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## Hydrogen sulphide

This fact sheet describes the risk posed by high concentrations of Hydrogen Sulphide, especially in businesses operating or located near geothermal bores. Hydrogen sulphide (H<sub>2</sub>S) is a toxic gas which occurs in a variety of natural and industrial settings.

### What is H<sub>2</sub>S?

Hydrogen sulphide (H<sub>2</sub>S) is a highly toxic, colourless (transparent) gas which is heavier than air. At low concentrations (small amounts), H<sub>2</sub>S has an offensive odour similar to rotten eggs, or a sickly sweet odour. At high concentrations (greater than 100ppm), no smell can be detected because H<sub>2</sub>S rapidly deadens the sense of smell.

H<sub>2</sub>S can have a volcanic origin, as in geothermal areas, or is formed when organic material rots or breaks down.

H<sub>2</sub>S is highly corrosive to some metals. It's flammable, and forms explosive mixtures with air or oxygen. It burns with a blue flame, producing sulphur dioxide (SO<sub>2</sub>), which is also toxic.

### Where can H<sub>2</sub>S be found?

H<sub>2</sub>S is found in most geothermal areas and in some oil and natural gas, but is also commonly found in sewers, cesspools, and stagnant water such as that found in swamps.

H<sub>2</sub>S gas is often encountered in large amounts in geothermal areas in New Zealand. Upon reaching the surface, most of the hydrogen sulphide is released from the geothermal fluid along with steam at boiling temperature. At lower temperatures, much of the H<sub>2</sub>S gas remains dissolved in the geothermal fluid.

Where geothermal energy is used, H<sub>2</sub>S gas is removed from the geothermal fluid and is vented at a safe height above ground for dispersal by wind.

H<sub>2</sub>S is heavier than air, and tends to settle in low-lying areas like trenches, pits, and excavations. On still, foggy days, H<sub>2</sub>S tends to accumulate in low places in dangerous concentrations.

H<sub>2</sub>S has been found in dangerous concentrations in construction and/or plumbing sites, geothermal pools open to the public, and where contractors were engaged to clear rotting plants underwater.

### What harm can H<sub>2</sub>S cause?

H<sub>2</sub>S is a poison that can paralyse your breathing system and kill in minutes. Even in small amounts, it is dangerous to your health.

When a person breathes H<sub>2</sub>S, it goes directly through the lungs and into the blood stream. To protect itself, the body oxidises (breaks down) the H<sub>2</sub>S as rapidly as possible into a harmless compound. If the individual breathes in more H<sub>2</sub>S than the body can process, the H<sub>2</sub>S builds up in the blood and poisons the individual. High levels of H<sub>2</sub>S quickly destroy a person's ability to smell. The nerve centres in the brain which control breathing are paralysed, the lungs stop working, and the person is asphyxiated.

The way H2S physically affects an individual depends on:

- **duration:** the length of time the individual is exposed.
- **frequency:** how often the individual is exposed.
- **intensity:** how much (concentration) the individual was exposed to.
- **individual susceptibility:** the individual's physiological makeup.

## Identification of H2S

H2S can be smelt in a concentration as little as one part of H2S in a million parts of air (1 ppm). At slightly higher concentrations, H2S may have a sickly sweet odour similar to rotten eggs. However, in the range of 100-150 ppm, the gas deadens the sense of smell and can lead to a false sense of security. Consequently, **smell can not be relied upon to detect the presence of H2S.**

## What to do if H2S is suspected

DO	DON'T
Stay clear and upwind of suspected source	Approach or go downwind of the suspected source
Ensure nobody enters suspected area	Enter low or confined areas
Erect signs warning of the risk	Rely on your nose
Vent the gas if possible, or call your local or regional authority to manage it	
<u>Notify WorkSafe</u> The risk of unconsciousness or death make an uncontrolled H2S leak a notifiable incident	

If H2S is suspected, put your Emergency Plan into action. This should alert everyone on the premises to proceed to the allocated muster point, and emergency response steps to be taken (eg venting the location of the source).

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