

## Combustible Dust



The dangers of combustible dust are often unrecognized, and the potential for catastrophic consequences is unappreciated. Seemingly safe solids, finely divided and dispersed in air, can be ignited and produce rapid, high-energy explosions.

### Why Should I Consider a Combustible Dust Program?

Combustible dust can form when fine particles of agricultural, carbonaceous, chemical, metal, or plastic materials are suspended in air. Fine particles can escape the process, accumulate in hidden areas, and provide fuel for an explosion. A dust explosion can be disastrous, causing many deaths and injuries, and often devastates the manufacturing facility.

A Chemical Safety Board (CSB) study of 281 combustible dust incidents from 1980 to 2005 reported the following:

- An average of 10 incidents per year, 15 or more in several years
- An average of 5 fatalities and 29 injuries per year
- Injury or fatalities occur in seventy-one percent of the incidents
- Seventy-five percent of the events occur in six industries: food products, wood and lumber products, chemical manufacturing, primary metals industry, rubber and plastics products, and electric services

*Source: U.S. Chemical Safety and Hazard Investigation Board Investigation Report – Combustible Dust Hazard Study – Report #2006-H-1 – November 2006*

### Benefits

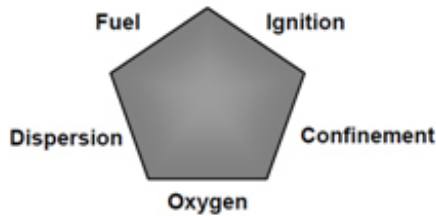
A robust combustible dust program will identify the risks of a process, proactively manage the likelihood of occurrence, and mitigate the consequences of an event. Benefits include the following:

- Improved dust containment and collection within primary equipment
- Less housekeeping due to fugitive emissions
- Improved housekeeping efficiency with proper tools and cleanable surfaces
- Heightened awareness and improved control for managing ignition hazards
- Increased confidence in plant safety and emergency preparedness

### Services

CH2M HILL is knowledgeable of industry codes, standards, and best practices to mitigate combustible dust risks. Our staff can assess hazards and measures to address issues such as the following:

- Survey facilities to identify locations for potential dust inventory
- Identify and control potential sources of sources of ignition
- Implement oxidant concentration reduction systems



### Dust Explosion Pentagon

Five elements are necessary to initiate a dust explosion, often referred to as the “Dust Explosion Pentagon.”

The first three elements are those needed for a fire, or the familiar “fire triangle”:

1. Combustible dust (fuel)
2. Ignition source (heat)
3. Oxygen in air (oxidizer)

An additional two elements must be present for a combustible dust explosion:

4. Dispersion of dust particles in sufficient quantity and concentration
5. Confinement of the dust cloud

If one of the above five elements is missing, an explosion cannot occur.

Source: OSHA

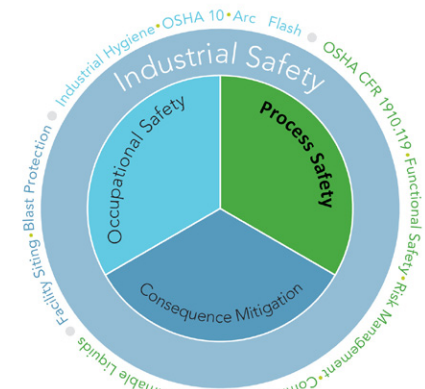
- Design ventilation to manage concentration in confined spaces
- Design equipment to contain and properly ventilate dust
- Design central vacuum systems to support housekeeping needs
- Retrofit facility structure and finishes to reduce areas where dusts can accumulate or reduce the potential thickness of accumulation
- Design deflagration, isolation, and venting systems to reduce the consequences of an explosion and improve the survivability of an event
- Perform consequence analysis blast modeling
- Prepare or update emergency management action plan

### Clients

- Roche
- Hoechst Celanese
- GlaxoSmithKline
- ICI Paints
- The Okonite Company
- Solvay Advanced Polymers
- Port of Longview, Washington
- BP
- The NutraSweet Company
- Pepsi
- Xerox
- American Cyanamid

### Application Experience

- Pharmaceutical compounds
- Polyester fiber
- Coatings and paint
- Resins
- Wire drawing and cable manufacturing
- Plastics manufacturing
- Coal tar pitch bulk loading
- Powdered metals handling
- Food flavorings and concentrates
- Carbon black
- Agricultural chemicals



### About CH2M HILL

Headquartered near Denver, Colorado, employee-owned CH2M HILL is a global leader in full-service consulting, program management, design, construction, and operations for public and private clients. With \$6.3 billion in revenue and more than 23,500 employees worldwide, CH2M HILL delivers innovative, practical, sustainable solutions—helping clients develop and manage infrastructure and facilities that improve efficiency, safety, and quality of life. The firm has long been recognized as a most-admired company and leading employer, including being named by FORTUNE magazine as one of the 100 Best Companies to Work For (2009). CH2M HILL is an industry-leading program management, construction management, and design firm as ranked by *Engineering News-Record* (2009).

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