



# ERM Webinar on Combustible Dust

A Hazard That Shouldn't Just be Brushed Off

Friday, 29 October 2021

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*The business of sustainability*



# What will we cover

- **Introduction & Safety Moment**
- **Overview of Recent Combustible Dust-related Incidents**
- **Combustible Dust Regulations, Identification, and Dust Hazard Analysis**
- **Key Takeaways**
- **Q&A**

# Where does the balance sit in your organization?



Occupational Safety Efforts

Technical Safety Efforts\*  
*(Process Safety + Major Hazard Risk Management)*

*\* Reflects typical ERM experience*

# ERM's Support of Combustible Dust Management

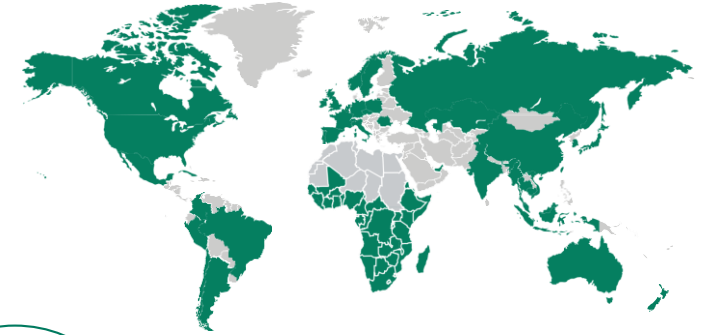


## ***ERM: A Global Leader in Sustainability***

ERM is the leading pure play sustainability and climate change consulting company globally, bringing 50 years of deep subject matter expertise.

**>50%**

**of the Global  
Fortune 500**



## ***A global consulting firm that collaborates with leading companies to manage combustible dust hazards***

Our “boots to boardroom” approach is possible by linking our local, technical know-how with evolving combustible dust insights.

**5500+**

**Experts**

**40**

**Countries**



## ***Combustible Dust Services***

ERM assists clients with a wide variety of services related to combustible dusts including development of sampling plans, Dust Hazard Analysis, facility siting surveys, combustible dust management programs, and more.

**50+**

**Years of history**

**160**

**Offices**

An aerial photograph showing a large-scale demolition project. A massive, billowing cloud of brown dust and debris rises from a central area where a structure is being dismantled. In the background, a railway yard with several blue passenger trains is visible. To the right, there are some industrial buildings and a fenced-in area with yellow excavators. The foreground shows a street with a few cars and a building with a corrugated metal roof.

Up Next

## ● Combustible Dust Incidents

Importance of Combustible Dust Management and Recent Process Incidents

# Potato Starch Powder Explosion, Tuas, Singapore

## Singapore

- On 24 Feb 2021, an explosion at an industrial building in Tuas, Singapore involving potato starch powder
- Fire ensued with black smoke generated



## Causalities:

- 3 workers dead
- 7 workers injured / suffered burns

Photo Credits: Facebook, CNA

# Metal Dust Explosion at Chemical Processing Lab, Seosan, South Korea

South Korea

- On 19 May 2020, an explosion occurred in the site's packing room involving aluminium alkyl powder
- Ignition took place and the fire was only put out about 1h after the initial explosion



Causalities:

- 1 person killed
- 2 others injured / suffered 2<sup>nd</sup> degree burns

Photo Credits: Facebook, CNA

# Combustible Dust Standards and Legislation in APAC

- **Singapore:** SS667: 2020 Code of Practice for handling, storage and processing of combustible dust was launched in 2021

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- **Australia:** AS/ NZS 4745: 2004 Code of practice for handling combustible dusts

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- **China:** GB15577-2018 covers safety regulations for dust explosion prevention and protection and there are other guidelines including AQ4273-2016 which addresses dust collector safety, SY6519-2001 which address classification of gas, vapor and dust related to electrical equipment in hazardous (classified) areas, etc.

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- **Japan:** Regulations concerning the prevention of explosions/ fires cover combustible dust including Ordinance on Prevention of Hazards Due to Dust. Guidelines for the Promotion of the Fifth Comprehensive Measures to Prevent Hazards Due to Dust have also been rolled out aimed at prevent incidence progress of pneumoconiosis.



