



SECTION 34
HYDROGEN SULFIDE (H₂S) PROGRAM



1. **REGULATORY STANDARD:** OSHA - 29 CFR 1910.1200 and 1926.55

Purpose: The purpose of this program is to inform interested persons, including employees, that Maul Electric, Inc is complying with OSHA's Gases, Vapors, Fumes, Dusts, and Mists standard, Title 29 Code of Federal Regulations 1926.55 and other OSHA rules as needed to ensure that no employee is exposed to inhalation, ingestion, skin absorption, or contact with any material or substance at a concentration above those specified in the "Threshold Limit Values of Airborne Contaminants for 1970" of the American Conference of Governmental Industrial Hygienists found in Appendix A of 29 CFR 1926.55. **This program will address potential exposures to Hydrogen Sulfide.**

To achieve compliance Maul Electric, Inc must first implement all feasible administrative and engineering controls. However, when such controls are not feasible, employees will use protective equipment provided by Maul Electric, Inc at no cost to the employee or other protective measures to keep the exposure of employees to air contaminants within the limits prescribed in Appendix A of 29 CFR 1926.55. All equipment and technical measures used to achieve compliance will first be approved for each particular use by a competent industrial hygienist or other technically qualified person.

2. **Administrative Duties:** This written safety program is for Maul Electric, Inc employees and subcontractors construction work sites. The Site Supervisor is the program coordinator/manager and is responsible for its implementation.

3. **Scope:** Maul Electric, Inc. has chosen to establish a Hydrogen Sulfide Awareness Program for emergencies that could arise from exposure to Hydrogen Sulfide.

4. **Physical and Chemical Characteristics**

4.1. Sulfur and Sulfur Compounds may be present in crude oil as hydrogen sulfide (H₂S), as compounds (e.g. mercaptans, sulfides, disulfides, thiophenes, etc.), or as elemental sulfur. Each crude oil has different amounts and types of sulfur compounds, but as a rule the proportion stability and complexity of the compounds are greater in heavier crude-oil fractions.

4.2. As part of the work of Maul Electric, Inc our employees may be exposed to H₂S especially when working in confined spaces or refineries. Hydrogen sulfide is a primary contributor to corrosion in refinery processing units and piping. Other corrosive substances are elemental sulfur and mercaptans. Moreover, the corrosive sulfur compounds have an obnoxious odor.

4.3. Hydrogen sulfide is a toxic, colorless, with the odor of rotten eggs at low concentrations, is soluble in water and is flammable.



5. Health Effects

5.1. Inhalation, ingestion, and contact with are all methods by which H₂S can affect the body. The effects may range from irritation of the eyes, nose, and throat; to temporary loss of smell. Headaches, dizziness, and upset stomach are more intense symptoms caused by higher concentrations. However, inhalation of high concentrations of H₂S may cause instant paralysis of the respiratory system causing loss of consciousness and death. In concentrations of H₂S at 1000 to 2000 ppm even a single breath may cause coma and may be fatal. Because of its extremely serious and/ or fatal potential, any employee believed to be exposed to H₂S shall immediately notify the Supervisor or Manager.

6. General Requirements. Maul Electric, Inc will establish Hydrogen Sulfide operational procedures through the use of this document.

Permissible Exposure Levels (PEL)

While not definitive, H₂S levels below 10 ppm appears to cause little short term effects. When H₂S level are unknown, respirators shall be used.

Current OSHA standards are:

20 ppm Ceiling Level

50 ppm Maximum allowable peak for 10 minutes with no other exposure

Current NIOSH standards are:

10 ppm PEL averaged over 10 minute period

50 ppm area shall be evacuated

7. Exposure detection, assessment, and monitoring

7.1. Maul Electric, Inc. Site Supervisor shall conduct personal or area sampling for hydrogen sulfide to measure worker exposures. Air sampling is needed to measure worker exposures and select appropriate engineering controls and respiratory protection. Where data is collected it must be retained to support negative exposure assessments. Maul Electric, Inc conduct both initial and periodic air monitoring

7.2. Maul Electric, Inc will further perform air monitoring as needed to measure the effectiveness of controls and as required under our written excavation procedures.

7.3. Maul Electric, Inc will utilize direct reading instruments (4 gas meter) and colorimetric tubes for quantification of exposures to Hydrogen Sulfide. Signs and symptoms of exposure are as follows:

Short Term Effects:

- 0.13 ppm Threshold of odor detection
- 0.77 ppm Faint, but readily perceptible odor
- 4.6 ppm Easily noticeable odor



- 10 ppm Eye irritation, soreness, redness, burning
- 27 ppm Strong, unpleasant, but not intolerable odor
- 50 ppm Irritation & dryness of nose, throat, and airways
- cough, shortness of breath, pneumonia
- 100 ppm Immediate irritation of eyes and respiratory tract
- 150 ppm Sense of smell may be paralyzed
- 200 ppm Headaches, dizziness, nausea
- 500 ppm Unconsciousness and death within a few minutes
- may be no warning odor
- 1000 ppm Immediate loss of consciousness and respiratory paralysis leading to death

7.4. Personal or area monitors that alarm when PEL exceeds the preset level of 20 PPM for 1910 or 10 PPM for 1926.

8. **Employee Notification and Signage.** This employer shall post signs at entrances to regulated areas. The signs shall bear the following legend:

DANGER
HYDROGEN SULFIDE
TOXIC
FLAMMABLE - NO SMOKING
AUTHORIZED PERSONNEL ONLY
RESPIRATOR REQUIRED

9. **Method of Compliance.** Exposures to Hydrogen Sulfide (H₂S) can generally be controlled through the use of engineering controls, work practices, and personal protective equipment. Engineering controls are hazard controls designed into equipment and workplaces. Work practices are procedures followed by employers and workers to control hazards. The following engineering Controls, work practices, and personal protective equipment should be used when dealing with H₂S.

- Ventilate spaces to mitigate accumulation of hydrogen sulfide or other gases.
- Notify the Site Supervisor upon detection of H₂S
- If the potential for exposure exists and assessment of levels cannot be performed, assume the Permissible Exposure Limit is being exceeded, and wear a NIOSH approved supplied air respirator.
- For persons escaping or providing emergency help, an approved self-contained breathing apparatus or airline respirator with escape SCBA shall be used.
- Should an alarm sound on an H₂S detector, immediately evacuate the area, and notify your supervisor.



10. Training.

10.1. Maul Electric, Inc will provide our employees workers with regulatory training that includes requirements of the substance specific requirements. This will include health effects, background information, engineering controls, ppe, medical surveillance, communication of hazards, hygiene, and methods of compliance at a minimum.

11. Medical surveillance

11.1 Although Maul Electric, Inc understands that medical examinations should always supplement effective gas, vapor, fume, dust, and mist monitoring and controls, and never substitute for them, we provide medical examinations for all workers who may be exposed to Hydrogen Sulfide at or above the respective PEL for greater than 30 days per year, found in 29 CFR 1926.55.

11.2. These medical examinations are provided by professional healthcare organizations at no cost to the employee and shall include all components as required under particular substance standards.

12. Record keeping

12.1. Maul Electric, Inc knows record keeping is critical to our safety and health program. Our record keeping tasks, at a minimum, include:

- Exposure monitoring data – 30 Years
- Medical surveillance data – Duration of employment plus 30 years

13. Emergency, Spill and Leak Procedures.

13.1. Employer should be aware of Owners contingency plan provisions. Employees must be informed of the plan of the host facility and aware of additional plant safety rules