



**ENVIRONMENTAL
RESTORATION, LLC**

**US EPA REGION 8
CONTRACT NUMBER 68HE0820D0002
SITE HEALTH AND SAFETY PLAN
HOLLADAY MERCURY RESPONSE**

**SITE HEALTH AND SAFETY PLAN
EMERGENCY AND RAPID RESPONSE SERVICES**

**Holladay Mercury Response
Holladay, UT**

Prepared for

**U.S. Environmental Protection Agency – Region 8
1595 Wynkoop Street
Denver, CO 80202-1129**

**Contract No.: 68HE0820D0002
Task Order: TBD
Project No: 8-HOLL**

April 23, 2024



**Environmental Restoration LLC
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Fenton, MO 63026
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SITE HEALTH AND SAFETY PLAN

EMERGENCY AND RAPID RESPONSE SERVICES

Holladay Mercury Response

The enclosed Site Health and Safety Plan, shown and marked in this submittal, has been prepared in accordance with OSHA 29 CFR 1910 and 29 CFR 1926; and is proposed to be incorporated with Job Number 8-SGMS:

This Site Health and Safety Plan is submitted for Government review and acknowledgement.

I accept this Health and Safety Plan. It provides for the health and safety of persons who will or may be affected by on-site operations.

John Walters
Response Manager
Environmental Restoration LLC

Date

314.347.9159
Phone Number

Tim Mosher
PHSM Environmental Restoration LLC

Date

314.347.9823
Phone Number

Taylor Bowker
USEPA Region 8

Date

303.868.0090
Phone Number



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ATTACHMENTS

ATTACHMENT A	SITE HEALTH AND SAFETY PLAN AMENDMENTS
ATTACHMENT B	SITE MAPS
ATTACHMENT C	CHEMICAL INVENTORY LIST / SDSs
ATTACHMENT Z	SITE SPECIFIC TRAINING RECORD



1. ORGANIZATIONAL STRUCTURE

The following personnel are designated to carry out the stated job functions on site. (Note: one person may carry out more than one job function.)

Project/Task Order:	
Key Personnel	
Names and Titles	Contact Information
USEPA OSC: Taylor Bowker	Mobile: 303.868.0090 Email: bowker.tayler@epa.gov
ER Response Manager / HSO: John Walters	Mobile: 314.347.9159 Email: j.walters@erllc.com
ER Field Team Members:	
1.	
2.	
3.	
4.	
Project HS Manager – Tim Mosher	Mobile: 314.347.9823 Email: t.mosher@erllc.com

The Environmental Restoration LLC (ER) Response Manager (RM) has responsibility and authority to direct all work operations. The RM coordinates safety and health functions with the Site Health and Safety Officer HSO has the authority to oversee and monitor the performance of the HSO, and bears ultimate responsibility for the proper implementation of this HASP. The specific duties of the RM are:

Preparing and coordinating the site work plan; providing site supervisor(s) with work assignments and overseeing their performance; coordinating safety and health efforts with the HSO; serving as primary site liaison with public agencies and officials and site contractors.

The ER HSO has full responsibility and authority to develop and implement this HASP and to verify compliance. The HSO reports to the RM. The HSO is on site or readily accessible to the site during all work operations and has the authority to halt site work if unsafe conditions are detected. The specific responsibilities of the HSO are:

Managing the safety and health functions on this site; serving as the site's point of contact for safety and health matters; ensuring site monitoring, worker training, and effective selection and use of PPE; assessing site conditions for unsafe acts and conditions and providing corrective action; assisting the preparation and review of this HASP; maintaining effective safety and health records as described in this HASP; coordinating with the Site Supervisor(s), and others as necessary for safety and health efforts.

The ER Site Supervisor is responsible for field operations and reports to the RM. The Site Supervisor ensures the implementation of the HASP requirements and procedures in the field. The specific responsibilities of the Site Supervisor are:

Executing the work plan and schedule as detailed by the RM; coordination with the Site HSO on safety and health; ensuring site work compliance with the requirements of this HASP.

ER site workers are responsible for complying with this HASP, using the proper PPE, reporting unsafe acts and conditions, and following the work and safety and health instructions of the RM, HSO, and Site Supervisor.

All activities on site must be cleared through the RM.



1. SITE CHARACTERIZATION & ACTIVITY HAZARD ANALYSIS

a. Site Description:

Site: Holladay Mercury Response

Address: 2284 E 6200 S, Holladay, UT

History: Single-family residence impacted by mercury spilled. Mercury source is considered unknown source found in the house.

b. Job Objective/s & Tasks at each location:

- i. Mobilize to site
- ii. Site Preparation
- iii. Site Remediation/Decontamination
- iv. Arrange Transportation and Disposal
- v. Demobilize

c. Site Hazard Identification

Chemical(s)	Elemental Mercury (Hg)	Hg Cleaning Solution	Gasoline
	Diesel	Propane	Kerosene
	Epoxy	Paint	

Physical Hazards: (check all that apply)

Heavy Equipment		Biological Agent	
Confined Space		Heat	X
Flammability	X	Cold	X
Reactivity		Drums	X
Topography		Oxygen Deficiency	
Electrical	X	Corrosivity	X
Noise	X	Altitude	
Radiation		Wildlife	
Ergonomic	X	Drilling	
Excavation		Other	

d. Activity Hazard Analysis

HAZARD	SOURCE	PREVENTION
Electrical	Outlets, extension cords, breaker boxes, etc...	Crews shall utilize GFCI equipped outlets or adapters. Crews shall not overload outlets
Slips, Trips, Falls	Irregular Surfaces, Extension Cords, Equipment, Wet Floors	Site orientation, Barricades, Tape Extension cords to floor where possible
Back injuries/improper lifting and support	Merc-Vac, Drums, Generator, Fans, Neg-Air Machine, Household Items	Use lifting aids, 2 or more persons if > 50 lbs ,Proper equipment/material support
Head, eye, body, or foot injury/struck by objects	Response Equipment, household items	Site orientation, Proper PPE



HAZARD	SOURCE	PREVENTION
Inhalation or contact with hazardous chemicals	See listed chemical hazards.	Review SDS's, Site orientation, PPE, Site Control
Flammable	Propane, Gasoline, Diesel, Kerosene, Torpedo Heaters, Fueling Operations, Epoxy Painting	Fueling operations shall be conducted in well ventilated areas. No equipment shall be fueled while in operation. Properly secure all propane connections. Enclosed areas must be well ventilated during painting operations.
Overhead Work / Falling	Ladder, Use of improper equipment.	Use ladder for all overhead work, Ladder inspection, Proper placement, secure ladder
Heat Stress	Heating & Venting	Personnel should minimize entry time during heating & venting operations
Cold Stress	Ambient Air Temperatures	Wear clean and dry clothing loose in layers. Avoid overheating. Set up or designate warming areas. Do not sit in a running vehicle without a window open at least 1.5 inches.
Vehicle Accidents	Winter Driving	Maintain a speed consistent with prevailing conditions. Double normal intervals while traveling. Use tire chains if needed. Carry emergency equipment for getting unstuck.

e. Chemical Hazards

NAME	TLV/PEL	ROUTES OF EXPOSURE	SIGNS OF EXPOSURE	FIRST AID
(Hg) Mercury	0.025 mg/m ³ 0.1 mg/m ³	Inhalation Absorption Ingestion Injection	Irritation eyes, skin; cough, chest pain, Dyspnea (breathing difficulty), Bronchitis Pneumonitis; tremor, Insomnia, Irritability, indecision, Headache, Fatigue, Weakness; stomatitis, Salivation; Gastrointestinal Disturbance, Anorexia, Weight loss; Proteinuria	Get medical attention immediately.
Hg Cleaning Solution	n/a	Inhalation Absorption Ingestion Injection	Eyes: Tearing, redness, blurred vision. Skin: Dryness, redness, chapping Inhalation: Difficulty breathing, nausea, vomiting, upset stomach.	Eyes: Flush 15 min Skin: Soap & water Inhalation: Move to fresh air Ingestion: DO NOT induce vomiting, seek medical attention
Diesel Fuel	100 mg/m ³	Inhalation Absorption Ingestion Injection	Effects of overexposure may include irritation of the nose and throat, irritation of the digestive tract, nausea, diarrhea, and transient excitation followed by signs of nervous system depression (e.g. headache, drowsiness, dizziness, loss of coordination, disorientation and fatigue).	Eyes: Flush 15 min Skin: Soap & water Inhalation: Move to fresh air Ingestion: DO NOT induce vomiting, seek medical attention



NAME	TLV/PEL	ROUTES OF EXPOSURE	SIGNS OF EXPOSURE	FIRST AID
Gasoline	300 ppm	Inhalation Absorption Ingestion Injection	Effects of overexposure may include irritation of the nose and throat, irritation of the digestive tract, nausea, diarrhea, and transient excitation followed by signs of nervous system depression (e.g. headache, drowsiness, dizziness, loss of coordination, disorientation and fatigue).	Eyes: Flush 15 min Skin: Soap & water Inhalation: Move to fresh air Ingestion: DO NOT induce vomiting, seek medical attention
Propane	1000 ppm	Inhalation Skin Contact Eye Contact	Simple hydrocarbons can irritate the eyes, mucous membranes, and respiratory system at high concentrations. Inhalation of high concentrations can cause dizziness, disorientation, incoordination, narcosis, nausea, and narcotic effects. May displace oxygen; maintain oxygen levels about 19.5%.	Prompt medical attention needed for overexposure. Conscious personnel should be move to fresh-air; unconscious personnel should be moved to fresh-air and assisted with supplemental oxygen.
Kerosene	100 mg/m3	Inhalation Ingestion Injection	Effects of overexposure may include irritation of the nose and throat, irritation of the digestive tract, nausea, diarrhea, and transient excitation followed by signs of nervous system depression (e.g. headache, drowsiness, dizziness, loss of coordination, disorientation and fatigue).	Eyes: Flush 15 min Skin: Soap & water Inhalation: Move to fresh air Ingestion: DO NOT induce vomiting, seek medical attention
Epoxy Paint	NE	Inhalation Ingestion Injection	Compound is slightly irritating to the skin with repeated exposure. High vapor concentrations may be irritating to the nose, throat, and respiratory tract and may cause central nervous system depression. Ingestion of product may result in vomiting; aspiration (breathing) of vomits into the lungs must be avoided as even small quantities may result in aspiration Pneumonitis. Considered moderately toxic and may be harmful if swallowed.	Flush eyes with large amounts of water until irritation subsides. Keep eyelids apart. Wash within 1 minute of contact for maximum results. Obtain medical attention. Remove contaminated clothing/shoes. Wipe excess from skin and wash skin with soap and water. Do not reuse clothing until it is cleaned. Remove victim to fresh air and provide oxygen if breathing is difficult. Administer artificial respiration if breathing has stopped. Seek medical attention. Do not give liquids if victim is unconscious or very drowsy.

1. SITE CONTROL

This site control program is designed to reduce the spread of hazardous substances from contaminated areas to clean areas, to identify and isolate contaminated areas of the site, to facilitate emergency evacuation and medical care, to prevent unauthorized entry to the site, and to deter vandalism and theft.

The site control program includes the elements specified in 29 CFR 1910.120(d) and provides the following site-specific information:

- a site map, indicating site perimeter and work zones
- site access procedures
- site security
- site work zones including standard operating procedures



- use of the buddy system
- both internal (on-site) and external communications

a. Site Map

See Attachment B.

b. Site Access

Access to this site is restricted to reduce the potential for exposure to its safety and health hazards. During hours of site operation, site entry and exit is authorized only at the point(s) identified on the site map in Attachment B. Entry and exit at these points is monitored by the ER RM.

Visitors to the site register with the ER RM and are escorted at all times. Visitors are expected to comply with the requirements of this HASP. Visitors who want to enter contaminated areas of the site must provide documentation that they have the required training and medical evaluation and must receive a site-specific briefing about protecting themselves from site hazards, recognizing site zones demarcations, and following emergency evacuation procedures prior to entry. PPE for visitors is provided by the ER PM.

c. Site Work Zones

Control boundaries have been established, and the Exclusion Zone (EZ), Contamination Reduction Zone (CRZ), and Support Zone (SZ) have been identified and designated. These boundaries are identified as follows (marking of zones, i.e., red boundary tape - hotline; traffic cones - Support Zone; etc.) All personnel on-site must sign in/out with designated ER representative/s.

EZ location:	As Designated by RMs based on site layout
CRZ location:	As Designated by RMs based on site layout
SZ location:	As Designated by RMs based on site layout

d. Buddy System

While working in the EZ, site workers use the buddy system. The buddy system means that personnel work in pairs and stay in close visual contact to be able to observe one another and summon rapid assistance in case of an emergency. The responsibilities of workers using the buddy system include:

- remaining in close visual contact with partner,
- observing partner for signs of heat stress or other difficulties,
- periodically checking the integrity of partner's PPE, and
- notifying the supervisor or other site personnel if emergency assistance is needed.

e. Site Communications

3 Horn blasts is the emergency signal to indicate that all personnel should leave the Exclusion Zone.

The following standard hand signals will be used in case of failure of radio communications:

Hand gripping throat	Out of air, can't breathe
Hands on top of head	Need Assistance
Thumbs up	OK, I am all right, I understand
Thumbs down	No, negative



Telephone communication to the Command Post/Response Manager via cellular phone should be established as soon as practical. Site Cell phone number is 314.347.9159

2. TRAINING PROGRAM

The site training program is designed to ensure that workers receive the training they need to work safely. Site safety and health training requirements are based on the job hazard assessments contained in Chapter 2 of this HASP and relevant OSHA requirements.

At this site the ER RM oversees the implementation of this training program and is responsible for ensuring that employees are adequately and currently trained for all tasks they are asked to perform. Employees who have not been trained to a level required by their job function and responsibility are not permitted to participate in or supervise field activities.

This training program is consistent with the requirements of 29 CFR 1910.120(e) and (q)(11) and addresses the following site-specific information:

Personnel at this site have successfully completed 40-hour initial HAZWOPER training consistent with the requirements of 29 CFR 1910.120(e)(3)(i), or have received equivalent training consistent with the provisions of 29 CFR 1910.120(e)(9), in order to work in contaminated areas. In addition, such personnel have received 3 days of supervised field experience applicable to this site.

The initial training provided to these workers addresses:

Regulatory Compliance (OSHA, EPA, DOT)
Toxicology
Flammables
Corrosives Reactions
Respiratory Protection
Protective Clothing
Environmental Monitoring
Site Safety Plans
Contingency Plans

Noise Stress
Heat/Cold Stress
Ionizing Radiation
Drum Handling
Confined Space
Decontamination
Medical Surveillance
Hazard Communication
OSHA Regulated Substances

a. Site Specific Briefing for Visitors and Workers

A site-specific briefing is provided to all individuals, including site visitors, who enter the site beyond the initial point of access.

For visitors, the site-specific briefing provides information about site hazards, the site lay-out including work zones and places of refuge, the emergency alarm system and emergency evacuation procedures, and other pertinent safety and health requirements as appropriate.

b. Training Certifications

This site maintains written certification of the successful completion of applicable training requirements for all personnel. Training records are maintained up-to-date and are retained onsite.

