

Management of confined spaces in agriculture

A handbook for workers



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WorkSafeBC was born out of a compromise between B.C.'s workers and employers in 1917 where workers gave up the right to sue their employers or fellow workers for injuries on the job in return for a no-fault insurance program fully paid for by employers. We are committed to a safe and healthy workplace, and to providing return-to-work rehabilitation and legislated compensation benefits to workers injured as a result of their employment.

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The WorkSafeBC Prevention Information Line can answer your questions about workplace health and safety, worker and employer responsibilities, and reporting a workplace incident. The Prevention Information Line accepts anonymous calls.

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ISBN 978-0-7726-6772-4

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WORK SAFE BC

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Introduction: Why confined spaces are a concern

Three steps to worker safety

- 1 Recognize confined spaces
- 2 Know the hazards
- 3 Know what to do about confined spaces

In this handbook, you'll learn about the types of confined spaces that may be on the farms where you work. In the following pages, you will read about:

- How to recognize a confined space
- The potential hazards of confined spaces
- How to stay safe when working in or near these spaces

On farms, confined spaces such as tanks, silos, and storage bins can be dangerous to anyone exposed to toxic gases and other hazards that may be in these spaces. Many workers have lost their lives because they didn't know a confined space was dangerous, so didn't take proper safety measures when entering.

That's why you need to know about the confined spaces where you work. It's also important that you never enter a confined space unless you have permission and proper training. You must also be sure all necessary safety measures are in place first.



Storage bins



Milk tank

Previous incidents in this industry are tragic reminders of why you must have proper knowledge of potential hazards and safe work procedures for confined spaces. Below, you will read about some tragic incidents that happened when workers did not know about the hazards of confined spaces, and proper safety procedures were missing. By learning from these incidents, you can better identify confined spaces and where hazards may be so you and your co-workers can stay safe on the job.



Brown water cistern



Pump shed



Composting pond

Incident at mushroom composting facility kills three workers

In September 2008, three men died and another two were permanently injured in a pump shed on a mushroom farm in Langley. Three of the men were trying to clear a blocked intake pipe in the shed. When the pipe was disconnected, one worker complained of a strange smell and then collapsed. A second worker remained in the shed with the unconscious worker while the supervisor went for help. Before emergency services arrived, several other workers entered the shed to help.

When the ambulance and fire crews arrived at the site, they found the supervisor outside the pump shed, disoriented and in respiratory distress. Five other workers were recovered from inside the shed. Three workers suffered fatal injuries and two suffered severe and permanent brain injuries from exposure to the toxic atmosphere.

What went wrong? The mushroom farm didn't have a health and safety program or a confined space program. Workers entered the space to rescue their fellow workers without any training or safety equipment. The pump shed had also not been identified as a confined space, so the workers didn't recognize that it might contain a hazardous atmosphere.

Winery incident kills two workers

In November 2002, two Okanagan winemakers died in a wine fermentation tank with low oxygen levels. One worker, standing on a ladder above the hatch of the tank, may have inhaled a high concentration of carbon dioxide gas (a by-product of fermentation) when the hatch was opened. He then lost consciousness and slumped into the chilled liquid in the tank. A fellow worker tried rescuing him but also died after he leaned into the hatch. Two people working nearby recalled hearing the second man say he couldn't breathe. Emergency rescuers tried draining the liquid from the tank and cutting it apart, but it was too late.

Dairy farm tragedy claims five in the US

In 2007, four family members and a worker died from exposure to hydrogen sulfide gas in a manure pit on a dairy farm. A dairy farmer was transferring liquid manure from a small pit to a larger one when the transfer pipe became blocked. After entering the small pit to clear the blockage, he collapsed from being exposed to hydrogen sulfide gas in the pit. Another worker then climbed into the pit to help the farmer but was also overcome by the deadly gas. The farmer's wife and two daughters then entered the pit and were also overcome by the gas. First responders to the scene were unable to revive the victims.

Step 1: Recognize confined spaces



Tanker truck

A confined space is an enclosed or partially enclosed area that is big enough for a worker to enter. The space may be enclosed on all sides (for example, a bin or tank), or as few as two sides (for example, an enclosed conveyor).

You can recognize a confined space because it will not have things you would normally find in a workspace, such as:

- Permanent utilities (e.g., ventilation systems, lighting, and plumbing services)
- Wall coverings and furniture
- Easy access (e.g., large doorways and shallow staircases)



Above-ground bunker

Confined spaces are not designed for someone to work in regularly. They are places where entry may be needed from time to time for inspection, cleaning, maintenance, or repair.

