



**WAGNER-MEINERT LLC**  
*Engineers – Contractors*

## **Hydrogen Sulfide Safety Program (Section 19)**

### **PURPOSE**

Wagner-Meinert, LLC is constantly striving to improve the safety of our employees, customers, and community. To further that goal, we have developed and have implemented this program specific to Hydrogen Sulfide Safety. Through this program we hope to assure that all company employees performing job tasks in which a potential Hydrogen Sulfide exposure could occur, are protected.

Compliance with this program is mandatory and is applicable to all company employees who work in an environment where Hydrogen Sulfide may be present in any amount. Failure to comply will result in disciplinary action and/or is grounds for termination.

### **DEFINITIONS**

*Permissible Exposure Limit (PEL)* - means the dermal or inhalation exposure limit. For Hydrogen Sulfide the PEL is 10 PPM.

*Hydrogen Sulfide (H<sub>2</sub>S)* – Colorless gas or liquid, with the odor of rotten eggs (sulfur smell).

### **1.0 INTRODUCTION**

- 1.1 Exposure to Hydrogen Sulfide occurs in many industries. Most exposures center around the oil and natural gas industries. Hydrogen sulfide is an extremely toxic, flammable gas that may be encountered in the production of gas well gas, high-sulfide high sulfur content crude oil, crude oil fractioning, associated gases, and waters. Hydrogen sulfide is heavier than air, and can collect in low places. As an employee of the company, potential exposure to various forms and amounts of hydrogen sulfide may occur during certain job activities. However, any exposure should be avoided. If an exposure cannot be avoided through ventilation, etc., proper personnel protective equipment must be used.

## **2.0 FORMS OF HYDROGEN SULFIDE EXPOSURE**

- 2.1 Hydrogen Sulfide exposures are almost exclusively through inhalation. However, other exposures such as ingestion should not be overlooked. Inhalation at certain concentrations can cause Hydrogen Sulfide injury or death. The listed IDLH (immediately dangerous to life and health) level is extremely low (300 PPM).

## **3.0 HEALTH EFFECTS OF HYDROGEN SULFIDE OVEREXPOSURE**

- 3.1 If steps are not taken to control exposure, continued inhalation of Hydrogen Sulfide could result in:

- 3.1.1 Loss of the sense of smell.
- 3.1.2 Death

- 3.2 Low concentration exposures (under 10 PPM)

- 3.2.1 In low concentrations, Hydrogen Sulfide can be detectable by its odor; however, the smell cannot be relied upon to forewarn of dangerous concentrations, because it rapidly paralyzes the sense of smell. A longer exposure to the lower concentrations may result in the loss of the sense of smell.

- 3.2.2 Symptoms from repeated exposure to low concentrations usually disappear after being removed from the exposure for a period of time.

- 3.3 Higher concentration exposures (10 PPM and above)

- 3.3.1 Concentrations that are prolonged or of high concentrations may lead to death.

- 3.3.2 It should be well understood that the sense of smell will be rendered ineffective by hydrogen sulfide, which can result in an individual failing to recognize the presence of dangerously high concentrations. Exposure to hydrogen sulfide causes death by poisoning the respiratory system.

### **3.4 REPORTING OF PROBLEMS**

- 3.5.1 Immediately notify your supervisor if you develop potential signs or symptoms associated with Hydrogen Sulfide exposure. You should also notify your supervisor if you have difficulty breathing while wearing a respirator or suspect problems with other personal protective equipment.

### **3.6 EXPOSURE ASSESSMENT**

- 3.6.1 The job site foreman will determine if employees are exposed to concentrations of hydrogen sulfide. The exposure determination shall be based on the following:

### 3.6.1.1 Personal exposure monitoring

3.6.2 If the initial exposure determination reveals employee exposure to be below the STEL, continuous monitoring will be performed. In addition, continuous ventilation shall be used. Appropriate personnel protective equipment will be worn by all employees exposed to Hydrogen Sulfide.

## 4.0 PREVENTING EXPOSURE

Proper control of exposure to Hydrogen Sulfide is the responsibility of both the host employer, Wagner-Meinert, LLC and the employee. All of the control methods discussed below are essential to minimize additional sources of Hydrogen Sulfide absorption from inhalation. Strict compliance with these provisions can virtually eliminate several sources of Hydrogen Sulfide exposure that significantly contribute to excessive Hydrogen Sulfide absorption.

4.1 Review the site specific safety programs as well as the site emergency action plan.

4.2 Ventilation systems may provide for venting of the Hydrogen Sulfide vapor prior to entrance into the area.

4.3 Confined Space Entry Procedures will greatly reduce the hazards to employees and should be followed whenever entry into a confined space is required. For further details, review the Wagner-Meinert, LLC Confined Space Entry program.

4.4 Respiratory Protection shall be used in combination with continuous monitoring when warranted by the conditions of the area.

4.4.1 Exposure to hazardous materials requires special precautions against absorption of toxic compounds. While engineering controls (e.g. ventilation systems) are the primary means of controlling materials such as Hydrogen Sulfide vapors, it is often necessary to rely on respiratory protection. The respirator will give you the proper amount of protection based on the nature of the hazard. Only use respirators tested and certified by the National Institute for Occupational Safety & Health (NIOSH).

