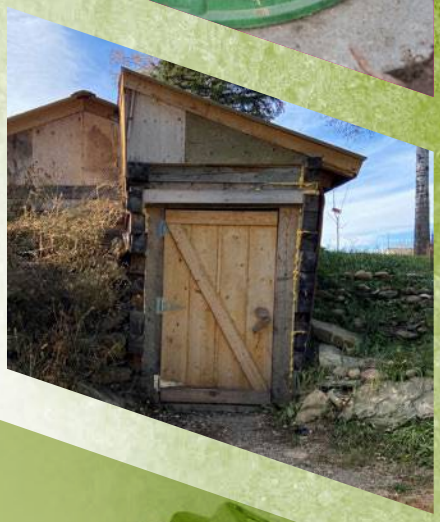

AgSafe ALBERTA

RESTRICTED & CONFINED SPACE

AWARENESS MANUAL

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MANUAL VERSION 1.0

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Table of Contents

IMPORTANT

- There is Glossary at the end of this manual to support your understanding of the terms used.
- The following abbreviations have been used to make this manual easier to read:
  - Occupational Health and Safety will be written as **OHS**
  - Occupational Health and Safety Act will be written as **OHS Act**
  - Occupational Health and Safety Code will be written as **OHS Code**
  - Canadian Standards Association or CSA Group will be written as **CSA**

FOREWORD

Introduction

Welcome to the AgSafe Alberta Confined Space Awareness Manual. This manual and the supporting course will help you learn how to identity restricted and confined spaces on your farm and the hazards of them. It will also introduce you to some of the ways that the hazards of these spaces can be controlled before someone can enter one for work purposes.

The information in this manual does not replace what is in Alberta Occupational Health and Safety (OHS) Legislation nor does it certify someone to work in a confined space, be an attendant, or perform a rescue in one, but it will support you in better protecting the people on your farm or ranch from the hazards of confined spaces.

Background

AgSafe Alberta is the health and safety association for agricultural producers in our province. It is a non-profit organization that works with and supports farms and ranches of all types and sizes in becoming safer. The AgSafe Alberta Board of Directors is made up of producers who represent various commodity groups and producer organizations, this helps ensure that the work being done is truly ***producer driven safety.***

In 2011, the Minister's Farm Safety Advisory Council recommended increased education, training and certification opportunities for Alberta farms. As a result, Alberta Agriculture and Forestry worked with the Canadian Agricultural Safety Association and Alberta's Partnerships in Injury Reduction (PIR) to develop the original Alberta FarmSafe Plan, a tool to help farms and ranches develop a health and safety program.

In 2019, AgSafe Alberta licensed the Alberta FarmSafe Plan from the Government of Alberta. The manual and workbook are updated regularly to stay current, and a certification program has been developed to help farms and ranches show their ongoing commitment to health and safety on their operation.

KEY POINTS TO REMEMBER

- Should you have any questions relating to agricultural health and safety, please email AgSafe Alberta at info@agsafeab.ca.
- To keep this manual as applicable to general agricultural awareness applications as possible, the information contained within is not comprehensive.

A Brief Timeline of Occupational Health and Safety (OHS) Legislation in Alberta

January 1, 2016: Bill 6 Enhanced Protection for Farm and Ranch Workers Act

- Made Alberta farms and ranches subject to occupational health and safety legislation.

January 31, 2020: Bill 26 Farm Freedom and Safety Act

- The entire OHS Act remained applicable to farming operations, but the OHS Code was no longer being directly applied. With these changes the "technical rules" that had been added to the OHS Code to address some aspects of safety on farming and ranching operations were lost.
- Some producers mistakenly thought their operations were exempt from all OHS legislation or that they were only responsible for "basic safety," when in reality they remained responsible for doing everything reasonable to protect the health and safety of workers.

December 1, 2021: AR 27/95 Farming and Ranching Exemption Repeal Regulation

- When the Farming and Ranching Exemption Repeal Regulation came into effect, it made part of the Alberta Occupational Health and Safety Code applicable to farming and ranching operations.
- At the time of publication, farming and ranching operations are exempt from most of the OHS Code, however the expectation for a farm owner, employer, or manager to take every practicable measure to protect the health and safety of the people working on the farm is the same as in any other industry.

The OHS Code is reviewed every few years. It is reasonable to expect additional changes that will affect farming and ranching operations to occur with each of these reviews. You will want to make efforts to stay informed of these changes and updates.

RESOURCES

- To gain a better understanding of how OHS legislation applies to your particular operation, refer to the Alberta FarmSafe Plan Manual and the free, self-paced online AgSafe Alberta FarmSafe Learning Program found at agsafeab.ca.
- Visit agsafeab.ca to subscribe to the free AgSafe Alberta monthly newsletter that focuses on farm safety affairs and highlights legislative health and safety matters that affect agricultural operations.
- Follow AgSafe Alberta on Instagram, X, and Facebook to help you stay current on farm safety matters.

KEY POINT TO REMEMBER

Volunteers are people who perform or provide services without being paid, however, they are still considered to be workers (but not regularly employed workers) and have the same health and safety rights and responsibilities as any other workers under Alberta OHS legislation.

(Government of Alberta, 2022, p.1)

ATTENTION

Throughout this manual, the term Confined Space Management Program is used rather than Confined Space Code of Practice. This has been done because most farms will be more familiar with what a program is as opposite to a Code of Practice. In addition, the term Confined Space Management Program reflects the terminology used in CSA Standard Z1006:23 *Management of work in confined spaces*.

To understand this better, refer to the Confined Space Management Program section of this manual.

The OHS Act, Code, and Your Farm

The OHS Act and Code set minimum standards for health, safety and wellness in Alberta's workplaces. It is intended to keep workplaces health, safe in addition to protecting the people working at a worksite, such as a farm, and those who may be impacted by the work being done.

OHS Act	OHS Code
Applies to farms and ranches	Farms and ranches are "exempt" from ***most*** of the OHS Code.
Assigns obligations, responsibilities and duties to individuals, owners, and organizations.	The Alberta OHS Code provides ***minimum*** technical requirements for health and safety in Alberta's workplaces (Government of Alberta, n.d.).
Assigns the obligation to take ***every reasonably practicable measure*** to protect the health and safety of: • Workers and volunteers • Contractors (e.g., custom harvest crews or veterinarians) • Service providers (e.g., tire repair service), • Visitors (e.g., tours during Alberta Open Farm Days) • Others who may be affected by hazards originating from the worksite	Following the OHS Code may not be enough to protect an employer from charges should an incident occur; the minimum requirements outlined in the OHS Code may not be enough to control the particular hazards of a situation or set of work conditions.

IMPORTANT

Confined spaces might look like normal work areas, but they are not.

Confined spaces are in fact complicated and much more dangerous than they appear, as you will learn.

Agricultural Confined Space Statistics

Confined spaces and confined space incidents occur in all industries, including farming. Canadian statistics relating to confined space incidents on farms are unfortunately limited, luckily, many American organizations do a good job of this and share their findings. A report published by Purdue University's Agricultural Safety and Health Program entitled *2022 Summary of U.S. Agricultural Confined Space-Related Injuries and Fatalities* found:

- There were at least 83 confined space incidents and 22 of which were fatal; their findings show that ***confined space incidents had increased 40.7%*** since 2021.
- 42 of the incidents were grain related, which represents the ***highest number of incidents in over a decade.***
- The 43 remaining incidents involved livestock waste handling, entanglements, falls, and grain dust explosions or fires.

(Cheng, Yuan-Hsin et al, 2023, p.1)

Why Working in a Confined Space Is More Dangerous Than Work in Other Spaces

Below are some examples of what makes a confined space more dangerous than other areas:

- There is little room for error; a missed hazard or a hazard that was not properly assessed and controlled could have serious results, such as severe injury or death.
- Both self-rescue and rescue by a rescue person or team is more difficult.
- Natural ventilation may not be enough to keep the air safe and the layout of the confined space can reduce air movement.
- Conditions can change very fast in this type of space; this can result from a lack of fresh air moving into and around in the space and/or from the small size of the space.
- Factors and conditions outside of the space can change the conditions inside of the confined space.
- The work being done inside the space can create new hazards that were not present before work began.
- Communication between the people in the space and anyone outside the space can be poor, leading to errors or other mishaps.

(adapted from Canadian Centre for Occupational Health & Safety, 2024)

Purpose & Limitations of this Manual

In 1986, the National Institute of Occupational Safety and Health (NIOSH) published an alert calling on managers, supervisors, and workers to prevent deaths in confined spaces… as these types of deaths kept happening again and again.

After investigating many confined space fatalities, three common factors were found in each incident. These shortcomings were the:

1. Lack of recognition of confined spaces (not enough hazard identification)
2. Lack of testing, evaluation, and monitoring (not enough hazard assessment & control)
3. Lack of a well-planned rescue

(National Institute for Occupational Safety and Health (NIOSH), 1986)

The purpose of this manual and the accompanying course is to help you prevent an incident from occurring on your farm by gaining an understanding of each of the three factors, and then determining what the next appropriate steps would be for your farm and taking them.

