounding fire.

Unsuitable Extinguishing Media

None

Fire Fighting Equipment/Instructions

Firefighters should wear full protective gear.

* * * Section 6 - Accidental Release Measures * * *

Recovery and Neutralization

Stop the flow of material, if this is without risk.

Materials and Methods for Clean-Up

Collect dry material using a scoop. Avoid actions that cause dust to become airborne. Avoid inhalation of dust and contact with skin. Scrape up wet material and place in an appropriate container. Allow the material to dry before disposal.

Emergency Measures

Isolate area. Keep unnecessary personnel away.

Personal Precautions and Protective Equipment

Wear appropriate personal protective equipment as described in Section 8.

Environmental Precautions

Do not attempt to wash Portland cement down sewers or storm drains.

Prevention of Secondary Hazards

None

* * * Section 7 - Handling and Storage * * *

Handling Procedures

Avoid prolonged or repeated breathing of dust. Avoid contact with eyes and skin. Promptly remove dusty clothing or clothing which is wet with cement fluids and launder before reuse. Wash thoroughly after exposure to dust or wet cement mixtures.

Storage Procedures

Store product in a cool, dry, ventilated area. Protect against physical damage and moisture. Keep cement dry until used. Normal temperature and pressures do not affect the material.

Incompatibilities

Wet Portland cement is alkaline. As such it is incompatible with acids, ammonium salts and aluminum metal.

* * * Section 8 - Exposure Controls / Personal Protection * * *

Component Exposure Limits

Cement, portland, chemicals (65997-15-1)

ACGIH:	1 mg/m3 TWA (particulate matter containing no asbestos and <1% crystalline silica, respirable fraction)
OSHA (Final):	15 mg/m3 TWA (total dust); 5 mg/m3 TWA (respirable fraction)
OSHA (Vacated):	10 mg/m3 TWA (total dust); 5 mg/m3 TWA (respirable fraction)
NIOSH:	10 mg/m3 TWA (total dust); 5 mg/m3 TWA (respirable dust)
Alberta:	10 mg/m3 TWA
British Columbia:	10 mg/m3 TWA (total particulate matter containing no Asbestos and <1% Crystalline silica, total particulate); 3 mg/m3 TWA (particulate matter containing no Asbestos and <1% Crystalline silica, respirable particulate)
Manitoba:	1 mg/m3 TWA (particulate matter containing no Asbestos and <1% Crystalline silica, respirable fraction)
New Brunswick:	10 mg/m3 TWA (particulate matter containing no Asbestos and <1% Crystalline silica)
NW Territories:	5 mg/m3 TWA (respirable mass); 10 mg/m3 TWA (total mass)
Nova Scotia:	1 mg/m3 TWA (particulate matter containing no Asbestos and <1% Crystalline silica, respirable fraction)
Nunavut:	5 mg/m3 TWA (respirable mass); 10 mg/m3 TWA (total mass)
Ontario:	10 mg/m3 TWA (containing no Asbestos and <1% Crystalline silica, total dust)
Quebec:	10 mg/m3 TWAEV (containing no Asbestos and <1% Crystalline silica, total dust); 5 mg/m3 TWAEV (containing no Asbestos and <1% Crystalline silica, respirable dust)
Saskatchewan:	10 mg/m3 TWA 20 mg/m3 STEL
Yukon:	30 mppcf TWA; 10 mg/m3 TWA 20 mg/m3 STEL

Limestone (1317-65-3)

OSHA (Final):	15 mg/m3 TWA (total dust); 5 mg/m3 TWA (respirable fraction)
OSHA (Vacated):	15 mg/m3 TWA (total dust); 5 mg/m3 TWA (respirable fraction)
NIOSH:	10 mg/m3 TWA (total dust); 5 mg/m3 TWA (respirable dust)
Alberta:	10 mg/m3 TWA
British Columbia:	10 mg/m3 TWA (total dust); 3 mg/m3 TWA (respirable fraction) 20 mg/m3 STEL
New Brunswick:	10 mg/m3 TWA (particulate matter containing no Asbestos and <1% Crystalline silica)
NW Territories:	5 mg/m3 TWA (respirable mass); 10 mg/m3 TWA (total mass)
Nunavut:	5 mg/m3 TWA (respirable mass); 10 mg/m3 TWA (total mass)
Quebec:	10 mg/m3 TWAEV (Limestone, containing no Asbestos and <1% Crystalline silica, total dust)
Saskatchewan:	10 mg/m3 TWA 20 mg/m3 STEL
Yukon:	30 mppcf TWA; 10 mg/m3 TWA 20 mg/m3 STEL

Gypsum (Ca(SO4).2H2O) (13397-24-5)

ACGIH:	10 mg/m3 TWA (inhalable fraction, listed under Calcium sulfate)
OSHA (Final):	15 mg/m3 TWA (total dust); 5 mg/m3 TWA (respirable fraction)
OSHA (Vacated):	15 mg/m3 TWA (total dust); 5 mg/m3 TWA (respirable fraction)
NIOSH:	10 mg/m3 TWA (total dust); 5 mg/m3 TWA (respirable dust)
Alberta:	10 mg/m3 TWA (listed under Calcium sulphate)
British Columbia:	10 mg/m3 TWA (total dust); 3 mg/m3 TWA (respirable fraction) 20 mg/m3 STEL
Manitoba:	10 mg/m3 TWA (inhalable fraction, listed under Calcium sulfate)
NW Territories:	5 mg/m3 TWA (respirable mass); 10 mg/m3 TWA (total mass)
Nova Scotia:	10 mg/m3 TWA (inhalable fraction, listed under Calcium sulfate)
Nunavut:	5 mg/m3 TWA (respirable mass); 10 mg/m3 TWA (total mass)
Ontario:	10 mg/m3 TWA (inhalable, listed under Calcium sulfate)
Quebec:	10 mg/m3 TWAEV (containing no Asbestos and <1% Crystalline silica, total dust); 5 mg/m3 TWAEV (containing no Asbestos and <1% Crystalline silica, respirable dust)
Saskatchewan:	10 mg/m3 TWA 20 mg/m3 STEL
Yukon:	30 mppcf TWA; 10 mg/m3 TWA 20 mg/m3 STEL

Quartz (14808-60-7)

ACGIH:	0.025 mg/m3 TWA (respirable fraction)
OSHA (Vacated):	0.1 mg/m3 TWA (respirable dust)
NIOSH:	0.05 mg/m3 TWA (respirable dust)
Alberta:	0.025 mg/m3 TWA (respirable particulate)
British Columbia:	ACGIH Category A2 - Suspected Human Carcinogen; IARC Category 1 - Human Carcinogen 0.025 mg/m3 TWA (respirable)
Manitoba:	0.025 mg/m3 TWA (respirable fraction)
New Brunswick:	0.1 mg/m3 TWA (respirable fraction)
NW Territories:	0.1 mg/m3 TWA (respirable mass); 0.3 mg/m3 TWA (total mass)
Nova Scotia:	0.025 mg/m3 TWA (respirable fraction)
Nunavut:	0.1 mg/m3 TWA (respirable mass); 0.3 mg/m3 TWA (total mass)
Ontario:	0.10 mg/m3 TWA (respirable fraction) 0.10 mg/m3 TWA (designated substance regulation, respirable)
Quebec:	0.1 mg/m3 TWAEV (respirable dust)
Saskatchewan:	0.05 mg/m3 TWA (respirable fraction, listed under Silica - crystalline)
Yukon:	300 particle/mL TWA (listed under Silica)

Engineering Measures

Avoid actions that cause dust to become airborne. Use local exhaust or general dilution ventilation to control exposure within applicable limits.

Personal Protective Equipment: Respiratory

Use local or general ventilation to control exposures below applicable exposure limits. NIOSH or MSHA approved particulate filter respirators should be used in the context of respiratory protection program meeting the requirements of the OSHA respiratory protection standard [29 CFR 1910.134] to control exposures when ventilation or other controls are inadequate or discomfort or irritation is experienced. Respirator and/or filter cartridge selection should be based on American National Standards Institute (ANSI) Standards Z88.2 Practices for Respiratory Protection.

Personal Protective Equipment: Hands

Where prolonged exposure to unhardened concrete products might occur, wear impervious gloves to eliminate skin contact. Do not rely on barrier creams; barrier creams should not be used in place of gloves. Periodically wash areas contacted by wet cement or its dry ingredients with a pH neutral soap and water. Wash again at the end of the work. If irritation occurs, immediately wash the affected area and seek treatment.

Personal Protective Equipment: Eyes

When engaged in activities where wet concrete or its dry ingredients could contact the eye, wear safety glasses with side shields or goggles. In extremely dusty environments and unpredictable environments, wear unvented or indirectly vented goggles to avoid eye irritation or injury. Contact lenses should not be worn when working with Portland cement or fresh cement products.

