



MUNICIPAL DISTRICT OF GREENVIEW NO. 16

"A Great Place to Live, Work and Play"

Procedure Title: CODE OF PRACTICE HYDROGEN SULFIDE H2S

Procedure No: 3007-01

Approval: CAO, HSC

Effective Date: October 16, 2014

Supersedes Procedure No: none

1. Purpose

1.1. The following generic Code of Practice applies to all work areas within Greenview where hydrogen sulfide containing materials (e.g. materials from wastewater, landfills, and upstream oil and gas operations) are present. It outlines responsibilities, safe work procedure and training, personal protective equipment and emergency response procedure requirements. All work areas where hydrogen sulfide is used or may be present within Greenview must implement the requirements identified in this Code of Practice.

2. Definitions

2.1. Hydrogen Sulfide – Hazard Summary

2.1.1. Hydrogen sulfide is a colorless, poisonous and flammable gas with the smell of rotten eggs. It can be detected by smell at very low concentrations ranging from 0.01 – 0.3 parts per million.

2.1.2. Detection by odor is not reliable because at high concentrations (e.g. 100 ppm), hydrogen sulfide deadens a person's sense of smell thus make it non-detectable. Hydrogen sulfide is very quickly absorbed into the lungs.

2.1.3. Short term exposure may cause irritation of nose, throat, eyes and lungs. The Alberta Occupational Exposure Limit (OEL) is 10 parts per million (ppm) for 8 hours and 15 ppm as a ceiling limit.

2.1.4. The Immediately Dangerous to Life and Health concentration of 100 ppm has been established by the National Institute for Occupational Safety and Health (NIOSH).

2.1.5. Table 1: Health Affects from Short-Term Exposure to Hydrogen Sulfide (reproduced from: Hydrogen Sulfide at the Work Site, Alberta Workplace Health & Safety Bulletin, CH 029, Revised August 2010)

Table 1

Concentration (ppm) - Health Effect	Concentration (ppm) - Health Effect
0.01 – 0.3 Odor Threshold	1 – 20 Offensive odor, possible nausea, tearing of the eyes or headaches with prolonged exposure.
20 – 50 Nose, throat and lung irritation; digestive upset and loss of appetite; sense of smell starts to become fatigued; acute conjunctivitis may occur (pain, tearing and light sensitivity)	100 – 200 Severe nose, throat and lung irritation; ability to smell odor completely disappears.
250 – 500 Pulmonary edema (build up of fluid in the lungs)	500 Severe lung irritation, excitement, headache, dizziness, staggering, sudden collapse (knockdown), unconsciousness and death within a few hours, loss of memory for the period of exposure.
500 – 1000 Respiratory paralysis, irregular heartbeat, collapse and death without rescue.	>1000 Rapid collapse and death

3. Responsibilities

3.1. CAO & General Managers

3.1.1. Ensure the elements identified in this Code of Practice are implemented.

3.1.2. Approve safe work procedures and JHA's

3.2. Supervisors

3.2.1. Identify projects and areas where there is a potential exposure to hydrogen sulfide (H₂S) or where H₂S may be present.

3.2.2. Assess hazards associated with the potential exposures to hydrogen sulfide in the specific project or area.

3.2.3. Implement appropriate engineering controls

3.2.4. Develop safe work procedures

3.2.5. Provide the necessary personal protective equipment to address the identified hazards.

3.2.6. Implement emergency response procedures that provide clear instructions on actions to take in the event of an emergency

3.2.7. Train all workers that work with hydrogen sulfide so they understand the hazards associated with the use of hydrogen sulfide and the safe work procedures.

3.2.8. Ensure others present in the area are aware of hydrogen sulfide hazards and the emergency response procedure.

3.2.9. Provide portable gas detectors and ensure they are calibrated and maintained as per manufacturer's recommendations.