Remember, the manual and course are for awareness purposes only, and in most cases, additional training is going to be required.

1

AN INTRODUCTION TO RESTRICTED AND CONFINED SPACES

Restricted and confined spaces are surprisingly common yet unrecognized on farms and ranches. In order to recognize these spaces, you will first need to understand what they are.

IMPORTANT

As you go through this, keep in mind that a space ***does not*** have to be fully enclosed in order to be a restricted or confined space.

Restricted spaces

A restricted space is a work area that:

- Is not meant to have someone in it all of the time or even very often.
- Would be big enough to enter and difficult to get in or out of.
- Would not have any other hazards or have the hazards properly controlled.

(Occupational Health and Safety Code, Statutes of Alberta 2023, s.1)

Think of a space with a small entry way or with obstructions that would make entering it, leaving it, and/or moving around inside of it hard. An example of a restricted space may be the attic of a house, where the access ladder and hatch would make it difficult to go into and leave the space but would pose no other threat to someone's health or safety while being in it.

Confined spaces

A confined space is a restricted space which is hazardous, or may become hazardous, to a person entering it because of:

- An atmosphere that has too little or too much oxygen, is flammable, explosive or toxic (e.g., silo gases in a silage bunker).
- A condition or changing set of events that may cause illness or injury (e.g., someone is inside a grain bin and someone outside turns on the auger).
- The potential for an activity to produce dangerous or harmful results in the space (e.g., using a harsh cleaning product in the confined space may allow toxic fumes to build up).
- The basic characteristics of an activity that can produce dangerous or harmful results in the space (e.g., welding in a confined space).

(Occupational Health and Safety Code, Statutes of Alberta 2023, s.1)

RESTRICTED SPACE + **EXISTING OR POTENTIAL HAZARD** = **CONFINED SPACE**

Examples of Confined Spaces in Agriculture

Below are some examples of confined spaces that may be found on a farm or ranch. Remember, this is not a comprehensive or complete list.

Grain, Feed & Forage Storage

- Steel bins, regardless of size
- Tanks
- Open grain piles
- Grain storage buildings & structures
- Silos
- Silage pits
- Sumps & tunnels under storage facilities
- Dump pits
- Grain driers

Manure Storage

- Above & below ground storage pits and tanks
- Sump/pump pits
- Ponds, lagoons, open pits
- Manure/bio-digesters

Agricultural Vehicles & Equipment

- Grain trucks, wagons & auger carts
- Chemical transport vehicles
- Sprayers
- Tub grinders
- Manure tanks & spreaders
- Grinder/mixer machines
- Combines
- Forage & silage dump wagons
- Bulk milk trucks
- Bale chambers

General/Other

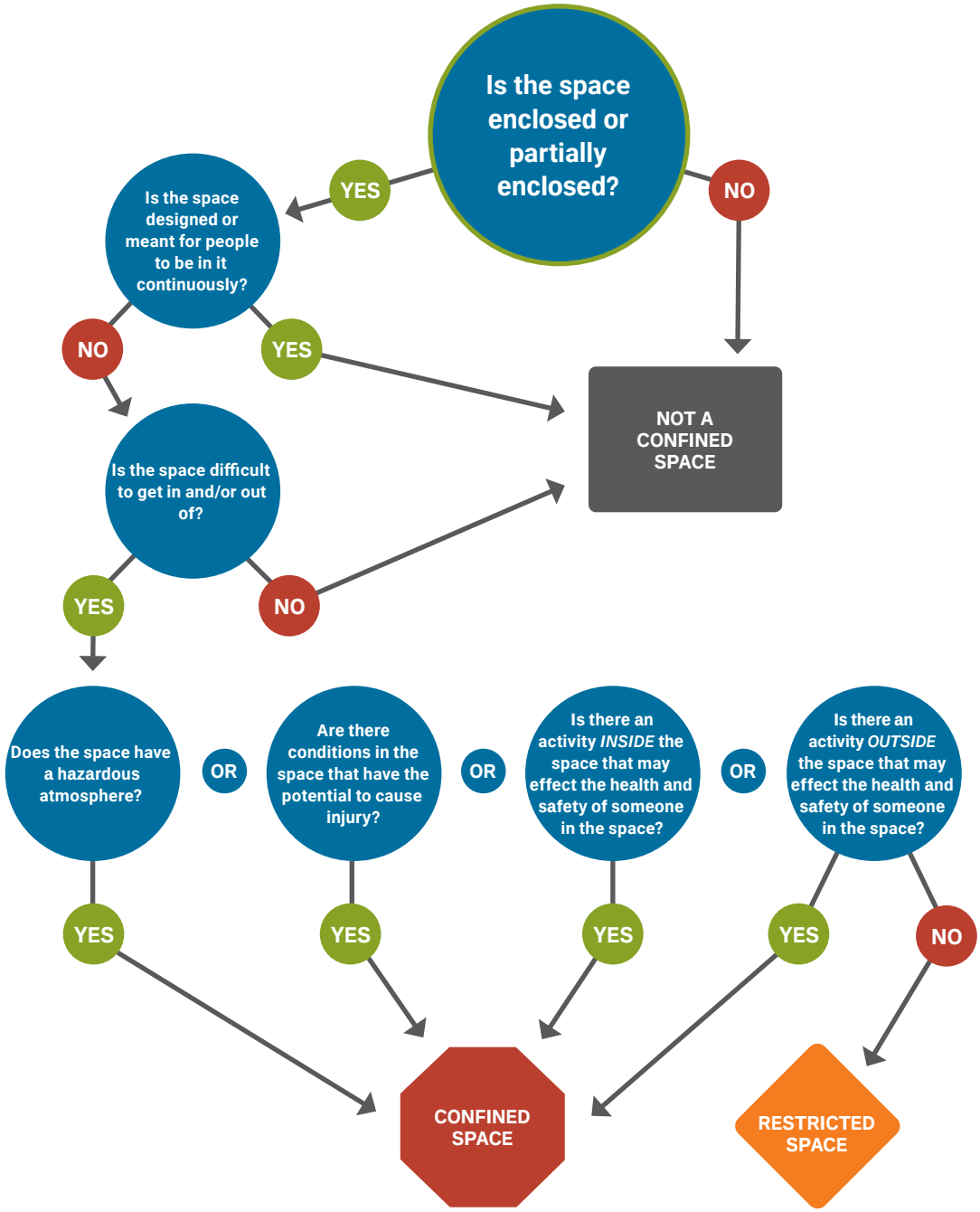
- Bulk liquid storage tanks
- Trenches
- Septic tanks
- Culverts
- Pump sheds
- Tunnels (e.g., conveyor tunnel)
- Dugouts
- Fuel storage tanks
- Root cellars
- Containment areas around diked storage tanks
- Drainage ditches
- Bunkers
- Sea cans

Identifying Restricted & Confined Spaces Can Be Complicated

What is and is not a restricted or confined space may not always be obvious, especially if you are new to identifying them. This awareness manual is designed to do exactly that, increase your awareness of confined spaces but it will not make you an expert, so you may need to find a qualified person to help you with the identification process.

Restricted or Confined Space Flow Chart

Once you better understand hazards and how they relate to confined spaces, this flow chart will be a helpful guide as you identify both the restricted and confined spaces present on your farm.



2

COMMON HAZARDS & RISKS OF CONFINED SPACES

You Must Become Skilled at Recognizing Hazards

You cannot identify a hazard that you do not know exists in a work area… or has the potential to exist in it. In order to do this effectively, you must have a good understanding of what hazards are and how to identify them.

A **hazard** is something that could cause damage or harm to someone or something on your farm. Injuries, illness, and other work related incidents are allowed to happen when the hazards of jobs and tasks are not identified, go unrecognized, or worse, are ignored. In this section, we will be reviewing some of the hazards commonly found in confined spaces.

The Importance of Hazard Identification, Assessment & Control

Well thought-out initial hazard assessments performed by qualified individuals and the proper control of these hazards prior to entry into the space is essential. It is then critical to perform ongoing hazard assessments as conditions can change quickly and even a small, hardly noticeable change can have a devastating impact.

This manual and course focus on restricted and confined space awareness, not the hazard identification, assessment, and control process. To gain a better understanding of hazard identification, assessment, and control, it is recommended that you refer to the **AgSafe Alberta FarmSafe Plan Manual** and the free, online **AgSafe Alberta FarmSafe Plan Learning Program.**

Common Hazards & Risks of Confined Spaces

Oxygen Deficiency

Oxygen deficiency is when there is too little oxygen in the air. The normal air around us contains almost 21% oxygen. Air that contains less than 19.5% oxygen is called oxygen deficient. Low levels of oxygen can result from displacement by other gases (e.g., welding gases, carbon monoxide), the rotting of organic matter (e.g., micro-organisms use up the available oxygen in the air and produce flammable methane gas which then also displaces oxygen), combustion processes, and even oxidation processes (e.g., rusting). Potentially oxygen deficient areas to be mindful of on farms include manure pits, root cellars, storage bins with rotting feed, and enclosed storage containers that are rusting on the inside.

