

# Due Diligence for Site Combustible Dust Hazards

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Anyone who works around bulk solids processes has seen dust. You've heard about the 2008 dust explosions at Imperial Sugar and you may have wondered if the dust layers you've seen on the floor, equipment, and overhead surfaces are combustible. The hazard is a dust deflagration or rapid burning of suspended dust at the Minimum Explosible Concentration (MEC), resulting in a flash fire inside the building or a dust explosion that can rupture a building or equipment. These conditions are needed for a deflagration: fuel, air, ignition source, dispersion of the fuel in a dense cloud (> MEC,) and confinement (building or equipment.)

Although some job descriptions include environmental, health, and safety responsibilities, it is in your interest to know if there is a combustible dust hazard and to encourage the appropriate company resources to find equipment or procedures or both to mitigate those hazards. The first step in any hazard assessment process is to determine the likelihood of the dust being combustible. The low cost way is to start with a literature review. If your dust or similar dusts are combustible based on published test results, then you will know that further investigation is needed. Here are some of the available published sets of combustible dust data:

- Safety Data Sheets for the powders processed at your site may list the potential for a dust explosion in the fire protection sections. However, the U.S. Chemical Safety Board in its 2006 Combustible Dust Hazard Investigation found few SDS gave useful guidance on combustible dust.
- Occupational Safety & Health Administration (OSHA) ([www.osha.gov/dsg/combustibledust/guidance.html](http://www.osha.gov/dsg/combustibledust/guidance.html)) provides a wealth of information on combustible dust. In its Safety and Health Information Bulletin, it states that most organic dusts (food, plastics, wood,) some inorganic dusts (sulfur,) and many metal dusts are combustible. Its 2008 Combustible Dust Safety Poster lists more than 100 dusts.
- NMAB 353-3, Classification of Combustible Dusts in Accordance with the National Electrical Code is the 1982 National Materials Advisory Board study listing a large number of dusts that

met the requirements for Electrical Hazard Class II (combustible dusts) for compliance with the National Electric Code.

- National Fire Protection Association (NFPA standards in some cases have partial lists of combustible dusts.
  - o NFPA 61: Standard for the Prevention of Fires and Explosions in Agricultural and Food Processing Facilities, Table A.6.2.1
  - o NFPA 68: Standard on Explosion Protection by Deflagration Venting, Annex F
  - o NFPA 484: Standard for Combustible Metals, Table A.1.1.3(b)
  - o NFPA 499: Recommended Practice for the Classification of Combustible Dusts and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas, Table 5.2.2
  
- International Data Sources
  - o IFA Institut für Arbeitsschutz der Deutschen Gesetzlichen Unfallversicherung ([www.dguv.de/ifa/Gefahrstoffdatenbanken/GESTIS-STAUB-EX/index-2.jsp](http://www.dguv.de/ifa/Gefahrstoffdatenbanken/GESTIS-STAUB-EX/index-2.jsp)) - 4600 dust samples.
  - o Worksafe British Columbia ([www.worksafebc.com/news\\_room/features/2012/Sawmills/IndustryResources.asp](http://www.worksafebc.com/news_room/features/2012/Sawmills/IndustryResources.asp)) posted its test report for wood dust samples.

So now what do you do if a literature search indicates your dust may be combustible? Here are several recommended steps:

1. Inform management and get support to form a multi-function team to study the hazard.
2. Identify places in your sites where these hazard conditions exist (process equipment with dense dust clouds, potential explosion propagation paths via ducts or chutes, dust accumulations inside the building).
3. Begin Housekeeping and Hot Work Procedures in the hazard areas.
4. Conduct combustible dust tests for your dusts. Do not use the literature values - they do not represent your process conditions.
5. Using the test results, complete process hazard analyses to identify explosion protection equipment and procedures to mitigate the risk. Implement the PHA recommendations on a schedule that fits your business needs.
6. Implement a complete combustible dust program to establish necessary procedures and hazards communication for the workforce on how to be safe.
7. Keep informed on OSHA regulation development.

Attending the 2014 Powder Show is a great way to start the process. There will be speakers from OSHA and NFPA, conference workshops, explosion protection equipment vendors, and combustible dust laboratories available to answer your questions. This can be the first step in your due diligence.

*Gary Q. Johnson, P.E., Workplace Exposure Solutions, helps clients find equipment and procedural solutions for workplace exposures. He recently joined the new ANSI/Z9.12 sub-committee writing a new national standard, "Combustible Dust Collection Systems," which will describe design and maintenance requirements for dust collection systems extracting combustible dusts. For more information, call 513-376-7129, email Gary Johnson at [gary@workexposoln.com](mailto:gary@workexposoln.com), or visit [www.workexposoln.com](http://www.workexposoln.com)*