3.2.10. Provide training certificates and documentation to Health and Safety

3.3. Workers

3.3.1. All workers that have the potential to be over exposed to hydrogen sulfide must participate in training and follow the established safe work procedures.

3.4. Health & Safety

3.4.1. Assists departments in the development of safe work procedures, training and other matters related to the health & safety of Greenview staff.

3.4.2. Provide current regulatory information updates necessary for compliance with Occupational Health & Safety legislation.

3.4.3. Review site-specific safe work procedures and Job Hazard Analysis

3.4.4. Review and update the Code of Practice for H2S as necessary.

3.4.5. Maintain records of all training provided and forward to Human Resources and Records.

4. Hazard Management

4.1. Supervisors are required to conduct hazard assessment of the project or area to identify specific hazards and implement appropriate control measures. Greenview's Job Hazard Analysis Form may be used to record the results of your hazard assessment.

4.2. Hazard Communication

4.2.1. Clearly indicate the area where hydrogen sulfide gas is found and at what levels. Clearly indicate on the hazard signage on that hydrogen sulfide gas or flammable gas are in the area, unauthorized entry prohibited, no ignition sources/smoking.

4.3. Safe Work Procedures

4.3.1. Develop site-specific safe work procedures that address the hazards and controls of hydrogen sulfide exposure. Include emergency response actions to be undertaken and by whom in the event of an accidental release or exposure.

5. Training

5.1. Training all workers in potential areas containing hydrogen sulfide must understand H2S and emergency procedures. The training will include but is not limited to:

5.1.1. Understanding of the hazards associated with the use of hydrogen sulfide gas and the information contained in the hazard analysis documents and safe work procedures and how the hazards will be managed.

- 5.1.2. Selection, use and maintenance of the required personal protective equipment.
- 5.1.3. How to use the control measures e.g. ventilation operation and use, monitoring of toxic gases and explosive limits.
- 5.1.4. Emergency response procedures to follow in the event of an accidental leak or exposure.
- 5.1.5. Use and maintenance of the H₂S detectors.
- 5.1.6. Fire extinguisher use.
- 5.1.7. Control Measures Engineering controls e.g. appropriate ventilation such as a properly functioning fume hood, ventilated gas cabinet or another type of local exhaust enclosure must be used to protect workers from potential exposures to hydrogen sulfide.
- 5.1.8. Personal Protective Equipment Appropriate personal protective equipment (e.g. gloves, laboratory coat or coveralls, air-tight goggles (hydrogen sulfide gas is irritating to the eyes) must be available.

6. Respiratory Protective Equipment

- 6.1. Engineering controls such as local exhaust ventilation must be the first option to control exposures to hydrogen sulfide. If that is not possible then a full- face piece positive pressure supplied air respirator is required for work areas where hydrogen sulfide concentrations exceed the 8-hour OEL of 10 ppm or the ceiling OEL of 15 ppm. NIOSH allows the use of air-purifying respirators for hydrogen sulfide at concentrations above 10 ppm and below 100 ppm.
- 6.2. Workers must undergo fit testing before respiratory protection can be used.

7. Gas Detector Monitors

- 7.1. Hydrogen Sulfide Detectors Hydrogen sulfide detectors are required in all areas where hydrogen sulfide may be found. All workers performing work where hydrogen sulfide gas may be present must have on them personal detectors. The detectors must be maintained and calibrated on a regularly scheduled basis as per the manufacturer's recommendations.

8. Working Alone

- 8.1. Working alone with hydrogen sulfide is not allowed.

9. Resources

- 9.1. Hydrogen Sulphide at the Work Site, Alberta Workplace Health & Safety Bulletin, CH 029, Revised August 2010 <http://www.employment.alberta.ca/documents/WHS/WHS-PUB-CH029.pdf>
- 9.2. Alberta Occupational Health & Safety Act, Regulation and Code and Explanation Guide <http://www.employment.alberta.ca/SFW/307.html>

10. End of Procedure

Approved: 14.10.006

CAO