

ALARM LEVELS:

- ❖ H2S is in ambient air next to the sensor heads. The low alarm set point is normally at 10 ppm; it is generally indicated by a FLASHING LIGHT. The high alarm set point is usually at 15 to 20 ppm, this is generally indicated by a SIREN OR HORN. This is the notification to put on breathing apparatus. Oftentimes on offshore facilities, a third alarm set point is designated at 50 ppm. This alarm notifies supervisors that the evacuation point for non-essential personnel has been reached. Always check the "Operating Conditions" for your facility to determine exactly what the alarm levels and alarm indicators are!

RESPIRATOR FITTING TEST:

- ❖ Only full face piece, positive pressure (A respirator in which the air pressure inside the respiratory-inlet coving is positive in relation to the air pressure of the outside atmosphere during exhalation and inhalation). It is required that a medical examination or the completion and approval of a medical questionnaire be concluded prior to the respirator fit-test.

SCBA RECHARGING PROCUDRES:

- ❖ Whenever recharging an SCVA (Self-Contained Breathing Apparatus) cylinder, several factors must be taken into consideration:
 1. Cylinder composition
 2. Pressure Rating
 3. Cylinder valve configurationThe composition of the SCBA cylinder dictates the rate of fill. A steel cylinder must be filled at a relatively slow rate; most manufacturers suggested a maximum fill rate of 300 psi per minute.

HYDROGEN SULFIDE EXPOSURE IN CONFINED SPACES:

- ❖ Due to the nature of hydrogen sulfide and/or sulfur dioxide gases, they will tend to accumulate in lower, non-ventilated areas. This is especially evident in confined spaces and thus presents a particular hazard in these areas of the facility. During any H2S release episode (this would include the flaring or burning of H2S gas), be sure to monitor carefully all confined spaces prior to attempting entry into these areas.

BASIC RESCUE PROCEDURES FOR AN H2S INCIDENT:

- ❖ When a coworker or any other individual is incapacitated by the effects of an exposure to hydrogen sulfide gas, time becomes a most important element in executing a rescue. The H2S victim must be removed from the contaminated area and resuscitated (if he is in respiratory arrest) as soon as it becomes feasible to do so. Before we can attempt a rescue, we must assure of two things. First, we must have a sufficient manpower to effectively complete any rescue attempt. To begin a rescue that we cannot finish may place "a seal of doom" on the victim. Second, we must be assured of a sufficient air supply.

General Inquiries Contact:
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H2S FACT SHEET

10 Questions to Answer.....

BEFORE YOU START WORK!!

1. What Are **Your Safety Responsibilities** That Apply to This Job?
2. Are You Familiar with The **Standards** That Apply to This Job?
3. Are There **Health Hazards** You Need to Be Aware Of?
4. Is **Special Training** Required?
5. What **Personal Protective Equipment** Is Required?
6. What Are the **Emergency Procedures**?
7. Where Are the Fire Extinguishers, First Aid Kits, And **Other Emergency Equipment**?
8. Do You Need a **Job Safety Analysis**?
9. Did You Have a **Pre-Job Safety Meeting**?
10. When are **Incident Reports** Required?

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PROPERTIES OF H₂S

HIGHLY TOXIC:

- ❖ Hydrogen sulfide (H₂S) is extremely toxic, being one of the deadliest natural gases known to mankind. It affects the human metabolism in two significant ways when it is respired. It causes a paralysis off the “Phrenic Nerve” which results in a disruption of the nerve impulses from the brain to the diaphragm, causing a cessation of respiratory function or put simply, **BREATHING STOPS!**

COLORLESS:

- ❖ Hydrogen sulfide, in its natural state, is completely transparent. You CANNOT detect the presence of H₂S gas by sight.

FOUL ODOR

- ❖ Hydrogen sulfide has a strong odor of rotten eggs in concentrations as low as 0.13 ppm. The strength of this odor intensifies with any increase in the hydrogen sulfide content up to a point. This point is called the upper odor threshold and occurs at approximately 27 ppm. Beyond this point, the odor gets no stronger. At a concentration of around 100 ppm of hydrogen sulfide in the surrounding air your olfactory nerve will become paralyzed, preventing your sense of smell.

HEAVIER THAN AIR:

- ❖ Hydrogen sulfide has a specific gravity of 1.192 indicating that H₂S is approximately 20% heavier than air. Hydrogen sulfide tends to settle in low lying areas or other non-ventilated areas. As H₂S gathers in these low areas it increases in potency. Because of this accumulative property of the gas, a relatively low concentration of hydrogen sulfide that is escaping from specific sources tends to collect in low or non-

ventilated areas and accumulate. It could easily attain a level that could prove to be instantly fatal to an unprepared worker.

HIGHLY SOLUBLE:

- ❖ Hydrogen sulfide gas is highly soluble; it will enter into solution quite readily in drilling fluids, especially in water-based drilling and workover fluids. It is often found entrained in crude oil, in natural gas and in water. The greatest threat to human life occurs when the H₂S gas breaks of solution and enters the ambient atmosphere.

CORROSIVITY:

- ❖ Hydrogen sulfide is extremely flammable; having an auto-ignition point of 518 degrees F and a flammable range that extends from 4.3% to 46% in a mixture with air. The elimination of ignition sources, along with a rigid enforcement of “no smoking” rules represent two actions that should be exercised in any potential H₂S area.

IRON SULFIDE:

- ❖ Iron sulfide, commonly referred to as iron pyrite or pyrophoric iron, occurs as a reaction product of hydrogen sulfide and iron in pipes and vessels. As long as it is excluded or kept moist, iron sulfide does not constitute as a hazard.

SULFUR DIOXIDE:

- ❖ Better known as “rain Acid”, sulfur dioxide has a specific gravity of 2.264, over twice as heavy as air. Like hydrogen sulfide, it is colorless; however, sulfur dioxide does have excellent warning properties. If SO₂ is present, even in small quantities, a strong, pungent and suffocating odor will indicate its presence in the area. Sulfur dioxide forms a mild, sulfurous acid when it is combined with

water and it can be quite damaging to the mucus membranes around the eyes and the corneas of the eyes, as well as to the lungs.

TOXICITY:

- ❖ Hydrogen sulfide is measured in parts per million of ppm. One percent (1%) is equivalent to 10,000 ppm. Although individual tolerances will vary widely from individual to individual, the following table will list some of the more likely symptoms and effects of hydrogen sulfide exposure.

PPM PHYSICAL EFFECTS/EXPOSURE LIMITS

0.13	Lower odor thresholds – detectable rotten egg order
4.6	Obvious odor of rotten eggs
10	Possible headache – TWA “Time Weighted Average” (ACGIH)
15	Mild nausea – STEL “Short-Term Exposure Limit” (ACGIH)
20	Possible fatigue – Acceptable Ceiling Concentration – 8 hour TWA (OSHA)
27	Upper odor threshold – very strong odor
50	Drowsiness – Peak Exposure Level (ANSI)
100	Loss of sense of smell in 2 – 15 minutes – dryness in eyes, nose and throat. IDLH level as per (NIOSH/OSHA)
200	Burning sensation in eyes, nose and throat; rapid loss of sense of smell and stiffness in joints
300	Burning sensation in chest. Potential for pulmonary edema
500	Loss of equilibrium; loss of mental function; respiratory disturbance
750	Rapid unconsciousness followed by respiratory arrest
1000	0.1% - Immediate respiratory arrest followed by <u>DEATH!!</u>