HOW TO BEGIN YOUR DUST HAZARDS ANALYSIS

Every manufacturing operation that generates, processes, or handles combustible dusts is required to complete a dust hazards analysis (DHA). However, the deadline has recently been extended to 2020. This article will provide an overview on the DHA process and requirements.

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In a dust hazards analysis (DHA), you systematically review your dusts, processes, equipment, and facility to identify any potential fire and explosion risks. Completing a DHA takes you through key questions about the probability and potential consequences of a combustion event including:

- What levels of combustion risk do my dusts represent?
- Where are nuisance dusts released in my facility, and how can I reduce them?
- How can I lessen the chance of a combustion occurring?
- How can I minimize the damage if a dust-related fire or explosion occurs?

Once you have this information, you must plan mitigation steps to reduce the hazards. A DHA should not be confused with a process hazards analysis, (PHA) which is a broader assessment beyond dust, required by OSHA. (For more information on PHAs, see the Fauske Q&A on PHA[1].) In the context of regulations, a DHA is an important and independent part of an overall process assessment.

Conducting a DHA is required by the National Fire Protection Association (NFPA) in several of its published standards.[2] The most broadly applicable standard is NFPA 652: *Standard on the Fundamentals of Combustible Dust*. Recently, a revised 2019 edition was published. Specific industries are regulated by additional commodity-specific NFPA standards, but the DHA requirement is common to all of them. Industry-specific standards include:

- *NFPA 61: Standard for the Prevention of Fires and Dust Explosions in Agricultural and Food Processing Facilities*
- *NFPA 484: Standard for Combustible Metals*
- *NFPA 654: Standard for the Prevention of Fire and Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids*
- *NFPA 655: Standard for Prevention of Sulfur Fires and Explosions*
- *NFPA 664: Standard for the Prevention of Fires and Explosions in Wood Processing and Woodworking Facilities*

As an operation owner, you need to determine which standards your facility operates under based on the materials handled in each process area.

Now that you know about some of the NFPA standards that you might reference when conducting a DHA, here are some answers to commonly asked questions pertaining to DHAs.

What is the deadline for my facility to complete its DHA?

In the original 2016 edition of Standard 652 published in 2015, the DHA deadline was September 2018. In the revised 2019 edition, it was pushed back to September 7, 2020. However, process owners need to demonstrate reasonable progress toward the completion of a DHA leading up to the 2020 date. This date aligns the deadlines for all industry-specific NFPA standards. In addition to creating a DHA, process owners are required to review and update their DHA every five years or whenever undergoing significant modifications to a process or facility.

Can the DHA requirement be enforced?

Standards developed by the NFPA are called "consensus" standards because they are widely recognized by authorities. However, they're not required to be met unless adopted by a city, state, or municipality. NFPA standards are referenced in national and international fire and mechanical codes, which are adopted by many states and municipalities. As such, your local building inspector and fire marshal may be required to enforce these standards . OSHA also considers NFPA standards to be good engineering practices and, during a general safety inspection, can fine a

facility under the general duty clause for not observing them when a hazard exists. In such cases, OSHA will reference the NFPA standards to resolve the issues.

What is the first step in a DHA?

The first step is to determine the combustibility of your dust. Unless you can find suitable property data for your materials in published sources, your dust should be tested by a qualified lab. If a simple "go/no-go" evaluation finds the dusts are combustible, further tests can determine if they are explosible (can ignite in a cloud), how fast that explosion can happen, and how much force it can carry. This helps determine the mitigation equipment your process might require. The more data you have, the more customized your prevention and protection strategies can be.

How do I evaluate the process itself?

Once you know your dust characteristics, audit your process to see where nuisance dusts are generated, released, or tend to accumulate. This may lead to further dust testing if not already evaluated. If not controlled by a local exhaust ventilation (LEV) system, consult with a dust collection manufacturer regarding new dust collection needs. If there is an existing dust collection system, consider the design and placement of the LEV system and ensure it's appropriate for your process. Depending on your dust and process hazard analysis, NFPA may dictate mitigation strategies necessary for your process. See the Combustible Dust Roadmap developed by Donaldson for a summary of steps for process owners to consider if combustible dust may be produced or handled in their facility.[3]

Along with testing and observation, are there other helpful hazard assessment methods?

A DHA can cover the entire processing facility or a single process line or area. If it involves the entire facility, it's helpful to break the evaluation into locations along a process (nodes), such as material intake, mixing, bag dumps, etc. Review each node to determine the production processes, housekeeping practices, fugitive dust control, and ignition sources present to help reduce identified risks for that specific node. While complex planning techniques like a hazard and operability study (HAZOP) can be applied to these discoveries, the most common method is a basic checklist, supplemented with "what if" scenarios. It's best to involve key production and maintenance personnel in this process. Also, including the AHJ (authority having jurisdiction) early in your assessment will help ensure that your end result is compliant and acceptable to the AHJ.

What are my compliance options for meeting NFPA standards?

There are two methods to comply with the NFPA standards; prescriptive and performance-based approaches. The prescriptive approach is detailed in the general standards and in each of the industry-specific standards. A performance-based design approach is also allowed as an alternative to the prescriptive methods and allows process owners to design a mitigation strategy based on the risk(s) associated with their process and application. It's common for facilities to use a combination of prescriptive and performance-based methods when complying with NFPA.

What are some combustion mitigation strategies available?

Mitigation strategies include prevention and protection techniques for both fire and explosion risks. Ignition mitigation may also be incorporated to help prevent any potential ignition source from reaching the accumulated dust (fuel) in the dust control system. In the case of an event, mitigation equipment, such as explosion vents on a dust collector, will help reduce the damage that is done, while inlet and outlet isolation prevent secondary events from occurring. Because each facility's dust and process hazard analysis is unique, there is no single mitigation strategy that fits all scenarios.

What guidance is available for conducting my DHA?

NFPA calls its Standard 652 "a single go-to source" for "installers, contractors, engineers, facility managers, code enforcers, inspectors, and environmental health and safety (EHS) personnel for the information necessary to help handle combustible dust safely in any industry, anywhere around the globe." The standard spells out a suggested process for a DHA and recommends using a qualified consultant to help conduct the analysis and recommend a strategy for your facility. For information on dust characteristics and testing, contact a qualified dust testing company. For new or existing dust collection products or assistance in identifying mitigation options and suppliers, contact your dust collector supplier. **PBE**

Note: *Fauske specializes in explosible/combustible dust hazards (DHA), process hazards analysis (PHA), and process safety management (PSM). Donaldson's expertise is in dust, fume, and mist collection. For authoritative guidance on hazardous dust, consult standards of the NFPA.*

References:

1. Q&A on PHA: Who, What, Where, When & Why of Process Hazards Analysis, Fauske & Associates, https://bit.ly/2SiqctF.
2. All NFPA standards are available from www.nfpa.org.
3. Download a Combustible Dust Roadmap developed by Donaldson to see a high-level summary of steps for process owners to consider if combustible dust may be produced or handled in their facility: https://bit.ly/2FKXtak.

For further reading

Find more information on this topic in articles listed under "Dust collection and dust control" and "Explosion protection" in *Powder and Bulk Engineering*'s comprehensive article index in the December 2018 issue or the Article Archive on *PBE*'s website, www.powderbulk.com (All articles listed in the archive are available for free download to registered users.)

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