

Iowa Farmer Today

Safety Watch: Bin fires can create CO danger

By Stephanie Leonard

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Carbon monoxide concentrations in a bin with a smoldering fire can remain dangerously elevated for days or weeks.

Photo courtesy Stephanie Leonard

I recently visited with a Wisconsin farmer who survived what could have been a fatal exposure to carbon monoxide (CO).

The scenario didn't involve what you might guess when you hear "carbon monoxide exposure" — working in a closed shop with an engine running, a malfunctioning gas or LP furnace or using a wood burner or kerosene space heater in a poorly ventilated room.

His too-close call occurred in a 10,000-bushel grain bin at his farm. He and the man working with him were overcome.

What started as a fire under the aeration floor of a drying bin resulted in a complex rescue.

The farmer recounted the events of a March day nearly six years ago when they observed smoke coming from the bin.

"It happened in the drying bin with a double floor; it also has a stirrator," he said.

The dryer controls had malfunctioned, causing the LP heater to operate at the high-heat setting, rather than the low setting he normally used.

They called the local fire department and then began pumping water from a nearby pond to flood the plenum chamber under the aeration floor. When they turned the bin fan on again and continued to see smoke, they realized the fire had spread above the floor into the corn.

By this time, the fire department had arrived. Efforts to empty the full bin failed when grain stopped flowing through the unloading auger.

The farmer went to open the bin's top sidewall door so they could enter and probe the clumped grain. But the stirrator was blocking the sidewall door.

At that time, his focus was on saving as much grain from the full bin as they could.

"I could have turned the stirrator on, but it moves slowly, and it would have taken 15 minutes to move out of the way of the door," he recalled.

He and the coworker climbed the exterior ladder and entered through the roof hatch. They dropped 8 feet onto the grain surface and attempted to manually move the stirrator enough to open the sidewall door.

He guessed they may have been in there 10 minutes or less before he was overcome by carbon monoxide, but he really can't be sure. He recalls feeling faint and suspects he passed out within seconds.

Jim Moon, then assistant chief of the local fire department, was not on call that day, but he heard the dispatch call for a grain fire and headed back to the site. He came upon a scene that "looked like an anthill of activity over by the bin."

It included first responders, personnel from several local mutual aid services, an ambulance, a life flight helicopter and neighbors.

A neighboring fire department's high-angle rescue team with a ladder truck had cut a hole in the bin roof. One victim had been extricated and was being prepared for air transfer, and crews were working to extricate the second.

The fire response-turned-rescue took several hours. The unresponsive men in the bin were air-lifted, hospitalized and treated in hyperbaric chambers to counter carbon monoxide poisoning.

The farmer's recovery involved a second round of hyperbaric treatment shortly after his initial hospitalization. Since then, he has recovered fully except for minor occasional weakness to his left side.

He emphasized the availability of a hospital with hyperbaric chamber capabilities were critical to his recovery.

A lack of awareness that carbon monoxide is produced in grain and forage fires — and the absence of any sensory warning properties to alert of its presence — create dangerous scenarios when grain or forage fires occur in enclosed structures.

“I had always associated carbon monoxide with gasoline combustion engines, working in an enclosed area, never with a corn or grain fire,” the farmer said. “There's no way you know it's there. You can't smell it, you can't see it, you can't taste it.”

Three years after his experience, carbon monoxide killed two Iowa men who entered a bin with a smoldering corn fire.

The scenarios were similar in some respects. The day before Rick and Adam Schneider entered the bin to break up grain and unplug a clogged auger, workers had noticed charred corn and identified a smoldering fire caused by metal-on-metal friction at the unloading auger.

Water was poured into the housing, and the auger section was repaired, but problems persisted in getting grain unloaded from the bin.

The next day, the men entered the bin to investigate the problem and break up clumped grain. Some minutes later, they failed to respond to radio communications and were found unconscious in the bin.

Firefighters and emergency responders arrived within minutes of the 911 call and worked to remove the victims through a hole cut in the bin sidewall, but they did not survive.

Carbon monoxide concentrations in a bin with a smoldering fire can remain dangerously elevated for days or weeks, even when smoke or flames are not visible. Dangerous concentrations over 500 parts per million were measured inside the bin several days after the Iowa fatalities.

In 1996, salvage workers hired to remove burning corn from a weeks-old bin fire in Seward, Ill., were overcome by carbon monoxide. Dale Zimmerman, a firefighter responding to the emergency call, was fatally overcome during their rescue.

Moon, now chief of the fire department that was awarded Scene Call of the Year for its role in the Wisconsin response and rescue, noted calls for grain fires are not uncommon; his department has responded to a handful of fires in bins or dryers since the 2010 incident. None of the subsequent fires required rescues due to unsafe entry.

He noted, “An additional challenge for these calls is being able to identify the electrical shut-offs for various equipment on farms; they’re typically not labeled. Having circuits and shut-offs labeled at the panel increases safety for everyone in the event of an emergency.”

In the “heat of the moment,” saving grain may seem to be the sole priority when a fire is discovered. But under no circumstances should you enter a storage structure to investigate or extinguish the fire or address equipment malfunctions due to the risk of poisoning.

Entry also presents the risk for grain entrapment.

Call 911 so trained responders with the right resources — including self-contained breathing apparatus (SCBA) respirators and atmospheric testing equipment — can address the fire safely.

In the summer when bins are empty, inspect grain moving equipment to identify potential sources of friction, heat or electrical malfunctions that could increase the risk for grain fires. And make sure your electrical switches, circuits and shut-offs for grain handling equipment are labeled.

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