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PRESS RELEASE

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FOR IMMEDIATE RELEASE

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COMBUSTIBLE DUST

Exposure to dust while harvesting, storing or moving grain is inevitable. While there are many potential health hazards related to this dust that is biologically active, a dangerously destructive and potentially deadly threat is that of explosion.

Combustible dust is a well-known term in the grain industry, but farmers and grain facility managers may be less familiar with the insidious process that leads to suspension of dust in any confined enclosure, such as a bin, elevator, room, vessel or process equipment.

"The dust is created as grain moves through grain bins and elevators. Those fine particles settle on any flat surface, including rafters, building beams, and motors," Bonita Winingham, Occupational Safety and Health Administration (OSHA) Deputy Regional Administrator in Region 7, says. "The particles also find their way into unseen areas in grain facilities, steadily building up over time."

The first documented dust explosion occurred in 1785 at a Turin, Italy, bakery. Flour dust in a bakery storeroom was ignited by a lamp. The incident led to the recognition that grain dust is a highly explosive substance that must be handled carefully. Although grain dust explosions are somewhat rare, they are catastrophic when they occur.

Grain dust accounts for an average of 24% of reported combustible dust explosions. Wood dust is involved in 34% of reported explosions, synthetics dust an average of 14%, coal/peat dust causes about 10%, metals dust is responsible for another 10%, paper for 2% and other materials are found in 6% of dust explosions.

Among the ways the dust can become suspended is any event that disturbs it and causes it to disperse into the air in sufficient quantity and concentration to create a dust cloud. If that cloud is confined, explosion potential is high. Five factors must be present for suspended dust to ignite.

"It's called the 'Dust Explosion Pentagon,'" Winingham says. "If oxygen, heat, fuel, dispersion and confinement are all present, an explosion will occur. The dust provides fuel and the heat to ignite it can be a variety of things, such as a spark from a motor, moving augers or a conveyor."

For an explosion to occur, dust must be combustible and fine enough to be airborne and the dust cloud must be dry and confined. The dust cloud must beat the Minimum Explosive Concentration (MEC) for the specific dust and there must be a source of ignition. The final element is sufficient oxygen in the atmosphere to support and sustain combustion.

Ignition sources include mechanical sparks, static electricity, friction, fire, hot surfaces, self-ignition, welding, smolder spots, electrical equipment and some miscellaneous triggers.

The MEC for grain dust, grain flour or ground feed ingredients varies according to particle size and energy. Smaller particles are more powerful and caloric values play a role. Corn starch is considered one of the more volatile and powerful grain products. As particle size decreases, risk of deflagration (sudden, violent burning) or explosion increases.

In the grain industry, dust explosions typically occur at transfer points such as bucket elevators or enclosed conveyors. Explosions can also occur in dust accumulation suspended in ceilings, in elevator legs, cyclone collectors, electrostatic collectors and holding bins.

If a primary explosion occurs in processing equipment or in an area where fugitive dust has accumulated, more dust may be dislodged, suspended in the air and ignited to generate a second explosion.

"One of the most important keys to preventing accumulation of combustible dust is to prepare and implement a thorough dust control plan," Winingham says. "The plan should involve identification of ignition sources. Facilities should be regularly cleaned with proper dust collection equipment and methods to prevent dust accumulation."

Since grain is just one material that can produce combustible dust hazards, OSHA recommends that companies assess the dust potential for all handled materials. Special care should be given to include identification of open and hidden spaces where dust could accumulate.

"The two most important keys are controlling dust and ignition sources," Winingham says. "If any one of the five elements of the dust explosion pentagon are missing, an explosion can't occur."

Proper dust collection systems and filters should be coupled with regular dust inspections and a thorough housekeeping process. Cleaning methods shouldn't generate dust clouds.

Additional safety practices include use of appropriate electrical equipment and wiring methods, static electricity control as well as careful management of smoking, open flames and sparks.

Separating heated surfaces and heating systems from dusts and venting for equipment and facilities also reduces explosion potential.

"Most employers want to do the right thing to make the workplace safe," Winingham says. "It will be difficult to miss this potential hazard if employers and workers are educated and trained in how to manage grain dust."

States offer small businesses a free confidential consultation and inspection of facilities that is without any penalty or fine if hazardous conditions are recognized. The directory of

consultation services is available at www.osha.gov/dcsp/smallbusiness/consult_directory.html.

"There are no fines assessed with a free consultation visit, owners are required to correct any serious hazard identified," Winingham says. "OSHA recognizes that it's so important to work cooperatively with business owners and private grain handlers to provide necessary education and training. What everyone wants is that we all go home safe and healthy to our families at the end of the day."

Additional information about combustible dust is available at https://www.osha.gov/OshDoc/data_General_Facts/OSHAcombustibledust.pdf.

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