SIGNATURE SYSTEMS

# WEEKLY SAFETY MEETING
# COMBUSTIBLE DUST
## Safety Meeting Overview

The weekly safety meeting is intended to be conducted by the supervisor or lead in their small group(s). This guide contains everything that is needed to conduct a meaningful small group safety meeting. This contains the following:

- Meeting Notice
- Leaders Guide
- Employee Handout, Quiz and Puzzle
- Meeting Sign-In Sheet
- Quiz and Puzzle Answers

Weekly safety meetings are not optional and must be conducted each week. If an employee is absent from the training – it is the responsibility of the supervisor or lead to conduct a make-up session to ensure that all employees have been trained. Training records (meeting sign-in sheets) must be turned in to the Plant Manager each week.

PRIOR TO THE WEEKLY MEETING:

- Post the meeting notice in your area where your employees will see it.
- Read through the Leaders Guide and Employee Handout to familiarize yourself with the topic for the week
- Make copies of the employee handout (one for each employee)

AT THE SAFETY MEETING:

- Pass around the meeting sign-in sheet – ensure all employees present at the meeting print and sign their names
- Pass out the employee hand-out, quiz and puzzle
- Conduct the meeting - keep the meeting simple
- Encourage discussion and questions

# WEEKLY SAFETY MEETING NOTICE

THIS WEEK, OUR SAFETY MEETING WILL COVER

COMBUSTIBLE DUST

SHIFT: _____

TIME: _____

DATE: _____

PLACE: _____

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# WEEKLY SAFETY MEETING

# COMBUSTIBLE DUST

## Leaders Guide

**PROCEDURE REFERENCE:**
NONE

**MEETING OBJECTIVE:**
Combustible dust has been a long-recognized hazard for American workers, and yet few specific regulations address the risks in a variety of occupational settings. This presentation will discuss recent combustible dust incidents; risk factors that can lead to catastrophes; actions being taken by OSHA, Congress and the Chemical Safety Board to address these conditions; national consensus standards that can help employers proactively protect workers; and "best practices" for control of hazardous conditions.

**MEETING PREPARATION:**
Review the employee handout to see if there are any other materials you wish to bring to the meeting.

Use a flip chart during the discussion to write key points and employee responses. This technique visually reinforces your instruction.

**MATERIALS CHECKLIST:**
Flip chart and marking pens

**MEETING**
INTRODUCTION
Any combustible material (and some materials normally considered noncombustible) can burn rapidly when in a finely divided form. If such a dust is suspended in air in the right concentration, it can become explosive. The force from such an explosion can cause employee deaths, injuries, and destruction of entire buildings. Such incidents have killed scores of employees and injured hundreds over the past few decades.

Materials that may form combustible dust include metals (such as aluminum and magnesium), wood, coal, plastics, biosolids, sugar, paper, soap, dried blood, and certain textiles. In many accidents, employers and employees were unaware that a hazard even existed.

A combustible dust explosion hazard may exist in a variety of industries, including: food (e.g., candy, sugar, spice, starch, flour, feed), grain, tobacco, plastics, wood, paper, pulp, rubber, furniture, textiles, pesticides, pharmaceuticals, dyes, coal, metals (e.g., aluminum, chromium, iron, magnesium, and zinc), and fossil fuel power generation.

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# WEEKLY SAFETY MEETING

## COMBUSTIBLE DUST

## Leaders Guide

Here are some examples of combustible dust explosions in the U.S.:

**Organic Dust Fire and Explosion: Massachusetts (3 killed, 9 injured)**
In February 1999, a deadly fire and explosion occurred in a foundry in Massachusetts. The Occupational Safety Health Administration (OSHA) and state and local officials conducted a joint investigation of this incident. The joint investigation report indicated that a fire initiated in a shell molding machine from an unknown source and then extended into the ventilation system ducts by feeding on heavy deposits of resin dust. A small primary deflagration occurred within the ductwork, dislodging dust that had settled on the exterior of the ducts. The ensuing dust cloud provided fuel for a secondary explosion which was powerful enough to lift the roof and cause wall failures.

