

HYDROGEN SULPHIDE AT PORT GEOGRAPHE, QUESTIONS AND ANSWERS

This brochure provides health information, reassurance and guidance in relation to exposure of the Port Geographe community to hydrogen sulphide emissions from sea grass.

What is hydrogen sulphide?

Hydrogen sulphide is a colourless gas with a characteristic odour of rotten eggs which, being denser than air, can pool in low areas in still conditions. It enters the environment as a result of human activities and often from natural sources.

In Western Australia there have been a number of situations where natural or disturbed natural processes have generated hydrogen sulphide, usually through microbial activity, which has affected air quality of nearby communities. These have included river degradation associated with acid sulphate soil disturbance, bore water contamination, and decomposition of sea grass deposits on beaches.

How can hydrogen sulphide affect my health?

People are normally exposed to hydrogen sulphide in air and may absorb it by breathing it in or by skin/eye contact. However it does not accumulate in the body as it is rapidly metabolised in the liver and excreted in the urine.

The rotten-egg odour of hydrogen sulphide can be smelt at very low levels that are far below the point where any health effect may occur. Health effects associated with hydrogen sulphide exposure are usually confined to occupational settings. Significant health effects associated with community exposure to hydrogen sulphide are rare.

Smelling hydrogen sulphide does not mean it will harm your health.

The smell can cause worry, anxiety and resentment. With repeated odour events this may culminate in real symptoms such as headache, fatigue and nausea. Although these are not direct health effects they are undesirable.

Table 1 provides an indication of the potential hydrogen sulphide effects associated with various air concentrations, based on at least 30 minutes of exposure.

At and above 2ppm of hydrogen sulphide in air, minor health effects, such as irritation of the eyes, nose and throat, may start to occur. People with asthma or other respiratory problems are more susceptible and the first to be affected. However, irritation and respiratory effects are temporary and reversible when these levels of exposure stop.

At higher levels various effects on human metabolic processes may occur, but these sorts of concentrations are not likely to arise in community situations and are more typical in some work settings such as sewage treatment plants.



Table 1 – Exposure and Effect Levels for Hydrogen Sulphide in Air

Exposure (ppm)	Effect/Observation
0.008	Odour threshold
>0.008	Increasing possibility of annoyance/amenity effects e.g. headache, nausea, fatigue etc
2	Bronchial restriction in some asthmatics
4	Increased eye complaints
5 to 10	Minor metabolic effects
20	Neurological effects including memory loss, dizziness

Adapted from *Concise International Chemical Assessment Document 53 – Hydrogen Sulfide: Human Health Aspects*, International Programme on Chemical Safety and World Health Organisation, Geneva 2003.

How are children affected?

It is not clear whether children are more sensitive than adults to hydrogen sulphide although they are likely to show the same types of effects. However, care should be taken, since children are lower to the ground where hydrogen sulphide may build up and active children may breathe in more of the gas.

Are there hydrogen sulphide exposure guidelines?

Australia does not have public health exposure guidelines for hydrogen sulphide in air. In the absence of Australian guidelines, Australian health regulators generally apply criteria developed by the World Health Organization (WHO). The WHO guidelines derive from the information presented in Table 1 and form the basis of the Western Australian Department of Health (DOH) guidelines for hydrogen sulphide (Table 2).

Table 2 - DOH Recommended H₂S Exposure Limits for Public Protection

Limit (ppm)	Averaging Timeframe
2	30 minute
0.1	24 hours
0.014	90 days

The 2ppm limit value relates to bronchial effects in some sensitive asthmatics and therefore should not be exceeded. The other limit values have safety margins built into them and so an exceedance does not necessarily mean a health consequence. The limit values also take into account potential health effects from repeated and continuous exposure.

Is hydrogen sulphide a health issue at Port Geographe?

Hydrogen sulphide from sea grass is primarily an issue in the Port Geographe area in winter and spring (including during the bypass operation) and its impacts are affected by wind conditions. Smaller amounts of hydrogen sulphide possibly may be released from wetlands or estuarine areas near Geographe Bay.

The DOH considers that the hydrogen sulphide at Port Geographe is primarily a nuisance issue for the majority of the local population. However, odour-related health effects could occur for some people, especially those living near to the source or people who are susceptible to impacts from smells. These effects are temporary and reversible, but nevertheless are undesirable.

In a small number of cases direct irritative health effects could occur in sensitive individuals, such as asthmatics, close to the source of emissions. Such effects should be prevented and the management processes outlined in this brochure are designed to do this. These processes should also reduce other unwanted effects of hydrogen sulphide.

Anyone concerned about possible health effects of hydrogen sulphide should seek medical advice and that practitioner may discuss the issue with Department of Health public health physicians listed below.

Are there hydrogen sulphide risks from swimming?

Any hydrogen sulphide dissolved in sea water is unlikely to be a risk in itself. The Department of Environment and Conservation (DEC) also advises that hydrogen sulphide levels at all water quality monitoring sites within Port Geographe and Geographe Bay have been below the level of detection of 0.02mg/L, although these locations may not correspond to primary sea grass deposition and disposal areas.

Accumulations of sea grass can present an entanglement hazard in the water and in still conditions any hydrogen sulphide present may layer on the surface increasing the risk of eye and respiratory effects.

It is possible that hydrogen sulphide may also be released from buried sea grass during the normal swimming season. It is recommended that areas with a strong hydrogen sulphide smell be avoided especially if there is much bubbling in the water.

What is being done to address health concerns at Port Geographe?

The Department of Health considers action is necessary to prevent potential health impacts and to reduce odour effects from hydrogen sulphide. The hydrogen sulphide monitoring during the 2008 sea grass bypassing program and resulting toxicological assessments have provided considerable information to assist in management of the issue.

Although a long-term engineering solution is desirable, it is likely in 2009 and possibly in subsequent years that hydrogen sulphide emissions will need to be managed by monitoring and procedural arrangements, primarily during the bypass operations when the emissions are expected to be greatest. DOH has recommended to DEC, the Shire and the developer how this should be done to ensure that hydrogen sulphide levels at residences closest to the emission sources are kept at least below WHO criteria, and therefore the rest of the community is afforded greater protection still.

What can I do to manage exposure?

In addition to regulatory mechanisms to manage hydrogen sulphide levels, the DOH recommends community members consider the following precautionary actions, especially during the bypass operation in onshore wind conditions:

- Avoid areas where high hydrogen sulphide levels may be present, for example near the source or in low lying areas where the gas may pool
- Avoid exercise in affected areas especially if the breathing rate is raised and mouth breathing occurs
- Be careful when entering a confined space or small building close to the hydrogen sulphide source and ventilate by opening doors and windows (if safe to do so)
- Minimise the amount of time spent outdoors if winds are light and are coming from the direction of nearby sea grass deposits
- Close up your home when external hydrogen levels are high and ventilate it when those levels subside
- Discuss with your doctor appropriate medical responses if you are an asthmatic or have respiratory problems.

Where can I get more information?

Useful information on possible health effects of hydrogen sulphide is in the *Public Health Statement for Hydrogen Sulphide – July 2006* from the United States of America Agency for Toxic Substances and Disease Registry which is available at:

<http://www.atsdr.cdc.gov/toxprofiles/phs114.html#bookmark06>

DOH has also prepared the following toxicological report on the issue:

Port Geographe Sea Grass Hydrogen Sulphide - Assessment of the Human Health Risk and Its Management - Department of Health - April 2009:

http://www.public.health.wa.gov.au/2/881/2/topical_issues.pm

A medical practitioner for a patient receiving treatment for hydrogen sulphide exposure may contact the following DOH public health physicians:

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