

**APPENDIX B**

**FUGITIVE EMISSION MATERIAL SAFETY DATA SHEET – HYDROGEN SULPHIDE GAS**

## FUGITIVE EMISSION MATERIAL SAFETY DATA SHEET

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### Section I: Material Identification and Use

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**Material Name:** Hydrogen Sulfide Gas

**WHMIS Class:** B1, D1A, D2B

**Synonyms:** Sewer Gas, Rotten Egg Gas, H<sub>2</sub>S

**Chemical Formula:** H<sub>2</sub>S

**Production:** Hydrogen sulfide gas is produced as a by-product of the decay of sulfur containing organic matter (eg. sewage).

**Exposure:** Exposure to hydrogen sulfide gas is likely to occur in or near sewers, sewage treatment plants or manure.

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### Section II: Hazardous Ingredients

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<u>Name</u>	<u>Concentration</u>	<u>CAS #</u>	<u>LC<sub>50</sub> (Rat)</u>	<u>Exposure Limits*</u>
Hydrogen Sulfide	Variable	7783-06-4	444 ppm for 4 hours	TLV-TWA - 10 ppm TLV-STEL - 15 ppm

\* American Conference of Governmental Industrial Hygienists (ACGIH) 1998. This group proposed, in 1998, lowering the TLV-TWA to 5 ppm and eliminating the TLV-STEL. this is a proposal for discussion and has not been adopted. If adopted it will mean that H<sub>2</sub>S levels should not exceed 15 ppm for any 30 minute period and should never exceed 25 ppm.

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### Section III: Physical Data

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**Physical State:** Gas

**Appearance:** Hydrogen sulfide is a colourless gas.

**Odour:** Hydrogen sulfide may smell of rotten eggs depending upon its concentration.

**Odour Threshold:** 0.13 ppm. Beyond 100 ppm the sense of smell is paralysed.

**Vapour Pressure:** 1875 kPa at 20 °C

**Vapour Density:** 1.189 (air=1)

**Evaporation Rate:** Not applicable

**Boiling Point:** -60.7 °C

**Freezing Point:** -85.5 °C

**Density:** Not applicable

**pH:** 4.1 (0.1N aqueous solution)

## **Section IV: Fire and Explosion Hazard**

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**Flammability:** Yes

**Means of Extinction:** Stop flow of gas if possible. Water spray, dry chemical, "alcohol foam" or carbon dioxide may be used as extinguishing agents.

**Special Procedures:** When heated to decomposition, it emits highly toxic fumes of sulfur and sulfur dioxide.

**Upper Explosive Limit:** 44% (in air)

**Lower Explosive Limit:** 4.0 % ( in air)

**Autoignition Temperature:** 260 °C

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## **Section V: Reactivity Data**

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**Chemical Stability:** Stable (as a gas)

**Incompatibility to Other Substances:** Hydrogen sulfide may react violently with oxidizing agents (eg. peroxides, nitrates). Hydrogen sulfide is incompatible with metals and metal oxides.

**Reactivity:** Normally stable

**Hazardous Polymerization:** Will not occur

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## **Section VI: Toxicological Properties**

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**Routes of Entry:** Inhalation is the major route of entry. However, eye and skin contact may also have adverse effects.

### **Health Effects - Acute:**

**Respiratory:** At concentrations of 0.13 to 30 ppm, the odour is obvious and unpleasant. At 50 ppm, dryness and irritation of the nose and throat occurs. Prolonged exposure may cause a runny nose, cough, hoarseness, shortness of breath, and pneumonia. At 100 to 150 ppm, there is a temporary loss of smell. At 200 to 250 ppm, H<sub>2</sub>S causes severe irritation as well as symptoms such as headache, vomiting and dizziness. Prolonged exposure may cause pulmonary edema (fluid build-up in the lungs). Exposure for 4 to 8 hours can cause death. Concentrations of 300 to 500 ppm cause these same effects sooner and more severely. Death can occur in 1 to 4 hours. At 500 ppm, excitement, headache, dizziness, staggering, unconsciousness and respiratory failure occur in 5 minutes to 1 hour. Death can occur in 30 minutes to 1 hour. Exposures above 500 ppm rapidly cause unconsciousness and death. Severe exposures which do not result in death may cause long-term symptoms such as memory loss, paralysis of facial muscles or nerve tissue damage.

## Hydrogen Sulfide Gas

**Eye and Skin Irritation:** Inflammation and irritation of the eyes can occur at very low airborne concentrations (sometimes less than 10 ppm). Exposure over several hours or days may result in "gas eyes" or "sore eyes" with symptoms of scratchiness, irritation, tearing and burning. Above 50 ppm, there is intense tearing, blurring of vision and pain when looking at light; the victim may see rings around bright lights. Most symptoms disappear when exposure ceases. However, in serious cases the eye may be permanently damaged. The gas may irritate the skin, although this is rare.

**Health Effects - Chronic:** Currently, the chronic effects of exposure to hydrogen sulfide gas are not known. Long-term exposure to hydrogen sulfide may cause fatigue, headache, dizziness, hoarseness, cough and irritability. However, these symptoms are not specific to hydrogen sulfide exposure and may be due to other causes.

**Carcinogenicity:** Not carcinogenic according to WHMIS criteria.

**Teratogenicity:** Not known

**Mutagenicity:** Not known

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## Section VII: Preventative Measures

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### Personal Protective Equipment:

**Eyes:** A full face-piece respirator may be required to prevent/reduce eye irritation.

**Clothing:** Wear appropriate shoes, gloves and clothing to guard against mechanical hazards.

**Respirator:** If engineering controls are not effective in controlling exposure to hydrogen sulfide, respiratory protection may be required. For concentrations known to be below 100 ppm a NIOSH approved full-face air-purifying respirator fitted with H<sub>2</sub>S cartridges can be used, or a supplied-air system can be used. For concentrations exceeding 100 ppm, emergency or planned entry into unknown concentrations, or IDLH (Immediately Dangerous to Life and Health) conditions use a NIOSH approved full-face supplied air respirator (SAR) or self contained breathing apparatus (SCBA). Note: The IDLH concentration for hydrogen sulfide is 100 ppm.

**Engineering Controls:** General and local ventilation should be used to reduce exposure to hydrogen sulfide gas. Additional engineering controls such as process enclosure, may also be required.

**Leak and Spill Procedures:** Not likely with hydrogen sulfide gas.

**Waste Disposal:** Not applicable

**Storage Requirements:** Not applicable

## **Section VIII: First Aid and Emergency Measures**

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**Eyes:** If irritation occurs, immediately flush the contaminated eye(s) with lukewarm, gently flowing water for 20 minutes. Obtain medical attention immediately.

**Skin:** Irritation of skin by contact with hydrogen sulfide gas is unlikely.

**Ingestion:** Ingestion is not a route of entry for hydrogen sulfide gas.

**Inhalation:** Take proper precautions to ensure your own safety before attempting rescue eg. wear appropriate protective equipment, use the "buddy" system. Remove source of contamination or move victim to fresh air. If breathing has stopped, trained personnel should begin artificial respiration or if the heart has stopped, cardiopulmonary resuscitation (CPR) immediately. Oxygen may be beneficial if administered by a person trained in its use, preferably on a physician's advice. Obtain medical attention immediately.

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## **Section IX: Preparation Information**

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### **References:**

1. Canadian Centre for Occupational Health and Safety, CCINFO, 98-4.

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