CV Technology specializes in complete explosion and fire protection solutions for the prevention and mitigation of explosions and fire hazards that result from the manufacturing and handling of dry bulk materials.

CV TECHNOLOGY
FIRE AND EXPLOSION PROTECTION

ADVANCING FORWARD AFTER YOUR DHA

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YOUR COMPLETE GUIDE ON WHAT TO DO ONCE YOUR DUST HAZARD ANALYSIS IS COMPLETE

235 FIRES AND EXPLOSIONS

Combustible dust hazards were the source of 235 fires and explosions in the United States and Canada in 2019.

STEP ONE:

COMPLETE YOUR DUST HAZARD ANALYSIS

The first step to managing combustible dust hazards is to complete your dust hazard analysis whether it is for an existing plant or a new process.

NFPA Dust Standards

The Chemical Safety Board's 12-year review revealed over 59 fatalities and 303 injuries from combustible dust related incidents during timespan of 2006 to 2017. Preventing this sort of catastrophe starts with a deep understanding of NFPA standards and how to apply recommendations from a DHA.

NFPA STANDARDS

In 2016, the National Fire Protection Association (NFPA), developed a new standard on the fundamentals of combustible dust, referred to as NFPA 652.

This standard applied retroactive requirements to help companies better understand and manage the hazards of combustible dust.

The first step of the process in this standard and the since revised commodity specific standards was to conduct a Dust Hazard Analysis (DHA).

A DHA is a systematic review of the processes and areas of a facility where combustible dusts and particulate solids are present.

The output of a DHA will identify where hazards exist, what safeguards exist, and what safeguards are required.

RETROACTIVE REQUIREMENTS

Dust hazard analysis is required by NFPA 652 and commodity specific standards.

DHA DEADLINE

A DHA is required but the deadline was pushed from 2018 to September 2020. Food facilities have been granted an extension of September 2022.

ONGOING UPDATES

Ongoing updates and revision to the DHA are required every five years.

What's Next?
DHA Action Plan

After a DHA is completed, it can be overwhelming to comprehend exactly what to do next. An initial DHA will likely identify a series of action items that will need to be implemented. The recommended action items might suggest recommendations such as: hazard awareness training, electrical classification assessment, safety equipment requirements, or even something as simple as a new housekeeping schedule for a particular area.

The difficulty for plant operators and engineers often lies in knowing which specific action items to implement and in what priority. The most common approach is a phased plan, one that prioritizes action items. When resources are limited, a phased plan is advantageous. Often plant operators will approach phasing by categorizing the hazards by their risk in order to determine a hierarchy.

Not all DHA's are completed using a risk assessment. A prescriptive approach is commonly used which assumes a dust hazard exists if combustible dust is present with a potential ignition source. When a prescriptive approach is used a secondary activity may be to evaluate that hazards identified and assign a risk level to them.

Dust Hazard Analysis

A dust hazard analysis will identify action items that need to be completed

DHA Recommendations

A dust hazard analysis will identify action items that need to be completed

Prescriptive Approach

Prescriptive approaches are often conducted if dust exists with an ignition source.

Risk Assessment

Risk assessements rank hazards based on likehood and consequence.

DHA Actions

1 Administrative

Training, Emergency Response, Management of Change

2 Documentation

Recording Information, Annotating, Relevant Codes and Standards

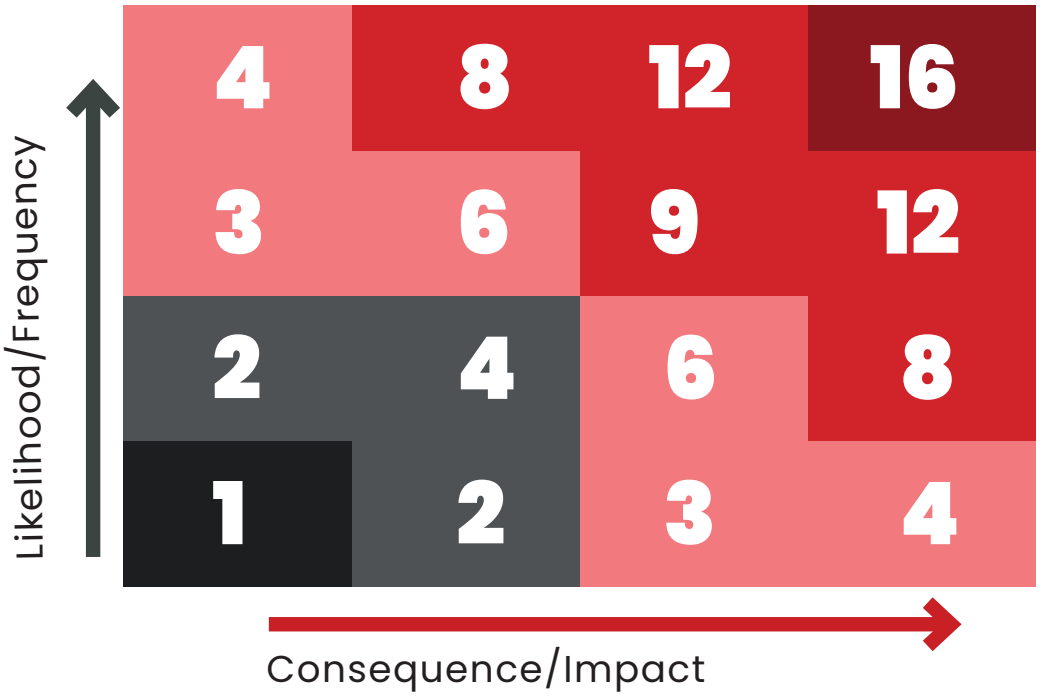
3 Exisiting Safeguards

Initial Design,Maintenance, Reliability, Process Interlocks

4 Required Safeguards

Prevention Systems, Protection Solutions, Design Documentation

USING RISK TO PRIORITIZE SAFETY



A risk-based approach to a DHA or a supplemental risk assessment to a prescriptive hazard assessment may help prioritize your plan to manage combustible dust hazards. This risk approach involves evaluating your consequence vs the frequency of a potential hazard. Assessing the risk of a hazard may also require action items to properly estimate.