Examples of confined spaces



Storage bins

- Silos
- Bins
- Bunkers
- Manure storage tanks, ponds, and pits
- Water cisterns and tanks
- Wells (clean water)
- Pump or lift stations
- Valve boxes (below ground)
- Sumps
- Milk tanks
- Mobile equipment
- Conveyors
- Crawl spaces or cellars

Step 2: Know the hazards



Manure pond

There are many different hazards that could be present in a confined space. There could be toxic (poisonous) gases, not enough oxygen, or moving parts or equipment that could harm you or your co-workers. Hazards may not be obvious, so a qualified person – someone who has proper training and experience – must look carefully at every confined space on the farm where you work to identify possible hazards.

What are some common hazards that might be in a confined space?

Oxygen – too little or too much



Above-ground manure tank

Lack of oxygen is a leading cause of death for workers in confined spaces. You cannot detect low oxygen levels by sight or smell, but they can cause brain damage and stop your heart after a few minutes. In a confined space, something as simple as rusting metal can cause low oxygen levels.

Too much oxygen in a confined space is also dangerous because it increases the risk of fire or explosion. Materials that wouldn't catch fire or burn in normal air may do so quickly and easily where there's a high level of oxygen.

Toxic gases



Compost bunker

Toxic gases can be produced in a confined space by liquids or solids, such as liquid manure or compost. They can also be produced because of work that is being done, such as painting or welding. At high enough levels, even a brief exposure to some gases can cause permanent health effects, such as brain, heart, or lung damage.

If you are exposed to toxic gases in a confined space, you may become dizzy or lose consciousness and be unable to escape. This can happen quickly, which is why it's important to know about the toxic gases that might exist in a confined space.



Feed mixer

Explosive atmospheres

Gases or vapours in confined spaces can ignite, resulting in fires or explosions. Keep fuel containers away from confined spaces. Grain and wood dusts may also explode when there's enough dust in the air.

Biological hazards

Composted material and manure can release bacteria, mould spores, allergens, and other biological material into the air. If you are exposed to lower levels of these materials, you may notice mild health symptoms, such as coughing, itchy eyes, stuffy nose, sneezing, or sore throat. For someone who has asthma or a sensitized immune system, the health effects can be more severe.



Conveyor in a tunnel

Entrapment and engulfment

Grain or compost that is being stored can be a risk to you or your co-workers because you could get trapped or buried. Grain or compost, especially if they are moist, can form “bridges” with empty spaces underneath them or “shoulders” that are overhead. If you walk on the surface of one of these bridges or under a shoulder, it could collapse, and bury or trap you.

Bins and hoppers are especially dangerous. You could be trapped or crushed when material is accidentally discharged into an empty bin or hopper.

Moving parts of equipment and machinery

Mechanical equipment, such as augers, mixers, or rotating tanks, can be dangerous to work around. Even when equipment is shut off, someone else could accidentally turn it on. The machine could also contain remaining energy, such as accumulated pressure. Equipment that has not been locked out and de-energized could also move unexpectedly, especially if it is not properly balanced.



Boiler in a greenhouse

Electrical shock

Electrical shock can result from defective extension cords, welding cables, or other electrical equipment. Work done in metal enclosures or wet conditions can be particularly dangerous.



Stormwater manhole

When solid materials, such as dry grain or feed, flow or move (for example, through pipes, augers, or hoppers), dry conditions can cause electrostatic arcs. Electrostatic arcs can ignite dust clouds and cause explosions.

Substances entering through piping

Pipes connected to or entering confined spaces may contain liquids, gases, or other harmful substances, including:

- Toxic gases
- Hot substances that could cause burns (e.g., steam)
- Liquids that could cause drowning (e.g., milk or liquid manure)
- Solids that could trap, crush, or bury, (e.g., grain or feed)



Crawl spaces

Temperature extremes

Some confined spaces have very high temperatures. Heat stress can produce sweating, muscle weakness, cramps, fatigue, thirst, and, in severe situations, heat stroke. Untreated heat stroke can lead to death.

If you're exposed to low temperatures, cold stress may result. Shivering is a common symptom of cold stress. In confined spaces, ventilation systems can be dangerous because they can cause you to lose more body heat quickly.

Noise

Noise in confined spaces can harm you because it reflects (or bounces) off walls. If noise levels cannot be reduced, you must wear hearing protection.