Personal Protective Equipment: Skin and Body

Where prolonged exposure to unhardened concrete products might occur, wear impervious clothing to eliminate skin contact. Where required, wear boots that are impervious to water to eliminate foot and ankle exposure. If clothing becomes saturated with wet concrete, it should be removed and replaced with clean dry clothing.

* * * Section 9 - Physical & Chemical Properties * * *

Appearance:	Gray powder.	**Odor:**	None
Physical State:	Solid	**pH:**	12-13 (in water)
Vapor Pressure:	Not Applicable	**Vapor Density:**	Not Applicable
Boiling Point:	Not Applicable	**Melting Point:**	Not Applicable
Solubility (H2O):	Slightly soluble	**Specific Gravity:**	3.15
Evaporation Rate:	Not Applicable	**VOC:**	Not Determined
Octanol/H2O Coeff.:	Not Determined	**Flash Point:**	None
Flash Point Method:	None	**Upper Flammability Limit (UFL):**	None
Lower Flammability Limit (LFL):	None	**Burning Rate:**	None
Auto Ignition:	Not Combustible		

* * * Section 10 - Chemical Stability & Reactivity Information * * *

Chemical Stability

This is a stable material.

Hazardous Reaction Potential

Will not occur.

Conditions to Avoid

Unintentional contact with water.

Incompatible Products

Wet Portland cement is alkaline. As such it is incompatible with acids, ammonium salts and aluminum metal.

Hazardous Decomposition Products

Will not spontaneously occur. Adding water results in hydration and produces (caustic) calcium hydroxide.

* * * Section 11 - Toxicological Information * * *

Acute Toxicity

Component Analysis - LD50/LC50

Quartz (14808-60-7)

Oral LD50 Rat 500 mg/kg

Potential Health Effects: Skin Corrosion Property/Stimulativeness

Discomfort or pain cannot be relied upon to alert a person to a hazardous skin exposure. Consequently, the only effective means of avoiding skin injury or illness involves minimizing skin contact, particularly contact with wet cement. Exposed persons may not feel discomfort until hours after the exposure has ended and significant injury has occurred. Exposure during the handling or mixing of the dry ingredients in Portland cement may cause drying of the skin with consequent mild irritation or more significant effects attributable to aggravation of other conditions. Exposure to wet concrete may cause more severe skin effects including thickening, cracking or fissuring of the skin. Prolonged exposure can cause severe skin damage in the form of (caustic) chemical burns.

Potential Health Effects: Eye Critical Damage/ Stimulativeness

Exposure to airborne dust during the handling or mixing of the dry ingredients in Portland cement may cause immediate or delayed irritation or inflammation. Eye contact by splashes of wet concrete may cause effects ranging from moderate eye irritation to chemical burns and blindness. Such exposures require immediate first aid (see Section 4) and medical attention to prevent significant damage to the eye.

Potential Health Effects: Ingestion

Although inadvertent ingestion of small quantities of wet concrete or its dry ingredients are not known to be harmful, accidental ingestion of larger quantities can be harmful and requires immediate medical attention.

Potential Health Effects: Inhalation

Exposure to Portland cement in excess of the applicable TLV or PEL (see section 2) may cause or aggravate other lung conditions. The ingredients in Portland cement may contain trace amounts of crystalline silica. Exposure to these ingredients in excess of the applicable TLV or PEL (see Section 2) may cause or aggravate other lung conditions. Exposure to Portland cement may cause irritation to the moist mucous membranes of the nose, throat, and upper respiratory system. It may also leave unpleasant deposits in the nose.

Respiratory Organs Sensitization/Skin Sensitization

May cause allergy or asthma symptoms or breathing difficulties if inhaled. Some individuals may exhibit an allergic response upon exposure to wet concrete. The response may appear in a variety of forms ranging from a mild rash to severe skin ulcers. Persons already sensitized may react to their first contact with the product. Other persons may first experience this effect after years of contact with Portland cement products.

Generative Cell Mutagenicity

This product is not reported to have any mutagenic effects.

Carcinogenicity

A: General Product Information

May cause cancer.

Prolonged and repeated exposure to airborne free respirable crystalline silica can result in lung disease and/or lung cancer. IARC states that crystalline silica in the form of quartz or cristobalite from occupational sources is carcinogenic to humans (Group 1).

B: Component Carcinogenicity

Cement, portland, chemicals (65997-15-1)

ACGIH: A4 - Not Classifiable as a Human Carcinogen

Quartz (14808-60-7)

ACGIH: A2 - Suspected Human Carcinogen
NIOSH: potential occupational carcinogen
NTP: Known Human Carcinogen (respirable size) (Select Carcinogen)
IARC: Monograph 100C [2012] (listed under Crystalline silica inhaled in the form of quartz or cristobalite from occupational sources); Monograph 68 [1997] (Group 1 (carcinogenic to humans))

Reproductive Toxicity

This product is not reported to have any reproductive toxicity effects.

Specified Target Organ General Toxicity: Single Exposure

This product is not reported to have any single exposure specific target organ toxicity effects.

Specified Target Organ General Toxicity: Repeated Exposure

Causes damage to organs through prolonged or repeated exposure (lungs).

Aspiration Respiratory Organs Hazard

This product is not reported to have any aspiration hazards.

* * * Section 12 - Ecological Information * * *

Ecotoxicity

A: General Product Information

This product is not reported to have any ecotoxicity effects.

B: Component Analysis - Ecotoxicity - Aquatic Toxicity

No ecotoxicity data are available for this product's components.

Persistence/Degradability

No information available for the product.

Bioaccumulation

No information available for the product.

Mobility in Soil

No information available for the product.

* * * Section 13 - Disposal Considerations * * *

Waste Disposal Instructions

See Section 7 for Handling Procedures. See Section 8 for Personal Protective Equipment recommendations.

Disposal of Contaminated Containers or Packaging

Dispose of contents/container in accordance with local/regional/national/international regulations.

* * * Section 14 - Transportation Information * * *

DOT/TDG Information

Shipping Name: Not Regulated.

* * * Section 15 - Regulatory Information * * *

Regulatory Information

US Federal Regulations

Component Analysis

None of this products components are listed under SARA Section 302 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65), or CERCLA (40 CFR 302.4).

State Regulations

Component Analysis - State

The following components appear on one or more of the following state hazardous substances lists:

Component	CAS	CA	MA	MN	NJ	PA	RI
Cement, portland, chemicals	65997-15-1	No	Yes	Yes	Yes	Yes	No
Limestone	1317-65-3	No	Yes	Yes	Yes	Yes	No
Gypsum (Ca(SO4).2H2O)	13397-24-5	No	No	Yes	Yes	Yes	No
Quartz	14808-60-7	No	Yes	Yes	Yes	Yes	No

The following statement(s) are provided under the California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65):

WARNING! This product contains chemicals known to the state of California to cause cancer, birth defects, or other reproductive harm.

Component Analysis - WHMIS IDL

No components are listed in the WHMIS IDL.

Status under Workplace Hazardous Materials Information System (WHMIS), Canada

Unhardened Ready-Mix concrete is considered to be a hazardous material under the Hazardous Products Act as defined by the Controlled Products Regulations (Class E - Corrosive Material) and is therefore subject to the labeling and MSDS requirements of the Workplace Hazardous Materials Information System (WHMIS).

Status under Canadian Environmental Protection Act

Not Listed

Additional Regulatory Information

Component Analysis - Inventory

Component	CAS #	TSCA	CAN	EEC
Cement, portland, chemicals	65997-15-1	Yes	DSL	EINECS
Limestone	1317-65-3	Yes	NDSL	EINECS
Gypsum (Ca(SO4).2H2O)	13397-24-5	No	DSL	No
Quartz	14808-60-7	Yes	DSL	EINECS

* * * Section 16 - Other Information * * *

Hazardous Material Information System (HMIS):		
	Health	1
	Flammability	0
	Physical Hazard	0
	Personal Protection	B

NFPA/HMIS Definitions: 0-Least, 1-Slight, 2-Moderate, 3-High, 4-Extreme
Protective Equipment: Safety glasses, gloves

Key/Legend

EPA = Environmental Protection Agency; TSCA = Toxic Substance Control Act; ACGIH = American Conference of Governmental Industrial Hygienists; IARC = International Agency for Research on Cancer; NIOSH = National Institute for Occupational Safety and Health; NTP = National Toxicology Program; OSHA = Occupational Safety and Health Administration., NJTSR = New Jersey Trade Secret Registry.

