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Welcome to the Hard Hat Training Series!



Welcome to the Hard Hat Training Series. Today, we will be talking about the hazards associated with Hydrogen Sulfide (H₂S) and how to protect yourself from its deadly effects.









In 1975, firefighters responded to an unusual distress call from a house three miles outside of town. By the time they arrived, it was already too late. Eight victims lay dead in vehicles they had been using to escape the scene. The cause of death was not fire or carbon monoxide; it was a gas used to pump oil into a nearby well. By the time the family realized they were in danger, they had only minutes to escape before the vapor overtook them. In the end, they lost their race against time.







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The highly toxic gas that killed this family, as well as an oil worker responding to the leak, is a common hazard to those who work in oil fields and several other industries. It is known officially as dihydrogen sulfide, but is often called hydrogen sulfide, sour gas, or sewer gas. We will refer to it in this training as hydrogen sulfide, or H₂S. While the fact that the incident we discussed killed nine people and was certainly tragic, it helped bring awareness to H₂S and establish regulation to keep workers safe from its deadly fumes.

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What Is H₂S?

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 H_2S is a colorless gas that is created naturally as bacteria breaks down organic material and waste from humans and animals. It occurs primarily in sewage and oil, but may also occur anywhere there is lots of biodegradation, such as swamps or manure stockpiles.

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 H_2S is denser than air. This causes a major hazard, as it will settle in lower areas, displacing air and cutting off oxygen supply. For this reason, confined spaces, holes, trenches, and poorly-ventilated areas present special dangers for workers who are exposed to H_2S .









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H₂S is also very flammable and an explosive hazard. It's important, when working in areas where H₂S is present, that you take care not to use any electric, gas, or other tools that may cause a spark.











Although it is primarily a biproduct, some companies use H₂S to produce pure sulfur. It can also be used in products such as pesticides, leathers, dyes, and pharmaceuticals. It is often used to create heavy water, a substance that allows nuclear reactors to function without enriched uranium.

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Hydrogen Sulfide is most commonly found in oil operations, but many incidents occur with waste water treatment plants and sewers, as well. Exposure to H₂S may also occur in swamps or agricultural silos and pits due to it being caused by the bacterial breakdown of organic materials. Other jobs where there may be risk of exposure are pulp, paper, and food processing, hot asphalt paving, mining, and other textile industries.







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Helpful Terms

Before proceeding, let's take the time to define a few terms that will be helpful as you navigate the course. **Parts per million (ppm):** A means to measure the concentration of H₂S. Parts per million indicates how many volume-based units out of a million the substance in question makes up.

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Permissible Exposure limit, or PEL, is the maximum amount of exposure workers can have over a designated amount of time, usually 8 hours.

Acceptable Ceiling Concentration: The maximum amount of a substance that a worker can be exposed to during a regular work day Acceptable maximum peak: The maximum concentration a worker can be exposed to during a specified amount of time. This concentration will be higher than the acceptable ceiling concentration, as it is only for a brief time.

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Regulated Areas: Areas that are marked off and designated by the employer where H₂S is or might be present. These areas should have appropriate warning signs. Only workers who have been properly trained should ever enter a regulated area.









Competent Person: One who is capable of recognizing H₂S hazards and has the authority to take immediate corrective measures to mitigate or eliminate them. A competent person should know how to test for H₂S, what to do in case of exposure, and how to respond to emergency situations.







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Qualified Person: A qualified person has a degree, certificate, professional standing, extensive knowledge, training, and experience with whatever subject is being referenced. They will have the ability to identify, resolve, and solve issues in the particular field or work being performed.







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We will be talking a lot about **Confined Spaces**. In general, a confined space:

- 1. Is large enough and so configured that an employee can **bodily** enter and perform assigned work (with openings as small as 18 inches in diameter)
- 2. Has limited or restricted means for entry or exit
- 3. Is *not* designed for continuous occupancy (often used for storing or transporting substances; occasional entry for repair, cleanup, and maintenance)

With this in mind, understand that countless workplaces contain spaces that are considered "confined."

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The last term to become familiar with is **PPE (Personal Protective Equipment)**. This term refers to any equipment or gear used to help keep you safe.



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These are some of the main standards concerning H₂S. Of course, states may have additional standards, as may some industries. We have provided these as a guide, but it's your responsibility to know all federal, state, local, and company rules that apply to hydrogen sulfide on your jobsite.

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H₂S has an acceptable ceiling limit of 20 ppm, although the recommended ceiling limit is only 10 ppm. You can safely be exposed to the acceptable maximum limit of 50 ppm for 10 minutes, but only if there are no other sources of exposure during the work shift. If levels exceed 50 ppm, workers should warn others and evacuate the contaminated area immediately.

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Once the H₂S concentration reaches 100 ppm, it is considered immediately dangerous to life and health. At this level, your ability to smell the gas wanes, and anyone exposed will begin to feel drowsy and have altered breathing. Workers need to evacuate the contaminated area immediately and get fresh air.





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The purpose of this presentation is to help you understand the hazards that hydrogen sulfide presents and how to safely work when there is potential for exposure. At the completion of this training, workers should understand the risks locations, and emergency procedures associated with H₂S. Training is vital for helping workers stay safe when jobs include risk of exposure to H₂S. No matter what controls, procedures, and precautions are implemented on a job, they will be worthless unless workers are trained on how to properly utilize them.

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We will now discuss H₂S's different concentrations, as well as how exposure to it affects the body. This section will also cover medical surveillance for work around H₂S.









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We will talk about monitoring and identifying the location and possible hazards of the H_2S concentration in question. We will also offer instruction on proper procedures for monitoring confined spaces and other areas that may contain H_2S .









We will go in depth on basic practices that will keep workers safe when an H₂S hazard is present. This will include monitoring, evacuation plans, confined space procedures, and emergency situations. These applications will vary according to jobsite. Employers should discuss the rules, procedures, and applications that are specific to your jobsite.

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We will spend time going over the PPE that you must wear when the risk of H_2S is present. This will include instructions for the proper care of your PPE and donning and doffing PPE on worksites that might be exposed to H_2S .







H₂S is dangerous. At levels as low as 5 parts per million, it begins to affect the body negatively. At higher concentrations, it can cause death almost instantaneously. To make matters worse, H₂S is completely invisible to us. However, with the proper training, precautions, and equipment, you can keep yourself from being exposed to this dangerous gas.

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