**Organic Dust Fire and Explosion: North Carolina (6 killed, 38 injured)**
In January 2003, devastating fires and explosions destroyed a North Carolina pharmaceutical plant that manufactured rubber drug-delivery components. Six employees were killed and 38 people, including two firefighters, were injured. The U. S. Chemical Safety and Hazard Investigation Board (CSB), concluded that an accumulation of a combustible polyethylene dust above the suspended ceilings fueled the explosion. The CSB was unable to determine that ignited the initial fire or how the dust was dispersed to create the explosive cloud in the hidden ceiling space. The explosion severely damaged the plant and caused minor damage to nearby businesses, a home, and a school.

**Organic Dust Fire and Explosion: Kentucky (7 killed, 37 injured)**
In February 2003, a Kentucky acoustics insulation manufacturing plant was the site of another fatal dust explosion. The CSB also investigated this incident. Their report cited the likely ignition scenario as a small fire extending from an unattended oven which ignited a dust cloud created by nearby line cleaning. This was followed by a deadly cascade of dust explosions throughout the plant.

**Metal Dust Fire and Explosion: Indiana (1 killed, 1 injured)**
Finely dispersed airborne metallic dust can also be explosive when confined in a vessel or building. In October 2003, an Indiana plant where auto wheels were machined experienced an incident which was investigated by CSB. A CSB news release told a story similar to the previously discussed organic dust incidents: aluminum dust was involved in a primary explosion near a chip melting furnace, followed by a secondary blast in dust collection equipment.

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# WEEKLY SAFETY MEETING

## COMBUSTIBLE DUST

## Leaders Guide

**DISCUSSION GUIDE**

***Question*: What is combustible dust?**

*Answer*: Combustible dust is finely divided solid material that is 420 microns or less in diameter and which, when dispersed in air in the proper proportions, could be ignited by a flame, spark, or other source of ignition.

***Question*: What creates combustible dust?**

*Answer*: Combustible dusts, is fine particles that ignite when suspended in air. Combustible dust comes from many sources, including sugar, flour, feed, plastics, wood, rubber, textiles, pesticides, pharmaceuticals, dyes, coal, and metals.

***Question:* How do you prevent combustible dust explosions?**

*Answer*: One of the best ways to prevent these explosions is to minimize dust accumulations. Ensuring good housekeeping, designing and maintaining equipment to prevent dust leaks, using dust collectors, eliminating flat surfaces and areas where dust can accumulate and sealing hard to clean areas (such as the area above a suspended ceiling) can effectively prevent or at least minimize the severity of flash fires and dust explosions.

***Question:* What four basic elements are needed for dust to explode?**

*Answer*: Combustible dust (fuel).

Ignition source (heat).

Oxygen in air (oxidizer).

Enclosed area for explosive pressure to build.

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# WEEKLY SAFETY MEETING

## COMBUSTIBLE DUST

## Leaders Guide

**SUMMARY:**

Since 1980, more than 130 workers were killed and more than 780 injured in combustible dust explosions, according to OSHA. These include 14 people who were killed in a dust explosion February 7, 2008, at an Imperial Sugar Company plant in Georgia and three workers who were burned in April 2009 in an Illinois pet food plant dust explosion. Please take today's topic seriously and understand the potential dangers of combustible dust.

**EMPLOYEE HANDOUT**

A. Employee Handout
B. Employee Quiz
C. Employee Puzzle

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# WEEKLY SAFETY MEETING

## COMBUSTIBLE DUST

### Employee Handout

You might not know it, but dust can explode. In some industries dust explosions are a serious hazard, capable of killing workers and leveling buildings.

Dust is the finely divided form of a solid material. When mixed with air, this dust will burn rapidly. Dust can be organic (such as cereal flour) or metallic (such as powdered aluminum). Explosive dust might be dry bulk material moving on conveyors, through chutes and hoppers into bags for shipment. Or it can occur as a byproduct of an industrial process, such as milling or shredding materials.

If the fire occurs in an enclosed space such as a duct or a grain elevator containing enough dust, pressure will rise until an explosion breaches the enclosure. This primary explosion dislodges dust accumulated in the area, causing a second explosion. It is this second explosion which flattens the workplace.

