ConocoPhillips Canada	**HYDROGEN SULPHIDE (H_2S)** ALL-A0A-00-000-HST-0010	**Retention Code:** *CG01 - CA* **Revised:** *February 2020*
Owner: *HSE Operations*	**Approved By:** *Manager, Health & Safety Operations*	**Review Frequency:** *Five years or less*

Contents

Document History

Date	Approved by	Change Summary
February 2020	David Reaich	Document Usability Mapped – Issued for Use

About this Standard.

Purpose	The purpose of this standard is to provide defenses to safely conduct work in Hydrogen Sulphide (H_2S) Environments.

1. Hydrogen Sulphide (H_2S) Properties

Sources of H_2S

Examples of potential H_2S sources or locations where H_2S is found include:

- Leaks from sour gas wellheads, pipelines, piping, equipment.
- Breaking equipment integrity or Pigging activities
- Uncoupling vent and load lines and vents/ hatches on storage tanks.
- Maintenance activities
- Flaring sour or acid gas
- Trucking activities
- Gauging tanks, changing filters, and sampling.

Physical Properties of H_2S

Hydrocarbons containing H_2S are commonly called "sour". The following physical properties of H_2S gas include:

- colorless and flammable
- heavier than air
- lighter than air if mixed with light hydrocarbons (i.e. methane)
- can occur as a vapour or dissolved in produced water, crude oil or condensate
- can collect in confined spaces or in headspaces of tanks, pipes, and vessels containing sour fluids.

Health Effects of H_2S

Health effects associated with H_2S exposure is as follows:

H2S Concentration	Health Effects
<1 ppm	Rotten egg smell
10 ppm	No know adverse health effects
20 ppm – 50 ppm	Eye, nose, throat and lung irritation
100 ppm – 150 ppm	Sever eye, nose, throat and lung irritation, loss of smell. IDLH = 100 ppm
200 ppm – 300 ppm	Headaches, drowsiness and fluid in lungs
300 ppm – 500 ppm	Unconsiousness and death in 1 to 4 hours
500 ppm – 700 ppm	Knockdown may be fatal within 1 hour
>700 ppm	Immediate knockdown may be fatal.

2. Working in H_2S Environments.

2.1.Respiratory Protective Equipment (RPE).

Respiratory Protective Equipment Requirements

Respiratory protection is required to mitigate H_2S breathing hazards when:

- Actual or potential H_2S concentrations exceed 10 ppm.
- H_2S concentrations are unknown.

NOTE: A continuous aspirated gas detector or detector tubes are required when confirming H_2S concentrations.

Respiratory protection type

The type of Respiratory protection equipment must be either:

Equipment	Details
SCBA	A full-face, positive pressure SCBA.
SABA	A full-face, positive pressure SABA with a 5-minute escape air bottle.

Fit Testing Requirements

Fit testing requirements must be followed when approved to wear respiratory protective equipment as follows:

- Workers must be fit tested for the specific respiratory protective equipment being used
- Personnel who may be required to wear RPE must be clean shaven

Minimum SCBA units available

The minimum number of SCBA units available on site for drilling, completions and well servicing work sites are:

Province	SCBA Units Required
Alberta	2
British Columbia	4

NOTE: Provincial regulations require SCBA units when a supplied air trailer is not present. Breathing air requirements at all other locations is based on hazard assessment.

2.2.Communication and Back-up Requirements.

Communication and Back-up Requirements

When working in H_2S environments communication and back-up requirements are as follows:

H_2S Concentration	Communication and Back-up Requirements
10 ppm to 100 ppm	• Review tasks and Establish communication plan with coworker • Establish follow-up communication intervals and Emergency Response Plan • Implement additional Defenses per Hazard Assessment.
>100 ppm	• Backup personnel must be present • Implement additional Defenses per Hazard Assessment.

Backup Personnel

If using backup personnel, the personnel must:

- Be onsite and equipped with RPE
- Ready to immediately respond
- Be trained in H_2S environments and fit tested

NOTE: Backup personnel must also be used when required by hazard assessment, work permits, and/or local site operating requirements.

2.3.Signage and Wind Indicators

Signage and wind indicator requirements

Sites where H_2S is present or known to be above 10ppm require:

- Signage at entrance warning of the presence of poisonous gas.
- Wind Indicator

NOTE: More than one wind indicator may be required depending on size of location and visibility to personnel.

3. Iron Sulphide.

Iron Sulphide Properties

Iron sulfide is present in most facilities where H_2S and iron come in contact with each other and has the following properties:

- Nontoxic.
- Spontaneous combustion will occur in the presence of air unless kept wet.
- Can be present in vessels, tanks, piping and fittings as a brown/black deposit.

Iron Sulphide Defense Actions

Consider the following defense actions when working with Iron Sulphide:

- Maintain wet.
- Use proper containers for disposal.
- Vessels or systems may require purging with inert gas prior to admitting air.
- Piping and fittings that have had Iron Sulphide removed must be flushed with water and dried immediately.

WARNING: Iron Sulphide will ignite in the presence of air.

References.

Document Name	Document ID
Respiratory Protection Code of Practice.	
Provincial Regulations for Alberta, British Columbia and Saskatchewan.	