True Story

In 1999 near Sylvan Lake, Alberta, a 19 year old girl went to get vegetables from a small, cement underground root cellar. She lost consciousness after climbing down a ladder to get inside of it. Her father, who was looking for her, found her unconscious in the root cellar, but he too lost consciousness. The family's 17 year old son found his father and sister, and told his mother to call 9-1-1. The son went back and attempted to rescue his father and sister, but lost consciousness as well. Both teenagers were reported as having died in hospital that night and their father had last been reported as being in stable condition. RCMP later reported that the cause of death in both cases appeared to be from a lack of oxygen in the root cellar.

(CBC News, 1999)

Oxygen Rich Environments

Oxygen rich environments occur when there is too much oxygen in the air. An oxygen rich environment can increase the risk of materials catching fire. A work area can become oxygen rich if it is ventilated with oxygen rather than normal air or if there is a leak coming from an oxygen tank used for welding.

Toxic Substances

Toxic substances are those that can have a poisonous or toxic effect on the body. Toxic substances can enter the body by being breathed in, being eaten or drank, through injection, and absorbing it (e.g., a substance comes into contact with our skin and passes through it into the body).

Inhalation **Absorption** **Swallowing** **Injection**

The harmful effects of a substance can happen very quickly or they can be long-term. Toxic substances can create an **immediately dangerous to life or health environment (IDLH) environment**; you will learn more about IDLH environments shortly.

- Schedule 1 of the Alberta OHS Code provides information on **occupational exposure limits (OELs)** for toxic substances in Alberta workplaces. Understanding and applying OELs will require training beyond what is covered here.

Flammable or Explosive Environments

Fires and explosions can occur when a source of heat or ignition comes into contact with something that is flammable or explosive. Welding, grinding, flames, sparks, hot surfaces, and even static electricity (e.g., from the flow of dry feed through something) can all be sources of ignition.

Flammable materials are materials that can ignite easily and burn quickly, such as:

- **Gases**; examples include substances like propane, hydrogen sulfide, and acetylene.
- **Liquids**; examples include substances such as gasoline, diesel, cleaners, degreasers, alcohols, and paints.
- **Solids**; examples can be any type of solid fuel. Grain dust can be an extremely dangerous solid fuel. Rags, matches, papers, and wood are all common solid fuels.

In the right concentrations, gases, vapours, and dusts can ignite and cause explosions.

True Story

A 27-year-old farm worker had been assigned to clean out a 1,000-gallon water tank that the farm had used to hold herbicide the previous year. The leftover herbicide had dried and become stuck to the bottom of the tank.

The farm worker climbed into the tank through an access hole and was scraping the dried herbicide from the tank when an explosion occurred. The type of tool that the farm worker had been using was not reported, though an investigation did take place. It was thought that the dust created by the workers efforts to remove the product had built up in the enclosed area (confined space) and was ignited by static electricity.

The farm worker was reported to have suffered severe burns (that left his skin charred and hanging) to 75% of his body and his lungs were severely damaged. In hospital, he was reported to have been undergoing multiple surgeries and cadaver skin grafts in efforts to save him. It is not known if the farm worker survived.

(Johnson, J., 2016) & (AtEx Explosion Hazards, 2016)

Unstable and/or Loose Materials

Certain materials, when damp, can form bridges and these bridges may collapse unexpectedly; this is commonly seen when grain that has been stored in bins is out of condition. In addition, the walls of trenches or ditches dug for pipes or drainage purposes can cave in, and as a result trap or crush someone under the heavy dirt.

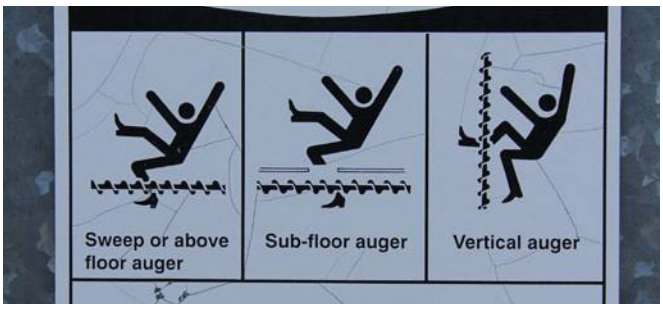
True Story

A 17 year old boy was working in a trench where a sewer line was to be installed. A 10 year old boy had been assigned to watch the 17 year old and get help if anything went wrong. The 10 year old began to see soil falling down from the trench walls and called out to the 17 year old. Shortly after, a large chunk of earth broke loose from the trench wall, striking the 17 year old and covering him. The 10 year old ran for help and 9-1-1 was called. After evaluating the scene, Emergency Responders determined that the situation was in fact a body recovery, and no longer an emergency rescue.

(NIOSH, 2015)

Mechanical Equipment & Moving Parts

Exposed moving parts are hazardous under normal circumstances and become even more dangerous in a confined space. Things like augers, mixers, conveyors, belts, chains, hydraulic parts, and pneumatic parts must all be properly locked out and tagged out to prevent injury prior to entry (you will learn more about **Lock Out Tag Out**, or **LOTO**, shortly).



Electrical Shock

Electrical shock can occur when tools, electrical cords or welding cables are damaged. Confined spaces that are made of metal and work that requires someone to enter or go under a machine and/or work in wet conditions increase the risk. Again, this is where **Lock Out Tag Out**, or **LOTO**, will be an important measure.

True Story

A 46 year old and a 23 year old were installing duct work in a house. The 46 year old went to work in the attic, and the 23 year old went to work in the crawlspace. The 23 year old was using an electric drill, powered by an extension cord to screw down aluminum strips. The edge of an aluminum strip contacted some of the wiring for the house, causing damage to the insulation around the wires. When the aluminum strip contacted the energized wires, an electrical current flowed from the aluminum strip, to the drill bit, then into the 23 year olds hand and body, finally grounding through an iron drain pipe. The 23 year old did not get thrown or fall away from the energized aluminum strip, and the electrical circuit stayed complete.

Someone in the house heard a noise coming from the crawl space, and told the 46 year old. The 46 year old went to the crawlspace and called out to the 23 year old. There was no response, so the 46 year old entered the crawlspace, where he located and grabbed the 23 year old. The 46 year old then became part of the electrical circuit.

The person in the house pulled the main circuit breaker and called 9-1-1. Emergency medical services found both victims in cardiac arrest. Both were pronounced dead at the hospital.

(NIOSH, 2015)

Poor Visibility

Poor visibility increases the risks inside the space. Consider these points:

- Confined spaces are already difficult to get out of… they become even harder to leave when you cannot see well in it.
- It is more difficult to avoid objects or notice changes in the walking surface that may lead to a slip, trip, fall or other incident.
- It is more difficult to perform work safely; for example, imagine unknowingly damaging and then coming into contact with a live electrical cord.

Temperature Extremes

Extremely warm temperatures can have many causes (e.g., working in a furnace room); this hazard can be made worse by poor ventilation and the lack of cooling air movement that results. Heat illnesses, such as heat stroke, are a serious risk of working in such conditions. Performing physically demanding work in the space will increase this risk.

Extremely cold temperatures are common in Alberta, with many types of injury and illness that can result from exposures (e.g., frostbite or hypothermia). Working in a confined space where the person working will have very limited movement will increase this risk.

Older individuals, people with some medical conditions and those taking certain medications may be at higher risk when working in temperature extremes.

Noise

Noise has many risks, such as permanent hearing damage, tinnitus, sleep disturbances, and others. In any work environment, noise prevents good communication from taking place. In a confined space, the noise is often reflected (bounced off) the walls of the space which increases the hazards and risks of it.

Biohazardous Materials

Feed dusts, urine, feces, mould spores, parasites, bacteria, and viruses may be present in these spaces. The short and long term effects of these materials on the human body will vary, so it will be important to know exactly what materials are or may be present, what their risks are, and how to appropriately control the hazards.

Substances Entering or Exiting the Space

Piping, augers and conveyors can bring materials into or out of a space. These materials can result in things like burns, engulfment, suffocation, crush injuries, drowning, etc.

True Story

A 43 year old male and two other farm labourers had been filling trucks with grain from a grain bin. The truck was almost full when the corn stopped flowing out of the discharge pipe. All three individuals were aware that some of the corn in the bin was out of condition. The 43 year old decided to transport what was in the truck, and then enter the bin and try to get the corn flowing again when he returned.

Upon return he grabbed a long piece of pipe, opened the top hatch, and entered the bin (which had approximately 12 feet of corn still in it) while the auger was still running. One of the labourers handed him the pipe, and the 43 year old began to probe the corn with it.