4.4.2 The cartridges that come with the mask are approved for the environment in which you will be working.

4.4.3 Never use a cartridge respirator in an atmosphere containing less than 19.5% oxygen or an atmosphere immediately dangerous to life and health (IDLH). In addition, observe the requirements of the Respiratory Protection Program. In extreme cases a NIOSH-certified air purifying respirators may be required.

4.4.4 See Section 12 Respiratory Protection Program. Personal

Protective Equipment required to protect personnel is to be supplied at no cost to the employees.

- 4.4.5 If Self-contained breathing apparatus is to be worn, all provisions applicable to the use of respirators apply as well as the provisions of the Wagner-Meinert, LLC Respiratory protection program.
- 4.4.6 If at any time the alarm sounds or there is an equipment malfunction. The area is to be evacuated and reevaluated prior to re-entry.
- 4.6 Gas detection equipment shall be used whenever an entry into an area which may contain hydrogen Sulfide vapor.
  - 4.6.1 Equipment shall be operated per the manufacturer's instructions.
  - 4.6.2 Detection equipment shall be calibrated prior to use and on a schedule per the manufacturer's instructions.
  - 4.6.3 Continuous monitoring shall be used when Hydrogen Sulfide has been detected.
- 4.7 Protective work clothing and equipment must be worn when the exposure to Hydrogen Sulfide and Hydrogen Sulfide compounds is above the PEL. If work clothing is provided, it will be given to you in a clean and dry condition. Protective work clothing and equipment can include coveralls, tyvek coveralls, gloves, hats, shoes, shoe coverlets, and / or full face respirators. All clothing and equipment will be repaired, replaced, cleaned, laundered, or disposed of as necessary by the company. Contaminated work clothing and equipment must be removed in the designated change room and placed in the provided closed containers to be cleaned or disposed of. At no time may Hydrogen Sulfide be removed from protective clothing or equipment by any means which disperses Hydrogen Sulfide into the workplace air.

## **5.0 EMPLOYEE INFORMATION & TRAINING**

- 5.1 Annual training will be conducted per the Wagner-Meinert, LLC Safety Program. Information and training will be given to all employees who may be exposed to Hydrogen Sulfide. The training program will inform employees of the following:
  - 5.1.1 The characteristics, possible sources, and hazards of Hydrogen Sulfide.
  - 5.1.2 Proper use of the Hydrogen Sulfide detection methods.
  - 5.1.3 Recognition of, and proper response to, Hydrogen Sulfide

warnings.

5.1.4 Symptoms of Hydrogen Sulfide exposure.

5.1.5 Proper rescue techniques and first-aid procedures to be used in a Hydrogen Sulfide exposure.

5.1.6 Proper use and maintenance of personal protective equipment. Demonstrated proficiency in using PPE should be required.

5.1.7 Wind direction awareness.

5.1.8 Use of safety equipment.

5.1.9 Use and operation of all Hydrogen Sulfide monitoring systems.

5.1.10 corrective action.

5.2 Site specific training will be conducted by the site foreman and per the Wagner-Meinert, LLC Safety Program. Information and training will be given to all employees (Wagner-Meinert, LLC and Sub-contractors) who may be exposed to Hydrogen Sulfide. The training program will inform employees of the following:

5.2.1 Emergency response procedures and shutdown procedures.

5.2.2 Locations of safety equipment.

5.2.3 Confined space and enclosed facility entry procedures.

5.2.4 Routes of egress.

5.2.5 Worker awareness and understanding of workplace practices and maintenance procedures to protect personnel from exposure to hydrogen sulfide.

5.2.6 Facility sources of Hydrogen Sulfide.

5.3 Documentation of employee information and training is kept on file at the Wagner-Meinert, LLC corporate office.

## **6.0 RECORD KEEPING**

The following records will be kept on file at the corporate office, if applicable:

- 6.1 Exposure monitoring for airborne Hydrogen Sulfide
- 6.2 Name and job classification of employees measured
- 6.3 Details of the sampling and analytic techniques

- 6.4 Results of the sampling
- 6.5 Type of respiratory equipment worn

#### **DOCUMENT MANAGEMENT:**

If after reading this program, you find that improvements can be made, please contact the Safety Director. We encourage all suggestions because we are committed to the success of our Hydrogen Sulfide Safety Program. We strive for clear understanding, safe behavior, and involvement from every level of the company.

#### **CHANGE CONTROL:**

All management system changes are reviewed, approved or disapproved by the Safety Committee.

This program was initially developed on September 23, 2004, replacing the former Hydrogen Sulfide Safety Program entirely.

- Revision No. 1 (September 23, 2004)
- Revision or Review No. 2 (January 3, 2006)
- Revision or Review No. 3 (June 26, 2006)
- Revision or Review No. 4 (September 6, 2007)
- Revision or Review No. 5 (October 7, 2011)

#### **PERSONNEL:**

The Owners of Wagner-Meinert, LLC have the ultimate responsibility for the Hydrogen Sulfide Safety Program. They have designated the Safety Director to manage the Hydrogen Sulfide Safety Program.