

1.1 PURPOSE

- 1.1.1 The purpose of this policy is to ensure that effective safe work practices are used to protect TERRY R PITT CONSTRUCTION employees from occupational exposure to hydrogen sulfide (H₂S).

1.2 SCOPE

- 1.2.1 This policy covers work performed by TERRY R PITT CONSTRUCTION employees and applies to all personnel at TERRY R PITT CONSTRUCTION's owned, operated, or maintained facilities where an exposure to airborne H₂S at or above 10 parts per million (ppm) may occur.
- 1.2.2 Use of this policy is required when any of the following activities are conducted in an area where H₂S could be present:
- 1.2.2.1 Entry into confined spaces
 - 1.2.2.2 Commodity sampling
 - 1.2.2.3 Working on corroded pipe/line repairs
 - 1.2.2.4 Leak response
 - 1.2.2.5 Operating process equipment in areas where H₂S is known to be or may be present
 - 1.2.2.6 Other activities which H₂S monitoring has determined H₂S in concentrations \geq 10 ppm
 - 1.2.2.7 Line breaking activities

1.3 RESPONSIBILITIES

- 1.3.1 Supervisor
- 1.3.1.1 Provide leadership to ensure safety policies and procedures are fully implemented
 - 1.3.1.2 Ensure that employees are knowledgeable of the H₂S requirements for the worksite
 - 1.3.1.3 Inform all personnel of the locations where H₂S may be expected
 - 1.3.1.4 Ensure that all monitoring is completed
 - 1.3.1.5 Ensure all warning systems are posted, mounted, or labeled, as appropriate
- 1.3.2 Employee
- 1.3.2.1 Follow H₂S requirements at the jobsite as described within this policy
- 1.3.3 Safety department
- 1.3.3.1 Assist with monitoring by providing information and instruction at the worksite
 - 1.3.3.2 Assist with the selection, location, and usage of fixed monitoring systems

1.3.3.3 Coordinate the development and revisions to this procedure

1.3.3.4 Coordinate the implementation and training of this procedure

1.4 CHARACTERISTICS

1.4.1 Hydrogen sulfide is a toxic, colorless gas with the odor of rotten eggs. You cannot depend upon vision to detect it.

1.4.2 H₂S is heavier than air, so it tends to settle in low-lying and non-well-ventilated areas. Even when using mechanical ventilation, employees should ensure that gas is not being directed to an area where it can settle on the platform or to other lower lying areas on the jobsite, where other individuals will be working. Additionally, because hydrogen sulfide is heavier than ambient air (approximately 19%), it can travel along the ground. In sufficient enough concentrations, it may find an ignition source before wind currents can break it up.

1.4.3 H₂S is soluble in liquids and therefore mixes easily with drilling mud and other drilling fluids. On still foggy days, hydrogen sulfide can accumulate at dangerous levels (fog is simply minute droplets of liquid suspended in air).

1.4.4 H₂S is corrosive and can cause deformation and/or fracturing of certain metals (stress cracking) in pressurized lines, and especially at electrical contacts due to high corrosives.

1.4.5 H₂S is extremely flammable, in a range of 4.0% to 44% (NIOSH), by volume in air. With 4.0% representing the LEL (lower explosive limit), and 44% representing the UEL (upper explosive limit). Employees, for the purpose of this policy, will not work in any hydrogen sulfide contaminated location where detectable levels, measured by a direct reading calibrated instrument, reveals levels of .04% or less (preferably 0%).

1.4.6 H₂S creates toxic byproducts when burned. When ignited, hydrogen sulfide produces sulfur dioxide (SO₂).

1.5 HEALTH EFFECTS

1.5.1 H₂S is an irritant and a chemical asphyxiant with effects on both oxygen utilization and the central nervous system. Its health effects can vary depending on the level and duration of exposure.

1.5.2 Low concentrations irritate the eyes, nose, throat, and respiratory system (ex. burning/tearing of eyes, cough, shortness of breath). Asthmatics may experience breathing difficulties.

1.5.3 The effects can be delayed for several hours or sometimes several days when working in low level concentrations. Repeated or prolonged exposures may cause eye inflammation, chronic headache, fatigue, irritability, insomnia and other sleep disorders, digestive disturbances, high blood pressure, nausea, and weight loss.

