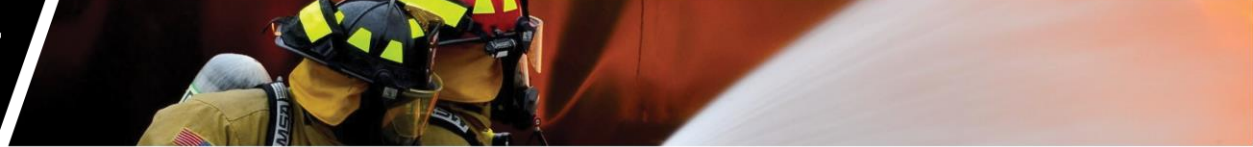


**LINE OF DUTY
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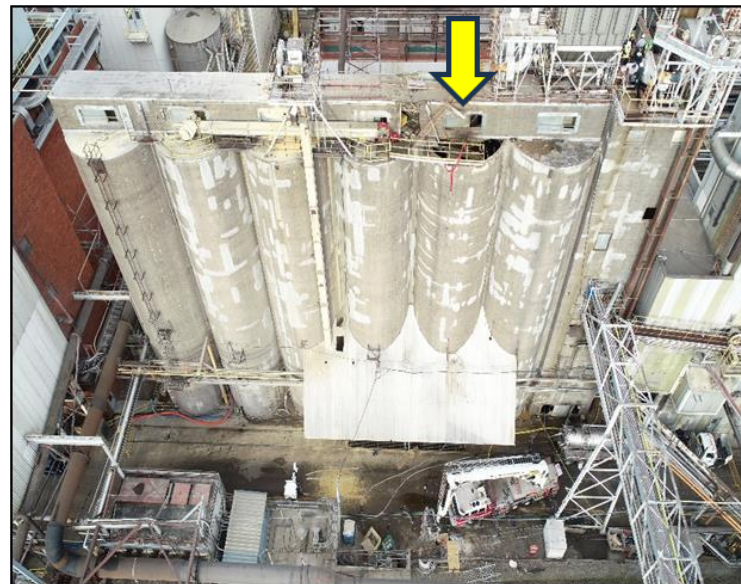
F2019-01

**Industrial Silo Fire and Subsequent
Explosion Kills One Firefighter and
Critically Injures Another - Iowa**



Summary

- January 5, 2019, an industrial silo fire and subsequent explosion killed a 33-year-old lieutenant and critically injured a 23-year-old firefighter.
- At 05:46 hours, Battalion 1 (B1), Ladder 54 (L54), Ladder 59 (L59), Engine 46 (E46), Ambulance 1 (A1), and Ambulance 2 (A2) were dispatched to a reported fire in the “germ pit” area of silo #2 at a corn processing facility.
- L54 and A2 were the first units on-scene at 05:52 hours followed by B1 at 05:53 hours.
- B1 established command and set up the command post about 500 feet upriver while L54 continued to silo #2 and performed a size-up.
- A unified command structure was developed at the command post between the fire department and facility representatives.

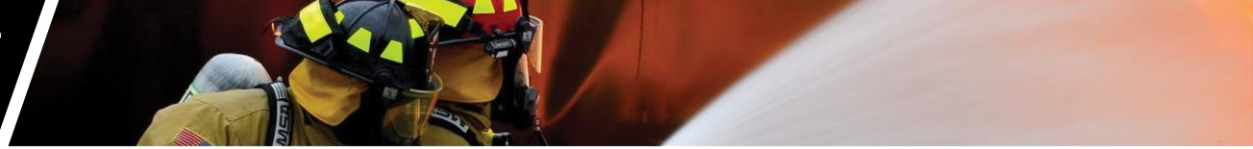


Six silos at a corn processing facility. Yellow arrow shows silo #2 whose top exploded approximately 3 hours after a corn pellet fire was discovered at the bottom of the silo. (Photo courtesy of the fire department)



Summary

- Facility employees informed Command that contractors had been working to remove an obstruction in the silo before the fire was discovered.
- Size-up from L54 revealed a smoldering silage fire in the bottom of silo #2.
- A tactical plan was initiated deploying L54's 1¾-inch hoseline from the below grade conveyor area, directing the water up into the silo.
- This plan was ineffective as L54 crews observed that air was being drawn/sucked into the silo and there was still active fire inside.
- This effort was abandoned at 06:42 hours and an alternative plan was developed involving flowing water through a 2ft-by-2ft access hatch on top of the silo using L54 as a standpipe and 50ft of 3-inch hose.



Location of silo #2 in relation to command post.
(Courtesy of the fire department)



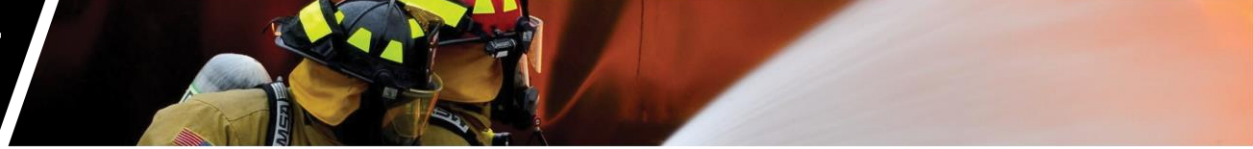
Summary

- At 07:55 hours, L54 was put into position next to the silo configuration and connected to the water supply from a hydrant.
- Command arranged the position of the firefighters for the operation as companies (CO1, CO2, and CO3) for task-level assignment and communication purposes.
- At 08:04 hours, a CO1 firefighter was positioned in L54's bucket to operate the standpipe, CO2 firefighters were positioned at the bottom of the silo to monitor progress, and CO3 lieutenant (deceased firefighter) and CO3 firefighter (critically injured firefighter) were positioned at the top of the silo to flow water.
- At 08:44 hours, after ten minutes of flowing water into the top of the silo, the hoseline was moved around to saturate more product.



Summary

- This resulted in an explosion at the top of the silo which caused CO3 lieutenant to fall 85ft from the edge of the silo, landing on a fiberglass awning below, and then onto the ground.
- The explosion also catapulted CO3 firefighter into the air who then fell into silo #2, landing on the still smoldering pellets.
- CO3 firefighter was rescued from inside the silo using the side access hatch.
- After both were transported to the hospital, firefighting operations resumed, changing tactics multiple times, until the fire was fully extinguished at 15:15 hours.
- CO3 lieutenant died and the CO3 firefighter was hospitalized for three weeks before being discharged from the hospital on January 25, 2019.



Location and ladder configuration used to locate and rescue CO3 firefighter from inside silo #2.
(Courtesy of the fire department)



Contributing Factors

- Smoldering propagation due to chemical reaction/self-ignition of silage
- Emergency planning at corn processing facility
- Fire suppression tactics and pre-incident planning
- Explosion due to application of water through the top hatches of silo



Recommendations

- Fire departments should train fire officers and firefighters on the hazards associated with different types of silos and the appropriate firefighting tactics, including any unique hazards posed by the silo contents.
- Fire departments should develop a pre-incident plan for all high-hazard occupancies in their jurisdictions.
- Governing municipalities (federal, state, regional/county, and local) should ensure the applicable fire and life safety codes are enforced at high-hazard occupancies such as agricultural and/or food processing facilities.
- Agricultural and/or food processing facilities should properly operate and maintain their silos and implement the applicable requirements of NFPA 61, Standard for the Prevention of Fires and Dust Explosions in Agricultural and Food Processing Facilities.

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