## Hydrogen Sulfide (H2S)

1. **Purpose**

To establish hydrogen sulfide safety requirements for facilities where H2S gas is present or potentially present.

1. **Responsibilities**

The Field Foreman shall:

* Review the Hydrogen Sulfide Policy with affected personnel.

The Environmental, Safety, and Health Department shall:

* Coordinate the overall Hydrogen Sulfide Program.
* Assist in the development of a site-specific contingency plan.
* Provide Hydrogen Sulfide Safety training and training materials.

1. **General**

* Exposure to H2S can occur in job functions such as drilling operations, recycled drilling mud, water from sour crude wells, blowouts, tank gauging, field maintenance and tank batteries and wells, etc.
* Each operating location with hydrogen sulfide (H2S) concentrations above 10 ppm in atmosphere or 100 ppm when measured level with the thief hatch of tanks shall have a written (H2S) safety program to govern activities that may expose personnel to H2S.
* H2S concentrations shall be measured level with the thief hatch opening on all manually-gauged sour crude and condensate tanks.
* Each operating location that is considered sour, as described above, shall comply with all aspects of governmental regulations regarding operations where H2S may be present.
* No person shall enter an area where H2S concentrations are known or suspected to be ten (10) parts per million (ppm) by volume in air at the employees breathing zone without wearing a self-contained breathing apparatus.
* All contract personnel shall be required to comply with the H2S safety requirements in this safety program.

1. **Health Effects**

H2S poisoning results in affecting the nerve centers in the brain which control breathing causing paralysis of that system; the lungs stop working and the person is asphyxiated.

1. **Training**

Safety training shall be provided for all personnel who may be required to work in a known or suspected H2S environment. This training must be given prior to working in an H2S environment. The following areas must be covered in the training program:

* Hazards and characteristics of H2S and sulfur dioxide (SO2) gases.
* Toxicity and properties of H2S and SO2.
* Use of H2S detection devices.
* Use and limitations of respiratory protection equipment.
* Symptoms of exposure.
* First aid procedures and equipment.
* Use of the buddy system and emergency rescue procedures.
* H2S alarms and contingency plans.
* Our policy and procedures and H2S locations.
* All personnel who work in or may be required to work in an H2S area shall complete a refresher course in H2S safety annually.
* All training shall be documented.
* Contractors shall document and provide verification of such training of their employees upon request.

1. **Respiratory Protection**

* Only positive pressure self-contained breathing apparatus (SCBA) or positive pressure airline units will be used in any known or suspected H2S environment of 10 ppm or greater in the breathing area.
* 5.1.2 The use of canister type gas masks for protection against H2S is prohibited.
* 5.1.3 All SCBA and supplied air face pieces shall be fitted with a nose cup where temperatures may drop below 32 degree F. and operated in the positive pressure mode.

1. **Signs**

* All field locations, production facilities, and platforms that present potential H2S exposures shall be so designated at their access points with danger signs that warn personnel of potential H2S exposures.
* Fields with limited public road access may use one H2S sign at each given access point to a group of well locations rather than placing a sign at each location. However, all tank battery access roads must have a sign in place.
* Sign wording should be: Danger: Poison Gas. Signs already in-place that convey the same meaning does not have to be replaced with signs that have this exact wording.

1. **Specific Work Procedures**

* No tank, line, valve, flange, etc. which may create a H2S concentration of 10 ppm or greater in the employees breathing zone shall be opened to the atmosphere unless proper respiratory protection is worn by personnel performing the job.
* When possible, the equipment should be depressured, isolated and purged/cleaned before opening.
* After opening equipment to atmosphere, the potential H2S source area shall be sampled to determine the H2S level.
* Respiratory protection must be worn when opening the equipment to atmosphere and during testing.
* If concentrations exceed 10 ppm in the breathing zone, respiratory protection must be worn for the duration of the job or until the H2S level drops below 10 ppm in breathing zone.
* Personal monitoring equipment shall be used by personnel working without respiratory equipment where during the course of their work there is a reasonable possibility that the H2S levels may rise above 10 ppm in the breathing zone, i.e. catwalks at sour tanks, header buildings or water stations.
* Personal monitoring devices must be set to alarm at 10 ppm so the employee is alerted to vacate the area to get respiratory equipment.
* If the area is equipped with a fixed detection system then personal monitoring devices are not required.
* Monitoring devices and fixed detection systems shall be calibrated prior to use in accordance with the manufacturers specifications.
* A standby person is required when an employee may be exposed to 300 ppm H2S in their breathing zone during the course of his/her work. This may include additional riders with pumper personnel.
* The standby person must be equipped with an SCBA.
* Has ruled that the breathing zone shall be considered being level with the thief hatch for tank gauging operations.
* Relief valves venting dangerous concentrations of (> 300 ppm) H2S vapors must be vented to flare or where personnel will not be exposed.
* Personnel shall not leave wells being blown down unattended.
* All employees must be aware of the company's emergency plan and they must be aware of any site specific emergency or contingency plan.

1. **Emergencies**

* Personnel responsibilities during an H2S alarm or emergency shall be established in writing by each operating location. These responsibilities shall include personnel accounting, securing the area, isolating the leak, etc.
* Personnel will not respond to an H2S alarm/leak alone. The buddy system must always be used in response to alarm situations.
* All personnel shall be trained in their responsibilities regarding H2S alarms or emergencies.
  + Training shall be documented.
  + This training may coincide with annual H2S training.
* Contractors and visitors shall be informed of their responsibilities during an H2S alarms before they begin work on any potential H2S location. Generally, their responsibilities shall be to evaluate the area and report to a safe briefing area.
* Safe briefing areas shall be established for all manned H2S locations. Safe briefing areas shall be designated by conspicuous signs.
* The supervisor in charge or the ranking employee on-site has the authority to decide whether an H2S leak is to be ignited. However, some state law enforcement agencies may have jurisdiction whether to ignite an H2S leak.

1. **H2S Detection Equipment**

* Fixed H2S detection systems shall be considered for areas that may experience H2S leaks where personnel are present on a daily basis.
* The system shall activate distinctive audible and visual alarms. Sensors shall be set to annunciate at 10 ppm for a low alarm and a maximum of 20 ppm for a high alarm.
* The system shall be calibrated at least every 90 days or sooner if required by regulation.
* All H2S alarms shall be treated as an actual gas release.
* H2S alarms shall be distinctive from all other alarms and shall be consistent throughout the facility.
* Hand held detection instruments shall be utilized for spot checking areas.
* All electronic hand held instruments shall be calibrated before use.
* All calibrations shall be documented and retained on file.

1. **First Aid Treatment**

* Activate the Emergency Response Plan.
* Always don an SCBA before entering a potential H2S area, then remove victim to a safe area and begin artificial resuscitation.
* Request mechanical resuscitator (continue mouth to mouth resuscitation until it arrives).
* Resuscitators shall be made available to employees working at all H2S locations with employees trained in their proper use.
* Resuscitator training can occur during the CPR training.
* Initiate CPR if circulation has stopped.
* Treat for shock (keep the victim warm).
* Ensure personnel overcome by H2S are examined by a physician.

1. **H2S Characteristics**

* H2S is colorless.
* H2S is heavier than air and will accumulate in low areas.
* H2S has a strong "rotten egg" smell but also H2S will quickly deaden your sense of smell.
* H2S is extremely flammable. If H2S catches on fire it will produce toxic by-products such as SO2.
* H2S will dissolve in water.
* H2S is extremely toxic. A single breath of H2S concentrations of 1000 ppm or higher can cause death.