1.5.4 Moderate concentrations can cause more severe eye and respiratory irritation (including coughing, difficulty breathing, accumulation of fluid in the lungs), headache, dizziness, nausea, vomiting, staggering, and excitability.

- 1.5.5 High concentrations can cause shock, convulsions, inability to breathe, extremely rapid unconsciousness, coma, and death. Effects can occur within a few breaths and possibly a single breath.

1.6 GENERAL INSTRUCTIONS

- 1.6.1 A method of protecting employees from exposure to atmospheric concentrations of H₂S equaling or exceeding 10 ppm will be provided. Acceptable methods include, but are not limited to:

- 1.6.1.1 Requiring all personnel to wear proper and fully functioning supplied air respiratory protection equipment before entering the area
- 1.6.1.2 Installing fixed H₂S monitoring equipment
- 1.6.1.3 Using personal H₂S monitors
- 1.6.1.4 Properly ventilating the facility to maintain H₂S concentrations in the work area atmosphere less than 10 ppm, confirmed by continuous monitoring

- 1.6.2 Testing in the facility should be performed before entry and performed continuously while in the facility using portable H₂S detection equipment to verify that H₂S concentration in the worksite atmosphere does not exceed 10 ppm.

1.7 DETECTION AND MONITORING

- 1.7.1 If an SDS is not available for a produced oil or gas stream, testing for the presence of H₂S must be done for each new type of material soon after it has been received so the degree of hazard can be assessed. Affected employees will be advised of monitoring results and what precautions to take.

- 1.7.2 Continuous fixed monitoring systems are used to constantly measure the concentration of H₂S in the atmosphere. A fixed monitoring system should be considered where process equipment loss of containment may create harmful levels of H₂S where personnel are likely to be working or where a significant release may pose a community threat.

- 1.7.3 Examples of such sites are meter stations and pump rooms that handle products containing levels of H₂S that may exceed 10 ppm in airborne samples.

- 1.7.3.1 Fixed monitors are set at 10 ppm to alert and warn personnel to use respiratory protection equipment if they are to remain in the area for an extended period.
- 1.7.3.2 If the fixed monitor has a second alarm, it will be set to alarm at 20 ppm. If TERRY R PITT CONSTRUCTION is subject to the 29 CFR 1926 Construction Industry standard, 10 ppm should not be exceeded.
- 1.7.3.3 The fixed monitors will be tested monthly, or as recommended by the manufacturer. The results of these tests will be recorded.
- 1.7.3.4 Odor is not considered an effective indicator of H₂S. Individuals may not be able to smell an odor after an extended period of exposure to it, because they become accustomed to the odor.

- 1.7.4 Personal and portable H₂S monitor/alarm units are designed to provide workers with an additional measure of protection by warning of potentially hazardous levels of H₂S within the immediate work area. These personal H₂S monitor units should be set to alarm (both visible and audible) at 10 ppm to alert and warn personnel to evacuate the area or to immediately don respiratory protection equipment (SCBA) if they are to remain in the area. Employees who have the potential to be exposed to hydrogen sulfide (H₂S) above the occupational exposure limit (OEL) of 10 ppm or the permissible exposure limit (PEL) of 20 ppm when working under the requirements of 29 CFR 1926.55, where applicable, will be trained in the operation and maintenance of the portable and personal gas detection equipment they are expected to use.
- 1.7.5 Contact the safety department for information regarding approved H₂S monitoring devices.
- 1.7.6 In areas where H₂S may be present, monitors shall be used. Monitors must be bump tested at a minimum as required by manufacturer. If monitor fails a bump test, a full calibration is required. Monitors must be calibrated according to manufacturer's recommendations. Personal alarm monitors must be set to alarm initially at 10ppm H₂S, and each employee shall wear an H₂S personal alarm monitor when working in all potential H₂S areas. Employees who have the potential to be exposed to hydrogen sulfide (H₂S) above the occupational exposure limit (OEL) or the permissible exposure limit (PEL) will be trained on how to bump test and calibrate the portable and personal gas detection equipment they are expected to use.
- 1.7.7 Employees who have the potential to be exposed to hydrogen sulfide (H₂S) above the occupational exposure limit (OEL) or the permissible exposure limit (PEL) will be trained on the required elements of OSHA's Respiratory Protection standard, 29 CFR 1910.134, to include medical evaluations, fit testing, and selected respirator training.