Employees and supervisors receive a written certificate when they complete necessary training and field experience. Any person who has not been so certified or who does not meet the requirements of equivalent training is prohibited from engaging in the clean-up operations on this site.



3. MEDICAL SURVEILLANCE

The medical surveillance section of the HASP describes how worker health status is monitored at this site. Medical surveillance is used when there is the potential for worker exposure to harmful levels of hazardous substances. The purpose of a medical surveillance program is to medically monitor worker health to ensure that personnel are not adversely affected by site hazards. The provisions for medical surveillance at this site are based on the site characterization and job hazard analysis found in Chapter 2 of this HASP. They are consistent with OSHA requirements in 29 CFR 1910.120(f)

The medical surveillance program addresses the following information:

- provisions of the site medical surveillance program
- communication between the site, physicians, and workers
- medical record keeping procedures

a. Site Medical Surveillance Program

A medical surveillance program is implemented at this site based on the potential for employee exposure to levels of hazardous substances or health hazards in excess of the PEL or other published exposure limits, the use of respiratory protection, and/or the assignment of workers to a HAZMAT team.

Medical surveillance requirements are based on a worker's potential for exposure as determined by the site characterization and job hazard analysis documented in Chapter 2 of this HASP and as required by 29 CFR 1910.120(f)(2)

All personnel who enter contaminated areas of this site are covered by the medical surveillance program. In addition, all workers assigned to tasks requiring the use of respirators receive medical evaluations in accordance with 29 CFR 1910.134(e) to ensure they are physically capable to perform the work and use the equipment.

b. Corporate Medical Surveillance Program

Pre-employment and periodic update medical examinations are required by 29CFR 1910.120 for persons working at hazardous waste sites. The medical examination must have been within a 12-month period prior to on-site activity and repeated annually. A licensed physician issues a written opinion that the worker is fit-for-duty for hazardous waste site work and respirator wear. Workers are informed of their right to accessibility of medical records. The ER written Medical Surveillance Program is on file in the ER – St. Louis, MO office.

4. PERSONAL PROTECTIVE EQUIPMENT

This is the site Personal Protective Equipment (PPE) program. This chapter of the HASP describes how PPE is selected and used to protect workers from exposure to hazardous substances and hazardous conditions on this site. Exposure hazards from the decontamination process are considered.

a. PPE Selection Criteria

Site safety and health hazards are eliminated or reduced to the greatest extent possible through engineering controls and work practices. Where hazards are still present, a combination of engineering controls, work practices, and PPE are used to protect employees. An initial level of PPE is assigned to each task to provide an adequate barrier to exposure hazards. Initial PPE ensembles are selected based on the anticipated route(s) of entry of biological and chemical hazards and their concentration. Ensemble materials are selected using permeation data supplied by individual manufacturers. Materials providing the greatest duration of protection have been chosen. Tear and seam strength of the PPE are also considered to ensure ensemble durability while work is performed. When necessary, multiple layers of protection are used to accommodate the range of hazards that may be encountered. Where possible, employees are provided with a range of component sizes to ensure properly fitted PPE.



The following criteria are used in selecting PPE levels at this site.

Use of Level C Protection

Employees use Level C protection during tasks that have or potentially have the following characteristics: Level C protection should be used to protect against measured concentrations of known atmospheric contaminants for which an air-purifying respirator can be used and when liquid splashes or other direct contact with hazardous substances will not adversely affect employee health or be absorbed through any exposed skin.

Air purifying respirators (APR) can be used only when the contaminant(s) are known, cartridges/canisters exist, and concentrations are within the substance-specific standard guidelines or within the maximum use concentration (MUC) for the APR used. The MUC is calculated by multiplying the assigned protection factor (APF) by the exposure limit for the contaminant(s).

The NIOSH APF for ER's Honeywell 6500 full face APRs is 50.

In accordance with 29 CFR 1910.134(d)(3)(iii)(B)(2), a cartridge change schedule has been determined. Cartridges used with air-purifying respirators on this site are replaced when any of the following occurs:

- a NIOSH-approved end of service life indicator (ESLI) is activated
- at 12 hour intervals or end of shift
- inhalation is restricted

If warning properties (chemical odors, tastes or physical irritation) are noted, employees will immediately leave the work area and notify their site supervisor or the site safety and health officer.

Use of Level D Protection

Employee will use Level D protection during tasks that have the following characteristics: Level D protection may be used during tasks where the atmosphere contains no known hazard and work functions preclude splashes, immersion, or the potential for unexpected inhalation of or contact with hazardous levels of any biological or chemical substances.

b. Use of PPE

Site-specific PPE ensembles and materials are identified below. These ensembles are consistent with 29 CFR 1910.120. All PPE is used in accordance with manufacturers' recommendations

Based on evaluation of potential hazards, the following levels of personal protection have been designated for the applicable work areas or tasks:

Location	Job Task/s	Levels of Protection
EZ	Hg Handling Tasks	C
EZ	HgX Application, Painting, Restoration	Mod-D only after air monitoring has shown mercury vapor concentration consistently below .0125 Mg/M ³ (12,500 nanograms). If at any time the mercury vapor concentration peaks above .0125 Mg/M ³ crew SHALL exit and upgrade to full Level C PPE.
CRZ	Decontamination	D
SZ	Support EZ and CRZ Tasks	D

PPE Requirements



Level C	Tyvek 400 inner/ Tychem 2000 Outer	Level D / MOD - D	Standard Work Clothes w/ ER Issued HI Vis Vest (Tyvek 400 for MOD D)
	Full face APR w/Hg Vapor Cartridges		ANSI Protective Toed Boots Over Ankle
	CR 4 Rated Cut Resistant Outer Gloves / Nitrile Inner		CR 4 Rated Cut Resistant Work Glove
	ANSI Protective Toed Work Boot over ankle with Chemical Cover as necessary		ANSI Approved ER Issued Hard Hat
	ANSI Approved ER issued Hard Hat		ANSI Z87.1 Eye Protection
	Hearing Protection >80dBA		Hearing Protection >80 dBA)

5. ENVIRONMENTAL MONITORING

The following environmental monitoring instruments shall be used on site at the specified intervals.

Prior to daily entry, START shall conduct monitoring, using an Ohio Lumex, to establish the current level of contamination in areas designated by the RM. The RM shall verify that the instrument being used is in good working order including applicable calibration. If the RM requires confirmation monitoring during the work day, he will request that the OSC coordinate sampling with START.

a. Health Hazard Monitoring

Thermal stress monitoring: The expected air temperature will be less than 70° F. If it is determined that heat stress monitoring is required (mandatory if over 80-F) the following procedures shall be followed: (describe procedures in effect, i.e., monitoring body temperature, body weight, and pulse rate): Per ER HS-17 Heat Stress

6. DECONTAMINATION

The decontamination chapter of the HASP describes how personnel and equipment are decontaminated when they leave the Exclusion Zone. This chapter also describes how residual waste from decontamination processes is disposed. Decontamination procedures are designed to achieve an orderly, controlled removal or neutralization of contaminants that may accumulate on personnel or equipment. These procedures minimize worker contact with contaminants and protect against the transfer of contaminants outside designated work zones. They also extend the useful life of PPE by reducing the amount of time that contaminants contact and permeate PPE surfaces. The decontamination procedures described below are designed to meet the requirements of 1910.120(k) and include project-specific information about:

- the location and type of project decontamination facilities
- general and specific decontamination procedures for personnel and PPE
- general and specific decontamination procedures for equipment
- disposal of residual waste from decontamination
- decontamination equipment and solutions
- the monitoring procedures used to evaluate the effectiveness of decontamination

a. Decontamination Facilities

Decontamination is conducted in the contamination reduction zone (CRZ). The CRZ acts as a buffer between the exclusion zone (EX) and the support zone (SZ). The location and design of decontamination stations minimize the spread of contamination beyond these stations. Separate facilities are used for personnel and for equipment. The RM(s) shall designate and clearly mark the location of the CRZ at their individual sites included in the Task Order.



b. Decontamination Procedures for Equipment and Personnel

Decontamination procedures are designed for the level of PPE used. Project-specific procedures for personnel and PPE decontamination minimize the potential for hazardous skin or inhalation exposure, cross-contamination, and chemical incompatibilities.

Personnel and equipment leaving the Exclusion Zone shall be thoroughly decontaminated. The standard decontamination protocol shall be used with the following stations:

- Equipment Drop
- Outer Suit - Outer Cut Resistant Gloves – Outer Boots
- Respirator
- Inner Gloves

The decontamination station will be located immediately adjacent to the exclusion zone in CRZ.

Equipment decontamination will include:

- Dry Brush
- Hg Cleaning Solution Wash
- Rinse

7. EMERGENCY RESPONSE

It is essential that site personnel be prepared in the event of an emergency. Emergencies can take many forms; illnesses or injuries, chemical exposure, fires, explosions, spills, leaks, releases of harmful contaminants, or sudden changes in the weather. The following sections outline the general procedures for emergencies. Emergency information should be posted as appropriate.

a. Emergency Planning Maps

Attachment B provides a map of the site(s) with key on-site emergency planning information clearly marked. Emergency evacuation route(s), places of refuge, assembly point(s), and the locations of key site emergency equipment are identified on this map. Site zone boundaries are shown to alert responders to known areas of contamination. Major building features and any ventilation system design or operation features that could affect emergency response planning are also marked on this map. Attachment B includes a map with the route to the nearest emergency medical assistance.

The following lists the emergency call list and the project organization. This table must be available to the crew at all times. In case of an emergency, the crew must be transported to the designated medical center. The following table provides contacts for emergency situations.

Emergency Call List and Project Organization		
Service	Name/Organization	Phone
Fire/Police/Emergency Medical	Local Fire/Police/Ambulance	911
*Hospital		Phone #: Clinic Hours: 24/7/365
*Occupational Medical Clinic		Phone #: Clinic Hours: 24/7/365
Injury Access Care	1 Source	866-622-7348
COVID Line	ER HR	636-680-8152
ER Response Manager	John Walters	314.347.9159



ER Site Health and Safety Officer	John Walters	314.347.9159
ER Project HS Manager	Tim Mosher	314.347.9823

*Directions from site to hospital and clinic are located in Attachment B and will be posted in the project office and available in all ER vehicles.

b. Location of Emergency Equipment

First-aid equipment is available on site at the following locations:

Physician approved First-aid Kit RM Response Vehicle
Emergency eyewash RM Response Vehicle
Other _____

c. Emergency Procedures

Incident Reporting/Analysis

- All incidents, including personal injury and property damage, must be reported to the RM, Supervisor, or HSO **within 20 minutes of incident**.
- The RM will contact the Project Health and Safety Manager by telephone immediately. The RM, HSO, and effected employees will conduct an immediate analysis of the incident and document all results on the Incident and Analysis Report form.
- The Response Manager will assign a supervisory individual to accompany all injured personnel to the clinic and follow guidelines outlined in the ER Return to Work Program.
- Copies of all Incident and Analysis Reports will be sent to the ER Vice President, Health and Safety.

12.5 COVID – 19 / Flu-like Illness Reporting Protocol

ER has developed guidance on reporting COVID-19 / Flu-like Illness reporting. We will continue to monitor CDC guidelines and respond accordingly.

The CDC regarding the COVID-19 virus is the definitive source for COVID-19 information. The following measures are required and expected by all site personnel.

- We no longer require employees to call or email in symptoms to the COVID Hotline.
- Employees who are not feeling well shall stay home and communicate with their supervisors.
- Employees will continue following proper hygiene practices and avoid spreading germs.
- Managers shall send home sick employees, or tell them not to come in when feeling ill.
- If an employee does test positive for COVID-19, we request they isolate for 5 days before returning to work following CDC guidelines. Employees should not return if their symptoms are not improving and seek medical attention with their personal physician.
- Continue to use social distancing-staying 6 feet away from others
- Cough and sneeze into a tissue or your elbow
- If an employee believes they have been exposed to COVID-19, they should notify their supervisor, and monitor themselves for symptoms carefully. They do not need to isolate until they are symptomatic and/or test positive.
- Follow all State and Local restrictions

Possible COVID-19 Symptoms per CDC include:

- Fever or chills
- Cough
- Shortness of breath or difficulty breathing
- Fatigue



- Muscle or body aches
- Headache
- New loss of taste or smell
- Sore throat
- Congestion or runny nose
- Nausea or vomiting
- Diarrhea

If you have additional questions about an employee returning to work from a COVID-19 / Flu-like illness event, please contact Justin Ruck directly - justin.ruck@erllc.com.

Medical Emergencies:

Any person who becomes ill or injured in the exclusion zone must be decontaminated to the maximum extent possible. If the injury or illness is minor, full decontamination should be completed and first aid administered prior to transport. If the patient's condition is serious, at least partial decontamination should be completed (i.e., complete disrobing of the victim and redressing in clean coveralls or wrapping in a blanket.) First aid should be administered while awaiting an ambulance or paramedics. All injuries and illnesses must immediately be reported to Vice President of Health and Safety.

Onsite First Aid Support

Onsite medical support during project execution will be available from two or more individuals who are trained in First Aid and Cardiopulmonary Resuscitation (CPR) and blood borne pathogens. First aid kits shall be Type III, 16 unit kits, including one pocket mouthpiece or CPR barrier. Kits shall be checked prior to use, and at least weekly when work is in progress to ensure that contents are replaced as used.

Medical Transport of Employees and Case Management

For non-emergency injuries, a local clinic will be identified with the assistance of the Corporate Medical Consultant, 1 Source Access Care program will be contacted immediately to establish a medical treatment plan prior to transporting the injured worker to the clinic. The 1 Source Access Care consultant will attempt to contact the clinic ahead of the arrival of the patient to establish oversight of case management. Under no circumstances will an injured employee drive unescorted to a hospital, clinic, etc. An employee with minor injury may be transported by car after first aid treatment is given. The HSO or other project management personnel will transport the injured person to the facility. The employee who transports the injured person shall be trained in first aid and CPR whenever possible. When the injury is severe, or when in doubt concerning the severity of injury, the employee will be transported by ambulance.

Injured employees that require medical treatment or are taken to a doctor, hospital, clinic, etc., will not be allowed to resume work without a written return to work statement from the treating physician. This statement shall supply a medical diagnosis of the problem, the date of return to work, and work limitations. Should a return to work statement such as "light duty" be given, the treating physician will be contacted to determine the specific limitation. ER will make an assessment of work the employee normally performs whether or not the limitation interferes with the employee's normal work.

Whenever there are questions on the appropriateness of the diagnosis or prescribed course of treatment, 1 Source will be contacted to arrange for a second opinion. Copies of all Incident and Investigation Reports will be sent to the ER Corporate Health and Safety Manager.

Fire or Explosion:



In the event of a fire or explosion, the local fire department should be summoned immediately. Upon their arrival the RM or designated alternate will advise the fire commander of the location, nature and identification of the hazardous materials on-site.

If it is safe to do so, site personnel may:

- Use firefighting equipment available on site.
- Remove or isolate flammable or other hazardous materials which may contribute to the fire.

Spills, Leaks or Releases:

In the event of a spill or a leak, site personnel will:

- Locate the source of the spillage and stop the flow if it can be done safely.
- Begin containment and recovery of the spilled materials.