Literature References

None

Other Information

SELLER MAKES NO WARRANTY, EXPRESS OR IMPLIED, CONCERNING THE PRODUCT OR THE MERCHANTABILITY OR FITNESS THEREOF FOR ANY PURPOSE OR CONCERNING THE ACCURACY OF ANY INFORMATION PROVIDED BY CALPORTLAND, except that the product shall conform to contracted specifications. The information provided herein was believed by CalPortland Company to be accurate at the time of preparation or prepared from sources believed to be reliable, but it is the responsibility of the user to investigate and understand other pertinent sources of information to comply with all laws and procedures applicable to the safe handling and use of the product and to determine the suitability of the product for its intended use. Buyer's exclusive remedy shall be for damages and no claim of any kind, whether as to product delivered or for nondelivery of product, and whether based on contract, breach of warranty, negligence, or otherwise shall be greater in amount than the purchase price of the quantity of product in respect of which damages are claimed. In no event shall Seller be liable for incidental or consequential damages, whether Buyer's claim is based on contract, breach of warranty, negligence or otherwise.

End of Sheet

SAFETY DATA SHEET

Version 1

1. Identification of the Substance / Preparation and of the Company / Undertaking

Product Name: Sodium Hydroxide 30-50%
UN/ID No UN1824
Synonyms: Sodium Hydroxide; Caustic; Caustic Soda; Lye; Sodium Hydrate; Caustic Soda Membrane Grade 50%; Caustic Soda Diaphragm 30%, 35%, 40%, 50%
Molecular Weight: 40

Company Name:
Vertex Chemical Corporation, 11685 Manchester Road, St. Louis, Missouri 63131. (314) 471-0500

Emergency Telephone:
NATIONAL EMERGENCY RESPONSE CENTER:
1-800-424-8802
VERTEX CHEMICAL CORPORATION 314-471-0500
CHEMTREC (US): 1-800-424-9300
Call CHEMTREC only in the event of chemical emergencies involving a SPILL, LEAK, FIRE, EXPOSURE, or ACCIDENT involving chemicals.

Email:
vertexchem@vertexchem.com
www.vertexchemical.com

2. Hazards Identification

GHS - Classification

Acute toxicity - Oral	Category 4
Skin corrosion/irritation	Category 1 Category 1A
Serious eye damage/eye irritation	Category 1
Specific target organ toxicity (single exposure)	Category 1

Signal Word: **Danger**
Hazard Statements:
• Harmful if swallowed
• Causes severe skin burns and eye damage
• Causes damage to organs
Physical Hazards

Corrosive to metals	Category 1

• May be corrosive to metals

Precautionary Statements:
• P301 + P312 - IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell
• P330 - Rinse mouth
• P312 - Call a POISON CENTER or doctor if you feel unwell
• P301 + P330 + P331 - IF SWALLOWED: rinse mouth. Do NOT induce vomiting
• P303 + P361 + P353 - IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower
• P363 - Wash contaminated clothing before reuse
• P304 + P340 - IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
• P280 - Wear protective gloves/protective clothing/eye protection/face protection
• P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
• P310 - Immediately call a POISON CENTER or doctor/physician
• P260 - Do not breathe dust/fume/gas/mist/vapors/spray
• P264 - Wash face, hands and any exposed skin thoroughly after handling
• P270 - Do not eat, drink or smoke when using this product
• P307 + P311 - IF exposed: Call a POISON CENTER or doctor/physician
• P405 - Store locked up
• P501 - Dispose of contents/ container to an approved waste disposal plant
• P334 - Immerse in cool water/wrap in wet bandages
• P390 - Absorb spillage to prevent material damage
• P406 - Store in corrosive resistant aluminum container with a resistant inliner

3. Composition / Information on Ingredients

Hazardous

Chemical Name	CAS No	Weight-%	EC No
Caustic soda	1310-73-2	30-50	215-185-5
Sodium chloride	7647-14-5	< 1.0	231-598-3
Sodium carbonate	497-19-8	< 0.2	207-838-8

Non-Hazardous

Chemical Name	CAS No	Weight-%	EC No
Water	7732-18-5	Balance	231-791-2

4. First Aid Measures

General Advice: Immediate medical attention is required.

Eye Contact: Immediate medical attention is required. Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Keep eye wide open while rinsing. Do not rub affected area.

Skin Contact: Immediate medical attention is required. Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes.

Inhalation: Move to fresh air. Call a physician or poison control center immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.

Ingestion: Immediate medical attention is required. Do NOT induce vomiting. Drink plenty of water. Never give anything by mouth to an unconscious person. Remove from exposure, lie down. Clean mouth with water and drink afterwards plenty of water. Call a physician or poison control center immediately.

Note to Physicians: Product is a corrosive material. Use of gastric lavage or emesis is contraindicated. Possible perforation of stomach or esophagus should be investigated. Do not give chemical antidotes. Asphyxia from glottal edema may occur. Marked decrease in blood pressure may occur with moist rales, frothy sputum, and high pulse pressure. Treat symptomatically.

Self-protection of the First Aider: Use personal protective equipment as required. Avoid contact with skin, eyes or clothing.

5. Fire-fighting Measures

Flammable Properties:
Not considered to be a fire hazard

Explosive Properties:
No information available

Suitable Extinguishing Media:
Use extinguishing measures that are appropriate to local circumstances and the surrounding environment

Unsuitable Extinguishing Media:
No information available

Specific Hazards Arising from the Chemical:
The product causes burns of eyes, skin and mucous membranes; Thermal decomposition can lead to release of irritating and toxic gases and vapors; In the event of fire and/or explosion do not breathe fumes

Protective Equipment and Precautions for Firefighters:
In the event of a fire, wear full protective clothing and MSHA/NIOSH (approved or equivalent) self-contained breathing apparatus with full facepiece operated in the pressure-demand or other positive pressure mode

6. Accidental Release Measures

Personal Precautions: Evacuate personnel to safe areas. Use personal protective equipment as required. Avoid contact with skin, eyes or clothing. Keep people away from and upwind of spill/leak.

Environmental Precautions: Do not allow into any sewer, on the ground or into any body of water. Should not be released into the environment. Prevent further leakage or spillage if safe to do so. Prevent product from entering drains.

Methods for Cleaning Up: Dike far ahead of liquid spill for later disposal. Soak up with inert absorbent material. Take up mechanically, placing in appropriate containers for disposal. Clean contaminated surface thoroughly. Prevent product from entering drains. Dam up. After cleaning, flush away traces with water.

Other Information: Not applicable.

7. Handling and Storage

Advice on Safe Handling: Use personal protective equipment as required. Avoid contact with skin, eyes or clothing. Use only with adequate ventilation. In case of insufficient ventilation, wear suitable respiratory equipment. Use only with adequate ventilation and in closed systems.

Storage Conditions: Keep container tightly closed in a dry and well-ventilated place. Keep out of the reach of children. Keep containers tightly closed in a dry, cool and well-ventilated place. Keep in properly labeled containers.

Incompatible Materials: Strong acids and bases; Oxidizing agents

8. Exposure Controls / Personal Protection

Chemical Name	ACGIH TLV	OSHA PEL	Ontario TWA
Caustic soda	Ceiling: 2 mg/m³	2 mg/m³ Ceiling 2 mg/m³ TWA	CEV: 2 mg/m³

Chemical Name	European Union	China	Japan	Korea	Australia	Taiwan
Caustic soda		Ceiling: 2 mg/m³ Ceiling	Ceiling: 2 mg/m³	Ceiling: 2 mg/m³	2 mg/m³ Peak	TWA: 2 mg/m³

Exposure Guidelines Vacated limits revoked by the Court of Appeals decision in AFL-CIO v. OSHA, 965 F.2d 962 (11th Cir., 1992)

Engineering Controls: Ensure adequate ventilation, especially in confined areas

Personal protective equipment (PPE)

Eye/Face Protection: Tight sealing safety goggles. Face protection shield.

Body Protection: Gloves made of plastic or rubber. Rubber boots. Suitable protective clothing. Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact. Wear chemical resistant clothing such as gloves, apron, boots or whole bodysuits made from neoprene, as appropriate.

General Hygiene Considerations:

When using do not eat, drink or smoke. Wash contaminated clothing before reuse. Keep away from food, drink and animal feeding stuffs. Contaminated work clothing should not be allowed out of the workplace. Regular cleaning of equipment, work area and clothing is recommended. Avoid contact with skin, eyes or clothing. Take off all contaminated clothing and wash it before reuse. Wear suitable gloves and eye/face protection.