The corn suddenly began to flow and in seconds the 43 year old was buried up to his knees and rapidly continuing to sink. The 43 year old yelled to the labourer at the hatch to shut the auger off. That labourer then communicated the same information to the second labourer who was on the ground. The first labourer climbed into the bin in an attempt to rescue the 43 year old, but he could not see much because of the dust in the air and he did not get a response from the 43 year old when he called out. The first labourer then climbed the ladder and told the second labourer to get help.

Emergency responders were called, and both labourers entered the bin in an attempt to rescue the 43 year old. Visibility in the bin was limited to only a few feet, and despite searching and digging, they could not locate the 43 year old. Emergency responders arrived on scene and began cutting openings in the side of the bin while shoveling corn out. The 43 year old was found at the bottom of the bin and cardiopulmonary resuscitation (CPR) was performed. Despite everyone's efforts, the 43 year old died.

(NIOSH, 2015)

Hazards That Could Contribute to a Slip, Trip & Fall

Some confined spaces, such as grain bins, may have ladders inside, increasing the risk of someone slipping and falling from a height. The walking surfaces inside of some confined spaces may be slippery, uneven, or covered in debris.

Falling Objects

Someone working in a ditch, trench or pit may be at risk of having tools, rocks, or other objects falling onto them. We don't often think about how even a small object, falling onto someone from a certain height, and hitting them in a certain place can have serious consequences, but we need to.

Drops Online has a downloadable *Drops Calculator in an Excel Spreadsheet* that can help to better assess the risk of a falling object. Remember, this calculator only takes into account the basic unit of energy (joules) assigned to the falling object, not its design, or if it is sharp and pointy. You can find the calculator here: https://www.dropsonline.org/drops-guidance-and-resources/drops-calculator/e-drops-calculator/

Risk of Drowning

Water, liquid manure, milk, and other fluids may rapidly enter a confined space where someone is working and result in them drowning. Drowning may also occur when someone becomes incapacitated (e.g., is overcome by a toxic gas or is knocked unconscious after hitting their head on a pipe) and falls into a liquid at the bottom of the space. Even small amounts of liquids can result in drowning; one source states that an adult can drown in roughly 40 seconds, and under the right circumstances, it can take as little as a ½ cup of fluid (McCabe, B., 2019).

Immediately Dangerous to Life or Health (IDLH) Environments

IDLH environments are common on farms, and quite often the conditions already exist but they can also develop quickly in a space. The term IDLH can be explained in more than one way, and below are some examples.

Alberta Occupational Health and Safety legislation defines IDLH as:
"Immediately dangerous to life or health" means circumstances in which the atmosphere is deficient in oxygen or the concentration of a harmful substance in the atmosphere:

a) Is an immediate threat to life,

b) May affect health irreversibly,

c) May have future adverse effects on health, or

d) May interfere with a worker's ability to escape from a dangerous atmosphere

(Occupational Health and Safety Code, Statutes of Alberta 2021, s.1)

WorkSafe BC gives us another way to think about IDLH conditions:

a) Where there is known toxin or chemical in the air at a concentration known to be IDLH

b) Where there is a known toxin or chemical in the air and the concentration is not known or has the potential to be IDLH

c) A confined space where the air has not been tested for toxins, chemicals, oxygen levels, etc.

d) Any place where the air is oxygen deficient

e) Firefighting activities

f) Any place where toxins or chemicals in the air are above 20% of their lower explosive limit (LEL)

(adapted from WorkSafe BC, 2011, p.9)

Engulfment & Entrapment

The risks of engulfment and entrapment are often presented together. You will want to have a clear understanding of what each one is.

Engulfment

An engulfment occurs when someone is surrounded by and cannot escape a liquid or flowable solid substance. Death can result from the substance being taken into the respiratory tract as the person attempts to breath (the substance fills or plugs the respiratory tract) or the pressure exerted on the body by the substance which results in strangulation, constriction, crushing, or suffocation.

True Story

In the fall of 2015, three sisters died while playing on a truck loaded with canola seed in central Alberta. The girls fell into the box of seed and were sucked underneath it. Despite being rescued by adults and having CPR performed, all three died at the young ages of 13 and 11 years.

(Calgary Herald, 2015)

Entrapment

Entrapments can be thought of as when someone becomes caught, trapped, or entangled in a hazardous space. Entrapments may involve the whole body, head and neck (head or feet first), arms, hands, legs, feet, fingers, clothing, and hair. An entanglement can be thought of as an entrapment where the body, head, arms, clothing, etc. become caught within the moving parts of a machine.

True Story

A 30 year old father, husband, motocross rider and snowmobile rider, was cleaning out a grain bin when both legs became caught up in the power sweeper auger. No details regarding how he became caught in the sweeper auger were provided. It was reported that the resulting injury was so severe that both legs were amputated in order to save his life.

(WindomNews.Com, 2023)

Psychological & Physiological Demands

Working in restricted and confined spaces can place additional demands on a person's mind and body.

- Someone with claustrophobia should not be performing work in a confined space.
- Someone may have a medical condition that would prevent them from wearing a respirator. If a respirator is required to work safely in the space, then they should not be working in it.
- Performing repairs in or under a machine may require someone to work in awkward body positions for lengths of time. The person doing this work will need to be physically able to do it.

Hazards Outside of Confined Spaces & Their Impact on Confined Spaces

When assessing the hazards of a confined space, you must remember to look at both existing and potential hazards outside of the confined space as well. Consider these examples:

- Moving vehicles or equipment near the openings of confined spaces can put people at risk of being hit or run over.
- Vehicles or equipment left idling near confined spaces can result in exhaust entering the confined space and creating a potentially deadly workspace.
- Someone grinding rough edges off of a metal panel in a livestock barn, where a spark could fall through the grate above a in-floor manure system (where highly combustible manure gases may be found) could result in a deadly explosion.

Breaking the Plane of a Restricted or Confined Space

You may have heard the term ***breaking the plane*** of a confined space before. Breaking the plane of a restricted or confined space occurs when any part of the body passes through the entrance of a confined space. Sometimes just the act of sticking one's head, a leg, or an arm into a confined space can put someone at risk of a serious injury. Before any form of entry is made into the space, the hazards (or potential hazards) of the confined space must be identified, assessed and eliminated or properly controlled.

Unintentionally Entering Restricted or Confined Spaces

Sometimes, people don't plan on entering restricted or confined spaces. This can often be seen when the space has a vertical (upward facing) opening. Efforts will need to be made to ensure that an accidental entry cannot occur; these measures can include fencing off areas or ensuring lids or grating is in good condition and secure.

- People have been seriously injured or died after falling into grain wagons or manure pits.
- The internet has many stories about children who have fallen into septic tanks and died after playing on top of them.

True Story

A young male farm worker was standing on a hay stack and using a handheld hay hook to drop bales into an operating feed grinder. Approximately 20 minutes later, a coworker saw that the grinder was running attended. After calling out and not receiving a response from the worker, the coworker looked into the feed grinder and realized that the young man had fallen into the grinder. 9-1-1 was called, and the victim was pronounced dead at the scene.

(NIOSH, 2003)

The Bigger Picture

While this course is intended to highlight some of the more common hazards and risks associated with restricted and confined spaces, there are more that can exist. To make matters even more challenging, some hazards can pose multiple risks. A few examples of other hazards to be mindful of include:

- Contact with chemicals
- Contact with hot surfaces
- Respiratory hazards
- Sharp edges

RESOURCES

To get a better understanding of what can create or contribute to flammable, explosive and toxic environments, refer the **AgSafe Alberta WHMIS, Pesticide, Veterinary Drug and Medicated Feed Awareness Manual** and online course.

To get a better understanding of respiratory hazards and respirators, refer the **AgSafe Alberta Respiratory Protective Equipment (RPE) Awareness Manual** and online course.

These can be found at agsafeab.ca.

3

HAZARDOUS ENERGY & LOCK OUT TAG OUT (LOTO)

Hazardous Energy

There are several types of hazardous energy. Hazardous energy can be defined as any electrical, mechanical, hydraulic, pneumatic, chemical, nuclear, thermal, gravitational, or other energy that could cause damage or harm to someone or something. Some of these types of energy have been touched on earlier, however, you can review them quickly here.

Electrical energy: This type of energy relates to the movement of electrically charged particles. It can be live (e.g., powerlines and electrical systems) or stored (e.g., batteries).

Hydraulic energy: This type of energy involves the power and energy in a pressurized liquid. Braking systems and tractor loaders use this type of energy. When released in an uncontrolled way, people may be crushed or struck by machinery, equipment, or their parts.

Pneumatic energy: This energy relates to the power and energy in pressurized air. Air brakes, spraying devices and air tools use this type of energy. When released in an uncontrolled way, people may be crushed or struck by machinery, equipment, or their parts.

Chemical energy: This type of energy is stored in the bonds of chemical compounds. It is released when a substance undergoes a chemical reaction. The energy that is released may be in the form of heat or pressure, and commonly results in a fire or explosion. Injuries may result from the chemical exposure or a resulting fire and/or explosion.