1.8 WARNING SYSTEMS

- 1.8.1 When mixtures containing hydrogen sulfide are present in the workplace and exposures above the applicable exposure limits can occur, appropriate hazard communication practices should be implemented. This includes SDSs, chemical inventory, container labeling, warning systems (ex. signs, flags, windsocks), and training.
- 1.8.2 A sign reading *DANGER - H₂S May Be Present* will be conspicuously located at points where equipment can be opened and H₂S released to the atmosphere
- 1.8.3 These points may include:
 - 1.8.3.1 Base of the stairway on tanks
 - 1.8.3.2 Sample points
 - 1.8.3.3 Barge/railcar loading and unloading facilities
 - 1.8.3.4 Valve boxes
 - 1.8.3.5 Scraper traps
 - 1.8.3.6 Pig launch or receipt stations

- 1.8.3.7 Other locations where monitoring has determined H₂S in concentrations equal to or above 10 ppm could be present and could pose a danger to personnel.
- 1.8.4 Above ground pipelines that contain product with concentrations above 1% or 10,000 ppm H₂S will be labeled H₂S with black letters on a yellow band. Letters should be at least 3" high and visible from any direction from which personnel could approach.
- 1.8.5 Windssocks will be located and maintained at facilities where atmospheric H₂S at the source exceeds 10 ppm. The windssocks should be strategically mounted throughout the facility where they are visible to personnel.
- 1.8.6 Employees with exposure to or conducting any of the following operations could have a potential of exposure to hydrogen sulfide: drilling operations, recycled drilling mud, water from sour crude wells, blowouts, tank gauging (tanks at producing, pipeline and refining operations), field maintenance, and tank batteries and wells, etc.
- 1.8.7 When monitor alarms sound, vacate the area and do not re-enter. Notify or contact necessary personnel, and do not return to work area until clearance is given for re-entry.

1.9 PERSONAL PROTECTIVE EQUIPMENT

- 1.9.1 Wear PPE to prevent eye contact. Selection of eye protection depends on the work operations conducted and other personal protective equipment worn. It may include safety glasses, chemical goggles, face shields, or a full-face piece respirator. See SDS for more information.
- 1.9.2 Follow instructions and requirements provided in the *Respiratory Protection* policy. If suspected area is a confined space, refer to *Confined Space Entry* policy.
- 1.9.3 TERRY R PITT CONSTRUCTION uses the following acceptable respirators:
 - 1.9.3.1 Full-face piece pressure-demand self-contained breathing apparatus (SCBA) with a service life of 30 minutes. Pressure demand respirators are positive pressure atmosphere-supplying respirators that admit breathing air to the face piece when the positive pressure is reduced inside the face piece by inhalation.
 - 1.9.3.2 Full face supplied air respirator (SAR) airline with auxiliary self-contained air supply.
- 1.9.4 Respirators provided solely for escape will be certified by NIOSH or have equivalent approval for escape from atmospheres containing hydrogen sulfide. Escape-only respirators have a single function: to allow a person working in a normally safe environment sufficient time to escape from suddenly occurring respiratory hazards. Selection of an escape-only respirator should include consideration of factors such as maximum expected concentration, escape time (ex. Exposure duration), breathing rate, respirator service life, and eye irritation. Supplied air escape-only respirators are recommended.
- 1.9.5 A self-contained breathing apparatus (SCBA) or a supplied airline respirator with an escape bottle with a full-face mask must be worn whenever:

- 1.9.5.1 H₂S concentration in atmosphere is at or suspected to be at 10 ppm or greater
- 1.9.5.2 Personnel are conducting air monitoring for H₂S and the concentration is unknown
- 1.9.5.3 When opening a system or bleeding down a system (for example, vessels, lines, scrubbers, etc.) and the concentration of H₂S in the work-area atmosphere is at or suspected to be at 10 ppm or greater
- 1.9.6 The TERRY R PITT CONSTRUCTION's hydrogen sulfide exposure limit determined to be IDLH is 100 ppm. The occupational exposure limit (OEL) for TERRY R PITT CONSTRUCTION, which limits employee exposure to H₂S, is 10 ppm, as stated as an eight-hour time weighted average (TWA). The OSHA PEL for Construction is 20 parts per million (ppm) as an eight-hour TWA and the OEL followed by ANSI, API, and NIOSH is 10 ppm as an eight-hour TWA. OSHA General Industry standards do not offer a PEL for industry; instead an accepted ceiling concentration (ACC) of 20 ppm is used.
- 1.9.7 TERRY R PITT CONSTRUCTION requires respiratory protection as described above, for entry into potential IDLH atmospheres, 100 ppm or greater. In addition, a second person is needed as a standby with an SCBA and rescue equipment in a safe area.
- 1.9.8 If manual tank gauging is performed to check automatic gauges or when gauge hatches will be opened for any reason and potential exposures are greater than or equal to 100 ppm, a second person (standby) is needed. The standby with an SCBA must be located in a safe area.