9. Physical and Chemical Properties

9.1. Information on basic physical and chemical properties

Physical State: Liquid
Appearance: No information available
Color: Colorless
Odor: Odorless
Odor Threshold: No information available

Property	Values	Remarks • Method
pH:	14	
"Salt Out" Point (°F):		No information available
Melting Point/Freezing Point:	14 °C / 57 °F	
Boiling Point/Boiling Range:	145 °C / 293 °F	
Flash Point:		No information available
Evaporation Rate (BuAc=1):		No information available
Flammability (solid, gas):		No information available
Flammability Limits in Air:		No information available
Upper Flammability Limit:		
Lower Flammability Limit:		
Vapor Pressure (mm Hg) :		No information available
Vapor density (Air =1)		No information available
Specific Gravity (H2O=1):	1.54	
Specific Gravity (2nd value):		
Water Solubility:		No information available
Solubility(ies):		No information available
Partition Coefficient (n-octanol/water)		No information available
Autoignition Temperature:		No information available
Decomposition Temperature:		No information available
Kinematic Viscosity:		No information available
Dynamic Viscosity:		No information available
Oxidizing Properties:	No information available	
Explosive Properties:	No information available	

9.2. Other information

Softening Point:	No information available
Molecular Weight:	40
VOC Content(%):	No information available
Density:	No information available
Bulk Density:	No information available

10. Stability and Reactivity

Stability: Stable under normal conditions of use and storage

Conditions to Avoid: Exposure to air or moisture over prolonged periods

Incompatible Materials: Strong acids and bases; Oxidizing agents

Hazardous Decomposition Products: Thermal decomposition can lead to release of irritating and toxic gases and vapors

Possibility of Hazardous Reactions: None under normal processing

11. Toxicological Information

Product Information

Acute Toxicity: 0% of the mixture consists of ingredient(s) of unknown toxicity.

The following values are calculated based on chapter 3.1 of the GHS document

Chemical Name	Oral LD_{50} :	Dermal LD_{50} :	LC_{50} (Lethal Concentration):
Caustic soda		1350 mg/kg (Rabbit)	
Sodium chloride	3 g/kg (Rat)	10 g/kg (Rabbit)	42 g/m³ (Rat) 1 h
Sodium carbonate	4090 mg/kg (Rat)		
Water	90 mL/kg (Rat)		

Chronic Toxicity:

Carcinogenicity: This product does not contain any carcinogens or potential carcinogens as listed by OSHA, IARC or NTP

Target Organ Effects: Eyes, Respiratory system, Skin

12. Ecological Information

Ecotoxicity

0% of the mixture consists of components(s) of unknown hazards to the aquatic environment

Chemical Name	Toxicity to algae	Toxicity to fish	Toxicity to daphnia and other aquatic invertebrates
Caustic soda		*45.4: 96 h Oncorhynchus mykiss mg/L LC50 static*	

Sodium chloride		*5560 - 6080: 96 h Lepomis macrochirus mg/L LC50 flow-through 6020 - 7070: 96 h Pimephales promelas mg/L LC50 static 12946: 96 h Lepomis macrochirus mg/L LC50 static 7050: 96 h Pimephales promelas mg/L LC50 semi-static 6420 - 6700: 96 h Pimephales promelas mg/L LC50 static 4747 - 7824: 96 h Oncorhynchus mykiss mg/L LC50 flow-through*	*1000: 48 h Daphnia magna mg/L EC50 340.7 - 469.2: 48 h Daphnia magna mg/L EC50 Static*
Sodium carbonate	*242: 120 h Nitzschia mg/L EC50*	*300: 96 h Lepomis macrochirus mg/L LC50 static 310 - 1220: 96 h Pimephales promelas mg/L LC50 static*	*265: 48 h Daphnia magna mg/L EC50*

Persistence and Degradability: No information available.

Bioaccumulation: No information available.

Mobility: No information available.

13. Disposal Considerations

Waste from Residues/Unused Products: Disposal should be in accordance with applicable regional, national and local laws and regulations

Contaminated Packaging: Do not reuse container.

14. Transport Information

IATA

DOT

Proper shipping name SODIUM HYDROXIDE SOLUTION
Hazard Class 8
UN/ID No UN1824
Packing Group PG II
Reportable Quantity (RQ) 1000 lbs
Description UN1824, SODIUM HYDROXIDE SOLUTION, 8, PG II

TDG

MEX

15. Regulatory Information

International Inventories

All of the components in the product are on the following Inventory lists: TSCA (United States):, Canada (DSL/NDSL), Europe (EINECS/ELINCS/NLP), Australia (AICS), South Korea (KECL):, China (IECSC), Philippines (PICCS),
This product contains a substance not listed on international inventories - it is for research and development use only.

AICS	Complies
TSCA	Complies
DSL/NDSL	Complies
EINECS/ELINCS	Complies
ENCS	-
IECSC	Complies
KECL	Complies
PICCS	Complies

Chemical Name	AICS	TSCA	DSL	NDSL	EINECS	ELINCS	ENCS	IECSC	KECL	PICCS
Caustic soda	Listed	Listed	Listed	-	Listed	-	(2)-1972 (1)-410	Listed	KE-31487	Listed
Sodium chloride	Listed	Listed	Listed	-	Listed	-	(1)-236	Listed	KE-31387	Present
Sodium carbonate	Listed	Listed	Listed	-	Listed	-	(1)-164	Listed	KE-31380	Present
Water	Listed	Listed	Listed	-	Listed	-	-	Listed	KE-35400	Present

Inventory Legend

AICS - Australian Inventory of Chemical Substances
TSCA - United States Toxic Substances Control Act Section 8(b) Inventory
DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List
EINECS/ELINCS - European Inventory of Existing Chemical Substances/European List of Notified Chemical Substances
ENCS - Japan Existing and New Chemical Substances
IECSC - China Inventory of Existing Chemical Substances
KECL - Korean Existing and Evaluated Chemical Substances
PICCS - Philippines Inventory of Chemicals and Chemical Substances

RESTRICTIONS - REACH TITLE VII No information available

US Federal Regulations

CERCLA

This material, as supplied, does not contain any substances regulated as hazardous substances under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355). There may be specific reporting requirements at the local, regional, or state level pertaining to releases of this material

Chemical Name	CERCLA Hazardous Substances and the Reportable Quantities	SARA Extremely Hazardous Substances EPCRA RQ	SARA Extremely Hazardous Substances TPQ
Caustic soda	1000 lb 454 kg	-	-

SARA 313

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372

SARA 311/312 Hazard Categories

Acute health hazard	Yes
Chronic health hazard	No
Fire hazard	No
Sudden release of pressure hazard	No
Reactive hazard	Yes

U.S. State Right-to-Know Regulations

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

16. Other Information

National Fire Protection Association (NFPA) Ratings

NSF Certification

Maximum Use (mg/L unless otherwise indicated):	100
Prepared By:	Adam Peterson, Rob Kelley, Andrew Morabu and Todd Bain from the HSE department.
Issue Date:	08-Jan-2013
Revision Date:	08-Jan-2013
Revision Note:	MSDS converted to GHS SDS Format.

Disclaimer:
Vertex Chemical Corporation ("Vertex") expressly disclaims all express or implied warranties of merchantability and fitness for a particular purpose, with respect to the product or information provided herein.

All information appearing herein is based upon data obtained from the manufacturer and/or recognized technical sources. While the information is believed to be accurate, Vertex makes no representations as to its accuracy or sufficiency. Conditions of use are beyond Vertex's control, and, therefore, users are responsible to verify this data under their own operating conditions to determine whether the product is suitable for their particular purposes, and they assume all risks of their use, handling, and disposal of the product, or from the publication or use of, or reliance upon, information contained herein. This information relates only to the product designated herein, and does not relate to its use in combination with any other material or in any other process.

End of Safety Data Sheet

Sulfuric Acid, 96% w/w

Safety Data Sheet 75289

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Date of issue: 10/01/1998 Revision date: 06/27/2013 Supersedes: 01/25/2012 Version: 1.0

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Product form	:	Substance
Substance name	:	Sulfuric Acid, 96% w/w
CAS No	:	7664-93-9
Product code	:	LC25550
Formula	:	H2SO4
Synonyms	:	battery acid / brown acid / brown oil of vitriol / dihydrogen sulfate / dipping acid / electrolyte acid / nordhausen acid / oil of vitriol / sulphuric acid
BIG no	:	14049

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

Use of the substance/mixture	:	Industrial use Laboratory chemical Battery: component

1.3. Details of the supplier of the safety data sheet

LabChem Inc
Jackson's Pointe Commerce Park Building 1000, 1010 Jackson's Pointe Court
Zelienople, PA 16063 - USA
T 412-826-5230 - F 724-473-0647
info@labchem.com - www.labchem.com

1.4. Emergency telephone number

Emergency number	:	CHEMTREC: 1-800-424-9300 or 011-703-527-3887

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

GHS-US classification

Skin Corr. 1A H314
Eye Dam. 1 H318

2.2. Label elements

GHS-US labelling

Hazard pictograms (GHS-US) :

GHS05

Signal word (GHS-US) : Danger

Hazard statements (GHS-US) :
H314 - Causes severe skin burns and eye damage
H318 - Causes serious eye damage

Precautionary statements (GHS-US) :
P260 - Do not breathe mist, vapours, spray
P264 - Wash exposed skin thoroughly after handling
P280 - Wear protective gloves, protective clothing, eye protection, face protection
P301+P330+P331 - IF SWALLOWED: Rinse mouth. Do NOT induce vomiting
P303+P361+P353 - IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower
P304+P340 - IF INHALED: Remove person to fresh air and keep comfortable for breathing
P305+P351+P338 - If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P310 - Immediately call a POISON CENTER/doctor/…
P363 - Wash contaminated clothing before reuse
P405 - Store locked up
P501 - Dispose of contents/container to comply with local, state and federal regulations

2.3. Other hazards

Other hazards not contributing to the classification	:	None.