The properties of your combustible dust may come into play in the decision-making process. Specifically, the ignition potential parameters for a dust need to be considered. The minimum ignition energy (MIE) may need to be tested to determine static discharge risks for powder being handled in a FIBC. Powders that are dried in a rotary dryer should be tested to determine the ignition temperature for both a cloud and layer to understand the likelihood of a fire in the system.

The real benefit to using risk to help prioritize your action items is that you can identify the greatest exposure from combustible dust hazards. Resources can then be used to systematically reduce the risk in an industrial facility in a phased approach.


8x
MORE DANGEROUS
A combustible dust explosion is 8X more likely to result in a fatality than a combustible dust fire.

RISK PHASING
CONSEQUENCE

The effect of a combustible dust event may range from minor to devasting. This range can depend on whether the hazard exists for a fire, flash fire, explosion, or any combination of all three. Consequences include loss of production, regulatory penalties, rebuild/repair costs, insurance premium increases, injuries, or in a worst case a fatality.

A combustible dust explosion is 8X more likely to result in a fatality than a combustible dust fire. Considerations should be made to the pressure and flame affects that a combustible event will have on an enclosed process, building compartment, and surrounding areas. Fire spread and explosion propagation can cause small events to become catastrophic.

IMPACT OF EVENTS

Regulatory penalties: OSHA issued more than $1,250,000.00 in penalties last year related to combustible dust. The average initial citation was over $40,000.00 per inspection.

Rebuild/repair costs: typical repairs will be over $100,000.00 for a combustible dust event. Major events can result in complete losses of facilities or process lines.

Insurance premium increases: events or lack of proper safeguards can result in process areas that cannot be insured or increased premiums (up to 30%).

Injuries/fatalities: the worst-case consequence of any dust related event. Fatalities from combustible dust explosions a 60X more likely than from general safety hazards.

RISK PHASING FREQUENCY

A combustible dust fire is 4X more likely to occur than a dust explosion. However, as discussed above an explosion can have greater consequence.

The likelihood of a combustible dust related event has several factors including the ignition sensitivity of the dust, potential ignition sources in a process, safety culture of the manufacturing facility, and the reliability of safeguards present in the process. The industry type is a potential indicator for combustible dust events. Wood and wood products and agriculture and food productions are the leaders in combustible dust related events. Strides have been made over the years in these industries to limit combustible hazards including the implementation of dust hazard analysis.

CONSIDERATIONS

Understand the ignition sensitivity of your material: How much energy is needed to ignite it? What temperature will ignite it? How much dust is needed for an explosible concentration?

What potential ignition sources are present: Consider sparks, mechanical impact, heat, static discharges, electrical equipment, friction, and open flames.

Safety culture: Does training exist for operators and contractors about combustible dust? Does a management of change process exist? Do safe guards exist?

Reliability of safeguards: Our safeguards applied with any reliability? Are safeguards provided in accordance with recognized standards? Are the correct safeguards in place and maintained?

HOW TO ADDRESS YOUR DHA HAZARDS

Different solutions to address hazards may require custom integration or reliance on explosion safety experts to help implement. Solutions can typically take the form of prevention or mitigation.

A prevention solution is designed to lower the potential for an ignition to occur in a process. Examples include spark detection systems for dust collector inlet lines or gas monitoring sensors for early detection of potential fires in storage vessels. Often overlooked as an additional action item, these systems can help lower the overall likelihood of a dust event occurring.

Mitigation systems are considered by most regulations as the minimum solution for addressing a combustible hazard. These solutions focus more on fire and pressure management during a combustible dust event to limit damage. Explosion vents are the most common approach but other solutions like flameless vents, suppression systems, and isolation valves are also used.

Phased approaches whether they are based on risk or other considerations such as funding or process downtime can play a factor in the steps you take after your DHA is completed. An engineered solution utilizing both prevention and mitigation solutions can help make sure you operate your process safely when handling combustible dusts.

WHEN DO ACTION ITEMS NEED TO BE ADDRESSED?

Anytime a hazard has been identified it is important to have a plan on how to address it. When you address the hazard may depend on several factors.

An Authority Having Jurisdiction (AHJ) may have some input on when action items may need to be completed. Additionally, some hazards may be deemed such a high risk that they require immediate action.

The critical factor is to have a plan to address action items that includes a timeframe for completion that satisfies your own safety concerns as well as any regulatory bodies.

We Can Help You to Become NFPA Compliant

About CV Technology

CV Technology specializes in complete explosion and fire protection solutions for the prevention and mitigation of explosions and fire hazards that result from the manufacturing and handling of dry bulk materials. Over the past 20 years in the industry, we have become one of the world leaders in superior fire and explosion protection design.

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