Open-top tanks

Drowning

Before you or others work in a confined space, the space should be fully drained and dry to prevent drowning. Workers have drowned in confined spaces after being knocked out by toxic gas, a lack of oxygen, or from a head injury that caused them to fall to the floor.

Step 3: Know what to do about confined spaces



Confined space warning sign

Keep out!

If you see a confined space – or a space you think might be a confined space – stay away. It could be dangerous for you to enter. You may not be able to tell if the air inside is safe to breathe.

You should also stay away from entrances or openings to confined spaces. If a confined space has toxic gases or not enough oxygen, even putting your head inside the space or near the opening could be dangerous.

Look out for warning signs and stay out of secured spaces

Your employer should have signs posted around the farm identifying all confined spaces. These signs are there to stop people from entering confined spaces that may be dangerous because of toxic gases or other hazards.

In many cases, confined spaces will be locked or secured. If you see a fence, barrier, or guardrail, it's probably there for a reason. If you think you need to enter a secured space, first ask your employer or supervisor if it's safe.

Don't rescue others without the proper training and equipment

If someone enters a confined space and loses consciousness or is unable to move, don't rush into the space to try and rescue them. The confined space may contain toxic gases that can knock you out too, or kill you in seconds. Since 2000, 18 workers have lost their lives in confined spaces on farms in British Columbia – half of these were rescuers.



Sanitary sewer manhole



Entry and ventilation equipment setup



Worker entering a manhole

When is it safe to enter a confined space?

Do not enter any confined space unless you can say “yes” to all of the following items:

- You have been trained to enter and work in confined spaces.
- Your employer has a confined spaces program and a rescue plan specific to your farm.
- Equipment is available to safely enter the space and rescue injured workers in an emergency.
- Machinery has been locked out and pipes have been isolated, where necessary.
- The atmosphere in the confined space has been tested to ensure it’s safe to enter.
- The space is properly ventilated.
- A designated standby person is stationed at or near the entrance to the confined space.

Always be sure to tell your employer if you see a possible confined space.

Now that you know more about confined spaces, look out for possible confined spaces on the farm where you work. There could be confined spaces that your employer or supervisor doesn’t know about.

Don’t ignore a possible confined space. It doesn’t hurt to ask about it. Alerting your employer or supervisor to spaces they may not already know about could save someone’s life.

Notes

Visit our website at worksafebc.com.

Abbotsford

2774 Trethewey Street V2T 3R1
Phone 604.276.3100
1.800.292.2219
Fax 604.556.2077

Burnaby

450 – 6450 Roberts Street V5G 4E1
Phone 604.276.3100
1.888.621.7233
Fax 604.232.5950

Coquitlam

104 – 3020 Lincoln Avenue V3B 6B4
Phone 604.276.3100
1.888.967.5377
Fax 604.232.1946

Courtenay

801 30th Street V9N 8G6
Phone 250.334.8765
1.800.663.7921
Fax 250.334.8757

Kamloops

321 Battle Street V2C 6P1
Phone 250.371.6003
1.800.663.3935
Fax 250.371.6031

Kelowna

110 – 2045 Enterprise Way V1Y 9T5
Phone 250.717.4313
1.888.922.4466
Fax 250.717.4380

Nanaimo

4980 Wills Road V9T 6C6
Phone 250.751.8040
1.800.663.7382
Fax 250.751.8046

Nelson

524 Kootenay Street V1L 6B4
Phone 250.352.2824
1.800.663.4962
Fax 250.352.1816

North Vancouver

400 – 224 Esplanade Ave. W. V7M 1A4
Phone 604.276.3100
1.888.875.6999
Fax 604.232.1558

Prince George

1066 Vancouver Street V2L 5M4
Phone 250.561.3700
1.800.663.6623
Fax 250.561.3710

Surrey

100 – 5500 152 Street V3S 5J9
Phone 604.276.3100
1.888.621.7233
Fax 604.232.7077

Terrace

4450 Lakelse Avenue V8G 1P2
Phone 250.615.6605
1.800.663.3871
Fax 250.615.6633

Victoria

4514 Chatterton Way V8X 5H2
Phone 250.881.3418
1.800.663.7593
Fax 250.881.3482

Head Office / Richmond

Prevention Information Line:

Phone 604.276.3100
1.888.621.7233 (621.SAFE)

Administration:

6951 Westminster Highway
Phone 604.273.2266

Mailing Address:

PO Box 5350 Stn Terminal
Vancouver BC V6B 5L5

After hours

health & safety emergency

604.273.7711
1.866.922.4357 (WCB.HELP)

