344 Third Street
Baton Rouge, LA 70801
Phone: 225-757-0480

SECTION 23

HYDROGEN SULFIDE

1. PURPOSE AND SCOPE –

1.1. **This safety guideline is intended to provide suitable information to all MAPP employees regarding the potential toxic effects of H2S so that adequate measures can be taken to limit exposures through controls in the workplace.**

2. GENERAL

2.1. Hydrogen sulfide is ever present in all refineries. In addition it is generated in many industrial processes as a by-product and also during the decomposition of organic matter containing sulfur. No MAPP employee should work in any area where H2S is at higher than PEL concentrations.

2.2. Hydrogen sulfide (H2S) is a colorless gas that at low concentrations has the odor of rotten eggs. At high concentrations, it kills your sense of smell.

2.2.1. Formula H_2S

2.2.2. CAS No.: 7783-06-04

2.3. H_2S is a highly flammable and extremely toxic gas that can form an explosive mixture with air over a wide area.

3. CHARACTERISTICS OF HYDROGEN SULFIDE

3.1. When ignition occurs, the combustion produces irritants and toxic gases, including sulfur dioxide (SO_2).SO_2 has an irritating effect on the eyes and lungs and can be fatal at concentrations about 100PPM.

3.2. H_2S is heavier than air, has a tendency to settle in low-laying areas, and is readily dispersed by wind movements or currents.

3.3. H_2S attacks most metals, especially in the presence of water, forming sulfides that are usually insoluble precipitates. It is also very corrosive to plastics and tissue.

3.4. H_2S dissolves in water forming a weak acid (hydro sulfurous acid).

3.5. H_2S will be released when in water when agitated making it a dangerous hidden hazard

4. HEALTH EFFECTS

4.1. The following information outlines the symptoms of hydrogen sulfide at specific concentrations

4.1.1. 10 PPM (0.001% H_2S)

4.1.1.1. Obvious and unpleasant odor.

4.1.1.2. Burning eye irritation

4.1.1.3. Permissible exposure limit is eight hours.

4.1.2. 200 PPM (0.02% H_2S)

4.1.2.1. Kills smell quickly.

4.1.2.2. Stings eyes and throat.

4.1.2.3. Respiratory irritation.

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4.1.2.4. Death after one to two hours of exposure.

4.1.3. 500 PPM (0.05% H_2S)

4.1.3.1. Dizziness. Breathing ceases within a few minutes

4.1.3.2. Requires prompt artificial respiration

4.1.3.3. Loss of muscle control, making self-rescue impossible.

4.1.4. 1000 PPM (0.10% H_2S)

4.1.4.1. Unconsciousness at once, followed by death within minutes.

5. EXPOSURE WARNING

5.1. H_2S CAN PARALYZE THE SENSE OF SMELL. DO NOT USE THE SENSE OF SMELL TO DETECT H_2S.

6. H_2S DETECTION AND ALARM SYSTEMS

6.1. In most refineries emergency employee alarms are installed to meet the regulatory standards. The alarms provide warning for the necessary emergency action according to the site emergency action plan and provide time for employees to safely escape from the workplace or the immediate area.

6.2. Systems are also used on drilling locations, offshore platforms and produce H2S, and some plants. It is not readily used on land production leases. Signs are and should be posted stating the presence of poison gas and urging caution.

7. WARNING CONDITIONS

7.1. There are three conditions that you must be aware of when working around H_2S. The following information identifies the level of danger and alarms associated with each condition.

7.1.1. **Condition Green**

7.1.1.1. Possible Danger

7.1.1.2. No Alarms

7.1.2. **Condition Yellow**

7.1.2.1. Moderate Danger

7.1.2.2. H_2S to 50 PPM

7.1.2.3. Alarm established by client system

7.1.3. **Condition Red**

7.1.3.1. Extreme Danger

7.1.3.2. H_2S at 50 PPM or Above

7.1.3.3. Alarm established by client system

8. HYDROGEN SULFIDE DETECTION DEVICES

8.1. Fixed H_2S devices (monitor and indicator) are designed to detect H_2S concentrations in air and established TWA (time weighted average) (10PPM) and STEL (15 PPM).

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8.2. The alarm should be capable of being perceived above the ambient noise or light levels in the affected area. The alarm should be distinctive and recognizable as a sign to evacuate the area and to start emergency status emergency procedures.

9. PERSONAL MONITORS

9.1. Personal monitors are also available in many types. They are also designed with the employee's safety in mind. Any employee required to wear a personal monitor shall be trained on the use and functions of the device upon assignment to that project.

10. PLANT MONITORS

10.1. Plant monitors are sometimes used by clients and are available in many types and are designed with the employee's safety in mind. Employees assigned to projects where monitors are used by the client shall be oriented according to the plant requirements upon assignment to the project. In order to respond effectively in an emergency situation, every individual at the site should know their specific responsibilities. Whether or not an individual has an assigned duty, each individual should know what to do in the event of an emergency.

11. EVACUATION

11.1. Follow these procedures in the event of a hydrogen sulfide release at a client location that requires evacuation:

11.1.1. Hold your breath and quickly leave the area containing H_2S. Do not inhale.

11.1.2. Move quickly to the upwind "Safe Breathing Area" to receive instructions from client and MAPP representatives.

11.1.3. Always be conscious of the wind and constantly monitor wind direction. Wind socks and streamers show which direction the wind is blowing so that you can determine the proper safe breathing area.

12. EMERGENCY RESUCE AND FIRST AID WARNING

12.1. To prevent risk and injury to other personnel, re-entry into an area of unknown concentration of H_2S will not be done by any MAPP personnel. Only those personnel trained adequately will do so with the use of self-contained breathing equipment and backup personnel.

13. PPE (PERSONAL PROTECTIVE EQUIPMENT)

13.1. Depending on the exposure, i.e. the amount of gas in the air and the type of work, employees will be required to wear different levels of PPE. Examples of protection include:

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13.1.1. When the exposure level is near or above 10 PPM, no MAPP employee will be allowed to work. At this level, employees are required to wear self-contained fresh air gear. No MAPP employee is authorized to wear fresh air SCPAs.

13.1.2. Wear chemical goggles or a face shield when eye contact with this material is possible

13.1.3. Avoid skin contact. Wear proper clothing such as impervious gloves, long sleeves, apron, and boots.

14. VENTILATION (INDOOR)

14.1. Use adequate general and local exhaust ventilation to keep atmospheric vapor concentrations below the occupational exposure limits.

15. EYEWASH AND SHOWERS

15.1. Safety showers and eyewash stations must be available in the vicinity of a potential exposure to the material. Familiarize yourself with the location of these facilities before starting the job.

16. TRAINING

16.1. All employees will be provided awareness training in the program in order to be familiar with the potential hazards and proper safe work procedures to follow if exposed to this health hazard. The training will be provided prior to working in any job with potential exposure to H_2S operations.

16.2. The purpose of hydrogen sulfide training is to familiarize employees with the governmental regulations affecting H_2S operations. Employees will learn the necessary skills to recognize and detect H_2S while working and how to respond in the event of evacuation situations.