Evacuation Routes and Resources:

Evacuation routes will be established by work area locations for this site. All buildings and outside work areas shall be provided with two designated exit points. Evacuation shall be conducted immediately, without regard for equipment under conditions of extreme emergency. See site map for evacuation routes.

1. Evacuation notification will be three blasts on an air horn, vehicle horn, or by verbal communication via radio.
2. Keep upwind of smoke, vapors or spill location.
3. Exit through the decontamination corridor if possible.
4. If evacuation is not possible via the decontamination corridor, site personnel should remove contaminated clothing once they are in a location of safety and leave it near the exclusion zone or in a safe place.
5. The RM will conduct a head count to insure all personnel have been evacuated safely.
6. In the event that emergency site evacuation is necessary, all personnel are to:
 - Escape the emergency situation;
 - Decontaminate to the maximum extent practical; and,
 - Meet at the predetermined a pre-determined rally point..
7. In the event that the command post is no longer in a safe zone, meet: at the designated upwind location established in the daily safety meeting.

d. Emergency Decontamination Route & Procedures

The following emergency escape routes are designated for use in those situations where egress from the Exclusion zone cannot occur through the decontamination line: (describe alternate routes to leave area in emergencies):

1. Rally point shall be designated by the site RM prior to entry based on mitigating circumstances such as wind speed and direction, temperature, and ease of access. Because there are two (2) distinctly separate job locations for this task order, each RM shall establish their own Rally Point relative to their own site.

Emergency decontamination will include the following stations:

- Equipment Drop
- Outer Suit - Outer Cut Resistant Gloves – Outer Boots
- Respirator
- Inner Gloves

In all situations, when an onsite emergency results in evacuation of the Exclusion Zone, personnel shall not re-enter until:

- The conditions resulting in the emergency have been corrected.



- The hazards have been reassessed.
- The Site Safety Plan has been reviewed.
- Site personnel have been briefed on any changes in Site Safety Plan

8. HAZARD COMMUNICATION

In accordance with 29 CFR 1910.1200, all site workers working with hazardous materials are provided with adequate information about their dangers and precautions. Containers of hazardous materials are labeled. SDS' are kept on site. Workers receive training on the information on the SDS' as part of the daily safety meetings. The ER written Hazard Communication Program is available on ER Intranet.



**ENVIRONMENTAL
RESTORATION, LLC**

**US EPA REGION 8
CONTRACT NUMBER 68HE0820D0002
SITE HEALTH AND SAFETY PLAN
HOLLADAY MERCURY RESPONSE**

ATTACHMENT A

SITE SAFETY PLAN AMENDMENTS



**ENVIRONMENTAL
RESTORATION, LLC**

**US EPA REGION 8
CONTRACT NUMBER 68HE0820D0002
SITE HEALTH AND SAFETY PLAN
HOLLADAY MERCURY RESPONSE**

Site Safety Plan Amendment	
Amendment No.:	
Site Name:	
Date of Issue:	
Type of Amendment:	
Reason for Amendment:	
Alternate Safeguard Procedures:	
Required Changes in PPE:	

EPA OSC, Region 8

(Date)

ER Response Manager/HSO

(Date)

ER Project Health and Safety Manager

(Date)



**ENVIRONMENTAL
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SITE HEALTH AND SAFETY PLAN
HOLLADAY MERCURY RESPONSE**

**ATTACHMENT B
SITE MAPS**

← from 2284 E 6200 S, Holladay, UT 84121
to CareNow Urgent Care - Salt Lake City, 441 S Re...

18 min (16.3 miles)



via I-215 W

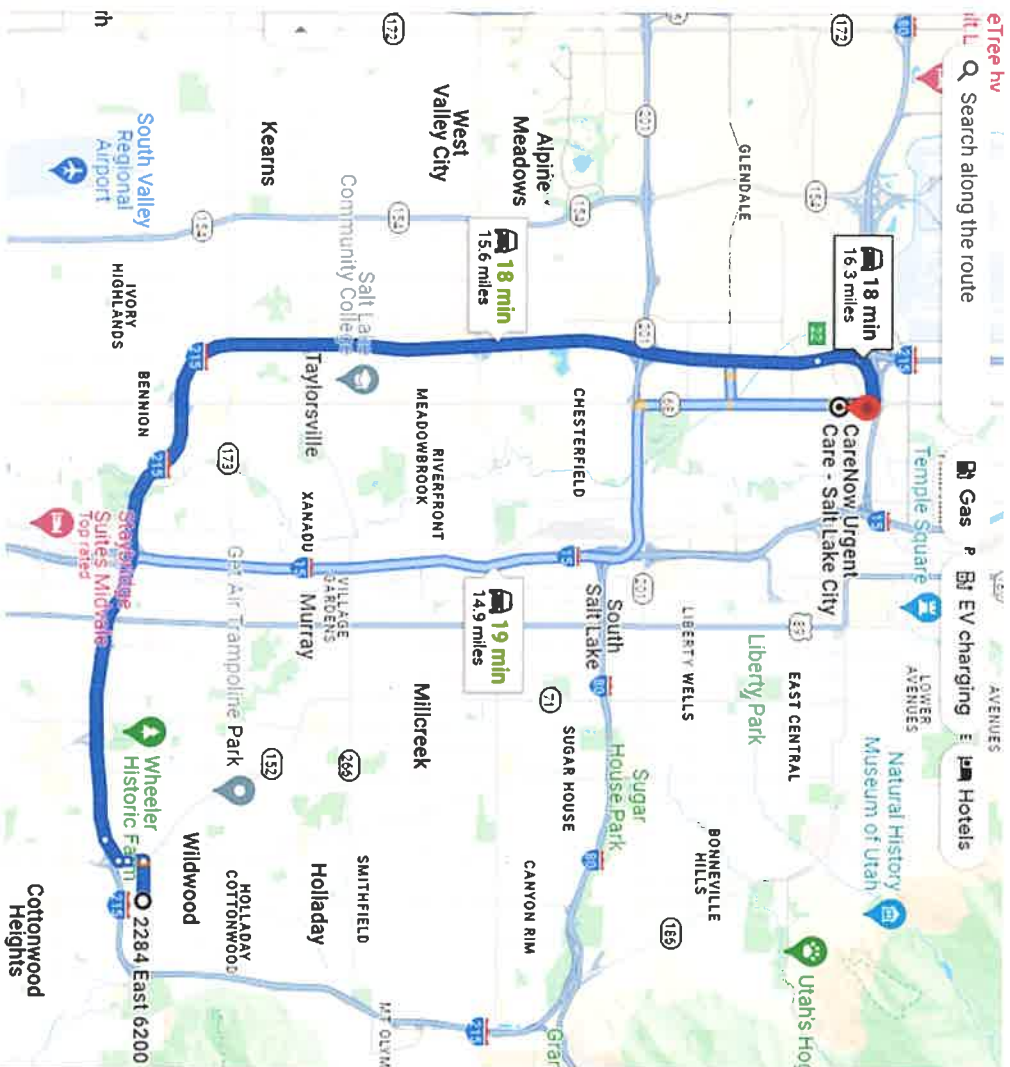
Fastest route, the usual traffic

2284 E 6200 S

Holladay, UT 84121

- > Get on I-215 W in Murray from 6200 S/Big Cottonwood Rd and S Highland Dr/Van Winkle 2 min (1.1 mi)
- > Follow I-215 W to UT-68 S/1700 W/S Redwood Rd in Salt Lake City. Take exit 22 from I-215 W 13 min (14.8 mi)
- > Follow UT-68 S/1700 W/S Redwood Rd to your destination 2 min (0.5 mi)

CareNow Urgent Care - Salt Lake City
441 S Redwood Rd, Salt Lake City, UT 84104



← from 2284 E 6200 S, Holladay, UT 84121
to LDS Hospital, 8th Ave, C St E, Salt Lake City, UT ...

24 min (14.6 miles)

via I-215 N

Fastest route, lighter traffic than usual



2284 E 6200 S

Holladay, UT 84121

> Get on I-215 N

3 min (1.2 mi)

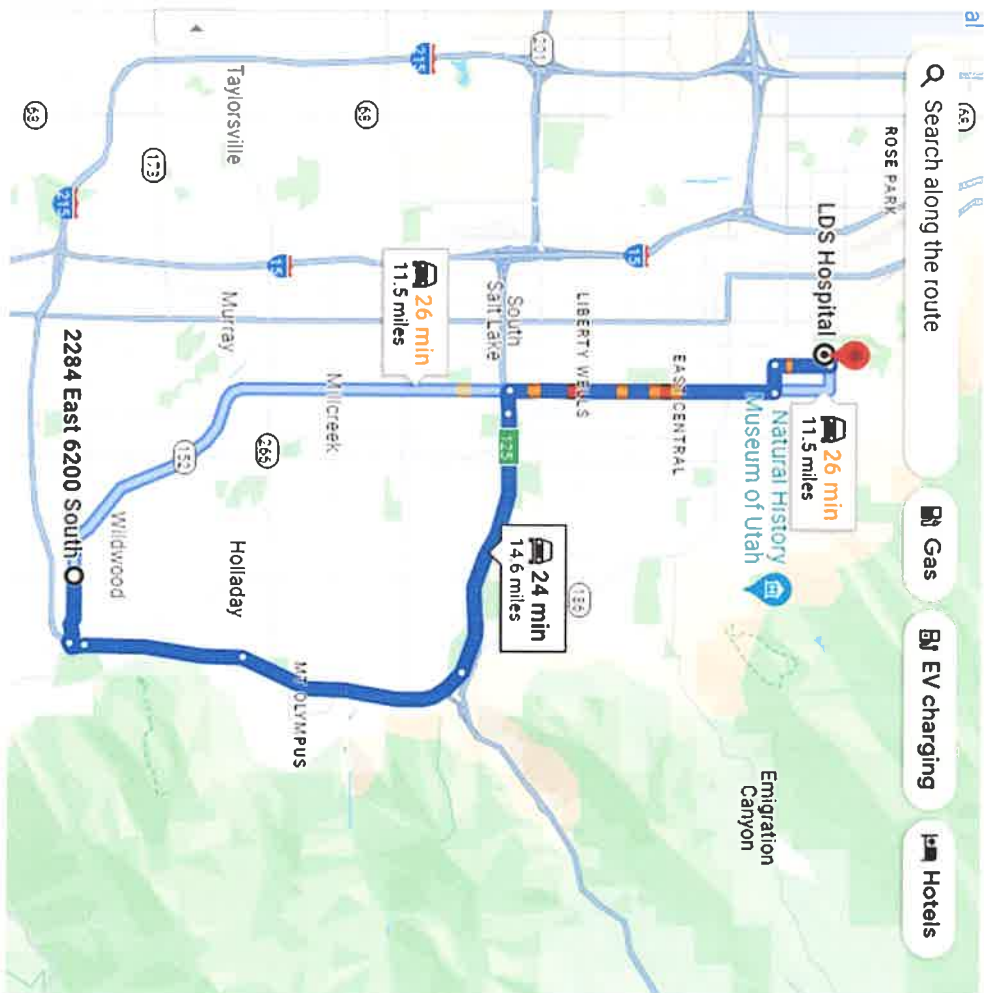
> Continue on I-215 N. Take I-80 W to S 700 E in Salt
Lake City. Take exit 125 from I-80 W

8 min (8.9 mi)

> Continue on S 700 E. Drive to D St E
13 min (4.6 mi)

LDS Hospital

8th Ave, C St E, Salt Lake City, UT 84143





Injury Treatment Contact Information & Protocols



Injury Management Protocol:

- ☐ **Diagnose & Treat (Injury)**
- ☐ **Instant Test Cup** (10 panel or 5 panel) **upon request only**
- ☐ **Breath Alcohol Test** **upon request only**

Billing Information

1 Source OHS Accounts
Payable
1573 N Cline Ave.
Griffith, IN 46319
Phone #: (855) 517-6872

Send All Reports To:

injurymgt@1Source365.com

or

Fax #: (219) 228-8852

Contact these individuals if you have any questions in regards to medical treatment. 1 Source is available 24 / 7 / 365.

Injury Triage Contact Lines

Primary: 866-622-7348

Secondary: 855-517-6872

Tertiary: 815-370-2940

Treatment Locations – Holladay, UT

Primary Clinic

CareNow Urgent Care
441 S. Redwood Road
Salt Lake City, UT 84104

Phone #: 801-973-2588
Fax #: 801-973-6985

Clinic Hours:
Monday – Friday: 7AM- 7PM

After-Hours

Intermountain LDS Hospital
8th Avenue C. Street
Salt Lake City, UT 84143

Phone# : 8014081100

Clinic Hours:
24 / 7 / 365

Injury Protocols

Emergency #: Dial 911 Immediately
Primary Injury #: (866) 622-7348
Secondary Injury #: (855) 517-6872



In the event you have an employee who reports a work-related injury or incident, follow the below itemized protocol:

Step #1: Contact 1 Source Immediately to report the injury / incident. Make sure you have the following information readily available:

- ✓ Injured Employee's Name
- ✓ Employee's Date of Birth
- ✓ Employee Contact Number(s)
- ✓ Date of Injury
- ✓ Type of Injury
- ✓ Job Position
- ✓ How much time is left on their shift
- ✓ When is their next scheduled work day
- ✓ Any pertinent information related to the event

Step #2: The 1 Source representative will discuss the injury with both the supervisor as well as the injured employee. If the employee declines medical treatment, see Step #3. If the employee agrees to participate in the Access Care Program (Tele-Triage) see Step #4. If they require immediate medical attention proceed to Step #5.

Step #3: If the employee makes the decision that they are declining medical treatment, 1 Source will explain all their rights as far as seeking medical treatment at a later date:

- ✓ The employee can still seek medical attention at a later date
- ✓ All medical care is still directed through the employer or 1 Source
- ✓ Medical treatment not directed by the employer or 1 Source is the responsibility of the employee
- ✓ They must sign the Medical Declination Waiver
- ✓ The employee is provided 1 Source's 24 / 7 / 365 contact information if they require treatment

Step #4: If the employee agrees to the Access Care Program, that employee will be put in contact with the appropriate 1 Source staff member. The employee will be subjected to the appropriate tele-triage diagnostic program. A treatment program and follow-up schedule will be developed based on the diagnostic information. All aspects of the injury and treatment plan will be reviewed with the employee. It will be confirmed and documented that the employee is agreeing to the Access Care Program Plan of Care. The employee will be given 1 Source's 24/7 contact information in case their medical condition changes. In addition, the employee will be informed that if they do seek medical treatment outside the direction of the employer or 1 Source it will be their fiscal responsibility.

1 Source will then review the plan of care with the supervisor. This will include any limitations that have been imposed. A report including the plan of care, limitations (if there are any) follow-up calls & anticipated MMI will be sent to the designated contacts.

Step #5: As soon as it has been determined by 1 Source in conjunction with the employee and employer that the injured employee requires clinical-based medical attention, 1 Source will proceed with the following:

- a) confirm the injured employee knows which clinic he/she is reporting to
- b) confirm the employee has a copy of the injury cards (if needed)
- c) 1 Source will create the authorization package and send it to the clinic
- d) 1 Source will contact the clinic to review the case with the treating clinician
- e) 1 Source will manage all aspects on the clinic-based injury care until the case is closed or if the assigned insurance adjuster indicates our participation is no longer required

Note: 1 Source OHS must be informed of the injury prior to the injury being sent to the nearest medical clinic. Case management is critical in controlling your company's exposure. 1 Source will provide the clinic with all critical information including the "Authorization to Treat" form.