Thermal energy: This energy is in the form of heat and is sometimes called heat energy; it is the energy in an object or system as a result of its temperature. This type of energy includes explosions, flames, high/low temperatures, and radiation from heat sources. Burns, dehydration, and frostbite are common injuries that relate to this type of energy.

Radiation energy: Radiation is energy that travels from a source in the form of waves or particles through space or a material at the speed of light. There are different types of radiation; these include low-frequency electromagnetic, optical and radio-frequency electromagnetic radiation.

Gravitational energy: This energy is stored in an object and relates to both the objects distance from the ground and its weight. This type of energy increases as the object gets further from the ground and/or goes up in weight.

Mechanical energy: An object, machine, tool, etc. has this type of energy due to its motion or its position. Mechanical energy can be either kinetic energy (energy of motion, such as a moving tractor) or potential energy (stored energy of position, such as a coiled and compressed spring).

(adapted from CCOHS, 2021)

What is Lock Out/Tag Out (LOTO)?

Lock out is a method of controlling hazardous energy by placing a lockout device on an energy-isolating device; this prevents a machine, piece of equipment, or process from energizing (or starting up).

- Examples of lockout devices include keyed locks.
- Examples of energy-isolating devices include things like switches, valves, breakers, and even restraining devices that prevent the movement of parts.

Tag out involves attaching a tag or other type of label that lists such information as:

- The reason why lock out/tag out is required, such as for maintenance or repair.
- The time and date that the lock and tag were put in place.
- The name of the person who attached the lock and tag.

The lock and tag can only be removed by the person who put them in place. This is done so that no one can start the machine, equipment or process without the person who applied the lock and tag knowing and being injured as a result.

IMPORTANT

This is a very simplified explanation of what lock out/tag out is. It is commonly a part of a hazardous energy control program that involves policies, procedures, and other steps that you will want to learn more about.

4

HAZARD ASSESSMENT & CONTROL

Hazard Control Basics

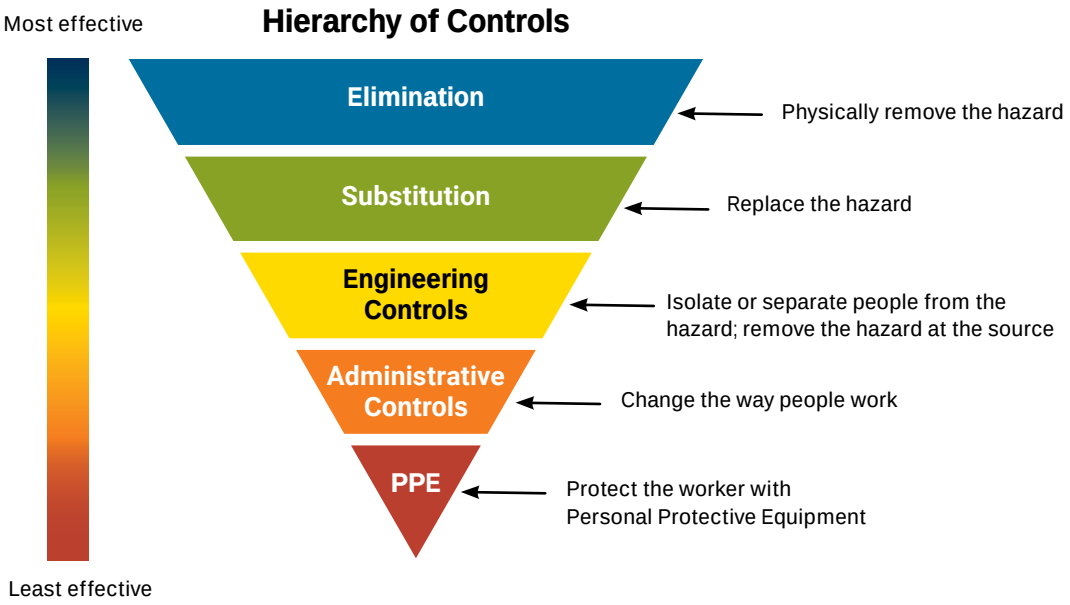
ATTENTION

CONFINED SPACES ARE NOT TREATED LIKE REGULAR WORK ENVIRONMENTS.

When something goes wrong in a confined space, the consequences are often serious. In addition to hazard control measures you may already be familiar with, there may be other types of hazard control measures that will need to be taken that you are not yet familiar with. Please keep in mind that this section will provide you with basic information and an introductory level of knowledge only.

Hierarchy of Controls

Many hazards can be reduced or even eliminated by working through the hierarchy of controls and putting reasonable, practical control measures in place.

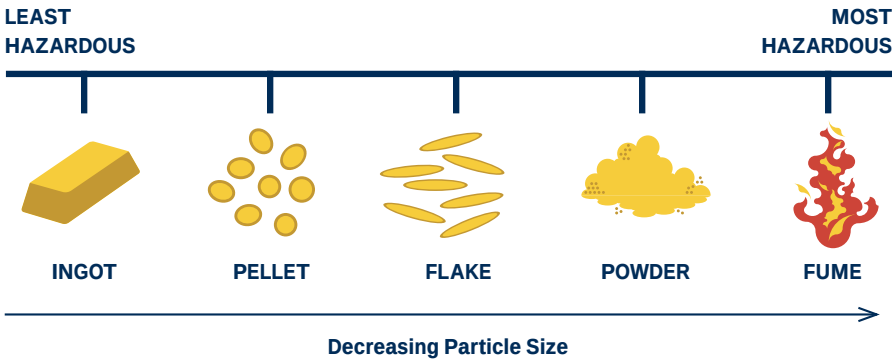


Elimination

Elimination is where the hazard is removed from the job, task or work environment completely. This should be done wherever possible, as it is the best way to ensure that no one and nothing will be harmed by it. An example of this would include changing the work process so that entry into the confined space is no longer necessary. Another example would be properly purging and ventilating a confined space to remove contaminants before going into it.

Substitution

Substitution is where a hazard or the source of the hazard is replaced with something less harmful. This could include using a less harmful chemical for cleaning a tank.



(adapted from NIOSH, n.d.)

Engineering Controls

Engineering controls are used to isolate or separate workers from the hazard or to remove the hazard at the source before a worker can come into contact with it. Examples of this could include installing protective barriers or guard rails around a space so that no one can accidentally fall into it.

Administrative Controls

Administrative controls change the way people work and involve developing a method or standard way of doing things that minimizes the hazard. Administrative controls commonly involve things being written, such as a farm specific confined space management program, developing procedures and safe work practices for the jobs and tasks that are performed, training people how to perform jobs and tasks, and posting signs to help make people in an area aware of the hazard(s) present.

Personal Protective Equipment (PPE)

Personal protective equipment (PPE) is anything worn by someone to reduce their exposure to a hazard. Respiratory protective equipment (e.g., respirators), personal gas monitors, and rescue harnesses are types of PPE.

Hazard Elimination & Control Summary

The most effective hazard control measures are those that do not rely on a person's actions or behaviors.

ATTENTION

NOT ENTERING A CONFINED SPACE IS THE SAFEST APPROACH.

When it comes to a confined space, careful consideration must always be given. The best and easiest way to avoid confined space hazards and the risks they post is not to enter the space at all. While this approach may not always be possible, you should still ask yourself:

Is it ***absolutely necessary*** for me (or someone else) to go into the confined space?

When we stop and think about what we are going to do and why we are going to do it, we may realize that it doesn't need to be done and that we don't need to put ourselves or someone else at risk in the first place.

Initial Steps

Identify the Restricted & Confined Spaces on Your Farm

Members of the farm team who have received appropriate training should be involved in this process. They will need to perform a critical and thoughtful inspection of the farm, as well as the many tasks that get performed on it. The results of this should be written down, so that nothing is forgotten.

Keep People Out

Keeping people out of these spaces is essential. The methods you use to keep people out of the space or away from the area will depend on the particular space, it's construction, and conditions. Barriers work well; for example, keeping the door on a pump house locked would be an effective measure that would keep unauthorized individuals out. Putting fences around dugouts and silage pits are also good measures to take. The use of clear, highly visible, and durable signage is an important supporting measure. Remember that how well some of these types of measure work will depend on the actions of others; for example, fences that can be climbed or signs will not be very effective with children.

Complete Detailed Hazard Assessments for Each Space

Once again, qualified members of the farm team will need to complete hazard assessments. Hazard assessments will need to be performed initially, again before someone enters the space, and as often as outlined in the farms confined space management program. Sometimes hazard assessments may need to be performed regularly during the time that the work is being performed if the hazards make it necessary. This is because small changes may occur which can have serious and deadly consequences.

Some Basic Hazard Control Measures for These Spaces

Never Work Alone & Keep Good Lines of Communication

Once all of the necessary hazard control measures are put in place and someone (commonly called the worker or the entrant) goes into a space to work, there will need to be someone outside of the space or near the entrance to be in communication with them. The person outside of the space is commonly called a tending worker, a monitor, or an attendant. In this manual, we will use the term **entrant** for the person working in the confined space and we will call the person outside of the space the **attendant** since both terms align with CSA Z1006:23 *Management of work in confined spaces*. The attendant is there to maintain communication with the entrant and to start the emergency response plan when needed. If the attendant loses contact with the entrant, they will need to initiate the emergency response plan which will include rescue.