2.4. Unknown acute toxicity (GHS-US)

No data available

SECTION 3: Composition/information on ingredients

3.1. Substances

Substance type : Mono-constituent

Name	Product identifier	%	GHS-US classification
Sulfuric Acid, 96% w/w (Main constituent)	(CAS No) 7664-93-9	96	Skin Corr. 1A, H314 Eye Dam. 1, H318

Full text of H-phrases: see section 16

3.2. Mixture

Not applicable

SECTION 4: First aid measures

4.1. Description of first aid measures

First-aid measures general : Check the vital functions. Unconscious: maintain adequate airway and respiration. Respiratory arrest: artificial respiration or oxygen. Cardiac arrest: perform resuscitation. Victim conscious with laboured breathing: half-seated. Victim in shock: on his back with legs slightly raised. Vomiting: prevent asphyxia/aspiration pneumonia. Prevent cooling by covering the victim (no warming up). Keep watching the victim. Give psychological aid. Keep the victim calm, avoid physical strain. Depending on the victim's condition: doctor/hospital.

First-aid measures after inhalation : Remove the victim into fresh air. Immediately consult a doctor/medical service.

First-aid measures after skin contact : Wash immediately with lots of water (15 minutes)/shower. Do not apply (chemical) neutralizing agents. Remove clothing while washing. Do not remove clothing if it sticks to the skin. Cover wounds with sterile bandage. Consult a doctor/medical service. If burned surface > 10%: take victim to hospital.

First-aid measures after eye contact : Rinse immediately with plenty of water for 15 minutes. Take victim to an ophthalmologist. Do not apply neutralizing agents.

First-aid measures after ingestion : Rinse mouth with water. Do not induce vomiting. Do not give activated charcoal. Immediately consult a doctor/medical service. Call Poison Information Centre (www.big.be/antigif.htm). Take the container/vomit to the doctor/hospital. Ingestion of large quantities: immediately to hospital. Do not give chemical antidote.

4.2. Most important symptoms and effects, both acute and delayed

Symptoms/injuries after inhalation : Dry/sore throat. Coughing. Irritation of the respiratory tract. Irritation of the nasal mucous membranes. ON CONTINUOUS EXPOSURE/CONTACT: Corrosion of the upper respiratory tract. FOLLOWING SYMPTOMS MAY APPEAR LATER: Possible laryngeal spasm/oedema. Risk of pneumonia. Risk of lung oedema. Respiratory difficulties.

Symptoms/injuries after skin contact : Caustic burns/corrosion of the skin.

Symptoms/injuries after eye contact : Corrosion of the eye tissue. Permanent eye damage.

Symptoms/injuries after ingestion : Nausea. Abdominal pain. Blood in stool. Blood in vomit. Burns to the gastric/intestinal mucosa. AFTER ABSORPTION OF HIGH QUANTITIES: Shock.

Chronic symptoms : ON CONTINUOUS/REPEATED EXPOSURE/CONTACT: Red skin. Dry skin. Itching. Skin rash/inflammation. Affection/discolouration of the teeth. Inflammation/damage of the eye tissue.

4.3. Indication of any immediate medical attention and special treatment needed

Obtain medical assistance.

SECTION 5: Firefighting measures

5.1. Extinguishing media

Unsuitable extinguishing media : EXTINGUISHING MEDIA FOR SURROUNDING FIRES: Water. Water spray.

5.2. Special hazards arising from the substance or mixture

Fire hazard : DIRECT FIRE HAZARD. Non combustible. INDIRECT FIRE HAZARD. Reactions involving a fire hazard: see "Reactivity Hazard".

Explosion hazard : INDIRECT EXPLOSION HAZARD. Reactions with explosion hazards: see "Reactivity Hazard".

Reactivity : Violent exothermic reaction with water (moisture): release of corrosive gases/vapours. Reacts on exposure to water (moisture) with (some) metals: release of highly flammable gases/vapours (hydrogen). On heating/burning: release of toxic and corrosive gases/vapours (sulphur oxides). Reacts violently with (some) bases: heat release resulting in increased fire or explosion risk. Reacts with many compounds e.g.: with (strong) reducers, with organic material and with combustible materials: (increased) risk of fire/explosion.

5.3. Advice for firefighters

Precautionary measures fire : Exposure to fire/heat: keep upwind. Exposure to fire/heat: consider evacuation. Exposure to fire/heat: seal off low-lying areas. Exposure to fire/heat: have neighbourhood close doors and windows.

Firefighting instructions : Cool tanks/drums with water spray/remove them into safety. When cooling/extinguishing: no water in the substance. Dilute toxic gases with water spray.

Protection during firefighting : Heat/fire exposure: compressed air/oxygen apparatus.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

6.1.1. For non-emergency personnel

Protective equipment : Gloves. Face-shield. Corrosion-proof suit. Large spills/in enclosed spaces: compressed air apparatus. Large spills/in enclosed spaces: gas-tight suit.

Emergency procedures : Mark the danger area. No naked flames. Keep containers closed. Avoid ingress of water in the containers. Wash contaminated clothes. Large spills/in confined spaces: consider evacuation. In case of hazardous reactions: keep upwind. In case of reactivity hazard: consider evacuation.

6.1.2. For emergency responders

Protective equipment : Equip cleanup crew with proper protection.

Emergency procedures : Stop leak if safe to do so. Ventilate area.

6.2. Environmental precautions

Prevent soil and water pollution. Prevent spreading in sewers.

6.3. Methods and material for containment and cleaning up

For containment : Contain released substance, pump into suitable containers. Consult "Material-handling" to select material of containers. Plug the leak, cut off the supply. Dam up the liquid spill. Hazardous reaction: measure explosive gas-air mixture. Reaction: dilute combustible gas/vapour with water curtain. Take account of toxic/corrosive precipitation water. Heat exposure: dilute toxic gas/vapour with water spray.

Methods for cleaning up : Take up liquid spill into inert absorbent material, e.g.: dry sand/earth/vermiculite. Scoop absorbed substance into closing containers. Carefully collect the spill/leftovers. Damaged/cooled tanks must be emptied. See "Material-handling" for suitable container materials. Clean contaminated surfaces with an excess of water. Take collected spill to manufacturer/competent authority. Wash clothing and equipment after handling.

6.4. Reference to other sections

No additional information available

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Precautions for safe handling : Comply with the legal requirements. Remove contaminated clothing immediately. Clean contaminated clothing. Keep the substance free from contamination. Thoroughly clean/dry the installation before use. Do not discharge the waste into the drain. Never add water to this product. Never dilute by pouring water to the acid. Always add the acid to the water. Keep away from naked flames/heat. Observe very strict hygiene - avoid contact. Keep container tightly closed. Measure the concentration in the air regularly. Carry operations in the open/under local exhaust/ventilation or with respiratory protection.

Hygiene measures : Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking and when leaving work. Wash contaminated clothing before reuse. Do not eat, drink or smoke when using this product.

7.2. Conditions for safe storage, including any incompatibilities

Incompatible products : Strong bases. metals. combustible materials.

Heat and ignition sources : KEEP SUBSTANCE AWAY FROM: heat sources.

Prohibitions on mixed storage : KEEP SUBSTANCE AWAY FROM: combustible materials. reducing agents. (strong) bases. highly flammable materials. metals. cellulosic materials. organic materials. alcohols. amines. water/moisture.

Storage area : Store in a dry area. Ventilation at floor level. Keep locked up. Provide for a tub to collect spills. Unauthorized persons are not admitted. Meet the legal requirements.

Special rules on packaging : SPECIAL REQUIREMENTS: closing. dry. clean. correctly labelled. meet the legal requirements. Secure fragile packagings in solid containers.

Packaging materials : SUITABLE MATERIAL: stainless steel. carbon steel. polyethylene. polypropylene. glass. stoneware/porcelain. MATERIAL TO AVOID: monel steel. lead. copper. zinc.

7.3. Specific end use(s)

No additional information available

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Sulfuric Acid, 96% w/w (7664-93-9)		
USA ACGIH	ACGIH TWA (mg/m³)	0.2 mg/m³
USA OSHA	OSHA PEL (TWA) (mg/m³)	1 mg/m³

8.2. Exposure controls

Appropriate engineering controls : Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure. Provide adequate general and local exhaust ventilation.