Primary Clinic: CareNow
441 S. Redwood Road
Salt Lake City, UT 84104

Phone #: 801-973-2588

Fax #: 801-973-6985

Hours of Operation: Monday – Friday: 7AM – 7PM

After-Hours: Intermountain LDS Hospital
8th Avenue C. Street
Salt Lake City, UT 84143

Main Contact: ER Administration

Phone #: 801-408-1100

Hours of Operation: Use During Primary Clinic's Off hours



**ENVIRONMENTAL
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CONTRACT NUMBER 68HE0820D0002
SITE HEALTH AND SAFETY PLAN
HOLLADAY MERCURY RESPONSE**

SITE MAP

OCCUPATIONAL MEDICAL FACILITY MAP - Pending 1 Source

ATTACHMENT C

CHEMICAL INVENTORY LIST



Promoting productive workplaces
through safety and health research



Synonyms & Trade Names

Colloidal mercury, Mercury metal, Metallic mercury, Quicksilver

CAS No.

7439-97-6 (metal)

RTECS No.

OV4550000 (metal)

DOT ID & Guide

2809 172(metal)

Formula

Hg (metal)

Conversion

IDLH

10 mg/m³ (as Hg)
See: 7439976

Exposure Limits

NIOSH REL

NIOSH REL:

Hg Vapor: TWA 0.05 mg/m³ [skin]

Other: C 0.1 mg/m³ [skin]

OSHA PEL

TWA 0.1 mg/m³ See Appendix G

Measurement Methods

NIOSH 6009;

OSHA ID140

See: NMAM or OSHA Methods

Physical Description

Metal: Silver-white, heavy, odorless liquid. [Note: "Other" Hg compounds include all inorganic & aryl Hg compounds except (organo) alkyls.]

Molecular Weight

200.6

Boiling Point

674°F

Freezing Point

-38°F

Solubility

Insoluble

Vapor Pressure

0.0012
mmHg

Ionization Potential

?

Specific Gravity

13.6 (metal)

Flash Point

NA

Upper Explosive Limit

NA

Lower Explosive Limit

NA

Metal: Noncombustible Liquid

Incompatibilities & Reactivities

Acetylene, ammonia, chlorine dioxide, azides, calcium (amalgam formation), sodium carbide, lithium, rubidium, copper



Chemical Datasheet

METHYL ETHYL KETONE



Chemical Identifiers

CAS Number

78-93-3

UN/NA Number

1193

DOT Hazard Label

Flammable Liquid

USCG CHRIS Code

MEK

NIOSH Pocket Guide

2-Butanone

International Chem Safety Card

METHYL ETHYL KETONE

NFPA 704

Diamond	Hazard	Value	Description
3 1 0	Health	1	Can cause significant irritation.
	Flammability	3	Can be ignited under almost all ambient temperature conditions.
	Instability	0	Normally stable, even under fire conditions.
	Special		

(NFPA, 2010)

General Description

Colorless fairly volatile liquid with a pleasant pungent odor. Flash point 20°F. Vapors heavier than air. Does not react with water or many common materials. Stable in normal transportation. Irritates the nose, eyes, and throat. Combustion may produce toxic materials. Density 6.7 lb / gal. Used as a solvent, for making other chemicals, and for production of wax from petroleum.

Hazards

Reactivity Alerts

Highly Flammable

Air & Water Reactions

Highly flammable. Soluble in water.

Fire Hazard

Excerpt from ERG Guide 127 [Flammable Liquids (Water-Miscible)]:

HIGHLY FLAMMABLE: Will be easily ignited by heat, sparks or flames. **CAUTION:** Ethanol (UN1170) can burn with an invisible flame. Use an alternate method of detection (thermal camera, broom handle, etc.) Vapors may form explosive mixtures with air. Vapors may travel to source of ignition and flash back. Most vapors are heavier than air. They will spread along the ground and collect in low or confined areas (sewers, basements, tanks, etc.). Vapor explosion hazard indoors, outdoors or in sewers. Those substances designated with a (P) may polymerize explosively when heated or involved in a fire. Runoff to sewer may create fire or explosion hazard. Containers may explode when heated. Many liquids will float on water. (ERG, 2024)

Health Hazard

Liquid causes eye burn. Vapor irritates eyes, nose, and throat; can cause headache, dizziness, nausea, weakness, and loss of consciousness. (USCG, 1999)

Reactivity Profile

METHYL ETHYL KETONE is explosive in the form of vapor when exposed to heat, flame or sparks. Ignition on contact with potassium tert-butoxide. Reactive with strong oxidizing materials, and will dissolve or soften some plastics. Mixture with 2-propanol will form explosive peroxides during storage. Vigorous reaction with chloroform in the presence of alkali (sodium hydroxide, potassium hydroxide), chlorosulfonic acid, fuming sulfuric acid (oleum) [Lewis, 3rd ed., 1993, p. 855]. Reaction with hydrogen peroxide in the presence of nitric acid forms heat- and shock-sensitive explosive acetone peroxides. [Bjorklund, G. H. et al., Trans. R. Soc. Can, 1950, 44, p. 25].

Belongs to the Following Reactive Group(s)

- Ketones

Potentially Incompatible Absorbents

No information available.

Response Recommendations

Isolation and Evacuation

Excerpt from ERG Guide 127 [Flammable Liquids (Water-Miscible)]:

IMMEDIATE PRECAUTIONARY MEASURE: Isolate spill or leak area for at least 50 meters (150 feet) in all directions.

LARGE SPILL: Consider initial downwind evacuation for at least 300 meters (1000 feet).

FIRE: If tank, rail tank car or highway tank is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions. (ERG, 2024)

Firefighting

Excerpt from ERG Guide 127 [Flammable Liquids (Water-Miscible)]:

CAUTION: The majority of these products have a very low flash point. Use of water spray when fighting fire may be inefficient. **CAUTION:** For fire involving UN1170, UN1987 or UN3475, alcohol-resistant foam should be used. **CAUTION:** Ethanol (UN1170) can burn with an invisible flame. Use an alternate method of detection (thermal camera, broom handle, etc.).

SMALL FIRE: Dry chemical, CO₂, water spray or alcohol-resistant foam.

LARGE FIRE: Water spray, fog or alcohol-resistant foam. Avoid aiming straight or solid streams directly onto the product. If it can be done safely, move undamaged containers away from the area around the fire.

FIRE INVOLVING TANKS, RAIL TANK CARS OR HIGHWAY TANKS: Fight fire from maximum distance or use unmanned master stream devices or monitor nozzles. Cool containers with flooding quantities of water until well after fire is out. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. **ALWAYS** stay away from tanks in direct contact with flames. For massive fire, use unmanned master stream devices or monitor nozzles; if this is impossible, withdraw from area and let fire burn. (ERG, 2024)

Non-Fire Response

Excerpt from ERG Guide 127 [Flammable Liquids (Water-Miscible)]:

ELIMINATE all ignition sources (no smoking, flares, sparks or flames) from immediate area. All equipment used when handling the product must be grounded. Do not touch or walk through spilled material. Stop leak if you can do it without risk. Prevent entry into waterways, sewers, basements or confined areas. A vapor-suppressing foam may be used to reduce vapors. Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers. Use clean, non-sparking tools to collect absorbed material.

LARGE SPILL: Dike far ahead of liquid spill for later disposal. Water spray may reduce vapor, but may not prevent ignition in closed spaces. (ERG, 2024)

Protective Clothing

Excerpt from NIOSH Pocket Guide for 2-Butanone:

Skin: PREVENT SKIN CONTACT - Wear appropriate personal protective clothing to prevent skin contact.

Eyes: PREVENT EYE CONTACT - Wear appropriate eye protection to prevent eye contact.

Wash skin: WHEN CONTAMINATED - The worker should immediately wash the skin when it becomes contaminated.

Remove: WHEN WET (FLAMMABLE) - Work clothing that becomes wet should be immediately removed due to its flammability hazard (i.e., for liquids with a flash point <100°F).

Change: No recommendation is made specifying the need for the worker to change clothing after the workshift.

Provide: EYEWASH - Eyewash fountains should be provided in areas where there is any possibility that workers could be exposed to the substances; this is irrespective of the recommendation involving the wearing of eye protection. (NIOSH, 2024)

DuPont Tychem® Suit Fabrics

Normalized Breakthrough Times (in Minutes)

Chemical	CAS Number	State	QS	QC	SL	C3	TF	TP	RC	TK	RF
Butanone	78-93-3	Liquid			18	>480	40*/64	40*/64	>480	>480	>480
MEK	78-93-3	Liquid			18	>480	40*/64	40*/64	>480	>480	>480
Methyl ethyl ketone	78-93-3	Liquid			18	>480	40*/64	40*/64	>480	>480	>480

> indicates greater than.

* indicates based on lowest single value.

Special Warning from DuPont: Tychem® and Tyvek® fabrics should not be used around heat, flames, sparks or in potentially flammable or explosive environments. Only...

(DuPont, 2024)

First Aid

EYES: First check the victim for contact lenses and remove if present. Flush victim's eyes with water or normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center. Do not put any ointments, oils, or medication in the victim's eyes without specific instructions from a physician. **IMMEDIATELY** transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop.

SKIN: **IMMEDIATELY** flood affected skin with water while removing and isolating all contaminated clothing. Gently wash all affected skin areas thoroughly with soap and water. If symptoms such as redness or irritation develop, **IMMEDIATELY** call a physician and be prepared to transport the victim to a hospital for treatment.

INHALATION: **IMMEDIATELY** leave the contaminated area; take deep breaths of fresh air. If symptoms (such as wheezing, coughing, shortness of breath, or burning in the mouth, throat, or chest) develop, call a physician and be prepared to transport the victim to a hospital. Provide proper respiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that advised under Protective Clothing.

INGESTION: **DO NOT INDUCE VOMITING.** Volatile chemicals have a high risk of being aspirated into the victim's lungs during vomiting which increases the medical problems. If the victim is conscious and not convulsing, give 1 or 2 glasses of water to dilute the chemical and **IMMEDIATELY** call a hospital or poison control center. **IMMEDIATELY** transport the victim to a hospital. If the victim is convulsing or unconscious, do not give anything by mouth, ensure that the victim's airway is open and lay the victim on his/her side with the head lower than the body. **DO NOT INDUCE VOMITING.** **IMMEDIATELY** transport the victim to a hospital. (NTP, 1992)

Physical Properties

Chemical Formula: C₄H₈O

Flash Point: 26°F (NTP, 1992)

Lower Explosive Limit (LEL): 1.8 % (NTP, 1992)

Upper Explosive Limit (UEL): 10 % (NTP, 1992)

Autoignition Temperature: 961°F (USCG, 1999)

Melting Point: -123.3°F (NTP, 1992)

Vapor Pressure: 77.5 mmHg at 68°F ; 100 mmHg at 77.0°F (NTP, 1992)

Vapor Density (Relative to Air): 2.42 (NTP, 1992) - Heavier than air; will sink

Specific Gravity: 0.806 at 68°F (USCG, 1999) - Less dense than water; will float

Boiling Point: 175.3°F at 760 mmHg (NTP, 1992)

Molecular Weight: 72.11 (NTP, 1992)

Water Solubility: greater than or equal to 100 mg/mL at 66°F (NTP, 1992)


Ionization Energy/Potential: 9.54 eV (NIOSH, 2024)

IDLH: 3000 ppm (NIOSH, 2024)

AEGLs (Acute Exposure Guideline Levels)

Final AEGLs for Methyl ethyl ketone (78-93-3)

Exposure Period	AEGL-1	AEGL-2	AEGL-3
10 minutes	200 ppm	4900 ppm 🌶️	10000 ppm 🌶️🌶️
30 minutes	200 ppm	3400 ppm 🌶️	10000 ppm 🌶️🌶️
60 minutes	200 ppm	2700 ppm 🌶️	4000 ppm 🌶️
4 hours	200 ppm	1700 ppm	2500 ppm 🌶️

Exposure Period	AEGL-1	AEGL-2	AEGL-3
8 hours	200 ppm	1700 ppm	2500 ppm 

Lower Explosive Limit (LEL) = 18000 ppm

 indicates value is 10-49% of LEL. Safety consideration against explosions must be taken into account.



  indicates value is 50-99% of LEL. Extreme safety consideration against explosions must be taken into account.


(NAC/NRC, 2024)

ERPGs (Emergency Response Planning Guidelines)

No ERPG information available.

PACs (Protective Action Criteria)

Chemical	PAC-1	PAC-2	PAC-3	
Butanone, 2-; (Methyl ethyl ketone; MEK) (78-93-3)	200 ppm	2700 ppm 	4000 ppm 	LEL = 18000 ppm

 indicates value is 10-49% of LEL.

(DOE, 2024)

Regulatory Information

EPA Consolidated List of Lists

Regulatory Name	CAS Number/ 313 Category Code	EPCRA 302 EHS TPQ	EPCRA 304 EHS RQ	CERCLA RQ	EPCRA 313 TRI	RCRA Code	CAA 112(r) RMP TQ
Methyl ethyl ketone	78-93-3			5000 pounds		U159	

(EPA List of Lists, 2024)

CISA Chemical Facility Anti-Terrorism Standards (CFATS)

No regulatory information available.

OSHA Process Safety Management (PSM) Standard List

No regulatory information available.

Alternate Chemical Names

- BUTANONE
- 2-BUTANONE
- 3-BUTANONE
- ETHYL METHYL KETONE
- KETONE, ETHYL METHYL
- MEETCO
- MEK
- METHYL ACETONE
- METHYL ETHYL KETONE
- METHYL ETHYL KETONE (MEK)



Chemical Datasheet

ACETIC ACID, GLACIAL



Chemical Identifiers

CAS Number

64-19-7

UN/NA Number

2789

DOT Hazard LabelCorrosive
Flammable Liquid**USCG CHRIS Code**

AAC

NIOSH Pocket Guide

Acetic acid

International Chem Safety Card

ACETIC ACID

NFPA 704

Diamond	Hazard	Value	Description
2 3 0	Health	3	Can cause serious or permanent injury.
	Flammability	2	Must be moderately heated or exposed to relatively high ambient temperatures before ignition can occur.
	Instability	0	Normally stable, even under fire conditions.
	Special		

(NFPA, 2010)

General Description

A clear colorless liquid with a strong odor of vinegar. Flash point 104°F. Density 8.8 lb / gal. Corrosive to metals and tissue. Used to make other chemicals, as a food additive, and in petroleum production.

Hazards

Reactivity Alerts

none

Air & Water Reactions

Flammable. Water soluble. Dissolution generates some heat.