Be Ready to Rescue

No one should enter a restricted or confined space unless there is an emergency evacuation and a rescue plan in place; it is critical that both are ready to be acted on. Depending on the space and the hazards, this can include the person inside the space wearing a rescue harness or it could include having a fully trained rescue team equipped with self-contained breathing apparatus (SCBA) readily available.

Farm employers will need to develop and put emergency procedures in place that include evacuation and rescue should the space become hazardous to the person inside.

Everyone Must Be Trained & Competent

The individuals performing the hazard assessment, the entrant, the attendant, the rescue person (or people), and anyone else involved in the emergency response plan will need to be both trained and competent to perform their role and duties of it.

Make It as Easy as Possible to Get In & Out Of

Once it is decided that entry into the space is necessary, you will want to take steps to make it as easy and safe to get in to and out of as possible. For example, if a ladder is required, the ladder will need to properly secured. If there are things that can be removed from inside the space to make it easier to get out of quickly, you will need to do so.

Protect Against Hazardous Substances

Anyone working in the confined space will need to be protected from hazardous substances that may enter or be introduced into the space. Some examples of substances that could present a hazard and the worker would need to be protect from are:

- Liquids or small solids entering a space which could result in drowning. Even small amounts of a liquid at the bottom of a space could result in drowning should someone lose consciousness and fall into it.
- Products already present or used in the space could create a toxic environment.
- Products already present or used in the space could be harmful to the persons skin, eyes, or respiratory tract.

Improve the Lighting

If the lighting in the space is or may be poor, you will need to address it. Adding portable lights and using headlamps can help ensure the person in the space can see what they are doing and where they are going; this is especially important should they need to leave the space quickly. Having more than one source of lighting and/or having backup lighting is important should one form of lighting fail. If the atmosphere in the space is or may become flammable or explosive, intrinsically safe lighting (lighting that won't be a source of ignition) will need to be used.

Protect Against Temperature Extremes

Think about the temperature inside the space; could it be too hot or too cold? Could the temperature change as a result of the work activities? What type(s) of clothing and personal protective equipment will the worker be wearing and how will all of this affect them?
It is important to think about what can be done to ensure the person is protected against temperature extremes without creating any new hazards.

Protect Against Noise

It is important to think about the noise that exists in the space normally as well as the noise that may result from the work being performed. Appropriate measures, such as the use of hearing protection, may be needed.

Control the Hazards Outside of the Space

Take a critical look and identify any existing or potential hazards outside of the space. Is the entry/exit point near an area where there may be traffic? If it rained, could water enter the space? Could someone leave equipment running nearby, allowing harmful exhaust to enter and build up in the space? Just like the hazards in the space, the hazards outside of the space will need to be eliminated or controlled.

Test the Atmosphere & Take Appropriate Actions

- Testing is critical to ensuring an atmosphere is safe!
- An untested atmosphere should not be entered unless it is deemed safe by a competent person.
- Under no circumstances should someone enter the space when:
    - Testing has shown that oxygen levels, flammability, or toxicity levels are outside of acceptable limits.
    - There is a contaminant present that has an unknown source.
    - A toxic, flammable, or low oxygen atmosphere may be present and the atmosphere has not been tested.

RESOURCE

For more information, visit **agsafeab.ca** or check out our Safety Bulletin, **Gas Monitors & Common Agricultural Gases**.

Actions that are commonly taken to eliminate atmosphere hazards in confined spaces include:

- **Ventilating the space.** If during the hazard assessment it is identified that the space needs to be ventilated, appropriate steps will need to be taken. This could include using a local exhaust ventilation system, a form of general ventilation system, or both if necessary.
- **Purging the space.** The process of purging involves removing the contaminants by displacing them with something else, such as air, water, steam or inert gases. After purging, the space will need to be ventilated with enough fresh air to remove any remaining inert gas (see below) and contaminants.
- **Inerting the space.** Inerting is when you purge a confined space using an inert gas. An inert gas can be used to displace toxic gases. This term can also apply to using an inert gas to purge high levels of oxygen from a confined space to remove the risk of fire or explosion.

Use the Right Type of Personal Protective Equipment (PPE)

PPE is the last line of defense against a hazard, and it is used with other types of hazard control measures. PPE needs to be selected by someone who is qualified to do so after a hazard assessment has been thoughtfully and carefully performed. The type(s) of PPE needed will be specific to the hazards of the space and may include:

- Respiratory protection
- Fall protection
- Eye protection
- Hearing protection
- Gloves
- Non-slip footwear
- Gas monitors
- Rescue harness and tripod

Any PPE used cannot interfere with someone's ability to quickly leave the confined space should the need arise.

Regardless of the type of PPE being used, it should always be inspected before each use.

Entry Permit System

Part 5 *Confined Spaces* of the Alberta OHS Code requires an employer to create and follow an entry permit system. While this part of the OHS Code does not *directly* apply to farms and ranches at the time of publication, an entry permit system should still be used. An entry permit system is an important type of administrative hazard control measure. Entry permits will need to be completed by a competent person.

At this point, some people may think that an entry permit system is going too far and that the agricultural industry is not the oilfield. You would be correct in the observation that there are differences between these two industries, but there are also similarities.

Some of information that should be included on an entry permit includes:

- The name(s) of the entrant(s) and the reason why they are entering.
- The location of the space and description of the space.
- The period of time during which the entry permit is thought of as being valid. This includes the date and time of entry into the space, as well as the anticipated exit time.
- The type of work being done in the space. This information is important legal reasons and so that it can be compared to the hazard assessment.
- The name(s) of the attendant(s).
- The name of the supervisor.
- Hazards that may be found inside and outside of the space.
- Hazards that could develop while the work is being performed.
- Details of any atmospheric testing done (e.g., where, when, the test results, bump tests, when the equipment was last calibrated).
- Hazard control measures that have been put in place, such as engineering controls (e.g., mechanical ventilation), administrative controls (e.g., procedures), and personal protective equipment (e.g., respirators, personal gas monitors, rescue harnesses).
- The means of communication between the entrant(s) and the attendant(s) (e.g., intrinsically safe two way radios).
- Emergency response information, and the protective equipment and emergency equipment to be used by any person who takes part in a rescue or responds to other emergency situations related to the space, and the names of the rescuer(s).
- The signature of the worker who did the confined space air testing. The signature on the permit would indicate that adequate precautions are being taken to control the anticipated hazards.
- An authorization signature by the supervisor certifying that the space has been properly evaluated, prepared, and it is safe for entry and work.
- The entry permit should be posted at the confined space and remain so until the work is completed. The employer should keep a copy of the completed permit on file.

What If My Hazard Assessment Indicates An Attendant Is Not Needed?

Sometimes the hazards can be eliminated or minimized to such a degree that the space is just a restricted space. If you are fortunate enough that this is the case and your hazard assessment determines that an attendant is not needed, you will still need to develop and follow an appropriate check in system between the person working in the space and another individual.

(CSA Group, s8.7.4)

ATTENTION

Think about this for a moment. If following these steps and writing on a sheet of paper could prevent someone you care about from dying on the farm (just like the people in the true stories that you are reading about here), would it be worth it? What we think of as "tragic" or "freak" accidents are in fact avoidable incidents when we stop and think about it.

5

RESCUE

ATTENTION

According to the National Institute for Occupational Safety and Health (NIOSH), more than 60% of the people who die in confined spaces are would-be rescuers (NIOSH, 2014). This number highlights how important it is to have a thoughtful, well planned, and properly executed rescue plan in place.

Effective Rescue Plans are Critical

Even if all of the other hazard control measures have been put in place, no one should enter a confined space unless an effective rescue can be performed. Emergency procedures, such as emergency evacuation and rescue, must be created, practiced, and ready to act on before someone goes into a confined space.

It is essential that the attendant is in constant contact (communication) with the person working inside. If something goes wrong in the confined space, the attendant will need to know right away and then communicate with the entrant in order to find out how severe the emergency is and determine what actions to take next based on the rescue plan.

True Story: 5 Family Members Die In Manure Pit

A farmer's 28 year old son entered a manure pit in the dairy barn to replace a shear pin on an agitator shaft. The farmer's 15 year old grandson (and nephew to the 28 year old) was there as well. An 8 year old grandson who was outside the barn heard the 15 year old yell for help, as the 28 year old had fallen into the pit. The 8 year old ran to the farmhouse to tell someone.

The farmer's 37 year old son and nephew ran to the pit and the wife of the 28 year old called emergency services.

The 15 year old grandson, the farmer, his 37 year old son, and his nephew all entered the pit in an attempt to rescue the 28 year old, and all were overcome. A carpet installer who had been working at the farmhouse also entered the pit in an attempt to rescue the five victims; he was quickly overcome but did not lose consciousness and was helped out of the pit by his assistant who was also there.