Dusts ranging from coffee to powdered milk can explode. These are some of the many explosive organic dusts:

- Cornstarch and sugar
- Epoxy resin
- Pea flour
- Pitch
- Wood dust

There are four conditions required for a dust explosion to occur:

- Enough dust must be present in the air to provide fuel.
- Oxygen must be present.
- A source of ignition, and
- A closed area for explosive pressure to build.

Dust explosions can be prevented by removing dust accumulations and by preventing ignition. Dust cleanup should include removing and vacuuming inside electrical outlet covers.

If you work with powdered materials or in a process that produces dust, you will be instructed to follow procedures to keep dust to a minimum.

Some of the methods used to keep dust from accumulating and burning are:

- Dust collection at the source.
- Ventilation to remove dust particles.
- Filling the atmosphere with an inert gas to displace oxygen.
- Applying moisture to settle dust.
- Maintaining machinery to prevent overheating.
- Using non-sparking equipment.

Another important measure to prevent ignition is to control static electricity, which causes sparks. Static charge is dissipated to the ground by bonding equipment together and grounding it. Where dust explosion is a significant hazard, workers will need to wear clothing made of materials that generate less static.

Besides the possibility of explosion, dust is a serious fire hazard in many kinds of workplaces. Wood dust, lint, paper dust, grain dust and other finely divided materials can burn easily. Keep your workplace clean according to prescribed methods. Vacuum instead of sweeping or using compressed air to clean. Keep rafters, shelves and other unused areas free of dust.

If your workplace has hazards for dust explosions, follow all procedures to prevent fires. Requirements for explosion-proof lighting, conductive clothing to prevent static, non-sparking tools, machinery maintenance and other measures are there for your protection.

Dust explosions, both the smaller primary explosion and the larger secondary explosion—can occur within a fraction of a second from ignition. This leaves you no time to use a fire extinguisher or run for your life.

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# WEEKLY SAFETY MEETING

## COMBUSTIBLE DUST

**MEETING DATE:** _____ **LOCATION:** _____

**SHIFT:** _____ **CONTENTS OF MEETING:** ☐ Handout ☐ Video ☐ Other ☐ Guest Speaker

**MEETING CONDUCTED BY:** _____

**GUEST SPEAKER (if applicable):** _____

**ATTENDEES:**

| | NAME (Print) | SIGNATURE | | NAME (Print) | SIGNATURE |
|---|---|---|---|---|---|
| 1 | | | 16 | | |
| 2 | | | 17 | | |
| 3 | | | 18 | | |
| 4 | | | 19 | | |
| 5 | | | 20 | | |
| 6 | | | 21 | | |
| 7 | | | 22 | | |
| 8 | | | 23 | | |
| 9 | | | 24 | | |
| 10 | | | 25 | | |
| 11 | | | 26 | | |
| 12 | | | 27 | | |
| 13 | | | 28 | | |
| 14 | | | 29 | | |
| 15 | | | 30 | | |

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# WEEKLY SAFETY MEETING

## COMBUSTIBLE DUST
## Employee Quiz

Answer the following questions to see what you know about combustible dust.

1. Only certain special kinds of dust can explode not ordinary wood or flour dust.
   True or False
2. Fired in organic dust can lead to explosions.
   True or False
3. Certain kinds of metal dust can burn.
   True or False
4. Oxygen must be present for most dust to burn.
   True or False
5. Ventilation is one way to reduce dust in a work area.
   True or False
6. In a dust fire, the first explosion dislodges dust, which results in:
   A. the fire being put out
   B. a second larger explosion
7. Preventing ignition is one way to prevent a dust explosion.
   True or False
8. A spark caused by static electricity can start a dust fire and explosion.
   True or False
9. Maintaining machinery properly can help prevent fires caused by overheating.
   True or False
10. Dust explosions usually take a long time to develop after ignition.
    True or False