Materials for protective clothing	:	GIVE EXCELLENT RESISTANCE: butyl rubber. polyethylene. tetrafluoroethylene. GIVE LESS RESISTANCE: neoprene. PVC. viton. GIVE POOR RESISTANCE: natural rubber. nitrile rubber. PVA.
Hand protection	:	Gloves.
Eye protection	:	Face shield.
Skin and body protection	:	Corrosion-proof clothing.
Respiratory protection	:	Gas mask with filter type E at conc. in air > exposure limit.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state	:	Liquid
Appearance	:	Liquid.
Molecular mass	:	98.08 g/mol
Colour	:	Pure substance: colourless. Unpurified: yellow to brown.
Odour	:	Almost odourless.
Odour threshold	:	> 1 mg/m³
pH	:	No data available
Relative evaporation rate (butylacetate=1)	:	No data available
Melting point	:	10 °C
Freezing point	:	No data available
Boiling point	:	288 °C
Flash point	:	Not applicable
Self ignition temperature	:	No data available
Decomposition temperature	:	> 340 °C
Flammability (solid, gas)	:	No data available
Vapour pressure	:	< 1.0 hPa
Relative vapour density at 20 °C	:	3.4
Relative density	:	1.8
Density	:	1840 kg/m³
Solubility	:	Exothermically soluble in water. Soluble in ethanol. Water: Complete
Log Pow	:	-2.20 (Estimated value)
Log Kow	:	No data available
Viscosity, kinematic	:	No data available
Viscosity, dynamic	:	No data available
Explosive properties	:	No data available.
Oxidising properties	:	No data available.
Explosive limits	:	No data available

9.2. Other information

VOC content	:	Not applicable
Other properties	:	Gas/vapour heavier than air at 20°C. Clear. Hygroscopic. Slightly volatile. Substance has acid reaction.

SECTION 10: Stability and reactivity

10.1. Reactivity

Violent exothermic reaction with water (moisture): release of corrosive gases/vapours. Reacts on exposure to water (moisture) with (some) metals: release of highly flammable gases/vapours (hydrogen). On heating/burning: release of toxic and corrosive gases/vapours (sulphur oxides). Reacts violently with (some) bases: heat release resulting in increased fire or explosion risk. Reacts with many compounds e.g.: with (strong) reducers, with organic material and with combustible materials: (increased) risk of fire/explosion.

10.2. Chemical stability

Unstable on exposure to moisture.

10.3. Possibility of hazardous reactions

Reacts violently with water. Reacts violently with (some) bases: release of heat.

10.4. Conditions to avoid

Incompatible materials. Moisture.

10.5. Incompatible materials

Water. Strong bases. Organic compounds. metals. Halogens. cyanides. combustible materials.

10.6. Hazardous decomposition products

Sulfur compounds.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity : Not classified

Sulfuric Acid, 96% w/w (\f)7664-93-9	
LD50 oral rat	2140 mg/kg bodyweight (Rat; Experimental value,Rat; Experimental value)

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

Serious eye damage/irritation : Causes serious eye damage.

Respiratory or skin sensitisation : Not classified

Germ cell mutagenicity : Not classified

Carcinogenicity : Not classified

Sulfuric Acid, 96% w/w (7664-93-9)	
IARC group	1

Reproductive toxicity : Not classified

Specific target organ toxicity (single exposure) : Not classified

Specific target organ toxicity (repeated exposure) : Not classified

Aspiration hazard : Not classified

Symptoms/injuries after inhalation : Dry/sore throat. Coughing. Irritation of the respiratory tract. Irritation of the nasal mucous membranes. ON CONTINUOUS EXPOSURE/CONTACT: Corrosion of the upper respiratory tract. FOLLOWING SYMPTOMS MAY APPEAR LATER: Possible laryngeal spasm/oedema. Risk of pneumonia. Risk of lung oedema. Respiratory difficulties.

Symptoms/injuries after skin contact : Caustic burns/corrosion of the skin.

Symptoms/injuries after eye contact : Corrosion of the eye tissue. Permanent eye damage.

Symptoms/injuries after ingestion : Nausea. Abdominal pain. Blood in stool. Blood in vomit. Burns to the gastric/intestinal mucosa. AFTER ABSORPTION OF HIGH QUANTITIES: Shock.

Chronic symptoms : ON CONTINUOUS/REPEATED EXPOSURE/CONTACT: Red skin. Dry skin. Itching. Skin rash/inflammation. Affection/discolouration of the teeth. Inflammation/damage of the eye tissue.

SECTION 12: Ecological information

12.1. Toxicity

Ecology - general : Classification concerning the environment: not applicable.

Ecology - water : Mild water pollutant (surface water). Ground water pollutant. Maximum concentration in drinking water: 250 mg/l (sulfate) (Directive 98/83/EC). Harmful to fishes. Harmful to invertebrates (Daphnia). Toxic to plankton. pH shift. Inhibition of activated sludge.

Sulfuric Acid, 96% w/w (7664-93-9)	
LC50 fishes 1	42 mg/l (96 h; Gambusia affinis)
EC50 Daphnia 1	29 mg/l (24 h; Daphnia magna)
LC50 fish 2	49 mg/l (48 h; Lepomis macrochirus)
TLM fish 1	42 mg/l (96 h; Gambusia affinis)
Threshold limit other aquatic organisms 1	6900 mg/l (24 h; Pseudomonas fluorescens)

12.2. Persistence and degradability

Sulfuric Acid, 96% w/w (7664-93-9)	
Persistence and degradability	Biodegradability: not applicable.
Biochemical oxygen demand (BOD)	Not applicable
Chemical oxygen demand (COD)	Not applicable
ThOD	Not applicable
BOD (% of ThOD)	Not applicable

12.3. Bioaccumulative potential

Sulfuric Acid, 96% w/w (7664-93-9)	
Log Pow	-2.20 (Estimated value)
Bioaccumulative potential	Bioaccumulation: not applicable.

12.4. Mobility in soil

No additional information available

12.5. Other adverse effects

No additional information available

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Waste disposal recommendations : Remove waste in accordance with local and/or national regulations. Recycle/reuse. Remove for physico-chemical/biological treatment. Remove to an authorized dump (Class I). Treat using the best available techniques before discharge into drains or the aquatic environment. Use appropriate containment to avoid environmental contamination.

Additional information : LWCA (the Netherlands): KGA category 01. Hazardous waste according to Directive 2008/98/EC.

Ecology - waste materials : Avoid release to the environment.

SECTION 14: Transport information

In accordance with DOT

14.1. UN number

UN-No.(DOT) : 1830

DOT NA no. UN1830

14.2. UN proper shipping name

DOT Proper Shipping Name : Sulfuric acid
with more than 51 percent acid

Department of Transportation (DOT) Hazard Classes : 8 - Class 8 - Corrosive material 49 CFR 173.136

Hazard labels (DOT) : 8 - Corrosive substances

Packing group (DOT) : II - Medium Danger

DOT Special Provisions (49 CFR 172.102) : A3 - For combination packagings, if glass inner packagings (including ampoules) are used, they must be packed with absorbent material in tightly closed metal receptacles before packing in outer packagings.
A7 - Steel packagings must be corrosion-resistant or have protection against corrosion.
B3 - MC 300, MC 301, MC 302, MC 303, MC 305, and MC 306 and DOT 406 cargo tanks and DOT 57 portable tanks are not authorized.
B83 - Bottom outlets are prohibited on tank car tanks transporting sulfuric acid in concentrations over 65.25 percent.
B84 - Packagings must be protected with non-metallic linings impervious to the lading or have a suitable corrosion allowance for sulfuric acid or spent sulfuric acid in concentration up to 65.25 percent.
IB2 - Authorized IBCs: Metal (31A, 31B and 31N); Rigid plastics (31H1 and 31H2); Composite (31HZ1). Additional Requirement: Only liquids with a vapor pressure less than or equal to 110 kPa at 50 C (1.1 bar at 122 F), or 130 kPa at 55 C (1.3 bar at 131 F) are authorized.
N34 - Aluminum construction materials are not authorized for any part of a packaging which is normally in contact with the hazardous material.
T8 - 4 178.274(d)(2) Normal..... Prohibited
TP2 - a. The maximum degree of filling must not exceed the degree of filling determined by the following: Degree of filling = 95 / (1 + a (tr - tf)) Where: tr is the maximum mean bulk temperature during transport, tf is the temperature in degrees celsius of the liquid during filling, and is the mean coefficient of cubical expansion of the liquid between the mean temperature of the liquid during filling (tf) and the maximum mean bulk temperature during transportation (tr) both in degrees celsius. b. For liquids transported under ambient conditions may be calculated using the formula: a = (d15 - d50) / 35*d50 Where: d15 and d50 are the densities (in units of mass per unit volume) of the liquid at 15 C (59 F) and 50 C (122 F), respectively.
TP12 - This material is considered highly corrosive to steel.

