Coffee Break Training - Fire Protection Series

Storage Practices: Grain Elevator Explosions

No. FP-2014-27 July 8, 2014

Learning Objective: *The student will be able to list practices intended to minimize the risk of fires and explosions in grain elevators.*

As end-of-summer harvest time nears, grain storage facilities will be gearing up to accept crops from farmers' fields. Many of these products produce combustible dusts that can result in catastrophic explosions when there is a suitable mix of air and fuel, as well as an ignition source such as a hot bearing, overheated motor, misaligned conveyor belt, or when welding, cutting and brazing are taking place.

According to U.S. Department of Labor statistics, since 1976, there have been 503 grain elevator explosions in the United States, resulting in 184 deaths and 677 injuries.

The likelihood, severity and lethality of grain dust explosions and fires can be reduced by a few simple safety precautions.

This massive, concrete grain elevator facility will move into full operation as the end-of-summer harvest season begins.

1. The property owner and operator should develop, implement and enforce a written housekeeping program with instructions to reduce dust accumulations on ledges, floors, equipment and other exposed surfaces.
2. Priority housekeeping areas in grain elevators include floors within 35 feet (10.7 meters) of inside bucket elevators, floors of enclosed areas containing grinding equipment, and floors of enclosed areas containing grain dryers located inside the facility.
3. Dust accumulations in these priority housekeeping areas should not exceed 1/8 inch (3.2 millimeters). Employers should make every effort to minimize dust accumulations on exposed surfaces since dust is the fuel for a fire or explosion. Dust accumulations should be removed by sweeping or vacuuming — never by blowing with compressed air. (This increases accumulations of static electricity which is a potential ignition source.)
4. A preventive maintenance program with regularly scheduled inspections for mechanical and safety control equipment should be implemented. These inspections may include heat-producing equipment such as motors, bearings, belts and other devices. Preventive maintenance is critical to controlling ignition sources.
5. Hot work operations of any kind (electric or gas welding, cutting, brazing or similar flame producing operations) should be closely monitored with safety controls. (See Coffee Break Training FP-2011-1.)
6. Install wiring and electrical equipment suitable for Class II, Division 1 or Division 2 dust-producing hazardous locations.
7. Design and properly locate dust collection systems to minimize explosion hazards. Filter collectors should be located outside the facility; located in an area inside the facility protected by an explosion suppression system; or located in an area that is separated from other areas by at least a one hour fire resistant-rated construction located next to an exterior wall vented to the outside.
8. Install an effective means of removing ferrous material from grain streams so that such material does not enter hammer mills, grinders, pulverizers and other equipment. These include magnetic and pneumatic separators.

For additional information, consider attending the National Fire Academy course "Hazardous Materials Code Enforcement" (R0615). Obtain more information and apply at http://apps.usfa.fema.gov/nfacourses/catalog/details/10504.