

Chevron Products – Lubricants Plants

Hydrogen Sulfide Standard

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Table of Contents

1.0	Purpose, Objectives and Scope	1
1.1	Purpose	1
1.2	Objective	1
1.3	Scope	1
2.0	Terms and Definitions	1
3.0	Roles, Responsibilities and Training Requirements	1
3.1	Training – General	2
4.0	Standard Instructions	2
4.1	Personal Protective Equipment	2
4	1.1.1 Personal Gas Monitors	2
4	1.1.2 Respiratory Protection	2
4.2	Plant Additive List	3
4	.2.1 Identifying H2S Potential Additives	3
4	Additive List	3
4.3	Management of Change	4
4.4	Additive Handling Activities	4
4	Additive Heating General	4
4	Additive Drums Storage and Heating	4
4.5	Bulk Truck, Railcar, Isotainer, and Tank Activities	5
4.6	Maintenance Activities	6
4.7	Lab Operations	6
4.8	Occupational Hygiene Monitoring	6
4.9	Emergency Response Plans	6
5.0	Records	6
5.1	Required Records	6

6.0	References	6
7.0	Revision History	7
Арре	endix A – Emergency Response Generic Scenario	8
Appe	endix B - Critical Safeguards List	9

1.0 Purpose, Objectives and Scope

1.1 Purpose

This standard describes the hazards of hydrogen sulfide (H2S) and required engineering and administrative controls when working with additives where H2S may be emitted.

1.2 Objective

The objective of this standard is to protect personnel from incidents through communication of H2S hazards and the establishment of procedures which shall be followed when additives with the potential to release H2S are present within our facilities.

1.3 Scope

This standard applies to all Chevron Lubricants facilities and JV terminals within Chevron's OE reporting boundaries.

2.0 Terms and Definitions

Personal Gas Monitor - A wearable device, usually battery operated, which senses the presence of gases including oxygen, toxic and or combustible gases.

Third Party Waste Stewardship (TWS) – Chevron process for managing waste that could pose an environmental risk.

3.0 Roles, Responsibilities and Training Requirements

Roles must be clearly defined, and personnel must meet the training and competency requirements of this standard prior to starting work. Local regulations may specify additional training and competency requirements. The following roles apply to personnel that may be exposed to additives with potential for H2S release.

- Personnel in contact with (blending, offloading, sampling, testing, spill response and cleanup, mechanical work on equipment, etc.) additives with the potential to release H2S
- Emergency Rescue Personnel
- Supervisors where additive handling is conducted

The above personnel must be trained in the following:

- a. General locations of additives with the potential for emitting H2S if overheated
- b. Physical and health hazards of hydrogen sulfide
- c. Symptoms of over-exposure and health effects
- d. Emergency and first aid procedures
- e. Special precautions necessary to minimize exposure. (i.e. use of personal H2S monitors, heating temperatures and controls, etc.)

3.1 Training – General

The HES Specialist, or designated person, shall ensure all parties involved are advised of any H2S hazard potential.

Prior to use of additives with the potential to release H2S, personnel must receive CL - Hydrogen Sulfide Awareness Training.

Training must be documented and records maintained per corporate record retention requirements.

Refresher training must be conducted every 3 years.

4.0 Standard Instructions

Hydrogen sulfide (H2S) is extremely toxic and can be lethal, if inhaled, at concentrations at or above 100 ppm.

H2S has a characteristic strong rotten-egg odor. However, with continued exposure and at high levels, H2S may deaden a person's sense of smell. If the rotten-egg odor is no longer noticeable, it may not necessarily mean that exposure has stopped.

At low levels, hydrogen sulfide causes irritation of the eyes, nose, and throat. Moderate levels can cause headache, dizziness, nausea, and vomiting, as well as coughing and difficulty breathing. Higher levels can cause shock, convulsions, coma, and death. After a serious exposure, symptoms usually begin immediately.

4.1 Personal Protective Equipment

4.1.1 **Personal Gas Monitors**

Personal gas monitors that detect H2S must worn at all times by personnel involved in the handling or transfer of additives where there is a potential for exposure to H2S.

- Personal monitors must be set to alarm at 5 ppm H2S.
- Personal monitors must be worn in the "breathing zone of the individual. I.e. on the shirt pocket, on the collar, near the persons face, etc.
- Monitors must be equipped with automated 'self-test' with 'shut-down' notification if detector is found to be non-functional

Note: Only purchase gas detectors and monitors from reputable dealers approved by the manufacturer. There have been counterfeit monitors found at Chevron locations and they were found to be non-functioning.

4.1.2 **Respiratory Protection**

• Self Contained Breathing Apparatus (SCBA)

Required to be worn by personnel in areas where the atmosphere contains 100 ppm H2S or greater.