Up Next



## • Combustible Dust Regulations, Identification, and Dust Hazard Analysis

Managing Combustible Dust Risks Through Industry Codes, Regulations, and Best Practices

# Drive for Further Combustible Dust Codes / Standards



- National Emphasis Program (2008, 2015)
- Regulated under the General Duty Clause



- NFPA - Complete dust hazard analyses of facilities by September 7, 2020
- IFC – Requires compliance with NFPA



- In October 2018 the Chemical Safety Board released a 'Call to Action' for improved awareness and management of combustible dust



- Combustible dust ranked #4 on the Global Safety Survey for investment priorities for clients

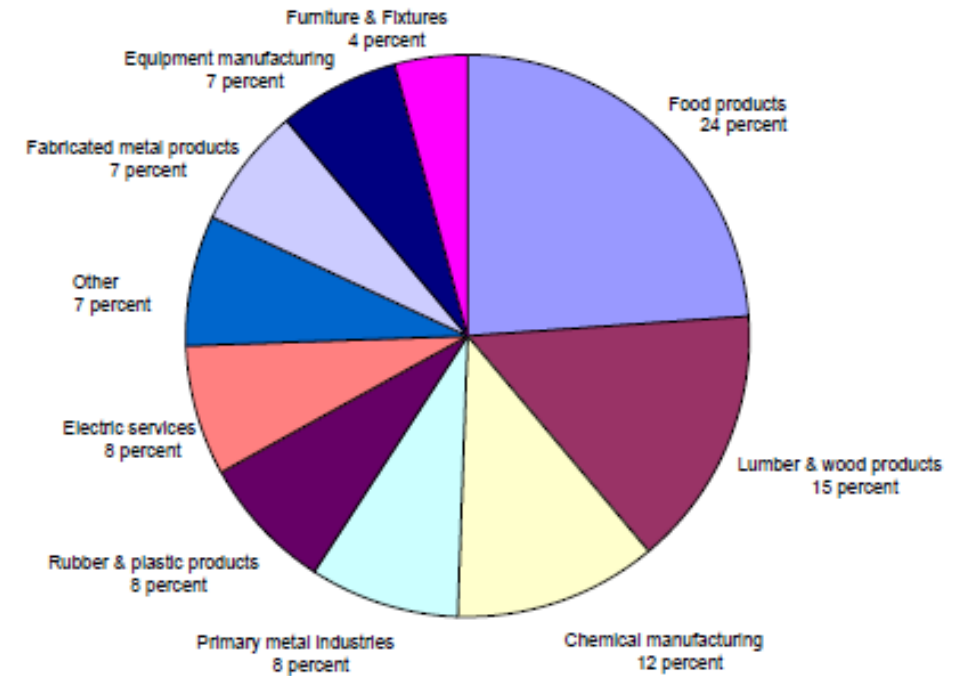
Since starting in 2016 we have recorded 632 **fires** and 243 explosions. Of these 875 **incidents**, 116 of them (13.2%) caused injury and 24 of them (2.7%) caused fatalities, resulting in 417 injuries and 45 deaths.<sup>1</sup>

# Related Industries with Combustible Dust

## OSHA Identified Industries (Entire List Available here:)

<https://www.osha.gov/Publications/combustibleposters.pdf>

- Agriculture
- Food Products
- Chemicals
- Textiles
- Forest and furniture products
- Metal processing
- Tire and rubber manufacturing plants
- Paper products
- Pharmaceuticals
- Wastewater treatment
- Recycling operations (metal, paper, and plastic.)
- Coal dust in coal handling and processing facilities



## Dust-Related Explosions by Industry

# Combustible Dust Identification

## ■ Particle Size

- Remove either confinement or suspension and a fire may still occur
- NFPA 654 Defines combustible dust with an average particle size < 420 microns and are considered by most reference sources to be explosive unless testing proves otherwise

## ■ Other Factors that influence explosiveness

- Moisture content, ambient humidity; available oxygen; shape of the particle, and concentration (minimum explosible concentration, or MEC), and presence of inert solid material

## ■ Suspension at the Minimum Explosible Concentration

- Burns more rapidly

## ■ Confinement

- Builds pressure

Common Materials	Size (microns)
Talcum powder, red blood cells, cocoa	5-10
Pollen, milled flour, coarse silt	44-74
Table salt	105-149
Coarse sand	297-1000



# Combustible Dust Sampling Plan

## Sampling Plan Elements

- Identification of locations where fine particulates and dusts are present
- Identification of representative samples
- Collection of representative samples
- Preservation of sample integrity
- Communication with the test laboratory regarding handling
- Documentation of samples taken
- Safe sampling practices
- Go / No go testing, MIE, KST, MIT, etc



# Dust Hazard Analysis

Identification and evaluation of the process or facility areas where fire, flash fire, and explosion hazards exist.

