

Safety & Health Advisory



Preventing Fatalities and Serious Injuries from Fires and Explosions in Oxygen-Limiting Silos

Understand the hazards and firefighting tactics for oxygen-limiting silo fires to prevent explosions.

WHAT FIREFIGHTERS CAN DO:

- ❑ Understand the characteristics of oxygen-limiting silos
- ❑ Train on oxygen-limiting silo hazards, including hazards specific to silo contents
- ❑ Develop a pre-incident plan for occupancies with silos
- ❑ Take time to analyze the situation and collect all relevant information, including silo type and contents, to develop a plan before committing resources
- ❑ Avoid directing water or foam into an oxygen-limiting silo
- ❑ Allow an oxygen-limiting silo fire to smother itself by keeping all hatches shut for up to a month



View of operations from recent silo incident. Photo by the fire department.

EVENT SUMMARY:

On May 15, 2026, two volunteer firefighters were killed and thirteen more were critically injured following an explosion of an oxygen-limiting silo at a lumber mill. After notification from the fire alarm system, facility owners and employees arrived and saw white smoke coming from the room underneath the silo. Firefighters arrived on scene and deployed a hoseline to the silo. At the direction of facility owners and employees, firefighters placed the hoseline nozzle in an access panel and began to spray water through the hole into the base of the silo. After some time, firefighters around the silo heard a “whoosh” as smoke began to quickly emanate from the air-material separator on the top of the silo. The silo launched into the air. As it rose, a large plume of fire came out of the bottom. The explosion threw surrounding facility employees, firefighters, and emergency medical services providers away in a blast of pressure and fire. The burning contents of the silo covered the area and those thrown by the blast. Read the [full report](#) for more details.



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QUESTIONS & ANSWERS

What are the characteristics of oxygen-limiting silos?

Silos preserve, store, and disburse organic material such as foodstuff. Silos can also store materials such as coal, powdered mixes, and sawdust. Oxygen-limiting or “sealed” silos have design features to limit content exposure to outside air creating an oxygen deficient environment inside. They are often constructed of poured reinforced concrete, concrete staves, or enamel-coated steel. They do not have outside chutes and typically have bottom unloaders that remove the contents from the bottom using augers and conveyor systems. Fill and unloading hatches are sealed with clamps and gaskets to limit airflow.

What are the hazards associated with oxygen-limiting silos created by silo contents?

Since 1985, NIOSH has investigated seven incidents of firefighter fatalities and injuries from silo fires and explosions. A common hazard presented by oxygen-limiting silos is a combustible dust explosion fueled by silo content. Combustible dust is a solid combustible material made of distinct particles. These particles present a fire or explosion hazard when suspended in air or other oxidizing medium through a range of concentrations. Dust explosions often occur in a series. The first explosion stirs the dust settled in the confined space and results in additional larger and stronger explosions. This dust is often a byproduct of organic materials that are finely ground. Fermentation may naturally occur from storing these organic materials and may form various gases in silos. When silo contents burn, the organic compounds also release hazardous gases such as carbon monoxide, nitrogen dioxide, and nitrogen tetroxide. Many of these gases are flammable, maintain an explosive range, and can accelerate the burning of combustible materials.

What are firefighting tactics for oxygen-limiting silo fires?

NIOSH cautions firefighters against introducing water or foam into an oxygen-limiting silo. Conventional firefighting tactics can unintentionally create conditions for an explosion in a silo by creating dust clouds, introducing air, and applying incompatible extinguishing methods. Allowing an oxygen-limiting silo fire to smother itself by not opening the hatches for up to a month allows the fire to safely be extinguished. This includes securing the bottom hatches and closing, but not latching, the top hatches for pressure relief.

What are considerations for responding to fires in oxygen-limiting silos?

One of the most important considerations for firefighters responding to silo fires is time. Time is especially important when responding to an oxygen-limiting silo fire because the design of the specific silo can reduce oxygen ingress to hinder combustion. Unlike most dry materials and flammable structures, silo fires burn slowly for days, weeks and even months. As such, there is often ample time at the scene to analyze the situation and develop a plan for extinguishing the fire. This includes meeting with facility employees and collecting all information, specifically silo type and contents. Before an incident, fire departments can develop a pre-incident plan for occupancies with silos in their jurisdiction and train with their facility employees.

REFERENCE

NIOSH [2026]. [Lumber mill silo fire and subsequent explosion kills two firefighters and critically injures thirteen more – Maine](#). By Attwood WR and Lago LR. Morgantown, WV: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, F2026-07.