1.10 TRAINING

- 1.10.1 Employees who work in areas where the potential for exposure to H₂S is 10 ppm or greater must be informed of the hazards of H₂S exposure, symptoms of overexposure, use of respiratory protection equipment, and special precautions to minimize exposure and will be trained in the hazards associated with H₂S and the use of personal protective equipment.
- 1.10.2 Trained workers will:
 - 1.10.2.1 Demonstrate knowledge of the hazards of H₂S
 - 1.10.2.2 Comply with the provisions of this and other applicable procedures
 - 1.10.2.3 Properly use and maintain personal protective equipment
 - 1.10.2.4 Demonstrate knowledge of site-specific operations/contingency plan procedures, if applicable
- 1.10.3 Workers whose job requirements may put them at worksites with potential concentrations of H₂S will have annual training in subjects including, but not limited to, the following:
 - 1.10.3.1 The hazards, characteristics, properties, and sources of H₂S
 - 1.10.3.2 Danger in relying on sense of smell - individuals may not be able to smell an odor after an extended period of exposure to it, because they become accustomed to the odor

- 1.10.3.3 Specific locations where H₂S monitors and respiratory protective equipment are required, locations of H₂S detectors and alarms
- 1.10.3.4 Proper use of H₂S detection methods and monitoring equipment
- 1.10.3.5 Effects of H₂S on equipment (metal fatigue)
- 1.10.3.6 Symptoms of overexposure to H₂S and first aid for H₂S overexposure
- 1.10.3.7 Emergency medical procedures as outlined in the facility contingency plan
- 1.10.3.8 Proper use of and maintenance of respiratory and eye protection equipment
- 1.10.3.9 Safe work and rescue procedures to minimize exposure and protect employees from an H₂S emergency
- 1.10.3.10 Wind direction awareness and safe routes of egress
- 1.10.3.11 Job hazards
- 1.10.3.12 Confined and enclosed space entry procedures (where applicable)
- 1.10.3.13 Right to access medical and exposure records, SDSs, and the chemical inventory
- 1.10.4 Employees who have the potential to be exposed to hydrogen sulfide (H₂S) above the stated occupational exposure limit (OEL) or permissible exposure limit (PEL) will be trained in H₂S awareness.
- 1.10.5 Affected company employees will be trained on site-specific emergency action plans to include evacuation procedures.
- 1.10.6 Training will be on an ongoing basis and be conducted by qualified personnel. Periodic drills on the use of the respirators and rescue of workers should be included as part of the training program.
- 1.10.7 Refresher training will be provided as follows:
 - 1.10.7.1 As required by applicable regulations or process safety standard
 - 1.10.7.2 As needed when identified by: verification, inspections, incidents, or audits
- 1.10.8 Training records, such as training rosters, and an outline of the training curriculum will be maintained on all H₂S training at each facility.
- 1.10.9 TERRY R PITT CONSTRUCTION will ensure that all workers with the potential to be exposed to H₂S above the OEL or PEL will be trained prior to working in H₂S environments with a minimum of 3.5 hours of instructor-led classroom training. Training programs will adhere to the ANSI Z390.1-2012 (R2017) *Accepted Practices for Hydrogen Sulfide (H₂S) Training Programs*.

Hydrogen Sulfide

1.10.10 All employees with the potential to be exposed to H₂S above the OEL or PEL will be required to take H₂S awareness refresher training annually. The training will be instructor-led classroom training for a minimum of 3.5 hours. The training will follow the ANSI Z390.1-2012 (R2017) standard.

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