Fire Hazard

Special Hazards of Combustion Products: Irritating vapor generated when heated. (USCG, 1999)

Health Hazard

Breathing of vapors causes coughing, chest pain, and irritation of nose and throat; may cause nausea and vomiting. Contact with skin and eye causes burns. (USCG, 1999)

Reactivity Profile

Mixing acetic acid in equal molar portions with any of the following substances in a closed container caused the temperature and pressure to increase: 2-Aminoethanol, chlorosulfonic acid, ethylene diamine, ethyleneimine [NFPA 1991]. Acetic acid or acetic anhydride can explode with nitric acid if not kept cold. Potassium hydroxide residue in a catalyst pot reacted violently when acetic acid was added [MCA Case History 920. 1963]. During the production of terephthalic acid, n-xylene is oxidized in the presence of acetic acid. During these processes, detonating mixtures may be produced. Addition of a small amount of water may largely eliminate the risk of explosion [NFPA 491M.1991.p. 7]. Acetaldehyde was put in drums previously pickled with acetic acid. The acid caused the acetaldehyde to polymerize and the drums got hot and vented [MCA Case History 1764. 1971]. A mixture of ammonium nitrate and acetic acid ignites when warmed, especially if concentrated [Von Schwartz 1918. p. 322]. Several laboratory explosions have been reported using acetic acid and phosphorus trichloride to form acetyl chloride. Poor heat control probably caused the formation of phosphine [J. Am. Chem. Soc. 60:488. 1938]. Acetic acid forms explosive mixtures with p-xylene and air (Shraer, B.I. 1970. Khim. Prom. 46(10):747-750.).

Belongs to the Following Reactive Group(s)

- Acids, Carboxylic

Potentially Incompatible Absorbents

No information available.

Response Recommendations

Isolation and Evacuation

Excerpt from ERG Guide 132 [Flammable Liquids - Corrosive]:

IMMEDIATE PRECAUTIONARY MEASURE: Isolate spill or leak area for at least 50 meters (150 feet) in all directions.

SPILL: Increase the immediate precautionary measure distance, in the downwind direction, as necessary.

FIRE: If tank, rail tank car or highway tank is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions. (ERG, 2024)

Firefighting

Excerpt from ERG Guide 132 [Flammable Liquids - Corrosive]:

Some of these materials may react violently with water.

SMALL FIRE: Dry chemical, CO₂, water spray or alcohol-resistant foam.

LARGE FIRE: Water spray, fog or alcohol-resistant foam. If it can be done safely, move undamaged containers away from the area around the fire. Dike runoff from fire control for later disposal. Do not get water inside containers.

FIRE INVOLVING TANKS, RAIL TANK CARS OR HIGHWAY TANKS: Fight fire from maximum distance or use unmanned master stream devices or monitor nozzles. Cool containers with flooding quantities of water until well after fire is out. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. ALWAYS stay away from tanks in direct contact with flames. For massive fire, use unmanned master stream devices or monitor nozzles; if this is impossible, withdraw from area and let fire burn. (ERG, 2024)

Non-Fire Response

Excerpt from ERG Guide 132 [Flammable Liquids - Corrosive]:

ELIMINATE all ignition sources (no smoking, flares, sparks or flames) from immediate area. All equipment used when handling the product must be grounded. Do not touch or walk through spilled material. Stop leak if you can do it without risk. Prevent entry into waterways, sewers, basements or confined areas. A vapor-suppressing foam may be used to reduce vapors. Absorb with earth, sand or other non-combustible material. For hydrazine, absorb with DRY sand or inert absorbent (vermiculite or absorbent pads). Use clean, non-sparking tools to collect absorbed material.

LARGE SPILL: Dike far ahead of liquid spill for later disposal. Water spray may reduce vapor, but may not prevent ignition in closed spaces. (ERG, 2024)

Protective Clothing

Excerpt from NIOSH Pocket Guide for Acetic acid:

Skin: PREVENT SKIN CONTACT (>10%) - Wear appropriate personal protective clothing to prevent skin contact. (>10%)

Eyes: PREVENT EYE CONTACT - Wear appropriate eye protection to prevent eye contact.

Wash skin: WHEN CONTAMINATED (>10%) - The worker should immediately wash the skin when it becomes contaminated. (>10%)

Remove: WHEN WET OR CONTAMINATED (>10%) - Work clothing that becomes wet or significantly contaminated should be removed and replaced. (>10%)

Change: No recommendation is made specifying the need for the worker to change clothing after the workshift.

Provide:

- EYEWASH (>5%) - Eyewash fountains should be provided in areas where there is any possibility that workers could be exposed to the substances; this is irrespective of the recommendation involving the wearing of eye protection. (>5%)
- QUICK DRENCH (>50%) - Facilities for quickly drenching the body should be provided within the immediate work area for emergency use where there is a possibility of exposure. [Note: It is intended that these facilities provide a sufficient quantity or flow of water to quickly remove the substance from any body areas likely to be exposed. The actual determination of what constitutes an adequate quick drench facility depends on the specific circumstances. In certain instances, a deluge shower should be readily available, whereas in others, the availability of water from a sink or hose could be considered adequate.] (>50%) (NIOSH, 2024)

DuPont Tychem® Suit Fabrics

Normalized Breakthrough Times (in Minutes)

Chemical	CAS Number	State	QS	QC	SL	C3	TF	TP	RC	TK	RF
Acetic acid (>95%)	64-19-7	Liquid		imm	>480	34	>480	>480	>480	>480	>480

> indicates greater than.

"imm" indicates immediate; having a normalized breakthrough time of 10 minutes or less.

Special Warning from DuPont: Tychem® and Tyvek® fabrics should not be used around heat, flames, sparks or in potentially flammable or explosive environments. Only...

(DuPont, 2024)

First Aid

EYES: First check the victim for contact lenses and remove if present. Flush victim's eyes with water or normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center. Do not put any ointments, oils, or medication in the victim's eyes without specific instructions from a physician. IMMEDIATELY transport the

victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop.

SKIN: IMMEDIATELY flood affected skin with water while removing and isolating all contaminated clothing. Gently wash all affected skin areas thoroughly with soap and water. IMMEDIATELY call a hospital or poison control center even if no symptoms (such as redness or irritation) develop. IMMEDIATELY transport the victim to a hospital for treatment after washing the affected areas.

INHALATION: IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. If symptoms (such as wheezing, coughing, shortness of breath, or burning in the mouth, throat, or chest) develop, call a physician and be prepared to transport the victim to a hospital. Provide proper respiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that advised under Protective Clothing.

INGESTION: DO NOT INDUCE VOMITING. Corrosive chemicals will destroy the membranes of the mouth, throat, and esophagus and, in addition, have a high risk of being aspirated into the victim's lungs during vomiting which increases the medical problems. If the victim is conscious and not convulsing, give 1 or 2 glasses of water to dilute the chemical and IMMEDIATELY call a hospital or poison control center. IMMEDIATELY transport the victim to a hospital. If the victim is convulsing or unconscious, do not give anything by mouth, ensure that the victim's airway is open and lay the victim on his/her side with the head lower than the body. DO NOT INDUCE VOMITING. Transport the victim IMMEDIATELY to a hospital. (NTP, 1992)

Physical Properties

Chemical Formula: C₂H₄O₂

Flash Point: 104°F (NTP, 1992)

Lower Explosive Limit (LEL): 5.4 % (NTP, 1992)

Upper Explosive Limit (UEL): 16 % (NTP, 1992)

Autoignition Temperature: 961°F (USCG, 1999)

Melting Point: 61.9°F (NTP, 1992)

Vapor Pressure: 11.4 mmHg at 68°F ; 20 mmHg at 86°F (NTP, 1992)

Vapor Density (Relative to Air): 2.07 (NTP, 1992) - Heavier than air; will sink

Specific Gravity: 1.051 at 68°F (USCG, 1999) - Denser than water; will sink

Boiling Point: 244°F at 760 mmHg (NTP, 1992)

Molecular Weight: 60.05 (NTP, 1992)

Water Solubility: greater than or equal to 100 mg/mL at 73°F (NTP, 1992)

Ionization Energy/Potential: 10.66 eV (NIOSH, 2024)

IDLH: 50 ppm (NIOSH, 2024)

AEGLs (Acute Exposure Guideline Levels)

No AEGL information available.

ERPGs (Emergency Response Planning Guidelines)

Chemical	ERPG-1	ERPG-2	ERPG-3
Acetic Acid (64-19-7)	5 ppm ⚠	35 ppm	250 ppm

⚠ indicates that odor should be detectable near ERPG-1.

(AIHA, 2022)

PACs (Protective Action Criteria)

Chemical	PAC-1	PAC-2	PAC-3	
Acetic acid (64-19-7)	5 ppm	35 ppm	250 ppm	LEL = 40000 ppm

(DOE, 2024)

Regulatory Information

EPA Consolidated List of Lists

Regulatory Name	CAS Number/ 313 Category Code	EPCRA 302 EHS TPQ	EPCRA 304 EHS RQ	CERCLA RQ	EPCRA 313 TRI	RCRA Code	CAA 112(r) RMPTQ
Acetic acid	64-19-7			5000 pounds			

(EPA List of Lists, 2024)

CISA Chemical Facility Anti-Terrorism Standards (CFATS)

No regulatory information available.

OSHA Process Safety Management (PSM) Standard List

No regulatory information available.

Alternate Chemical Names

- ACETIC ACID
- ACETIC ACID (AQUEOUS)
- ACETIC ACID, GLACIAL
- ACETIC ACID, [GLACIAL]
- ACI-JEL
- ETHANOIC ACID
- ETHANOIC ACID MONOMER
- ETHYLIC ACID
- GLACIAL ACETIC ACID
- GLACIAL ACETIC ACID (PURE COMPOUND)
- METHANECARBOXYLIC ACID
- VINEGAR ACID



Chemical Datasheet

HYDROGEN PEROXIDE, AQUEOUS SOLUTION,
WITH NOT LESS THAN 20% BUT NOT MORE THAN
60% HYDROGEN PEROXIDE (STABILIZED AS
NECESSARY)



Chemical Identifiers

CAS Number

7722-84-1

UN/NA Number

2014

DOT Hazard LabelOxidizer
Corrosive**USCG CHRIS Code**

none

NIOSH Pocket Guide

Hydrogen peroxide

International Chem Safety Card

HYDROGEN PEROXIDE (>60% SOLUTION IN WATER)

NFPA 704

Diamond	Hazard	Value	Description
0 3 1 OX	Health	3	Can cause serious or permanent injury.
	Flammability	0	Will not burn under typical fire conditions.
	Instability	1	Normally stable but can become unstable at elevated temperatures and pressures.
	Special	OX	Possesses oxidizing properties.

(NFPA, 2010)

General Description

Colorless aqueous solution. Vapors may irritate the eyes and mucous membranes. Contact with most common metals and their compounds may cause violent decomposition, especially in the higher concentrations. Contact with combustible materials may result in spontaneous ignition. Prolonged exposure to fire or heat may cause decomposition and rupturing of the container. Used to bleach textiles and wood pulp, in chemical manufacturing and food processing.

Hazards

Reactivity Alerts

Explosive

Strong Oxidizing Agent

Air & Water Reactions

An aqueous solution that is readily diluted.

Fire Hazard

Excerpt from ERG Guide 140 [Oxidizers]:

CAUTION: Ammonium nitrate products may explode if involved in fire or contaminated with hydrocarbons (fuels), organic matter, other contaminants or when hot molten and contained. Treat as an explosive (ERG Guide 112). These substances will accelerate burning when involved in a fire. Some may decompose explosively when heated or involved in a fire. May explode from heat or contamination. Some will react explosively with hydrocarbons (fuels). May ignite combustibles (wood, paper, oil, clothing, etc.). Containers may explode when heated. Runoff may create fire or explosion hazard. (ERG, 2024)

Health Hazard

Excerpt from ERG Guide 140 [Oxidizers]:

Inhalation, ingestion or contact (skin, eyes) with vapors or substance may cause severe injury, burns or death. Fire may produce irritating, corrosive and/or toxic gases. Runoff from fire control or dilution water may cause environmental contamination. (ERG, 2024)

Reactivity Profile

The hazards associated with the use of HYDROGEN PEROXIDE (especially highly concentrated solutions) are well documented. There is a release of enough energy during the catalytic decomposition of 65% peroxide to evaporate all water and ignite nearby combustible materials. Most cellulose materials contain enough catalyst to cause spontaneous ignition with 90% peroxide. Contamination of concentrated peroxide causes the possibility of explosion. Readily oxidizable materials, or alkaline substances containing heavy metals may react violently. Solvents (acetone, ethanol, glycerol) will detonate on mixture with peroxide of over 30% concentration, the violence increasing with concentration. Concentrated peroxide may decompose violently in contact with iron, copper, chromium, and most other metals or their salts, and dust (which frequently contain rust). During concentration under vacuum of aqueous or of aqueous-alcoholic solutions of hydrogen peroxide, violent explosions occurred when the concentration was sufficiently high (>90%), [Bretherick 2nd ed., 1979]. Mixtures of alcohols with concentrated sulfuric acid and strong hydrogen peroxide can cause explosions. Example: An explosion will occur if dimethylbenzylcarbinol is added to 90% hydrogen peroxide then acidified with concentrated sulfuric acid. Mixtures of ethyl alcohol with concentrated hydrogen peroxide form powerful explosives. Mixtures of hydrogen peroxide and 1-phenyl-2-methyl propyl alcohol tend to explode if acidified with 70% sulfuric acid, [Chem. Eng. News 45(43):73(1967); J. Org. Chem. 28:1893(1963)]. Hydrogen selenide and hydrogen peroxide undergo a very rapid decomposition, [Mellor 1:941(1946-1947)].

Belongs to the Following Reactive Group(s)

- Oxidizing Agents, Strong
- Water and Aqueous Solutions

Potentially Incompatible Absorbents

Use caution: Liquids with this reactive group classification have been known to react with the absorbents listed below.

- Cellulose-Based Absorbents
- Expanded Polymeric Absorbents

Response Recommendations

Isolation and Evacuation

Excerpt from ERG Guide 140 [Oxidizers]:

IMMEDIATE PRECAUTIONARY MEASURE: Isolate spill or leak area in all directions for at least 50 meters (150 feet) for liquids and at least 25 meters (75 feet) for solids.

LARGE SPILL: Consider initial downwind evacuation for at least 100 meters (330 feet).

FIRE: If tank, rail tank car or highway tank is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions. If ammonium nitrate products are in a tank, rail car or truck and involved in a fire, ISOLATE for 1600 meters (1 mile) in all directions; also, initiate evacuation including emergency responders for 1600 meters (1 mile) in all directions. (ERG, 2024)

Firefighting

Excerpt from ERG Guide 140 [Oxidizers]:

SMALL FIRE: Use water. Do not use dry chemicals or foams. CO2 or Halon® may provide limited control.

LARGE FIRE: Flood fire area with water from a distance. Do not move cargo or vehicle if cargo has been exposed to heat. If it can be done safely, move undamaged containers away from the area around the fire.

FIRE INVOLVING TANKS, RAIL TANK CARS OR HIGHWAY TANKS: For ammonium nitrate products: Do not fight cargo fire. Withdraw, evacuate and isolate area for at least 1600 meters (1 mile). Treat as an explosive (ERG Guide 112). Do not enter area for 24 hours or until expert advice has been provided. Fight fire from maximum distance or use unmanned master stream devices or monitor nozzles. Cool containers with flooding quantities of water until well after fire is out. ALWAYS stay away from tanks in direct contact with flames. For massive fire, use unmanned master stream devices or monitor nozzles; if this is impossible, withdraw from area and let fire burn. (ERG, 2024)

Non-Fire Response

Excerpt from ERG Guide 140 [Oxidizers]:

Keep combustibles (wood, paper, oil, etc.) away from spilled material. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Stop leak if you can do it without risk. Do not get water inside containers.