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# WEEKLY SAFETY MEETING

## COMBUSTIBLE DUST

### Employee Puzzle

P R W Q C A I G D X W H C E D
R D N X W Z H D X R H U O N A
V R P R E V E N T I O N F Z D
Q A T H Z V P Q L F X L V B Y
N Z E E A D D Z M L A U U F O
H A F H M T U K K M P H U E O
T H I G N I T E E T P E T O X
E V I S O L P X E O L Z R D Y
F M G X N N C Z C V A E I O G
I E V R H B W D O A Z A P F E
R I G N I T I O N I I R H P N
E B N H N J T I D F Q T K S F
C O M B U S T I B L E O D V O
Z S D U S T X Y M B M C R B V
C S L G P O K R A P S X P K T

COMBUSTIBLE
DUST
EXPLOSIVE
FIRE
FLAME
FUEL
HAZARD
HEAT
IGNITE
IGNITION
OSHA
OXIDIZER
OXYGEN
PREVENTION
SPARK

SIGNATURE SYSTEMS

# WEEKLY SAFETY MEETING

## COMBUSTIBLE DUST
## Employee Quiz Answers

Answer the following questions to see what you know about combustible dust.

1. Only certain special kinds of dust can explode not ordinary wood or flour dust.
   True or False
2. Fired in organic dust can lead to explosions.
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3. Certain kinds of metal dust can burn.
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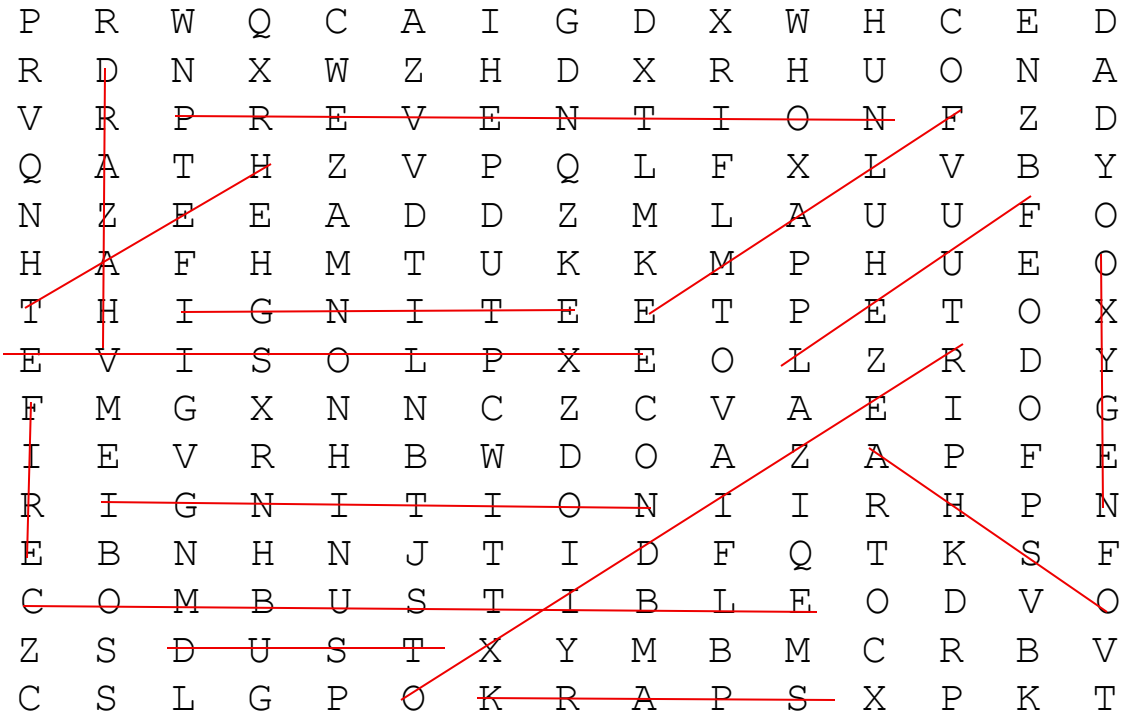
# WEEKLY SAFETY MEETING

## COMBUSTIBLE DUST

### Employee Puzzle




COMBUSTIBLE
DUST
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