Sadly, all five family members died from asphyxiation due to methane gas exposure.

(NIOSH, 2015)

3 Types of Emergency Rescue

Self-rescue occurs when the entrant is able to leave the confined space on their own and without any outside help. This is the best option, as the entrant is able to recognize the dangerous conditions and can leave the space immediately without putting anyone else at risk.

Non-entry rescue occurs when entrant is not able to leave the confined space on their own. When this happens, the attendant starts the emergency rescue procedure and uses a retrieval system that has been put in place to remove the entrant from the confined space. Examples of retrieval systems would be tripod and winch or a hoist system where the entrant is wearing a rescue harness that is connected to the retrieval system. The benefit of this type of rescue is that it can be started right way and without anyone else entering the space or being put at risk.

Entry rescue requires trained, competent, and fully equipped rescuers to enter the confined space and bring the entrant out of the confined space according to the rescue plan. Rescues that involve a confined space with an IDLH atmosphere will require special measures to be taken (e.g., self-contained breathing apparatus) that will not be covered here.

Examples of Equipment Used in Rescues

Full body harness and retrieval line

Hoist systems

Tripod and winch system

Self-contained breathing apparatus (SCBA) or Supplied Air Respirators (SARS)

Extrinsically safe lighting

Extrinsically safe gas monitors/gas detection equipment


NMC Central States Center for Agriculture

6

ROLES, RESPONSIBILITIES, & TRAINING

Everyone Will Need to Know Their Role

In this part, we will look at some of the roles and responsibilities that relate to work in confined spaces. Keep in mind that the roles and responsibilities listed are general and not extensive; this means that you will need to refer to the legislation and standards that apply to your farm, in addition to thinking about your farms particular structure and needs.

ATTENTION

IMPORTANT

It is essential that everyone with a role relating to confined space entry is trained, competent, fit for duty, and alert.

Farm Employer / Management Responsibilities

- Ensure that a competent person is identifying the hazards and performing the hazard assessment for each confined space; remember that others should be involved in this process as well.
- Ensure that everyone working on the farm has easy access to the confined space management program, the parts of it, and other parts of your health and safety program that apply to it (e.g., hazard assessments, hazardous energy control program, etc.).
- Ensure that each person with a role and responsibilities relating to work performed in confined spaces is trained and competent.
- Ensure that the hazard controls and emergency response equipment are provided, available, and kept in good working order.
- Develop and put in place on-farm emergency response measures for any type of emergency that could occur in each confined space.
- In addition to ensuring the supervisor, entrant, and attendant understand the work to be performed and the particulars of the confined space, the employer/management must ensure this information is provided to whoever is in charge of emergency response in advance, so that they can plan and prepare for rescue operations before the need arises.
- Inform farm team members on how well the confined space management program is performing (as appropriate) for the purpose of ongoing program improvement.
- Ensure records relating to the confined space management program are maintained (e.g., training records, hazard assessments, permits).

Entrant (or Entry Team) Responsibilities

- Know and understand the existing hazards of the space, the potential hazards of the space, and the work to be done.
- Recognize hazards and changing conditions within the space.
- Use appropriate hazard control measures, including but not limited to personal protective equipment.
- Maintain communication with the attendant and immediately notify them of emergency conditions.
- Know the signs, symptoms, and consequences of hazard exposures.
- Exit the space immediately when unacceptable conditions are present, the work is completed, and when told exit by the attendant or supervisor.

Attendant(s)

- Know and understand the existing hazards of the space, the potential hazards of the space, and the work to be done.
- Know the signs, symptoms, and consequences of hazard exposures.
- Remain immediately outside of the confined space during entry operations.
- Maintain constant communication with the entrant and provide assistance to them.
- Tell the entrant to exit the space when necessary (e.g., conditions develop that require it).
- Have a way to communicate with the supervisor and emergency response team.
- Perform non-entry rescues when specified by the rescue plan and qualified to do so.
- Call for the rescue team and other services during an emergency.
- Keep unauthorized people away from permit spaces.
- Never perform other tasks or duties (as this will take their attention off of the entrant).

Entry Supervisor

- Know and understand the existing hazards of the space, the potential hazards of the space, and the work to be done.
- Ensure that the farm's confined space management program is being followed; this includes but is not limited to:
    - Ensuring that everyone who has a role related to the confined space entry is trained, competent, fit for duty, and carrying out their responsibilities.
    - Verifying that procedures are being followed and equipment is being used as appropriate.
- Verifying that all required actions have been taken prior to entry, such as entry permits, communication measures, etc.
- Stop the entry when conditions change, the work is completed, or when it is otherwise required.
- Ensure a rescue plan is in place and rescue actions are ready to be taken in the event they are needed.
- Take measures to keep unauthorized individuals out of the space.
- Ensure the steps taken and work performed are completed as planned so that the conditions inside the space remain acceptable.

Rescuer(s)

- Know and understand the existing hazards of the space, the potential hazards of the space, and the work to be done.
- Ensure that prior to anyone entering the space, that a written emergency response plan is developed to enable rescue of the entrants from the confined space in case of an emergency.
- For a space that is not IDLH, the rescuer(s) must be available during the entry and be ready to respond. For a confined space that is IDLH, the rescuer(s) must be present immediately outside of the space and ready to respond.
- Ensure rescue equipment is ready and in good working order before the space is entered & use the rescue equipment when needed.
- Enter the space when required to perform a rescue and perform the necessary tasks in the confined space to get the entrant out as quickly and safely as possible.

Training

The farm will need to ensure that before anyone (e.g., supervisors, entrant, attendant, rescue personnel) is assigned duties related to a confined space that they are trained and competent. To do this, it must identify what training will be required for each role as it relates to their particular operation. If the farm has performed hazard assessments and developed procedures, these can be used as a guide.

Remember, it is essential that these individuals can:

- Identify the hazards associated with working in confined and restricted spaces,
- Take the necessary steps to control the hazards,
- Recognize when something is not right or going according to plan, and
- Perform their tasks and duties safely.

Below is a list of general training that the supervisor, entrant, attendant and rescue personnel should receive.

- Hazard identification, elimination, assessment & control as it relates to their role and tasks
- Confined space and other legislation & standards that apply (e.g., respiratory protection, IDLH atmospheres)
- Confined space procedures
- All appropriate procedures and farm specific requirements
- Emergency response plans
- Non-entry rescue
- Selecting the correct type of confined space equipment for space and the work to be done
- Atmospheric monitoring equipment (including use, care, and limitations)
- Ventilation systems
- Hazardous energy control, isolation & lockout
- Lighting
- Personal protective equipment and devices
- Communication systems/equipment
- How to obtain the necessary equipment
- Retrieval systems (including set-up and operation)
- Practical, hands on experience with the equipment
- Rescue equipment (including use and limitations)
- How to operate the farms communication systems
- How to manage & work effectively in an emergency
- Self-contained breathing apparatus (SCBA) or Supplied Air Respirators (SARS) (including use, care and limitations)
- First aid

Specialized Training & Training Providers

Confined space entry, first aid, rescue equipment, atmospheric monitoring equipment, etc. will require specialized training. Much of this training is available across the province through manufacturers, dealers, authorized training providers, as well as health and safety associations.

KEY POINT TO REMEMBER

Records relating to roles, responsibilities, training, and competence should be created and securely stored.

7

CONFINED SPACE MANAGEMENT PROGRAMS

Confined Spaces & Alberta OHS Legislation

In Alberta, an employer must have written practices and procedures that are followed when someone enters and works in a confined space. In addition to being written, these practices and procedures will need to identify the existing and potential confined spaces on the farm, be reviewed regularly, and be updated as needed.

Part 5 of the Alberta Occupational Health and Safety (OHS) Code focuses on confined spaces and performing work in them. At the time of publication, most of the Alberta OHS Codes does not directly apply to farms and ranches, but it is important to recognize that the OHS Code only sets *minimum technical requirements* for health, safety and wellness in Alberta workplaces (Government of Alberta, n.d.). This means that even if a farm employer were to do everything as outlined in Part 5 *Confined Spaces* of the OHS Code, the farm may still be charged should an incident occur. This is because the farm is required by the OHS Act to do everything reasonably practicable to protect the health and safety of their employees, and even what is outlined in the OHS Code may not be enough to control the particular hazards of a situation or set of working conditions.

Confined Space Code of Practice Versus Confined Space Management Program

As you learned earlier, the term Confined Space Management Program is used in this manual rather than Confined Space Code of Practice. A Confined Space Code of Practice (which is referenced in Part 5 *Confined Spaces* of the Alberta Occupational Health and Safety Code) and a Confined Space Management Program (which is referenced in CSA Z1006:23 *Management of work in confined spaces*) are both written guidelines containing similar information that have been set out by the Alberta Government and the CSA Group respectively for the purpose of helping employers become compliant with various standards, legislation, and ultimately help employers protect the health and safety of their workers.