SMALL DRY SPILL: With clean shovel, place material into clean, dry container and cover loosely; move containers from spill area.

SMALL LIQUID SPILL: Use a non-combustible material like vermiculite or sand to soak up the product and place into a container for later disposal.

LARGE SPILL: Dike far ahead of liquid spill for later disposal. (ERG, 2024)

Protective Clothing

Excerpt from ERG Guide 140 [Oxidizers]:

Wear positive pressure self-contained breathing apparatus (SCBA). Wear chemical protective clothing that is specifically recommended by the manufacturer when there is NO RISK OF FIRE. Structural firefighters' protective clothing provides thermal protection but only limited chemical protection. (ERG, 2024)

DuPont Tychem® Suit Fabrics

Normalized Breakthrough Times (in Minutes)

Chemical	CAS Number	State	QS	QC	SL	C3	TF	TP	RC	TK	RF
----------	------------	-------	----	----	----	----	----	----	----	----	----

Chemical	CAS Number	State	QS	QC	SL	C3	TF	TP	RC	TK	RF
Hydrogen peroxide (30%)	7722-84-1	Liquid		>480	>480				>480	>480	
Hydrogen peroxide (50%)	7722-84-1	Liquid		>480		>480	>480	>480			
Hydrogen peroxide (70%)	7722-84-1	Liquid	>480	>480			>480	>480	>480	>480	>480

> indicates greater than.

Special Warning from DuPont: Tychem® and Tyvek® fabrics should not be used around heat, flames, sparks or in potentially flammable or explosive environments. Only...

(DuPont, 2024)

First Aid

EYES: First check the victim for contact lenses and remove if present. Flush victim's eyes with water or normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center. Do not put any ointments, oils, or medication in the victim's eyes without specific instructions from a physician. IMMEDIATELY transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop.

SKIN: IMMEDIATELY flood affected skin with water while removing and isolating all contaminated clothing. Gently wash all affected skin areas thoroughly with soap and water. IMMEDIATELY call a hospital or poison control center even if no symptoms (such as redness or irritation) develop. IMMEDIATELY transport the victim to a hospital for treatment after washing the affected areas.

INHALATION: IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. If symptoms (such as wheezing, coughing, shortness of breath, or burning in the mouth, throat, or chest) develop, call a physician and be prepared to transport the victim to a hospital. Provide proper respiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that advised under Protective Clothing.

INGESTION: DO NOT INDUCE VOMITING. Corrosive chemicals will destroy the membranes of the mouth, throat, and esophagus and, in addition, have a high risk of being aspirated into the victim's lungs during vomiting which increases the medical problems. If the victim is conscious and not convulsing, give 1 or 2 glasses of water to dilute the chemical and IMMEDIATELY call a hospital or poison control center. IMMEDIATELY transport the victim to a hospital. If the victim is convulsing or unconscious, do not give anything by mouth, ensure that the victim's airway is open and lay the victim on his/her side with the head lower than the body. DO NOT INDUCE VOMITING. Transport the victim IMMEDIATELY to a hospital. (NTP, 1992)

Physical Properties

Chemical Formula: H₂O₂, aqueous

Flash Point: data unavailable

Lower Explosive Limit (LEL): data unavailable

Upper Explosive Limit (UEL): data unavailable

Autoignition Temperature: data unavailable

Melting Point: 31.3°F (NTP, 1992)

Vapor Pressure: 1 mmHg at 59.5°F (NTP, 1992)

Vapor Density (Relative to Air): data unavailable

Specific Gravity: 1.11 at 68°F (NTP, 1992) - Denser than water; will sink

Boiling Point: 302.4°F at 760 mmHg (NTP, 1992)

Molecular Weight: 34.02 (NTP, 1992)

Water Solubility: greater than or equal to 100 mg/mL at 72°F (NTP, 1992)

Ionization Energy/Potential: 10.54 eV [From NPG: Hydrogen peroxide] (NIOSH, 2024)

IDLH: 75 ppm [From NPG: Hydrogen peroxide] (NIOSH, 2024)

AEGLs (Acute Exposure Guideline Levels)

No AEGL information available.

ERPGs (Emergency Response Planning Guidelines)

Chemical	ERPG-1	ERPG-2	ERPG-3
Hydrogen Peroxide (7722-84-1)	10 ppm	50 ppm	100 ppm

(AIHA, 2022)

PACs (Protective Action Criteria)

Chemical	PAC-1	PAC-2	PAC-3
Hydrogen peroxide (7722-84-1)	10 ppm	50 ppm	100 ppm

(DOE, 2024)

Regulatory Information

EPA Consolidated List of Lists

Regulatory Name	CAS Number/ 313 Category Code	EPCRA 302 EHS TPQ	EPCRA 304 EHS RQ	CERCLA RQ	EPCRA 313 TRI	RCRA Code	CAA 112(r) RMP TQ
Hydrogen peroxide (Conc.> 52%)	7722-84-1	1000 pounds	1000 pounds				

(EPA List of Lists, 2024)

CISA Chemical Facility Anti-Terrorism Standards (CFATS)

		RELEASE			THEFT			SABOTAGE		
Chemical of Interest	CAS Number	Min Conc	STQ	Security Issue	Min Conc	STQ	Security Issue	Min Conc	STQ	Security Issue
Hydrogen peroxide (concentration of at least 35%)	7722-84-1				35.00 %	400 pounds	EXP/IEDP			

EXP/IEDP = explosives/improvised explosive device precursors.

(CISA, 2007)

OSHA Process Safety Management (PSM) Standard List

Chemical Name	CAS Number	Threshold Quantity (TQ)
Hydrogen Peroxide (52% by weight or greater)	7722-84-1	7500 pounds

(OSHA, 2019)

Alternate Chemical Names

- ALBONE

- ALBONE 35
- ALBONE DS
- BAQUASHOCK
- DIHYDROGEN DIOXIDE
- HIPOX
- HYBRITE
- HYDROGEN DIOXIDE
- HYDROGEN PEROXIDE
- HYDROGEN PEROXIDE (35% TO 52% BY WEIGHT)
- HYDROGEN PEROXIDE (CONC.> 52%)
- HYDROGEN PEROXIDE SOLUTION (30%)
- HYDROGEN PEROXIDE SOLUTION, [40% TO 52% PEROXIDE]
- HYDROGEN PEROXIDE, AQUEOUS SOLUTION, WITH NOT LESS THAN 20% BUT NOT MORE THAN 60% HYDROGEN PEROXIDE (STABILIZED AS NECESSARY)
- HYDROPEROXIDE
- INHIBINE
- METROKUR
- ODOSAT D
- OXYDOL
- OXYFULL
- OXYSEPT I
- PERHYDROL
- PERONE
- PEROXAAN
- PEROXIDE
- SELECT BLEACH
- SUPEROXOL
- T-STUFF



Chemical Datasheet

SULFURIC ACID



Chemical Identifiers

CAS Number	UN/NA Number	DOT Hazard Label	USCG CHRIS Code
7664-93-9	1830	Corrosive	SFA

NIOSH Pocket Guide
Sulfuric acid

International Chem Safety Card
SULFURIC ACID

NFPA 704

Diamond	Hazard	Value	Description
0 3 2 W	Health	3	Can cause serious or permanent injury.
	Flammability	0	Will not burn under typical fire conditions.
	Instability	2	Readily undergoes violent chemical changes at elevated temperatures and pressures.
	Special	W	Reacts violently or explosively with water.

(NFPA, 2010)

General Description

Sulfuric acid is a colorless oily liquid. It is soluble in water with release of heat. It is corrosive to metals and tissue. It will char wood and most other organic matter on contact, but is unlikely to cause a fire. Density 15 lb / gal. Long term exposure to low concentrations or short term exposure to high concentrations can result in adverse health effects from inhalation. It is used to make fertilizers and other chemicals, in petroleum refining, in iron and steel production, and for many other uses.

Rate of onset: Immediate

Persistence: Hours, days

Odor threshold:

Source/use/other hazard: Battery/dyes/paper/glue/metals industries; volcanic gas; toxic fumes when heated.

Hazards

Reactivity Alerts

Strong Oxidizing Agent
Known Catalytic Activity
Water-Reactive

Air & Water Reactions

Reaction with water is negligible unless acid strength is above 80-90% then heat from hydrolysis is extreme, may cause severe burns [Merck, 11th ed. 1989]. During sulfonation of mononitrobenzene by fuming sulfuric acid, a leak from an internal cooling coil permitted water to enter the reaction tank. A violent eruption occurred due to the heat of solution [MCA Case History 944 1963].

Fire Hazard

It is highly reactive and capable of igniting finely-divided combustible materials on contact. When heated, it emits highly toxic fumes. Avoid heat; water and organic materials. Sulfuric acid is explosive or incompatible with an enormous array of substances. Can undergo violent chemical change at elevated temperatures and pressure. May react violently with water. When heated, it emits highly toxic fumes. Hazardous polymerization may not occur. (EPA, 1998)

Health Hazard

Corrosive to all body tissues. Inhalation of vapor may cause serious lung damage. Contact with eyes may result in total loss of vision. Skin contact may produce severe necrosis. Fatal amount for adult: between 1 teaspoonful and one-half ounce of the concentrated chemical. Even a few drops may be fatal if the acid gains access to the trachea. Chronic exposure may cause tracheobronchitis, stomatitis, conjunctivitis, and gastritis. Gastric perforation and peritonitis may occur and may be followed by circulatory collapse. Circulatory shock is often the immediate cause of death. Those with chronic respiratory, gastrointestinal, or nervous diseases and any eye and skin diseases are at greater risk. (EPA, 1998)

Reactivity Profile

SULFURIC ACID is strongly acidic. Reacts violently with bromine pentafluoride [Mellor 2 Supp. 1:172 1956]. Exploded with para-nitrotoluene at 80°C [Chem. Eng. News 27:2504]. An explosion occurred when concentrated sulfuric acid was mixed with crystalline potassium permanganate in a vessel containing moisture. Manganese heptoxide was formed, which explodes at 70°C [Delhez 1967]. A mixture of acrylonitrile with concentrated sulfuric acid must be kept well chilled, otherwise a vigorous exothermic reaction occurs [Chem. Safety Data Sheet SD-31:8. 1949]. Mixing sulfuric acid (96%) in equal portions with any of the following substances in a closed container caused the temperature and pressure to increase: acetonitrile, acrolein, 2-aminoethanol, ammonium hydroxide (28%), aniline, n-butyraldehyde, chlorosulfonic acid, ethylene diamine, ethyleneimine, epichlorohydrin, ethylene cyanohydrin, hydrochloric acid (36%), hydrofluoric acid (48.7%), propiolactone, propylene oxide, sodium hydroxide, styrene monomer [NFPA 1991]. Sulfuric acid (concentrated) is extremely hazardous in contact with carbides, bromates, chlorates, fulminates, picrates, and powdered metals [Haz. Chem. Data 1966]. Allyl chloride may polymerize violently under conditions involving an acid catalyst, such as sulfuric acid [Ventrone 1971]. React exothermically with sodium hypochlorite to produce chlorine gas. Mixing chlorosulfuric acid and 98% sulfuric acid may evolve HCl [Subref: Anon, Loss Prev. Bull. 1977, (013), 2-3]. Zinc iodide reacts violently with H₂SO₄. (Pascal, 1962, Vol. 5, 168).

Belongs to the Following Reactive Group(s)

- Acids, Strong Oxidizing

Potentially Incompatible Absorbents

Use caution: Liquids with this reactive group classification have been known to react with the absorbents listed below.

- Cellulose-Based Absorbents
- Expanded Polymeric Absorbents

Isolation and Evacuation

Excerpt from ERG Guide 137 [Substances - Water-Reactive - Corrosive]:

IMMEDIATE PRECAUTIONARY MEASURE: Isolate spill or leak area in all directions for at least 50 meters (150 feet) for liquids and at least 25 meters (75 feet) for solids.

SPILL: Increase the immediate precautionary measure distance, in the downwind direction, as necessary.

FIRE: If tank, rail tank car or highway tank is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions. (ERG, 2024)

Firefighting

Fight fire from safe distance or from protected location. Use care as water applied directly to this acid results in evolution of heat and causes spattering. Cool containers that are exposed to flames with streams of water until fire is out. Wear positive pressure breathing apparatus and special protective clothing.

Not flammable. For small fires use dry chemical or carbon dioxide. Use water on combustibles burning in vicinity of this material. For large fires flood fire area with water from a distance. Do not get solid streams of water on material. Move container from area if you can do so without risk. (EPA, 1998)

Non-Fire Response

Excerpt from ERG Guide 137 [Substances - Water-Reactive - Corrosive]:

Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Stop leak if you can do it without risk. Use water spray to reduce vapors; do not put water directly on leak, spill area or inside container. Keep combustibles (wood, paper, oil, etc.) away from spilled material.

SMALL SPILL: Cover with DRY earth, DRY sand or other non-combustible material followed with plastic sheet to minimize spreading or contact with rain. Use clean, non-sparking tools to collect material and place it into loosely covered plastic containers for later disposal. Prevent entry into waterways, sewers, basements or confined areas. (ERG, 2024)

Protective Clothing

Excerpt from NIOSH Pocket Guide for Sulfuric acid:

Skin: PREVENT SKIN CONTACT - Wear appropriate personal protective clothing to prevent skin contact.

Eyes: PREVENT EYE CONTACT - Wear appropriate eye protection to prevent eye contact.

Wash skin: WHEN CONTAMINATED - The worker should immediately wash the skin when it becomes contaminated.

Remove: WHEN WET OR CONTAMINATED - Work clothing that becomes wet or significantly contaminated should be removed and replaced.

Change: No recommendation is made specifying the need for the worker to change clothing after the workshift.

Provide:

- **EYEWASH (>1%)** - Eyewash fountains should be provided in areas where there is any possibility that workers could be exposed to the substances; this is irrespective of the recommendation involving the wearing of eye protection. (>1%)
- **QUICK DRENCH (>1%)** - Facilities for quickly drenching the body should be provided within the immediate work area for emergency use where there is a possibility of exposure. [Note: It is intended that these facilities provide a sufficient quantity or flow of water to quickly remove the substance from any body areas likely to be exposed. The actual determination of what constitutes an adequate quick drench facility depends on the specific circumstances. In certain

instances, a deluge shower should be readily available, whereas in others, the availability of water from a sink or hose could be considered adequate.] (>1%) (NIOSH, 2024)

DuPont Tychem® Suit Fabrics

Normalized Breakthrough Times (in Minutes)

Chemical	CAS Number	State	QS	QC	SL	C3	TF	TP	RC	TK	RF
Sulfuric acid (30%)	7664-93-9	Liquid						>480			
Sulfuric acid (50%)	7664-93-9	Liquid						>480			
Sulfuric acid (70%)	7664-93-9	Liquid						>480			
Sulfuric acid (98% at 50°C)	7664-93-9	Liquid					>480				
Sulfuric acid (>95%)	7664-93-9	Liquid	>480	>480	>480	>480	>480	50	>480	>480	>480

> indicates greater than.

