

Real-Life Stories

OSHA Fatal Facts: Confined Space Entry on a Farm

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Confined spaces are areas large enough for a worker to enter and perform work, have a limited or restricted means of entry or exit; and are not designed for continuous employee occupancy. The purpose of this Fatal Facts is to highlight the importance of identifying confined spaces in agricultural workplaces to prevent another fatality.

The General Duty Clause requires employers to provide employees with workplaces, including confined spaces, which are free from recognized hazards likely to cause death or serious physical harm. Agricultural operations are covered by several Occupational Safety and Health standards including Agriculture (29 CFR 1928) and parts of General Industry (29 CFR 1910), as well as the General Duty Clause of the Occupational Safety and Health Act (section 5(a)(1)). OSHA's confined spaces standard at 29 C.F.R. 1910.146 does not apply to agricultural operations, but serves as a guide for how to prevent these accidents.

BRIEF DESCRIPTION OF INCIDENT

A farm maintenance worker died after entering an 8,000-gallon polyethylene storage tank that was not marked to indicate a potential uncontrolled hazardous atmosphere. At the time of the incident, the tank contained liquid whey, known to produce carbon dioxide gas as it decomposes. A broken ball valve inside the tank needed replacement. Using a forklift, a worker was lowered through a 16-inch-diameter hole at the top to fix the valve. The forklift operator had no visual contact or other means to monitor the situation inside the 12-foot-by-12-foot tank. To determine the worker's progress inside the tank, the operator climbed to the top of an adjacent bin where he saw the worker lying face down inside the

whey tank. The fire department responded and cut a hole in the tank (see Figure 1) to retrieve the worker who had died from asphyxiation.



Figure 1: The hole cut into the side of the whey tank

LIKELY CAUSES

The high outdoor temperatures and direct sunlight on the tank likely caused the liquid whey in the tank to decompose more rapidly than normal. Decomposition likely released lethal carbon dioxide gas and lowered oxygen levels, resulting in a hazardous atmosphere (oxygen concentrations below 19.5% or above 23.5% create a hazardous atmosphere). The employer failed to recognize that the tank was a confined space containing a hazard, so protective measures were not in place to alert workers to a potential hazardous atmosphere and prevent them from entering the storage tank without recognized controls.

INCIDENT PREVENTION

Employers involved in agricultural operations can take the following actions to reduce worker exposures to confined space hazards:

- **Identify and label all confined spaces.** Examples common in agriculture include:
- Grain and feed storage facilities
- Corrugated steel bins
- Silos
- Sumps, tunnels, and pump pits
- Dump pits
- Forage storage
- Manure storage tanks
- Manure/bio-digester units
- Manure transport vehicles (tanks and applicators)
- Bulk transport vehicles
- Sprayer and chemical transport vehicles
- Forage and silage dump wagons
- Feed grinders/mixers
- Feed mixer wagons tanks
- Storage and mixing tanks, bins, and silos
- Fermentation vessels
- Environmentally controlled fruit and vegetable storage units
- Bulk liquid storage tanks
- Containment areas around diked storage tanks

- Wells, cisterns, dry wells, septic tanks
- Grain driers
- Fuel storage tanks
- **Evaluate all confined spaces** to determine if they contain any actual or potential hazards.
- **Train workers** to never enter a confined space before the hazards and the steps to address the hazards to provide for safe entry and exit have been identified.
- **Ensure workers review, understand, and follow the procedures** before entering confined spaces and know how and when to exit. Ensure there is a safe means to enter and exit the space such as using ladders.
- **Consider chemical reactions** that could occur based on the materials in the confined spaces, and potential byproducts that could create a hazardous atmosphere.
- Ensure air sampling is conducted prior to anyone entering the space.
- Ensure that sampling equipment can measure potential byproducts.
- Use an appropriate routine and simple detection approach. A 4-gas meter will only detect oxygen deficiency and three additional hazards (usually flammability, carbon monoxide, and hydrogen sulfide). Detector tubes or a simple hand-held meter such as a photoionization detector may also be needed.
- **Use a written confined space entry system** that covers the following:
 - Before entry, identify any hazards, including physical, within the space.
 - Before and during entry, test and monitor for oxygen content, flammability, toxicity, and explosion hazards.
 - Ensure confined spaces are properly ventilated.
 - Ensure that workers entering confined spaces maintain contact at all times with a trained attendant either visually, by phone, or by two-way radio.
 - Use appropriate equipment (fall protection, rescue, air-monitoring, lighting, and communication) according to entry procedures.
 - **Develop an emergency action plan** that includes quick removal of the entrant and procedures for facility operators and local responders. Communicate the plan to workers, and ensure that it is reviewed and updated regularly.

ADDITIONAL RESOURCES:

- Refer to the consensus standard on permit-required confined space: American National Standard ANSI/ASSE Z117.1: Safety Requirements for Entering Confined Spaces.
- OSHA's Safety and Health Topics: ***Agricultural Operations***
- OSHA's Safety and Health Topics: ***Confined Spaces***
- **29 CFR 1910.146** Permit-required confined spaces.

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