

WorkSafeBC Occupational Health & Safety (OH&S) Regulation:

Hazardous Atmospheres and Confined Spaces in Compost Operations

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Prevention Field Services

Why is Health and Safety Important?

Previous Workplace Incidents in British Columbia

Fatal and Serious Injuries

- 3 workers died, 2 seriously injured while entering a confined space (2008)
- 1 worker seriously injured while carrying out contract work (2010)
- Incidents led to recommendations from the Coroner's Inquest (2012):
 - WorkSafeBC to partner with Farm and Ranch Safety and Health Association (AgSafeBC)
 - Set up a "Confined Space Centre of Excellence" to deliver best practice information and appropriate risk mitigation procedures

Hazardous Atmospheres Compost Operations

- Hydrogen Sulfide
- Ammonia
- Methane
- Carbon Monoxide
- Carbon Dioxide
- Biohazards -bacteria, fungi, viruses as well as their by-products.

Hydrogen Sulfide (H₂S)

- H₂S may form and be released when organic material such as manure or vegetable matter breaks down without oxygen
- H₂S is a very toxic gas. It has no colour, but it smells like rotten eggs
- H₂S is heavier than air, it may settle in low spots which can pose a risk to workers when entering areas where the gas is present
- In larger amounts, H₂S quickly blocks sense of smell
- That is why odour should never be used to rate H₂S levels

H2S Warning Signs

Concentration in parts per million (PPM) Observations and health effects

Less than 1	Most people smell "rotten eggs"
3 to 5	Odour is strong
20 to 150	Nose and throat feel dry and irritated. Eyes Sting, itch, or water. Prolonged exposure may cause coughing, hoarseness, shortness of breath, and runny nose.
150 to 200	Sense of smell is blocked (olfactory fatigue)
200 to 250	Major irritation of the nose, throat, and lungs occurs, along with headache, nausea, vomiting, and dizziness. Prolonged exposure can cause fluid buildup in the lungs which can be fatal
300 to 500	Symptoms are the same as above, but more severe. Death can occur within 1 to 4 hours of exposure
Above 500	Immediate loss of consciousness. Death is rapid, sometimes immediate.

Hydrogen Sulfide

- H₂S dissolves in water and oil, and it may be released when these liquids are heated, depressurized, or agitated
- Workers can be exposed to H₂S when they:
 - moving or handling large stock piles of compost that have gone anaerobic
 - Inspecting or cleaning drainage ditches, sumps, pipes or tanks
 - Repairing plumbing or piping

Occupational Exposure Limit (OEL)

- The OEL is the level of an airborne substance that workers may be exposed to without wearing protective equipment, and without normally suffering adverse health effects.
- In British Columbia, *the OEL for H₂S is a Ceiling Limit (not to be exceeded) of 10 ppm*. At levels above this ceiling, only workers who are trained in the hazards of H₂S and are wearing required protective equipment may enter the work area.
- If an H₂S leak occurs, the area must be evacuated; only workers wearing appropriate protective equipment may enter to correct the problem.

Exposure control Plan

Part 5 OH&S Regulation

- statement of purpose and responsibilities
- risk identification, assessment and control
- education and training
- written work procedures
- hygiene facilities and decontamination procedures
- health monitoring
- documentation

Types of Controls

5.55 Type of controls

If there is a risk to a worker from exposure to a hazardous substance by any route of exposure, the employer **must eliminate** the exposure, or otherwise control it below harmful levels and below the applicable exposure limit established under section 5.48 by

- (a) substitution,
- (b) engineering control,
- (c) administrative control, or
- (d) personal protective equipment.

Confined Spaces

Part 9 OH&S Regulation

"*confined space*", except as otherwise determined by the Board, means an area, other than an underground working, that

- is enclosed or partially enclosed
- is not designed or intended for continuous human occupancy
- has limited or restricted means for entry or exit that may complicate the provision of first aid, evacuation, rescue or other emergency response service
- is large enough and so configured that a worker could enter to perform assigned work

Confined Spaces

9.2 Initial determination

The employer must

(a) ensure that each confined space in the workplace is identified, and

(b) determine whether any such space will require entry by a worker, either in scheduled work activities or as a result of foreseeable system failures or other emergencies.