Special Warning from DuPont: Tychem® and Tyvek® fabrics should not be used around heat, flames, sparks or in potentially flammable or explosive environments. Only...

(DuPont, 2024)

First Aid

Caution: Sulfuric acid is extremely corrosive. Caution is advised.

Signs and Symptoms of Acute Sulfuric Acid Exposure: Signs and symptoms of acute ingestion of sulfuric acid may be severe and include salivation, intense thirst, difficulty in swallowing, pain, and shock. Oral, esophageal, and stomach burns are common. Vomitus generally has a coffee-ground appearance. The potential for circulatory collapse is high following ingestion of sulfuric acid. Acute inhalation exposure may result in sneezing, hoarseness, choking, laryngitis, dyspnea (shortness of breath), respiratory tract irritation, and chest pain. Bleeding of nose and gums, ulceration of the nasal and oral mucosa, pulmonary edema, chronic bronchitis, and pneumonia may also occur. If the eyes have come in contact with sulfuric acid, irritation, pain, swelling, corneal erosion, and blindness may result. Dermal exposure may result in severe burns, pain, and dermatitis (red, inflamed skin).

Emergency Life-Support Procedures: Acute exposure to sulfuric acid may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to sulfuric acid.
2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.
3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.
4. RUSH to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to sulfuric acid.
2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.
3. Remove contaminated clothing as soon as possible.
4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.
5. Wash exposed skin areas THOROUGHLY with soap and water.
6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.
7. RUSH to a health care facility.

- Ingestion Exposure:
- 1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.
 - 2. Rinse mouth with large amounts of water. Instruct victims not to swallow the water.
 - 3. DO NOT induce vomiting or attempt to neutralize!
 - 4. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.
 - 5. Activated charcoal is of no value.
 - 6. Give the victims water or milk: children up to 1 year old, 125 mL (4 oz or 1/2 cup); children 1 to 12 years old, 200 mL (6 oz or 3/4 cup); adults, 250 mL (8 oz or 1 cup). Water or milk should be given only if victims are conscious and alert.
 - 7. RUSH to a health care facility. (EPA, 1998)

Physical Properties

Chemical Formula: H2SO4

Flash Point: data unavailable

Lower Explosive Limit (LEL): data unavailable

Upper Explosive Limit (UEL): data unavailable

Autoignition Temperature: Not flammable (USCG, 1999)

Melting Point: 50.65°F (EPA, 1998)

Vapor Pressure: 1 mmHg at 294.8°F (EPA, 1998)

Vapor Density (Relative to Air): 3.4 (EPA, 1998) - Heavier than air; will sink

Specific Gravity: 1.841 (EPA, 1998) - Denser than water; will sink

Boiling Point: 554°F at 760 mmHg (EPA, 1998)

Molecular Weight: 98.08 (EPA, 1998)

Water Solubility: Miscible (NIOSH, 2024)

Ionization Energy/Potential: data unavailable

IDLH: 15 mg/m3 (NIOSH, 2024)

AEGLs (Acute Exposure Guideline Levels)

Interim AEGLs for Sulfuric acid (7664-93-9)

Exposure Period	AEGL-1	AEGL-2	AEGL-3
10 minutes	0.2 mg/m3	8.7 mg/m3	270 mg/m3
30 minutes	0.2 mg/m3	8.7 mg/m3	200 mg/m3
60 minutes	0.2 mg/m3	8.7 mg/m3	160 mg/m3
4 hours	0.2 mg/m3	8.7 mg/m3	110 mg/m3
8 hours	0.2 mg/m3	8.7 mg/m3	93 mg/m3

(NAC/NRC, 2024)

ERPGs (Emergency Response Planning Guidelines)

Chemical	ERPG-1	ERPG-2	ERPG-3
Sulfuric Acid (Oleum [8014-95-7], Sulfur Trioxide [7446-11-9], and Sulfuric Acid [7664-	2 mg/m3 ⚠	10 mg/m3	120 mg/m3

Chemical	ERPG-1	ERPG-2	ERPG-3
93-9])			

☼ indicates that odor should be detectable near ERPG-1.

(AIHA, 2022)

PACs (Protective Action Criteria)

Chemical	PAC-1	PAC-2	PAC-3
Sulfuric acid (7664-93-9)	0.2 mg/m3	8.7 mg/m3	160 mg/m3

(DOE, 2024)

Regulatory Information

EPA Consolidated List of Lists

Regulatory Name	CAS Number/ 313 Category Code	EPCRA 302 EHS TPQ	EPCRA 304 EHS RQ	CERCLA RQ	EPCRA 313 TRI	RCRA Code	CAA 112(r) RMP TQ
Sulfuric acid	7664-93-9	1000 pounds	1000 pounds	1000 pounds			
Sulfuric acid (aerosol forms only)	7664-93-9	1000 pounds	1000 pounds	1000 pounds	313		

(EPA List of Lists, 2024)

CISA Chemical Facility Anti-Terrorism Standards (CFATS)

No regulatory information available.

OSHA Process Safety Management (PSM) Standard List

No regulatory information available.

Alternate Chemical Names

- BATTERY ACID
- BOV
- CHAMBER ACID
- CONTACT ACID
- DIHYDROGEN SULFATE
- DIPPING ACID
- FERTILIZER ACID
- HYDROGEN SULFATE
- MATTING ACID
- NORDHAUSEN ACID
- OIL OF VITRIOL
- SPENT SULFURIC ACID
- SPIRIT OF SULFUR
- SULFURIC ACID
- SULFURIC ACID (AEROSOL FORMS ONLY)
- SULFURIC ACID (AQUEOUS)
- SULFURIC ACID, WITH MORE THAN 51% ACID
- SULPHURIC ACID
- SULPHURIC ACID, WITH MORE THAN 51% ACID
- VITRIOL BROWN OIL



Chemical Datasheet

CHLORATES, INORGANIC, N.O.S.



Chemical Identifiers

CAS Number	UN/NA Number	DOT Hazard Label	USCG CHRIS Code
14866-68-3	1461	Oxidizer	none
NIOSH Pocket Guide		International Chem Safety Card	
none		none	

NFPA 704

data unavailable

General Description

Chlorate, inorganic, n.o.s. is a white crystalline. It is soluble in water. The material itself is noncombustible, but it can form a very flammable mixture with combustible materials, and this mixture may be explosive if the combustible material is very finely divided. The mixture can be ignited by friction. Contact with strong sulfuric acid can cause fires or explosions. When mixed with ammonium salts, spontaneous decomposition and ignition may result. Prolonged exposure of the material to heat or fire can result in an explosion.

Hazards

Reactivity Alerts

Explosive
Strong Oxidizing Agent

Air & Water Reactions

They are soluble in water.

Fire Hazard

Excerpt from ERG Guide 140 [Oxidizers]:

CAUTION: Ammonium nitrate products may explode if involved in fire or contaminated with hydrocarbons (fuels), organic matter, other contaminants or when hot molten and contained. Treat as an explosive (ERG Guide 112). These substances will accelerate burning when involved in a fire. Some may decompose explosively when heated or involved in a fire. May explode from heat or contamination. Some will react explosively with hydrocarbons (fuels). May ignite combustibles (wood, paper, oil, clothing, etc.). Containers may explode when heated. Runoff may create fire or explosion hazard. (ERG, 2024)

Health Hazard

Excerpt from ERG Guide 140 [Oxidizers]:

Inhalation, ingestion or contact (skin, eyes) with vapors or substance may cause severe injury, burns or death. Fire may produce irritating, corrosive and/or toxic gases. Runoff from fire control or dilution water may cause environmental contamination. (ERG, 2024)

Reactivity Profile

Metal chlorates are oxidants in the presence of strong acid; liberates explosive chlorine dioxide gas; liberates chlorine dioxide and carbon dioxide by heating a moist metal chlorate and a dibasic organic acid; mixtures of perchlorates with sulfur or phosphorus are explosives [Bretherick 1979 p. 100]; mixtures of the chlorate with ammonium salts, powdered metals, silicon, sulfur, or sulfides are readily ignited and potentially explosive [Bretherick 1979 p. 806]. A combination of finely divided aluminum with finely divided bromates (also chlorates and iodates) of barium, calcium, magnesium, potassium, sodium, or zinc can explode by heat, percussion, or friction [Mellor 2:310 1946-47].

Belongs to the Following Reactive Group(s)

- Oxidizing Agents, Strong

Potentially Incompatible Absorbents

Use caution: Liquids with this reactive group classification have been known to react with the absorbents listed below.

- Cellulose-Based Absorbents
- Expanded Polymeric Absorbents

Response Recommendations

Isolation and Evacuation

Excerpt from ERG Guide 140 [Oxidizers]:

IMMEDIATE PRECAUTIONARY MEASURE: Isolate spill or leak area in all directions for at least 50 meters (150 feet) for liquids and at least 25 meters (75 feet) for solids.

LARGE SPILL: Consider initial downwind evacuation for at least 100 meters (330 feet).

FIRE: If tank, rail tank car or highway tank is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions. If ammonium nitrate products are in a tank, rail car or truck and involved in a fire, ISOLATE for 1600 meters (1 mile) in all directions; also, initiate evacuation including emergency responders for 1600 meters (1 mile) in all directions. (ERG, 2024)

Firefighting

Excerpt from ERG Guide 140 [Oxidizers]:

SMALL FIRE: Use water. Do not use dry chemicals or foams. CO₂ or Halon® may provide limited control.

LARGE FIRE: Flood fire area with water from a distance. Do not move cargo or vehicle if cargo has been exposed to heat. If it can be done safely, move undamaged containers away from the area around the fire.

FIRE INVOLVING TANKS, RAIL TANK CARS OR HIGHWAY TANKS: For ammonium nitrate products: Do not fight cargo fire. Withdraw, evacuate and isolate area for at least 1600 meters (1 mile). Treat as an explosive (ERG Guide 112). Do not enter area for 24 hours or until expert advice has been provided. Fight fire from maximum distance or use unmanned master stream devices or monitor nozzles. Cool containers with flooding quantities of water until well after fire

is out. ALWAYS stay away from tanks in direct contact with flames. For massive fire, use unmanned master stream devices or monitor nozzles; if this is impossible, withdraw from area and let fire burn. (ERG, 2024)

Non-Fire Response

Excerpt from ERG Guide 140 [Oxidizers]:

Keep combustibles (wood, paper, oil, etc.) away from spilled material. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Stop leak if you can do it without risk. Do not get water inside containers.

SMALL DRY SPILL: With clean shovel, place material into clean, dry container and cover loosely; move containers from spill area.

SMALL LIQUID SPILL: Use a non-combustible material like vermiculite or sand to soak up the product and place into a container for later disposal.

LARGE SPILL: Dike far ahead of liquid spill for later disposal. (ERG, 2024)

Protective Clothing

Excerpt from ERG Guide 140 [Oxidizers]:

Wear positive pressure self-contained breathing apparatus (SCBA). Wear chemical protective clothing that is specifically recommended by the manufacturer when there is NO RISK OF FIRE. Structural firefighters' protective clothing provides thermal protection but only limited chemical protection. (ERG, 2024)

DuPont Tychem® Suit Fabrics

No information available.

First Aid

Excerpt from ERG Guide 140 [Oxidizers]:

Refer to the "General First Aid" section. Specific First Aid: Contaminated clothing may be a fire risk when dry. (ERG, 2024)

Physical Properties

Chemical Formula: ClO3

Flash Point: data unavailable

Lower Explosive Limit (LEL): data unavailable

Upper Explosive Limit (UEL): data unavailable

Autoignition Temperature: data unavailable

Melting Point: data unavailable

Vapor Pressure: data unavailable

Vapor Density (Relative to Air): data unavailable

Specific Gravity: data unavailable

Boiling Point: data unavailable

Molecular Weight: data unavailable

Water Solubility: data unavailable

Ionization Energy/Potential: data unavailable

IDLH: data unavailable

AEGLs (Acute Exposure Guideline Levels)

No AEGL information available.

ERPGs (Emergency Response Planning Guidelines)

No ERPG information available.

PACs (Protective Action Criteria)

No PAC information available.

Regulatory Information

EPA Consolidated List of Lists

No regulatory information available.

CISA Chemical Facility Anti-Terrorism Standards (CFATS)

No regulatory information available.

OSHA Process Safety Management (PSM) Standard List

No regulatory information available.

Alternate Chemical Names

- CHLORATE
- CHLORATE ION
- CHLORATE ION (CLO3-)
- CHLORATE(1-)
- CHLORATES, INORGANIC, N.O.S.
- CHLORIC ACID, ION(1-)
- CHLORINE OXIDE (CLO31-)



Site Safety Plan Amendment	
Amendment No.: 2	
Site Name: Holladay Merc	M8-34
Date of Issue:	4/23
Type of Amendment:	Change of Conditions
Reason for Amendment:	High explosives found on location
Alternate Safeguard Procedures:	Bomb Squad onsite, direction by CFA (unified Fire Authority) on how to remove chemicals other than TNT.
Required Changes in PPE:	Level C



EPA OSC, Region 8



ER Response Manager/HSO

ER Project Health and Safety Manager

4/22/24

(Date)

4/23/24

(Date)

(Date)



Chemical Datasheet

TRINITROTOLUENE, DRY OR WETTED WITH LESS THAN 30 PERCENT WATER, BY MASS .



Chemical Identifiers

CAS Number	UN/NA Number	DOT Hazard Label	USCG CHRIS Code
118-96-7	0209	Explosive 1.1D	none
NIOSH Pocket Guide 2,4,6-Trinitrotoluene		International Chem Safety Card 2,4,6-TRINITROTOLUENE	

NFPA 704

data unavailable

General Description

An explosive solid. Primary hazard is from effects of a blast. Not designed to produce significant fragmentation or throw projectiles. May explode under exposure to intense heat or fire.

Hazards

Reactivity Alerts

Explosive
Strong Oxidizing Agent

Air & Water Reactions

Insoluble in water.

Fire Hazard

Flash point data for this chemical are not available. It is explosive. (NTP, 1992)

Health Hazard

SYMPTOMS: Symptoms of exposure to this compound may include headache, weakness, anemia, toxic hepatitis, cyanosis, dermatitis, jaundice, purpura, liver injury, conjunctivitis, irritation of the respiratory tract, constriction in the chest, lack of appetite, nausea, vomiting, diarrhea, petechial hemorrhages in the skin, oliguria, albuminuria, casts in urine, papular dermatitis, and yellow-orange discoloration of the hands, nails, face and hair.

ACUTE/CHRONIC HAZARDS: This compound can be absorbed through the skin. The vapors are toxic. When heated to decomposition it emits toxic fumes. It will detonate under strong shock or sudden heating. (NTP, 1992)

Reactivity Profile

TRINITROTOLUENE, DRY OR WETTED WITH LESS THAN 30 PERCENT WATER, BY MASS is sensitive to heat and shock. This compound reacts with reducing agents. It will detonate if vigorously shocked or heated to 450°F. (NTP, 1992)

Belongs to the Following Reactive Group(s)

- Nitro, Nitroso, Nitrate, and Nitrite Compounds, Organic

Potentially Incompatible Absorbents

Use caution: Liquids with this reactive group classification have been known to react with the absorbents listed below.