Having a written guideline, regardless of whether you call it a program or a code of practice, is a highly recommended best practice for farms and ranches. Involving the people on your farm in the development of your Confined Space Management Program will help ensure that it makes sense for your particular operation, the work being performed on it, as well as make it more likely to be followed by everyone on your farm.

KEY POINT TO REMEMBER

The Canadian Standards Association (CSA), or CSA Group, is made up of industry, government, and consumer group representatives who develop standards for various industries. The standards that the CSA Group develops are sometimes used in occupational health and safety legislation in Canada and can be thought of as best practices on the subject addressed in the standard.

At the time of publication, the Alberta Occupational Health and Safety Code does not reference CSA Standard Z1006:23 *Management of work in confined spaces*, however, this standard is available for viewing at no cost through community.csagroup.org and is a valuable resource that can help guide you.

Basic Parts of a Confined Space Management Program

It is important that your confined space management program is specific to your operation; this helps to ensure that it is practical and effective. For more detailed information about what to include in your program, refer to CSA Standard Z1006:23 *Management of work in confined spaces*, as well as Part 5 *Confined Spaces* of the Alberta Occupational Health and Safety Code.

Basic parts of a confined space management program include:

1. Roles & responsibilities (This includes management leadership and worker participation)
2. Hazard identification & assessment
3. Hazard prevention, elimination & control
4. Communication and training
5. Confined space work procedures & entry permit system
6. Emergency preparedness and response
7. Recordkeeping
8. Program maintenance, evaluation & continuous improvement

Program Administration

Program administration includes the documenting, tracking, managing, maintenance, and evaluation of all parts of the farm's confined space management program. Good program administration ensures important activities are happening and it allows for the measurement and analysis of the health and safety program as a whole and its individual parts, both of which are necessary for the programs ongoing improvement.

To learn more about program administration, refer to Module 9: Program Administration of the AgSafe Alberta FarmSafe Plan Program Manual.

ATTENTION

IMPORTANT

The farm's written confined space management program will need to be readily available to the people working on your farm and kept up to date. This includes documents relating to confined space entry, the work performed in confined spaces, entry permits, any testing performed, etc.

Glossary

Foreword

Act: A form of law that allows a government to regulate an area, such as Occupational Health and Safety (Government of Canada, 2011).

Codes: Codes are pieces of legislation that can be enforced.

Reasonably practicable: 1. Meeting a legislated occupational health and safety obligation in a way that is sensible, realistic and would be thought of as making sense for the facts and conditions by a reasonable person. 2. A recognized term that is based on the reasonable person test, which basically asks, what would a dozen of your peers consider reasonable in similar circumstances (Government of Alberta, 2017, p.1)?

Regulations: Regulations commonly list the requirements for specific workplace conditions and work practices in more detail than an Act. Regulations can be sector specific (as we have seen with farming and ranching) or hazard specific.

Volunteer: Someone who performs or provide services without being paid and have the same health and safety rights and responsibilities as any other workers under Alberta OHS legislation; a volunteer is still a worker, but they are not considered to be a regularly employed worker (Government of Alberta, 2022, p.1).

Restricted & Confined Spaces

Confined space: A restricted space which is hazardous, or may become hazardous, to a person entering it because of: an atmosphere that has too little or too much oxygen, is flammable, explosive or toxic; a condition or changing set of events that may cause illness or injury; the potential for an activity to produce dangerous or harmful results in the space; the basic characteristics of an activity that can produce dangerous or harmful results in the space.

Restricted space: A space that is not meant to have someone in it all of the time or even very often, would be big enough to enter & difficult to get in or out of, and would not have any other hazards or have the hazards properly controlled.

Common Hazards & Risks

Breaking the plane: Breaking the plane of a restricted or confined space occurs when any part of the body passes through the entrance of a confined space.

Claustrophobia: When someone has an extreme fear of confined spaces.

Engulfment: When someone is surrounded by and cannot escape a liquid or flowable solid substance.

Entrapments: When someone becomes caught, trapped, or entangled in a hazardous space.

Flammable: Easily set on fire, burnable or ignitable.

Hazard: Something that could cause damage or harm to someone or something on your farm.

Immediately dangerous to life or health atmosphere (IDLH): 1. “An atmosphere that poses an immediate threat to life, would cause irreversible adverse health effects, or would impair an individual’s ability to escape from a dangerous atmosphere (Occupational Safety and Health Administration, 2009, p.8)." 2. “Circumstances in which the atmosphere is deficient in oxygen or the concentration of a harmful substance in the atmosphere (a) is an immediate threat to life, (b) may affect health irreversibly, (c) may have future adverse effects on health, or (d) may interfere with a worker’s ability to escape from a dangerous atmosphere (Occupational Health and Safety Code, Statutes of Alberta 2021, s.1).”

Occupational Exposure Limit (OEL): The level of permitted exposure, for an amount of time, to a chemical or physical hazard that is not likely to affect the health of a worker.

Oxygen deficiency: When there is too little oxygen in the air. Air that contains less than 19.5% oxygen.

Oxygen rich: When there is too much oxygen in the air.

Toxic substances: Substances that can have a poisonous or toxic effect on the body.

Hazardous Energy & Lock Out Tag Out (LOTO)

Chemical energy: Energy that is stored in the bonds of chemical compounds.

Electrical energy: Energy that relates to the movement of electrically charged particles.

Gravitational energy: Energy that is stored in an object and relates to both the objects distance from the ground and its weight.

Hazardous energy: Any electrical, mechanical, hydraulic, pneumatic, chemical, nuclear, thermal, gravitational, or other energy that could cause damage or harm to someone or something.

Hydraulic energy: Energy that involves the power and energy in a pressurized liquid.

Lock out: A method of controlling hazardous energy by placing a lockout device on an energy-isolating device.

Mechanical energy: Energy that relates to the motion or position of an object, machine, tool, etc.

Pneumatic energy: Energy that relates to the power and energy in pressurized air.

Radiation energy: Energy that travels from a source in the form of waves or particles through space or a material at the speed of light.

Tag out: Involves attaching a tag or other type of label that is attached to a machine or piece of equipment that lists information as why it is locked and tagged, when the lock and tag were put in place, and the name of the person who attached the lock and tag.

Thermal energy: Energy that is in the form of heat and is sometimes called heat energy.

Hazard Assessment & Control

Administrative control: These controls change the way people work and involve developing a method or standard way of doing things that minimizes the hazard.

Competent person: A person who is adequately qualified, suitably trained, has the necessary attitude, and has enough experience to safely perform work without or with only a minimal degree of supervision (Occupational Health and Safety Act, 2022, s.1(d)).

Confined space attendant: A trained, competent person who monitors the person in a confined space, as well as activities in and around a confined space.

Confined space entrant: A trained, competent person who performs work in a confined space.

Elimination: Where the hazard is removed from the job, task or work environment.

Engineering control: Methods to isolate or separate workers from the hazard or to remove the hazard at the source before a worker can come into contact with it.

Entry permit: An administrative hazard control measure that communicates important information about the hazards, the work to be done, communication, rescue, etc.

Hazard assessment: 1. The process of evaluating the hazards identified for a particular job or task. 2. The written or unwritten process of evaluating the hazards and risks of a particular job or task and determining appropriate methods to eliminate or control these hazards.

Hazard control: An action or actions taken to eliminate or minimize the risk of injury, illness or damage.

Hierarchy of controls: A system for controlling risks in the workplace where risk controls are ranked from the highest level of protection and reliability through to the lowest and least reliable level of protection.

Inerting: The process of purging a confined space using an inert gas to displace to toxic gases or high levels of oxygen.

Personal protective equipment (PPE): Anything worn by someone to reduce their exposure to a hazard.

Purging: The process removing contaminants by displacing them with something else, such as air, water, steam or inert gases.

Substitution: Where a hazard or the source of the hazard is replaced with something less harmful.

Ventilating: The process of moving air in or through an area; commonly involves a machine or device, such as fans or exhaust systems.

Rescue

Entry rescue: When trained, competent, and fully equipped rescuers enter a confined space and bring the entrant out of the confined space according to the rescue plan.

Self-rescue: When an entrant is able to leave the confined space on their own and without any outside help.

Non-entry rescue: When an entrant is not able to leave the confined space on their own and the attendant starts the emergency rescue procedure using a retrieval system that has been put in place to remove the entrant from the confined space.

Roles, Responsibilities & Training

Responsibilities: The tasks or duties that people in the various positions are expected to complete as a function or part of their job.

Role: The position or purposes that someone has in a situation or organization; the position held by someone on the farm.

Confined Space Management Programs

Confined space code of practice: A written guideline containing information set out by the Alberta Government for the purpose of helping employers become compliant with legislation, and ultimately help employers protect the health and safety of their workers.

Confined space management program: A written guideline containing information that helps employers become compliant with various standards, legislation, and ultimately help employers protect the health and safety of their workers.

Program administration: The documenting, tracking, managing, maintenance, and evaluation of all parts of the farm's confined space management program and is necessary for the programs ongoing improvement.

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