



## Don't Risk Safety Shortcuts with H<sub>2</sub>S Gas Exposure

An article in a maritime trade paper recounted the death of two seamen from exposure to what was suspected to be hydrogen sulfide gas.

The chief officer and one other seaman were killed after being exposed to toxic concentrations of hydrogen sulfide (H<sub>2</sub>S) vapors; two more crewmen were hospitalized. Three other seamen who were also exposed did not require medical attention. The vessel reportedly carried a previous cargo of high-sulfur crude oil and was in the process of cleaning tanks to prepare for another shipment.

Our industry is marred by a history of these types of incidents. Despite knowledge of the hazards of toxic and flammable gases, oxygen-deficient atmospheres and how to safeguard from these dangers, people continue to get injured and killed. It shouldn't happen. The way to prevent these tragedies is to follow well-established safety procedures. This is especially true for tasks that become "routine". There can never be a valid excuse for shortcutting safety!

It appears that the cause of death in this incident was exposure to hydrogen sulfide, commonly found in sour crude oil. But this type of incident is not exclusive to crude oil tankers. Personnel on non-petroleum tank vessels should not ignore the risks associated with hydrogen sulfide. Every product that contains hydrocarbon has the potential to contain toxic quantities of hydrogen sulfide.

### Recognize Potential Hazards

A good place to start is the material safety data sheet (MSDS). Hydrogen sulfide gas is highly toxic, explosive and colorless. At low concentrations it has a distinctive "rotten egg" odor. It is heavier than air and will settle in low areas. Hydrogen sulfide is found in crude oil, naphtha, fuel oil, bitumen and gas oil.

The Permissible Exposure Limit of hydrogen sulfide expressed as a Time Weighted Average is 10 ppm. Escalating exposure and effects are shown in Exhibit I.

### Proper Procedures

- Establish H<sub>2</sub>S procedures and be sure personnel are aware of the hazards and their responsibilities during pre-job safety meetings.
- Use closed operation procedures when handling cargoes containing hydrogen sulfide.
- Conduct personnel and area air monitoring with the appropriate H<sub>2</sub>S detection instruments.

### Personal Protective Equipment

- Follow procedures for the use of respiratory protective equipment.
- Emergency breathing apparatus should be available to persons working in hazardous areas.



**Exhibit I**  
**Effects of Exposure to Hydrogen Sulfide**

<b>Concentration</b>	<b>Effects</b>
0-10 ppm	Noticeable odor, no adverse effects during 8-hour exposure
10-20 ppm	Eye irritation
20-100 ppm	Inflammation, corneal blistering and opacity of eyes, loss of sense of smell, headache, cough, nausea
100-300 ppm	Marked eye and respiratory irritation and difficulty breathing after exposure of one hour
300-600 ppm	Dizziness, headache, nausea within 15 minutes, loss of consciousness, death occurring within 30 to 60 minutes
600-1000 ppm	Rapid unconsciousness, death occurring within a few minutes
Above 1000 ppm	Instantaneous collapse, respiratory failure and death

**In the Event of an Emergency**

Be alert to changes in your work area. If conditions change or the situation becomes unstable, STOP – and retreat to a safe area until conditions can be evaluated and corrected. Persons overexposed to H<sub>2</sub>S may be reversed and the probability of saving a person's life improves if prompt action is taken.

When working in areas where hydrogen sulfide may be present, your life and the lives of others could depend on your actions and responses.

- Lawrence B. Russell  
Marine Transport Lines  
Marine Section Member

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