4.2 Plant Additive List

4.2.1 Identifying H2S Potential Additives

Additives containing ZDDP (zinc dialkyl dithiorphoric acid or zinc alkyl dithiophosphate), sulfides, sulfonates, or mercaptans may have the potential to emit hydrogen sulfide if heated above the recommended temperature, particularly if water is present. The rate of liberation of H2S increases with temperature and agitation of the material.

Determining whether there is an H2S risk can be done by reviewing the SDS for the additive. It can be complicated to get the H2S information because there is no standard for where in the SDS this information must be. Below is a list of locations in the SDS where you might find the information, but keep in mind that information on the hazard may exist elsewhere.

• Section 2: Might have information specific to H2S and if ZDDP is present.

Other hazards which do not resultContainer vapor space may contain hydrogen sulfide whichin GHS classification:may cause respiratory irritation.

Hazardous Ingredients				
Comp	CAS No.	Percentage (by wt.)	Carcinogen	
Zinc alkyldithiophosphate	Confidential.	From 50 to 59.9 percent	N/E	
Butylated phenol	Confidential	From 20 to 29.9 percent	N/E	

• Section 7 Handling and Storage: Might have information specific to H2S

Precautions for safe handling:	Material can accumulate static charges which may cause an electrical spark (ignition source). Use proper bonding and/or grounding procedures. Use grounding and bonding connection when transferring material. In case of spills, beware of slippery floors and surfaces.
	Liberates hydrogen sulfide gas. Open container carefully and only in adequately ventilated areas or use appropriate respiratory protection. Keep

• Section 10 (Stability and Reactivity): This section may highlight that "thermal decomposition" of the additive could release H2S.

Hazardous Decomposition	Thermal decomposition or combustion may generate smoke, carbon
Products:	monoxide, carbon dioxide , sulfur oxides, mercaptans, sulfides, including
	hydrogen sulfide and other products of incomplete combustion. Thermal

4.2.2 Additive List

A list of additives that may emit H2S if overheated is to be maintained at the plant the by HES Specialist or designated person. SDSs shall be reviewed as the source document. Plants should note which additives on their list require heating and the critical temperatures.

At a minimum, the additives that require heating and their critical temperatures must be displayed as a reference in the areas where heating of these additives occurs (i.e. near hot houses, at railcar racks, etc.), as described in section 4.4

Additive	Type of Container	Maximum Storage Temperature °F (°C)	Maximum Allowable Temperature °F (°C)
Anglamol 6043CA	Bulk	113 (45)	140 (60)
Irgalube 353	Drum	95 (35)	95 (35)
OLOA 21030SA	Drum	113 (45)	185 (85)

TABLE 1 – EXAMPLE: ADDITIVES WHICH MAY EMIT H2S IF OVERHEATED

4.3 Management of Change

The MOC process must be followed prior to receiving any new additives to the plant.

4.4 Additive Handling Activities

Designate area(s) for management of drum transfer activities (e.g., drawing samples, pulling small volume quantities to be added to blends, etc.) at each Facility with the following required criteria:

- Indoor Locations Mechanical ventilation, either forced draft or induced draft to be used during the physical transfer of material from drum to transfer container(s) or tanks/kettles.
 - Ventilated airflow must be directed away from adjacent areas where personnel are normally working

4.4.1 Additive Heating General

- Post maximum temperature listings for all products that have H2S potential at heating locations, e.g. drum ovens, railcar rack, etc. See section 4.2.2
- These additives must have their handling and storage temperatures identified. The temperatures can be determined by reviewing section 7 of the SDS. These temperatures must be identified and communicated to personnel, and must be identified on the plant additive list.
- **Maximum Storage Temperature** This is the maximum temperature that the additive can be stored at for an extended period of time. If this temperature is exceeded for an extended period, H2S could evolve.
- Maximum Handling Temperature (aka Pumping Temperature or Loading Temperature) This is the maximum temperature that the additive can ever be heated to. This temperature should never be exceeded. Additives heated to this temperature should be used as soon as possible and then allowed to cool down to below the Maximum Storage Temperature.
- Only heat quantities necessary for use, e.g. 1 drum vs full pallet if only 1 drum will be needed for blending

4.4.2 Additive Drums Storage and Heating

All drums on the plant additive list shall have H2S warning labels placed on them. The labels must, at a minimum contain the word "Warning" and text that bring attention to the H2S hazard. Label examples:



- All drum heating activities must be managed to ensure that components being heated do not exceed maximum temperatures
 - **Temperature controls and displays:** Hot boxes, heating bands, etc. must be equipped with temperature controls (set points) and must have the temperature displayed (can be remote i.e. on the operator's computer screen).
 - Automatic alarm and shutdown for high temperature: All drum heating systems must be equipped with a high temperature alarm and shutdown mechanism to alert the operator that this critical temperature has been reached and to ensure that H2S risk is mitigated. The alarm and shutdown setpoint can be no greater than the maximum storage temperature or maximum handling temperature, depending on what the additives are being heated to.
- Under NO circumstances shall drums be placed in hot rooms set to exceed their maximum short term handling temperature. Operators should identify clearly those drums placed in hot rooms (e.g. whiteboard on outside of hotbox).
- All drums previously containing H2S additives must be kept closed (bungs screwed in) once empty. H2S warning stickers should be left on to aid with communicating the hazard to the TWS vendor.

