

Egg Harbor Fire Department and First Responders Standard Operating Guidelines

SUBJECT: SILO FIRES

SOG 826

PURPOSE: The purpose of this Standard Operating Guideline is to provide a guide for conducting silo fire operations.

SCOPE: This policy shall apply to all members of the Egg Harbor Fire Department.

PROCEDURE:

A. UPON ARRIVAL:

1. Give the exact location of the incident if different from the one given by dispatch and a complete size-up report.
2. Determine the type of silo.

- a. **Conventional**--Conventional silos are by far the most common type of silo.

There are two main characteristics of conventional silos: an unloading chute that runs the vertical length of the exterior of the silo, and an open top or loosely constructed dome. The chute is about 3' in diameter and is used to unload and drop silage into a conveyor belt or feed room. The unloading chute can be steel, sheet metal, concrete, or fiberglass.

Unloading doors are located every few feet in a column configuration similar to a floor opening. The unloading doors, located inside the unloading chute, are most commonly wood with steel hinges, handles, and ladder rungs bolted through the door.

The dome or roof cap can be constructed of fiberglass, aluminized steel, or other similar materials. Those silos with a roof cap or dome generally have a fill tube and loading door on the side of the top of the dome. Many concrete stave silos have a metal fill platform at the top of the outside ladder. Many of the silos also have a steel safety cage surrounding the exterior ladder.

- b. **Oxygen-Limiting**--One type of vertical silo is an "oxygen-limiting" or "controlled atmosphere" silo. The primary identifying feature of oxygen-limiting silos is the absence of an unloading chute on the exterior of the silo. Common characteristics of oxygen-limiting silos can also include a fill door located in the center of the top of the silo roof, a roof hatch rather than a loading door, a center fill pipe attached to a blower or fill pipe, or a single unloading door at the bottom of the silo. Oxygen-limiting silos primarily use bottom unloading-filling from the top and removing silage from the bottom.

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Most oxygen-limiting silos also have a steel ladder and safety cage leading up to and across the roof to the center fill door.

3. Contact owner or employee and attempt to determine what is burning.
4. Have the owner or employee move any livestock or machinery from the area and adjacent structures, if possible.
5. Perform a Risk Management Analysis.

B. SAFETY

1. All members involved in operation shall be in full protective clothing, including SCBA.
2. The Incident Commander should designate a Safety Officer as early in the incident as possible. In silo fires, the Safety Officer should pay particular attention to the climbing and entry procedures, use of full protective clothing including SCBA, and the timing and accountability of firefighters working in the silo. The Safety Officer should also be sensitive to the requirements of rotating the firefighters in strenuous assignments.
3. Whether fire is suspected or evident, use a lifeline and never step directly on the silage surface. Place boards, pieces of plywood or ladders on the surface to distribute weight over a larger area. This will minimize the risk of falling into a burned out cavity.
4. A rapid intervention team of fully equipped firefighters should be in close and constant visual or verbal contact with the entry crew. A good arrangement places an observer at the top of the silo who can observe and communicate with the entry team as well as alerting the back-up team to initiate support if needed.

C. FIRE CONTROL

1. Conventional silos

- a. Extinguish the burning surface by applying water or foam with a straight bore nozzle.
- b. Determine the hot spots in the silage.
- c. Using a piercing nozzle apply water or foam to these hot spots to extinguish and cool.
- d. Ventilate silo using positive pressure ventilation. To assist with ventilation of the silo, open as many doors as possible above the top of the silage.
- e. **CAUTION:** Do not attempt to extinguish a silo fire by pumping large quantities of water onto the surface of the silage, hoping it will soak in and cool the fire - it won't work. Water will not penetrate the silage well enough to control the fire in this manner. In addition, the silo cannot withstand the higher lateral pressure created by the water and structural damage may result.

2. Oxygen-Limiting silos

- a. **DO NOT USE WATER OR FOAM** to fight a fire in an oxygen-limiting silo. Opening the top hatch to apply water or foam will allow oxygen to enter. The stream of water or foam will carry large amounts of air into the silo. In addition, the steam formed when the water reaches the fire may also contribute to an explosion.
- b. If the silo is cool and quiet, and if minimal smoke is escaping, carefully climb the silo and close the top hatch or any other openings. Do not lock or latch the top hatch. Closing the hatch will prevent oxygen from entering the silo, yet pressure increases can be relieved safely.
- c. Leave the silo closed for up to three weeks to allow the fire to use all oxygen and self-extinguish. During this time, make temperature readings of weekly samples from the unloader to be sure the fire is extinguished.
- d. If the silo is producing considerable smoke or steam, or if the silo is rumbling, leave the hatch alone. Closing the hatch on an active fire could bring carbon monoxide and air mixtures into the explosive range.
- e. If sealing the silo does not extinguish the fire, inject nitrogen or carbon dioxide to displace oxygen and cool the fire. Be careful not to introduce additional oxygen. Most oxygen-limiting silos have pipe nipples for injecting these gases.

CO₂ or N₂ Quantity Required to Extinguish Fires in Oxygen-Limiting Silos

Silo Size (dia x ht (ft))	CO ₂ (no. 50 lb. cylinders)	N ₂ (no. 50 lb. cylinders)
20 x 60	20	40
20 x 70	22	44
20 x 80	30	60
24 x 60	30	60
24 x 70	35	70
24 x 80	40	80
30 x 60	45	90
30 x 70	50	100
30 x 80	60	120

D. AFTER ANY SILO FIRE

1. If safe to do so, unload spoiled or damaged feed and dispose of in an appropriate manner.
2. Watch for any missed hot spots that may ignite and burning areas not cooled sufficiently may reignite.
3. Inspect the silo for damage which may have caused the fire or which may be a result of the fire.
4. If structural damage is suspected, have the manufacturer or dealer inspect the silo and follow their recommendations. Damaged bottom unloading silos could collapse during emptying unless strengthened first.