DOT Packaging Exceptions (49 CFR 173.xxx) : 154

DOT Packaging Non Bulk (49 CFR 173.xxx) : 202

DOT Packaging Bulk (49 CFR 173.xxx) : 242

14.3. Additional information

Other information : No supplementary information available.

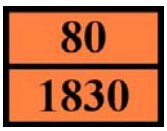
State during transport (ADR-RID) : as liquid.

Overland transport

Packing group (ADR) : II

Class (ADR)	:	8 - Corrosive substances
Hazard identification number (Kemler No.)	:	80
Classification code (ADR)	:	C1
Danger labels (ADR)	:	8 - Corrosive substances

Orange plates :



Tunnel restriction code : E

Transport by sea

DOT Vessel Stowage Location	:	C - The material must be stowed ‘‘on deck only’’ on a cargo vessel and on a passenger vessel.
DOT Vessel Stowage Other	:	14 - For metal drums, stowage permitted under deck on cargo vessels
EmS-No. (1)	:	F-A
EmS-No. (2)	:	S-B

Air transport

DOT Quantity Limitations Passenger aircraft/rail (49 CFR 173.27)	:	1 L
DOT Quantity Limitations Cargo aircraft only (49 CFR 175.75)	:	30 L

SECTION 15: Regulatory information

15.1. US Federal regulations

Sulfuric Acid, 96% w/w (7664-93-9)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory	
RQ (Reportable quantity, section 304 of EPA's List of Lists) :	1000 lb
SARA Section 311/312 Hazard Classes	Immediate (acute) health hazard

15.2. International regulations

CANADA

Sulfuric Acid, 96% w/w (7664-93-9)	
Listed on the Canadian DSL (Domestic Sustances List) inventory.	
WHMIS Classification	Class E - Corrosive Material

EU-Regulations

No additional information available

Classification according to Regulation (EC) No. 1272/2008 [CLP]

Skin Corr. 1A H314

Full text of H-phrases: see section 16

Classification according to Directive 67/548/EEC or 1999/45/EC

C; R35

Full text of R-phrases: see section 16

15.2.2. National regulations

Sulfuric Acid, 96% w/w (7664-93-9)
Listed on the Canadian Ingredient Disclosure List

15.3. US State regulations

No additional information available

SECTION 16: Other information

Full text of H-phrases: see section 16:

Eye Dam. 1	Serious eye damage/eye irritation, Category 1
Skin Corr. 1A	Skin corrosion/irritation, Category 1A
H314	Causes severe skin burns and eye damage
H318	Causes serious eye damage

NFPA health hazard : 3 - Short exposure could cause serious temporary or residual injury even though prompt medical attention was given.

NFPA fire hazard : 0 - Materials that will not burn.

NFPA reactivity : 2 - Normally unstable and readily undergo violent decomposition but do not detonate. Also: may react violently with water or may form potentially explosive mixtures with water.

NFPA specific hazard : W - Unusual reactivity with water. This indicates a potential hazard using water to fight a fire involving this material. When a compound is both water-reactive and an oxidizer, the W/bar symbol should go in this quadrant and the OX warning is placed immediately below the NFPA diamond.

HMIS III Rating

Health : 3 Serious Hazard - Major injury likely unless prompt action is taken and medical treatment is given

Flammability : 0 Minimal Hazard

Physical : 2 Moderate Hazard

Personal Protection : H

SDS US (GHS HazCom 2012)

Information in this SDS is from available published sources and is believed to be accurate. No warranty, express or implied, is made and LabChem Inc assumes no liability resulting from the use of this SDS. The user must determine suitability of this information for his application.

APPENDIX F

SITE SAFETY ORIENTATION FORM

SITE SAFETY ORIENTATION

Project: Review Avenue Development Sites Site: RAD I and RAD II

Project Number: Date:

All applicable items listed below are to be reviewed on the first day of site activities and when new workers arrive on site. Training provider, please initial each item covered in the training, or note "NA" as applicable.

General Supervisor: .....

Site Health and Safety Supervisor (SHSS): .....

Employees' direct supervisor: .....

Location of HASP and MSDS on site: .....

Review of Contents of HASP: .....

HAZCOM labeling system if different from Local Operation: .....

Site-specific medical surveillance requirements: .....

Site control measures (location of exclusion zone, etc.): .....

Safety and health hazards on site: .....

The Level of Protection and specific PPE to be used: .....

Work practices to be used on site to minimize exposure: .....

Decontamination procedures: .....

How to effectively use site/task engineering controls: .....

Applicable elements of the site emergency response plan: .....

Any other site-specific health and safety related requirements: .....

Verify that workers have provided documentation of training and medical monitoring as identified Table 3-1.

Participating employees must print and sign their name in the spaces provided below:

APPENDIX G

DAILY TAILGATE SAFETY MEETING CHECKLIST

AMEC FOSTER WHEELER ENVIRONMENT & INFRASTRUCTURE

DAILY TAILGATE SAFETY MEETING CHECKLIST

Project:	Review Avenue Development Sites	Site:	RAD I and RAD II
Date:		Location:	Long Island City, Queens, NY

To be reviewed on the first day of site activities and when new workers arrive on site:

Alternate for Health & Safety:	
Location of on-site HASP:	
Site training requirements:	See HASP
Specific medical surveillance requirements:	See HASP

Agenda:

During the project, one or more of the agenda items could be selected for the required daily site training.

		Date						
		__	__	__	__	__	__	__
		Check-off:						
1.	Planned work for this day (discuss – include review of applicable JHAs)	☐	☐	☐	☐	☐	☐	☐
2.	Physical hazards and controls (discuss/review)	☐	☐	☐	☐	☐	☐	☐
3.	Chemical hazards and controls (discuss/review)	☐	☐	☐	☐	☐	☐	☐
4.	Biological hazards and controls (discuss/review)	☐	☐	☐	☐	☐	☐	☐
5.	Personal protective equipment Modified D	☐	☐	☐	☐	☐	☐	☐
6.	Personal protective equipment required per the hazard assessment in JHA:	☐	☐	☐	☐	☐	☐	☐

SPECIFY TYPE	
Protective coveralls	
Safety glasses/goggles	ANSI approved
Hard hat	ANSI approved
Foot protection	Safety toe boots & overboots
Work gloves	
Chemical gloves	Neoproene outer, nitrile inner
Hearing protection	
Other	

7.	Review inspection, decon, and maintenance procedures and the limitations of the above stated PPE.	☐	☐	☐	☐	☐	☐	☐
8.	Decontamination procedure (discuss/review)	☐	☐	☐	☐	☐	☐	☐
9.	Exclusion zone maintained	☐	☐	☐	☐	☐	☐	☐
10.	Site emergency response plan (discuss/review)	☐	☐	☐	☐	☐	☐	☐
11.	Signs and symptoms of overexposure to chemicals anticipated on site	☐	☐	☐	☐	☐	☐	☐
12.	General health and safety rules	☐	☐	☐	☐	☐	☐	☐
13.	Specific health and safety requirements relating to site activities including: (discuss/review)	☐	☐	☐	☐	☐	☐	☐
14.	Drilling/boring	☐	☐	☐	☐	☐	☐	☐
15.	UST	☐	☐	☐	☐	☐	☐	☐
16.	Excavations (including UG utility locations)	☐	☐	☐	☐	☐	☐	☐
17.	Heavy equipment	☐	☐	☐	☐	☐	☐	☐
18.	Slips, trips, and falls	☐	☐	☐	☐	☐	☐	☐
19.	Lockout/tagout	☐	☐	☐	☐	☐	☐	☐
20.	Working in temperature extremes	☐	☐	☐	☐	☐	☐	☐
21.	Rain or other weather advisories	☐	☐	☐	☐	☐	☐	☐
22.	Other health & safety issues (discuss/note)	☐	☐	☐	☐	☐	☐	☐
23.	Issued Daily Work Permit	☐	☐	☐	☐	☐	☐	☐

AMEC FOSTER WHEELER ENVIRONMENT & INFRASTRUCTURE

DAILY TAILGATE SAFETY MEETING CHECKLIST

I have participated in the daily safety meeting discussing the topics indicated on the reverse and fully understand my responsibility for complying with all health and safety requirements. I have had the opportunity to have my questions on site health and safety issues and procedures answered.