Where such a hazard exists, identification and evaluation of specific fire and deflagration scenarios shall include the following

- Identification of safe operating ranges
- Identification of the safeguards that are in place to manage fire, deflagration, and explosion events.
- Recommendation of additional safeguards where warranted, including a plan for implementation

# Combustible Dust Management



Housekeeping Program



Mechanical Integrity



Employee Training



Personal Protective Equipment



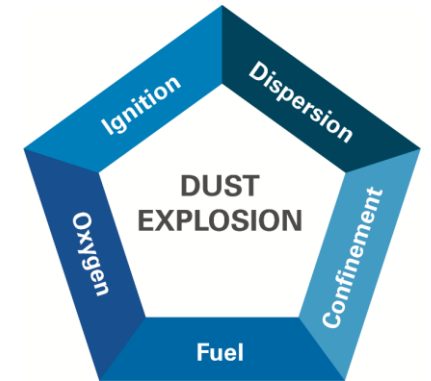
Operating Procedures



Incident Investigation



Change Management



# Additional Dust Considerations

Dust dispersion and explosion modeling.

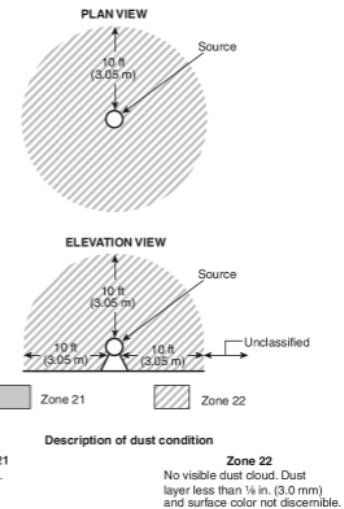
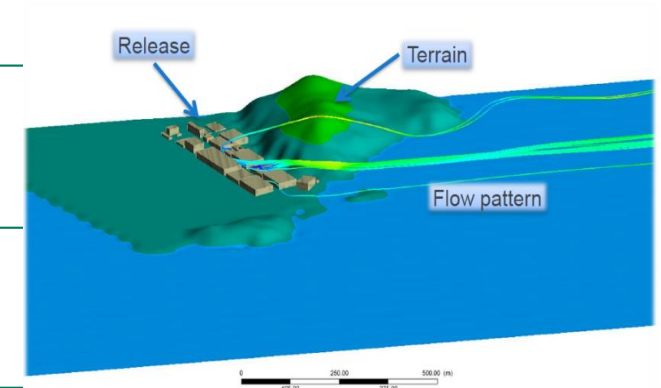
Electrical classification assessment for dust processes.

Facility Siting that considers dust explosion hazards.

Dust Risk Assessment, which quantifies dust fire/explosion severity and frequency and assesses risk to people and assets

Support dust hazard management and risk mitigation efforts, such as providing input to minimize dust explosion effects via strategic placement of flame front detectors, high-speed isolation valves, flame front diverters, chemical suppressants, and pressure/explosion vent panels.

Client success with support in dust-related incident investigations, large-scale dust hazard analysis projects, and implementation of dust management programs.





# Up Next



- **Key Takeaways**

# Key Takeaways

- ✓ **Combustible dust is a hazard that affects a significant amount of industries that if improperly managed, can lead to catastrophic events.**
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- ✓ **Hazard Identification:**

- ✓ Identify potential combustible dusts and then develop a sampling plan to determine hazard properties
  - ✓ Conduct a Dust Hazard Analysis on systems where combustible dusts are present.
  - ✓ Close out any recommendations or action items resulting from the Dust Hazard Analysis
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- ✓ **Combustible Dust Management:**

- ✓ Develop and implement documented housekeeping practices
- ✓ Train personnel in recognizing combustible dust hazards and proper equipment operation
- ✓ Implement a dust management program (management of change, mechanical integrity, operating procedures, etc.)

# Up Next



- Q&A



# Thank you



**Nik Syahron**  
Partner  
ERM

[Niksyahron.Fauzi@erm.com](mailto:Niksyahron.Fauzi@erm.com)

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