Confined Spaces

9.3 Prohibited entry

If a confined space exists at a workplace but no worker entry is required, the employer must ensure that each point of access to the confined space is secured against entry or identified by a sign or other effective means which indicates the nature of the hazard and the prohibition of entry, and that workers are instructed not to enter.

Confined Spaces

9.12 Identification

When a confined space requires entry by a worker, each point of access which is not secured against entry must be identified by a sign or other effective means which indicates the hazard and prohibits entry by unauthorized workers

Confined Spaces

9.5 Confined space entry program

Before a worker is required or permitted to enter a confined space, the employer must prepare and implement a written confined space entry program which includes

(a) an assignment of responsibilities,

(b) a list of each confined space or group of similar spaces and a hazard assessment of those spaces, and

(c) written safe work procedures for entry into and work in the confined space, that address, where applicable

Confined Spaces

9.9 Hazard Assessment

(1) A hazard assessment must be conducted for each

(a) confined space, or each group of confined spaces which share similar characteristics, and

(b) work activity, or group of work activities which present similar hazards, to be performed inside a confined space.

Confined Spaces

The hazard assessment must consider

- (a) the conditions which may exist prior to entry due to the confined space's design, location or use, or which may develop during work activity inside the space, and

- (b) the potential for oxygen enrichment and deficiency, flammable gas, vapour or mist, combustible dust, other hazardous atmospheres, harmful substances requiring lockout and isolation, engulfment and entrapment, and other hazardous conditions.

Confined Spaces

9.10 Procedures

Written procedures specifying the means to eliminate or minimize all hazards likely to prevail must be developed, based on the hazard assessment required by section 9.9.

Confined Space

9.11 Qualifications

- (1) The hazard assessment and written confined space entry procedures must be prepared
 - (a) by a qualified person who has adequate training and experience in the recognition, evaluation and control of confined space hazards, and
 - (b) in consultation with the person assigned overall responsibility for administration of the confined space entry program and with the joint committee or the worker health and safety representative, as applicable.

Resources

- WorkSafeBC.com
<https://www.worksafebc.com/en>
- AgSafeBC.ca
<http://www.agsafebc.ca/>
- Sample Exposure Control plans
[https://www.worksafebc.com/en/forms-resources#q=exposure%20control%20plan&sort=relevancy&f:language-facet=\[English\]](https://www.worksafebc.com/en/forms-resources#q=exposure%20control%20plan&sort=relevancy&f:language-facet=[English])

Confined Space Resources

WorkSafeBC and AgSafeBC

Confined Space Centre of Excellence

- Confined Space Training Materials
- Hazard Assessments
- Templates and Checklists
- Decals and Signs

[https://www.worksafebc.com/en/forms-resources#q=confined%20spaces%20agriculture&sort=relevancy&f:language-facet=\[English\]](https://www.worksafebc.com/en/forms-resources#q=confined%20spaces%20agriculture&sort=relevancy&f:language-facet=[English])

<http://www.agsafebc.ca/tools/confined-spaces/>

WorkSafeBC Bulletins

Incorrect use of monitoring equipment in confined spaces can endanger workers

<https://www.worksafebc.com/en/resources/health-safety/hazard-alerts/incorrect-use-of-monitoring-equipment-in-confined-spaces-can-endanger-workers?lang=en&origin=s&returnurl=https%3A%2F%2Fwww.worksafebc.com%2Fen%2Fforms-resources%23q%3Dincorrect%2520use%2520of%2520monitoring%2520equipment%2520in%2520confined%2520spaces%26sort%3Drelevancy%26f%3Alanguage-facet%3D%5BEnglish%5D&highlight=incorrect+use%2Bof%2Bmonitoring%2Bequipment%2Bin%2Bconfined%2Bspaces>