Employee Name	Employee Signature	Date

Name and Signature of person conducting training

Date

APPENDIX H

WEEKLY HEALTH AND SAFETY CHECKLIST

WEEKLY SITE SAFETY AND HEALTH CHECKLIST

Site: _____ **Date:** _____

Project Number: _____ **Project Manager:** _____

Conducted by: _____

Names of Amec Foster Wheeler employee's onsite: _____

	Y	N	NA
HASP, Training and Documentation:			
1. Are emergency phone numbers posted?	☐	☐	☐
2. Are directions to the nearest emergency medical care posted?	☐	☐	☐
3. Is the OSHA Poster posted?	☐	☐	☐
4. Is there a SSHP at the site?	☐	☐	☐
a. Is it current and address all tasks?	☐	☐	☐
b. Does it address all know/suspected hazards?	☐	☐	☐
c. Are JHAs included for all tasks?	☐	☐	☐
d. Are employees following the procedures as outlined in the JHAs?	☐	☐	☐
e. Is it approved?	☐	☐	☐
f. Have all field members signed off that they have read it?	☐	☐	☐
5. Are there MSDSs for required materials/chemicals brought to the site?	☐	☐	☐
6. Are all containers properly labeled, as to content, hazard?	☐	☐	☐
7. Is there list of chemicals brought to the site? Do the names on the list match the name on the label and MSDS?	☐	☐	☐
8. Do applicable workers have their 40-hour initial training and are current in their refreshers?	☐	☐	☐
9. Do the Field Lead and Health and Safety Officer have Supervisory training?	☐	☐	☐
10. Are all applicable workers current in their physicals?	☐	☐	☐
11. Are Tailgate Safety Meetings taking place and documented?	☐	☐	☐
12. Are there means to minimize heat or cold stress on-site?	☐	☐	☐
13. Is eating, drinking, smoking, etc. only done in areas free from toxic materials?	☐	☐	☐
14. Are two people used to lift equipment or materials weighting more than 50 lbs.?	☐	☐	☐
15. Are the locations of electrical power lines and other utilities identified prior to digging or drilling?	☐	☐	☐
PPE and Monitoring Instruments:			
16. Does the PPE being worn match what is required in the HASP and JHAs?	☐	☐	☐
17. Is hearing protection worn when noise makes conversation difficult at a distance of 2 feet?	☐	☐	☐
18. Are approved respirators and cartridges worn when needed?	☐	☐	☐
a. Are cartridges changed daily, unless specified otherwise in the HASP?	☐	☐	☐
b. Are cartridges appropriate for the contaminants at the site?	☐	☐	☐
19. Are all air monitoring instruments identified in the HASP being used and calibrated daily, as required?	☐	☐	☐
a. Do employees know upgrade/downgrade action levels?	☐	☐	☐
First Aid:			
20. Are there eyewash bottles on-site? Solution not expired?	☐	☐	☐
21. Are first aid kits on-site and adequately stocked (including bloodborne pathogen equipment)?	☐	☐	☐
22. Is there always at least one person on site current in their first aid/CPR training?	☐	☐	☐
Fire Safety:			
23. Is there a charged fire extinguisher on-site?	☐	☐	☐
a. Have Amec Foster Wheeler workers, who would use extinguishers, received fire extinguisher training in past year?	☐	☐	☐
b. Are fire extinguishers visually inspected monthly and are the inspections documented?	☐	☐	☐
c. Have fire extinguishers been professionally inspected within the past year?	☐	☐	☐
24. Are flammable liquids (e.g., gasoline) being stored safety (e.g., in safety cans and 20 feet from combustibles)?	☐	☐	☐
25. Are flammable liquid dispensing systems bonded (metal to metal)?	☐	☐	☐
Compressed Gas:			
26. Are cylinders stored in a secure manner, with caps on, upright and protected from damage?	☐	☐	☐
27. Are cylinders protected from snow, rain, etc.?	☐	☐	☐
28. Are cylinder caps in place before cylinders are moved?	☐	☐	☐
29. Are fuel gas and oxygen cylinders stored a minimum of 20 feet apart?	☐	☐	☐
30. Are propane cylinders stored and used only outside of buildings?	☐	☐	☐

WEEKLY SITE SAFETY AND HEALTH CHECKLIST

	Y	N	NA
Vehicles:			
31. Are employees wearing their seat belts and not talking on cell phones while car is in motion?	☐	☐	☐
32. Do Company vehicles have the "How's my Driving" decals?	☐	☐	☐
33. Are vehicles parked in a safe manner? Are traffic cones used, if required?	☐	☐	☐
34. Are company vehicle inspected weekly and the inspections documented?	☐	☐	☐
35. Are materials stored in vehicles in a neat, orderly and secure manner so that they won't become a distraction to the driver, become a projectile hazard in the event of a sudden stop or crash or fall from the vehicle when in transport?	☐	☐	☐
Electrical:			
36. Is at least a 10 foot clearance maintained between equipment and power lines?	☐	☐	☐
37. Are all electrically operated tools grounded?	☐	☐	☐
38. Are GFCI's used?	☐	☐	☐
39. Are exposed wiring and cords in good condition (not frayed or deteriorated)?	☐	☐	☐
40. Do extension cords have a grounding conductor?	☐	☐	☐
41. Are extension cords only used in one continuous length (not daisy chained)?	☐	☐	☐
42. Are extension cords kept out of wet areas?	☐	☐	☐
43. Has a lockout/tagout system been established, if required?	☐	☐	☐
Hand and Power Tools:			
44. Are tools and equipment used by employees in good condition or tagged out of service?	☐	☐	☐
45. Are guards and safety devices in place on power tools?	☐	☐	☐
Walking and Working Surfaces:			
46. Do stairways into trailers/buildings that have 4 steps or more, have hand rails?	☐	☐	☐
47. Is good housekeeping being maintained at the site?	☐	☐	☐
48. Are all ladders in good condition, stored against damage and properly secured when in use?	☐	☐	☐
49. Are approved manlifts provided for the lifting of personnel (e.g., cherry pickers, scissor lifts, etc.)?	☐	☐	☐
50. Are personnel in manlifts wearing approved fall protection devices when required?	☐	☐	☐
51. Is fall protection used when working at elevations greater than 6 feet?	☐	☐	☐
52. Are ladders inspected prior to use?	☐	☐	☐
53. Are all ladders in good condition and defective ladders tagged out of service?	☐	☐	☐
Scaffolding:			
54. Is scaffolding placed on a flat, firm surface?	☐	☐	☐
55. Are scaffold planks free of mud, ice, grease, etc.?	☐	☐	☐
56. On scaffolds where platforms are overlapped, is planking overlapped a minimum of 12 inches?	☐	☐	☐
57. Does scaffold planking extend over end supports between 6 to 18 inches (dependent upon platform length)?	☐	☐	☐
58. Are employees restricted from working on scaffolds during storms and high winds?	☐	☐	☐
59. Is required perimeter guarding (top rail, mid rail, and toe board) present?	☐	☐	☐
60. Has a competent person been designated to oversee scaffold construction and inspect daily?	☐	☐	☐
Excavations:			
61. Has entrance into excavations greater than 4 feet deep prohibited unless the following precautions are taken?	☐	☐	☐
a. The sides of excavations sloped or shored to prevent cave ins if over 5 feet deep?	☐	☐	☐
b. Excavations greater than 4 feet deep been monitored for hazardous atmospheres (i.e., LEL/O2)?	☐	☐	☐
c. Ladders or ramps used in excavations over 4 feet deep?	☐	☐	☐
d. Means of egress available so as to require no more than 25 feet of lateral travel?	☐	☐	☐
e. Excavation inspected daily by competent persons and documented?	☐	☐	☐
62. Is excavated material placed a minimum of 24 inches from the excavation?	☐	☐	☐
Heavy Equipment:			
63. Is heavy equipment shut down for fueling and maintenance?	☐	☐	☐
64. Are backup alarms installed and working on mobile equipment?	☐	☐	☐
65. Are riders prohibited on heavy equipment?	☐	☐	☐
66. Are guards and safety appliances in place and used?	☐	☐	☐
67. Are operators using the "three point" system when mounting/dismounting equipment?	☐	☐	☐
Confined Space Entry:			
68. Are there confined spaces at the site that AMEC will be entering? If yes:	☐	☐	☐
a. Is the permit completely filled out and approved prior to entry?	☐	☐	☐
b. Are confined spaces thoroughly emptied of the hazardous substances prior to entry?	☐	☐	☐
c. Is ventilation provided prior to entry?	☐	☐	☐

		Y	N	NA
d.	Is air within the confined space tested for oxygen deficiency, LEL and toxic substances in that order?	☐	☐	☐
e.	Is there an assigned safety standby outside the space who is adequately trained?	☐	☐	☐
f.	Has a rescue plan been established?	☐	☐	☐
g.	Is an entry supervisor present at each permit-required entry?	☐	☐	☐
h.	Are required extraction/fall protection devices being used?	☐	☐	☐
Decontamination:				
69.	Are decontamination stations set up on site?	☐	☐	☐
70.	Is decontamination water properly contained and disposed of?	☐	☐	☐
71.	Are all pieces of equipment inspected for proper decontamination before leaving the site?	☐	☐	☐
Working on or Near Water:				
72.	Has a float plan been filed if working from a boat?	☐	☐	☐
73.	Are personal floatation devices available and being used?	☐	☐	☐
74.	Are Coast Guard requirements being followed when boating on navigable waters?	☐	☐	☐

Notes

Findings	Corrected on
1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
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