- Cellulose-Based Absorbents
- Expanded Polymeric Absorbents

Response Recommendations

Isolation and Evacuation

Excerpt from ERG Guide 112 [Explosives - Division 1.1, 1.2, 1.3 or 1.5]:

IMMEDIATE PRECAUTIONARY MEASURE: Isolate spill or leak area immediately for at least 500 meters (1/3 mile) in all directions.

LARGE SPILL: Consider initial evacuation for 800 meters (1/2 mile) in all directions.

FIRE: If rail car or trailer is involved in a fire, ISOLATE for 1600 meters (1 mile) in all directions; also, initiate evacuation including emergency responders for 1600 meters (1 mile) in all directions. (ERG, 2024)

Firefighting

Excerpt from ERG Guide 112 [Explosives - Division 1.1, 1.2, 1.3 or 1.5]:

CARGO FIRE: DO NOT fight fire when fire reaches cargo! Cargo may EXPLODE! Stop all traffic and clear the area for at least 1600 meters (1 mile) in all directions and let burn. Do not move cargo or vehicle if cargo has been exposed to heat.

TIRE OR VEHICLE FIRE: Use plenty of water - FLOOD it! If water is not available, use CO2, dry chemical or dirt. If possible, and WITHOUT RISK, use unmanned master stream devices or monitor nozzles from maximum distance to prevent fire from spreading to cargo area. Pay special attention to tire fires as re-ignition may occur. Stand by, at a safe distance, with extinguisher ready for possible re-ignition. (ERG, 2024)

Non-Fire Response

Excerpt from ERG Guide 112 [Explosives - Division 1.1, 1.2, 1.3 or 1.5]:

ELIMINATE all ignition sources (no smoking, flares, sparks or flames) from immediate area. All equipment used when handling the product must be grounded. Do not touch or walk through spilled material. DO NOT OPERATE RADIO TRANSMITTERS WITHIN 100 METERS (330 FEET) OF ELECTRIC DETONATORS. DO NOT CLEAN-UP OR DISPOSE OF, EXCEPT UNDER SUPERVISION OF A SPECIALIST. (ERG, 2024)

Protective Clothing

Excerpt from ERG Guide 112 [Explosives - Division 1.1, 1.2, 1.3 or 1.5]:

Wear positive pressure self-contained breathing apparatus (SCBA). Structural firefighters' protective clothing provides thermal protection but only limited chemical protection. (ERG, 2024)

DuPont Tychem® Suit Fabrics

No information available.

First Aid

EYES: First check the victim for contact lenses and remove if present. Flush victim's eyes with water or normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center. Do not put any ointments, oils, or medication in the victim's eyes without specific instructions from a physician. IMMEDIATELY transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop.

SKIN: IMMEDIATELY flood affected skin with water while removing and isolating all contaminated clothing. Gently wash all affected skin areas thoroughly with soap and water. If symptoms such as redness or irritation develop, IMMEDIATELY call a physician and be prepared to transport the victim to a hospital for treatment.

INHALATION: IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. If symptoms (such as wheezing, coughing, shortness of breath, or burning in the mouth, throat, or chest) develop, call a physician and be prepared to transport the victim to a hospital. Provide proper respiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that advised under Protective Clothing.

INGESTION: DO NOT INDUCE VOMITING. If the victim is conscious and not convulsing, give 1 or 2 glasses of water to dilute the chemical and IMMEDIATELY call a hospital or poison control center. Be prepared to transport the victim to a hospital if advised by a physician. If the victim is convulsing or unconscious, do not give anything by mouth, ensure that the victim's airway is open and lay the victim on his/her side with the head lower than the body. DO NOT INDUCE VOMITING. IMMEDIATELY transport the victim to a hospital. (NTP, 1992)

Physical Properties

Chemical Formula: C₇H₅N₃O₆

Flash Point: (Explodes) (NIOSH, 2024)

Lower Explosive Limit (LEL): data unavailable

Upper Explosive Limit (UEL): data unavailable

Autoignition Temperature: data unavailable

Melting Point: 177.6°F (NTP, 1992)

Vapor Pressure: 0.046 mmHg (NTP, 1992)

Vapor Density (Relative to Air): data unavailable

Specific Gravity: 1.654 at 68°F (NTP, 1992) - Denser than water; will sink

Boiling Point: 464°F at 760 mmHg EXPLODES (NTP, 1992)

Molecular Weight: 227.15 (NTP, 1992)

Water Solubility: Insoluble (NTP, 1992)

Ionization Energy/Potential: 10.59 eV (NIOSH, 2024)

IDLH: 500 mg/m³ (NIOSH, 2024)

AEGLs (Acute Exposure Guideline Levels)

No AEGL information available.

ERPGs (Emergency Response Planning Guidelines)

No ERPG information available.

PACs (Protective Action Criteria)

Chemical	PAC-1	PAC-2	PAC-3
Trinitrotoluene, 2,4,6- (118-96-7)	0.3 mg/m3	17 mg/m3	1000 mg/m3

(DOE, 2024)

Regulatory Information

EPA Consolidated List of Lists

No regulatory information available.

CISA Chemical Facility Anti-Terrorism Standards (CFATS)

Chemical of Interest	CAS Number	RELEASE			THEFT			SABOTAGE		
		Min Conc	STQ	Security Issue	Min Conc	STQ	Security Issue	Min Conc	STQ	Security Issue
TNT; [Trinitrotoluene]	118-96-7	ACG	5000 pounds	explosive	ACG	400 pounds	EXP/IEDP			

ACG = a commercial grade.

EXP/IEDP = explosives/improvised explosive device precursors.

(CISA, 2007)

OSHA Process Safety Management (PSM) Standard List

No regulatory information available.

Alternate Chemical Names

- ALPHA-TNT
- ALPHA-TRINITROTOLUOL
- ENTSUFON
- GRADETOL
- 2-METHYL-1,3,5-TRINITROBENZENE
- 1-METHYL-2,4,6-TRINITROBENZENE
- METHYLTRINITROBENZENE
- S-TRINITROTOLUENE
- S-TRINITROTOLUOL
- SYM-TRINITROTOLUENE
- SYM-TRINITROTOLUOL
- TNT
- TOLIT
- TOLITE
- TOLUENE, 2,4,6-TRINITRO-
- TRILIT
- TRINITROTOLUENE
- TRINITROTOLUENE, DRY OR WETTED WITH LESS THAN 30 PERCENT WATER, BY MASS
- 2,4,6-TRINITROTOLUENE
- TRINITROTOLUOL
- TRITOL
- TRITOL (EXPLOSIVE)
- TRITON
- TROTYL
- TROTYL OIL



**ENVIRONMENTAL
RESTORATION, LLC**

**US EPA REGION 8
CONTRACT NUMBER 68HE0820D0002
SITE HEALTH AND SAFETY PLAN
HOLLADAY MERCURY RESPONSE**

ATTACHMENT Z

SITE-SPECIFIC TRAINING RECORD



SITE-SPECIFIC TRAINING RECORD

This is to advise that John Walters conducted a Site-Specific Training Course
(Instructor's name)

For ER, LLC at the
(Company Name)

Holladay Mercury Resposne Project on _____
(TO #, Project Name) (Date)

The total duration of the instructions was _____ hours.

Instruction covered the topics checked off below:

- Site Location, Description and History ☐
- Potential site hazards (chemical, physical, and biological) ☐
- Chemical, physical, and toxicological properties of site contaminants ☐
- Safe work practices ☐
- Training requirements ☐
- Medical Surveillance ☐
- Control Zones ☐
- Monitoring ☐
- Selection, use, and limitation, of personal protective equipment ☐
- Personnel and equipment decontamination ☐
- Emergency response procedures ☐
- Hazard communication ☐
- Blood borne pathogen briefing ☐
- COVID 19 Site Protocol ☐

The following participant attended the training course for the full duration indicated above.


Signature

Maile Lutai

Name (Print)



SITE-SPECIFIC TRAINING RECORD

This is to advise that John Walters conducted a Site-Specific Training Course
(Instructor's name)

For ER, LLC at the
(Company Name)

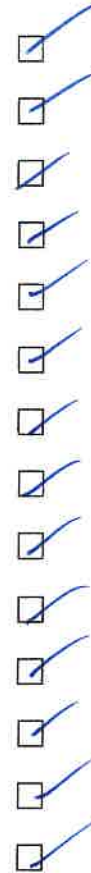
Holladay Mercury Resposne Project on
(TO #, Project Name)

(Date)

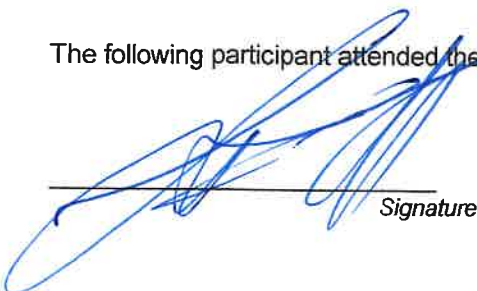
The total duration of the instructions was _____ hours.

Instruction covered the topics checked off below:

- Site Location, Description and History
- Potential site hazards (chemical, physical, and biological)
- Chemical, physical, and toxicological properties of site contaminants
- Safe work practices
- Training requirements
- Medical Surveillance
- Control Zones
- Monitoring
- Selection, use, and limitation, of personal protective equipment
- Personnel and equipment decontamination
- Emergency response procedures
- Hazard communication
- Blood borne pathogen briefing
- COVID 19 Site Protocol



The following participant attended the training course for the full duration indicated above.


Signature

Lee James T/2 w/16 Name (Print)



SITE-SPECIFIC TRAINING RECORD

This is to advise that John Walters conducted a Site-Specific Training Course
(Instructor's name)

For ER, LLC at the
(Company Name)

Holladay Mercury Resposne Project on
(TO #, Project Name) (Date)

The total duration of the instructions was _____ hours.

Instruction covered the topics checked off below:

- Site Location, Description and History ☐
- Potential site hazards (chemical, physical, and biological) ☐
- Chemical, physical, and toxicological properties of site contaminants ☐
- Safe work practices ☐
- Training requirements ☐
- Medical Surveillance ☐
- Control Zones ☐
- Monitoring ☐
- Selection, use, and limitation, of personal protective equipment ☐
- Personnel and equipment decontamination ☐
- Emergency response procedures ☐
- Hazard communication ☐
- Blood borne pathogen briefing ☐
- COVID 19 Site Protocol ☐

The following participant attended the training course for the full duration indicated above.


Signature

Sione Puvua
Name (Print)



SITE-SPECIFIC TRAINING RECORD

This is to advise that John Walters conducted a Site-Specific Training Course
(Instructor's name)

For ER, LLC at the
(Company Name)

Holladay Mercury Resposne Project on
(TO #, Project Name) (Date)

The total duration of the instructions was _____ hours.

Instruction covered the topics checked off below:

- Site Location, Description and History ☒
- Potential site hazards (chemical, physical, and biological) ☒
- Chemical, physical, and toxicological properties of site contaminants ☒
- Safe work practices ☒
- Training requirements ☒
- Medical Surveillance ☒
- Control Zones ☒
- Monitoring ☒
- Selection, use, and limitation, of personal protective equipment ☒
- Personnel and equipment decontamination ☒
- Emergency response procedures ☒
- Hazard communication ☒
- Blood borne pathogen briefing ☒
- COVID 19 Site Protocol ☒

The following participant attended the training course for the full duration indicated above.

Javier B. Rias
Signature

Javier B. Rias
Name (Print)



SITE-SPECIFIC TRAINING RECORD

This is to advise that John Walters conducted a Site-Specific Training Course
(Instructor's name)

For ER, LLC at the
(Company Name)

Holladay Mercury Resposne Project on
(TO #, Project Name)

(Date)

The total duration of the instructions was _____ hours.

Instruction covered the topics checked off below:

- Site Location, Description and History
- Potential site hazards (chemical, physical, and biological)
- Chemical, physical, and toxicological properties of site contaminants
- Safe work practices
- Training requirements
- Medical Surveillance
- Control Zones
- Monitoring
- Selection, use, and limitation, of personal protective equipment
- Personnel and equipment decontamination
- Emergency response procedures
- Hazard communication
- Blood borne pathogen briefing
- COVID 19 Site Protocol



The following participant attended the training course for the full duration indicated above.

[Signature]
Signature

Diego Ortiz

Name (Print)



SITE-SPECIFIC TRAINING RECORD

This is to advise that John Walters conducted a Site-Specific Training Course
(Instructor's name)

For ER, LLC at the
(Company Name)

Holladay Mercury Response Project on
(TO #, Project Name)

(Date)

The total duration of the instructions was _____ hours.

Instruction covered the topics checked off below:

- Site Location, Description and History
- Potential site hazards (chemical, physical, and biological)
- Chemical, physical, and toxicological properties of site contaminants
- Safe work practices
- Training requirements
- Medical Surveillance
- Control Zones
- Monitoring
- Selection, use, and limitation, of personal protective equipment
- Personnel and equipment decontamination
- Emergency response procedures
- Hazard communication
- Blood borne pathogen briefing
- COVID 19 Site Protocol



The following participant attended the training course for the full duration indicated above.

Pruoy

Signature

Leonardo Rios

Name (Print)



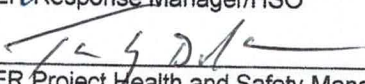
Site Safety Plan Amendment	
Amendment No.: 1	
Site Name: Holladay Merc	
Date of Issue: 4/23	
Type of Amendment:	Change of Scope - Chemicals of unknown Type Present on site
Reason for Amendment:	Chemical Removal vs. Mercury Clean-up became Priority.
Alternate Safeguard Procedures:	Inventory Chemicals - with START - Chemist on site To look up chemicals and search SDS for handling
Required Changes in PPE:	Level C - Chem Suits - OVC


EPA OSC, Region 8

4/23/24
(Date)


ER Response Manager/HSO

4/23/24
(Date)


ER Project Health and Safety Manager

4.23.24
(Date)


Cameo - utilized to look up any specific chemicals for safe handling - Package groups established w/START Chemist, Chemist also coordinated safe handling as needed.



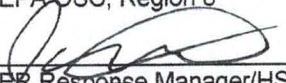
ENVIRONMENTAL
RESTORATION, LLC

US EPA REGION 8
CONTRACT NUMBER 68HE0820D0002
SITE HEALTH AND SAFETY PLAN
HOLLADAY MERCURY RESPONSE

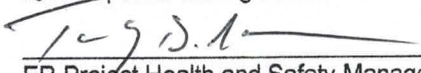
Site Safety Plan Amendment	
Amendment No.: 2	
Site Name: Holladay Merc	M8-34
Date of Issue:	4/23
Type of Amendment:	Change of Conditions
Reason for Amendment:	High explosives found on location
Alternate Safeguard Procedures:	Bomb Squad onsite, direction by CFA (Unified Fire Authority) on how to Remove chemicals other than TNT.
Required Changes in PPE:	Level C



EPA OSC, Region 8



ER Response Manager/HSO



ER Project Health and Safety Manager

4/22/24

(Date)

4/23/24

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4.23.24

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