4.5 Bulk Truck, Railcar, Isotainer, and Tank Activities

Operators should position themselves on the upwind side of the container/conveyance whose contents has the potential to release H2S (e.g., railcar dome, ISO-container dome, tank gauge hatch, etc.) when conducting operating activities (e.g., opening hatch, gauging, sampling, etc.).

All railcar, isotainer, bulk truck heating systems (when H2S additives are being heated) must be equipped with:

- **Temperature controls and displays:** Temperature controls (set points) must have the temperature displayed (can be remote i.e. on the operator's computer screen).
- Automatic alarm and shutdown for high temperature: Must be equipped with a high temperature alarm and shutdown mechanism to alert the operator that this critical temperature has been reached and to ensure that H2S risk is mitigated. The alarm and shutdown setpoint can be no greater than the maximum storage temperature of maximum handling temperature, depending on what the additives are being heated to.

4.6 Maintenance Activities

Before maintenance personnel are permitted to work on equipment that has contained H2S additives, gas testing shall be conducted to determine the H2S concentration. Equipment should be cooled, ventilated, drained, and otherwise cleaned before gas testing.

If H2S concentrations detected are greater than or equal to 5 ppm, work shall not be permitted. Equipment should be cleaned thoroughly or mechanical ventilation used until H2S concentrations are reduced to below 5 ppm.

4.7 Lab Operations

Lab operations with H2S additives should be conducted within the confines of a hood whenever possible.

Operations outside of the fume hood should be conducted in a well ventilated area. Larger quantities of additives being transferred or otherwise used should be conducted using mechanical ventilation as described in section 4.4.

4.8 Occupational Hygiene Monitoring

Occupational Hygiene (OH) monitoring to be conducted in accordance with the OH process.

4.9 Emergency Response Plans

Emergency Response plans and drills should address preparedness for a potential H2S release scenario and may include the identification of dedicated storage locations for additives which may emit H2S if overheated.

See Appendix A for an example of an emergency response scenario

5.0 Records

5.1 Required Records

The following records will be kept for conformance with this standard:

- Emergency response drill reports related to H2S release
- Training records

6.0 References

The following is a complete list of the documents referenced by this standard: Hydrogen Sulfide Awareness Training – Found in WorkDay

7.0 Revision History

Table 1. Revision History

Revision Number	Date	Note
0	February 2010	Initital Release
1	November 2018	Major Update

Appendix A – Emergency Response Generic Scenario

Release of H2S

First Person to Discover the release (This is normally by the detection of a "rotten egg" smell or the activation of a personal H2S monitor)

- Leave the immediate area.
- Immediately notify the Emergency Response Team.
- Immediately notify Supervisory Personnel.

Incident Command / Emergency Response Team:

- Identify and secure/isolate the area.
- A Qualified Gas Tester will carefully enter area to determine the H2S levels and to identify source of H2S gas.
- If the level of H2S is determined to be 100 ppm or greater, develop strategy to reduce the concentration to acceptable level. I.e. ventilate area and allow any additives to cool down (shut down heat source, etc.)

Rescue and First Aid

- Immediately move personnel exposed to H2S to fresh air.
- H2S poisoning is a life –threatening condition, characterized by loss of consciousness and associated respiratory failure. Therefore, treatment must be rapid to be effective.
- If a person's breathing and heartbeat has stopped, CPR should be administered at once. Note: CPR should be performed using a one-way valve to prevent rescuers from H2S exposure. The person should be kept warm and be seen by a physician as soon as possible.
- Eye irritation should be treated by flushing the eyes with fresh water for 15 minutes.

Supervisory Personnel:

- Summon Plant Emergency Response Team (ERT's) to the scene if there is an H2S injury (overexposure).
- Ensure all persons are out of impacted area.
- Provide operational support to ERT

Appendix B - Critical Safeguards List

Safeguard	Preventative / Mitigative	Human Action / Hardware / Both
MOC process being used for new additives	Preventative	Human Action
Communication of hazards and safeguards to employees	Preventative	Human Action
Communication of additives that contain H2S at the facility and the critical heating temperatures	Preventative	Human Action
Heating controls for railcar/isotainer/truck heating	Preventative	Human Action and Hardware
Heating controls for hot boxes, heating bands, etc.	Preventative	Human Action and Hardware
Personal Monitors	Mitigative	Engineering
Mechanical ventilation for indoor transfer activities	Mitigative	Engineering
Portable Gas Testers	Mitigative	Human Action and Hardware
Self contained breathing apparatus (SCBA) for personnel entering 100 ppm or greater atmospheres	Mitigative	Human Action and Hardware
Alarms for heating operations	Mitigative	Engineering