

FACE: 85-49  
DATE: September 27, 1985  
CAUSE: Fire  
SUBJECT: Three Fire Fighters Killed Fighting Silo Fire in Ohio

On August 27, 1985, three firefighters were killed when a burning oxygen-limiting silo exploded. The firefighters were spraying water into the silo from its top at the time of the explosion. A male firefighter on the ground was also injured.

After observing "wispy" smoke coming from the top hatch of a silo, the owner summoned the Fire Department. Firefighters arrived at the silo at about 7:00 P.M. Three firefighters climbed to the top of the 76-foot-high silo and applied water onto the fire. In 30 minutes they exhausted the capacity of two 1,500-gallon water trucks. They retreated for 15-20 minutes, and returned when the water was replenished. At about 8:00 P.M., as the three firefighters applied water from the top and two fighters applied water to the bottom hatch area, there was an explosion that lifted the concrete silo roof about four feet in the air. Two firefighters fell to the ground and a third fell into the silo. A firefighter on the ground suffered a broken leg when struck by a piece of concrete from the roof. The victim inside the silo was removed by a hole cut into the silo 28 feet above ground. At the time of the incident, the silo was filled with silage to about 12 feet from the ground in the center, and about 40 feet around the inside rim. The silo was 20 feet in diameter. Cause of the ignition was spontaneous heating of the silage. When properly sealed, fire due to spontaneous heating in an oxygen-limiting silo is unlikely because there is usually not enough oxygen to feed a fire. Witnesses state, however, that the bottom and top doors of the silo were open when firefighters arrived, which would allow sufficient oxygen for spontaneous heating. The explosion was due either to a buildup of combustible gases from incomplete combustion, a dust explosion, or a combination of the two. Directing water into the top of a silo is an improper method of fighting such a fire, because opening the hatches to apply water admits more oxygen. Air in the water also introduces oxygen. Water spray can place dust into suspension, increasing the risk of explosion. Recommendations:

- o During fire fighting operations, water should not be directed onto a fire through the top hatches of an oxygen-limiting silo. Use of liquid nitrogen or carbon dioxide has met with success. See "Extinguishing Silo Fires," Northeast Regional Agricultural Engineering Service; NIOSH Alert No. 85-112; and NIOSH Report No. 83-126.
- o When not being filled or emptied, the silo hatches should be kept closed, and proper maintenance on the silo should be performed to ensure the integrity of the oxygen-limiting features.