

CSB'S DRIVERS OF CRITICAL CHEMICAL SAFETY CHANGE



U.S. Chemical Safety and Hazard Investigation Board

Combustible Dust Safety

The U.S. Chemical Safety Board (CSB) had identified combustible dust as a critical issue in industrial safety. The CSB has issued numerous recommendations to address safety gaps in Federal and state regulations; industry codes and standards; and best practices. The CSB initiated a study on the hazards of combustible dust following a series of major explosions and fires that resulted in the loss of lives and many burn injuries; making its first recommendations in 2006. The CSB found companies either ignore the hazard, fail to take adequate action to mitigate the danger, or are simply unaware of the hazard in their facilities. The CSB study concluded that while good engineering and safety practices to prevent dust explosions have existed for decades, there is no comprehensive Federal standard requiring adherence to those practices.

The CSB issued a formal recommendation to the Occupational Safety and Health Administration (OSHA) to promulgate a comprehensive combustible dust standard to address the existing safety gap. The Board recommended the standard be based on existing National Fire Protection Association (NFPA) dust explosion standards. NFPA standards address critical topics such as dust hazard analysis, engineering controls, housekeeping, building design, explosion protection, operating procedures, and worker training.

Combustible dust-fueled fires and explosions continue to injure and claim the lives of workers across a broad spectrum of industries, including food processing, oil production, fuel storage, waste treatment, and pulp and paper

The CSB has issued four recommendations to OSHA calling for the issuance of a comprehensive general industry standard for combustible dust as the Board's first "Driver of Critical Chemical Safety Change."

manufacturing. The 2006 Combustible Dust Study reviewed three combustible dust-related incidents over a two-year period, and identified 281 combustible dust incidents between 1980 and 2005 that killed 119 workers, injured 718, and extensively damaged industrial facilities. Since 2006, the CSB has conducted five additional investigations into dust-related incidents. These five incidents alone have taken the lives of 27 workers and injured 61 others.



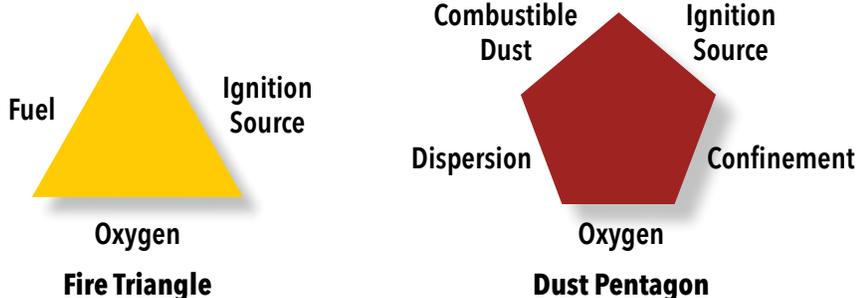
CSB Imperial Sugar Investigation, 2008

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Dust fires are unique because, in addition to the three elements of fuel, oxygen, and an ignition source, dust explosions require dispersion and confinement.



When the dust is confined, a powerful explosion can occur and propagate. Dust may accumulate on surfaces and lie undisturbed for years. Then an initial fire or explosion, known as a primary event, shakes it loose and it ignites. The resulting pressure wave travels through the plant and dislodges accumulated dust from the rafters, beams, and equipment. This serves as the fuel for the secondary explosions. Most of the fatalities and the devastating injuries have been caused by these secondary dust explosions.

According to the NFPA, a catastrophic explosion can occur from as little as $1/32$ of an inch of accumulated dust, around the thickness of a dime, covering just 5% of a room's surface area. That is why the NFPA recommends that companies control fugitive dust emissions, design facilities to prevent dust from migrating and accumulating, and perform rigorous housekeeping to remove any dust that does build up.

Preventing combustible dust explosions is a three-fold process.

- 1. Education:** The hazards must be understood.
- 2. Regulation:** OSHA must develop a comprehensive combustible dust regulation based on NFPA standards.
- 3. Enforcement:** The OSHA regulation must be enforced.

Year	Investigation/Deployment
2017	Didion Milling (Cambria, WI)
2012	US Ink (East Rutherford, NJ)
2011	Hoeganaes Corporation (Gallatin, TN)
2010	AL Solutions (New Cumberland, WV)
2008	Imperial Sugar (Port Wentworth, GA)
2006	Combustible Dust Study
2003	West Pharmaceuticals (Kingston, NC)
2003	CTA Acoustics (Corbin, KY)
2003	Hayes-Lemmerz (Huntington, IN)

VISION: A nation safe from chemical disasters.

MISSION: Drive chemical safety change through independent investigations to protect people and the environment.

The CSB is an independent federal agency charged with investigating serious chemical incidents. The agency's board members are appointed by the president and confirmed by the Senate. CSB investigations look into all aspects of chemical incidents, including physical causes such as equipment failure as well as inadequacies in regulations, industry standards, and safety management systems.

The Board does not issue citations or fines but does make safety recommendations to facility management, industry organizations, labor groups, and regulatory agencies such as OSHA and EPA.

U.S. Chemical Safety Board

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