Combustible Dust National Emphasis Program – CPL 03-00-008

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General Information – CPL 03-00-008

- Re-issue Date 03/11/2008
- Canceled previous NEP Document 03-00-006 issued 10/18/07
- Dusts listed in purpose statement include:
  - Metal dust such as aluminum and magnesium
  - Wood dust
  - Coal and other carbon dusts
  - Plastic dust and additives
  - Biosolids
  - Other organic dust such as sugar, flour, paper, soap, and dried blood
  - Certain textile materials

Executive Summary

- "…increase its enforcement activities and to focus on specific industry groups that have experienced either frequent combustible dust incidents or combustible dust incidents with catastrophic consequences."
- "…increase activities in outreach, training, the creation and dissemination of guidance and educational materials…as well as enhancing its enforcement activities.."

Other Programs

- State plan participation in this national emphasis effort is strongly encouraged but is not required. State response is required
- Does not replace the grain handling facility directive, OSHA Instruction CPL 02-01-004, Inspection of Grain Handling Facilities, 29 CFR 1910.272
- Not intended for inspections of explosives and pyrotechnics manufacturing facilities covered by the Process Safety Management (PSM) standard (1910.119)
- Does not exclude facilities that manufacture or handle other types of combustible dusts (such as ammonium perchlorate) covered under the PSM standard

NEP/ Industry Application

- Food products
- Agriculture
- 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 (Note: 1910.269 addresses electric power plants and MSHA has authority in some areas involving coal crushing/conveying)

Combustible Dust Explosions History

- Ford River Rouge:
  - Primary Natural Gas
- Secondary
- Coal Dust Explosion
- February 1, 1999
- Killed six workers and injured 36
- Fined 1.5 M

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Combustible Dust Explosions History

- October 29, 2003
- Hayes Lemmerz Manufacturing Plant
  - Two severely burned (one of the victims died)
  - Accumulated aluminum dust
  - Facility manufactured cast aluminum automotive wheels

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Combustible Dust Explosions History

- February 20, 2003 – CTA Acoustics Corbin, KY
  - Seven Workers died
  - Facility produced fiberglass insulation for automotive industry
  - Resin accumulated in production area and was ignited
  - Supplier found Liable

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Combustible Dust Explosions History

- January 29, 2003 - West Pharmaceutical Services, Kinston, NC
  - Six deaths, dozens of injuries
  - Facility produced rubber stoppers and other products for medical use
  - Plastic powder accumulated above suspended ceiling ignited

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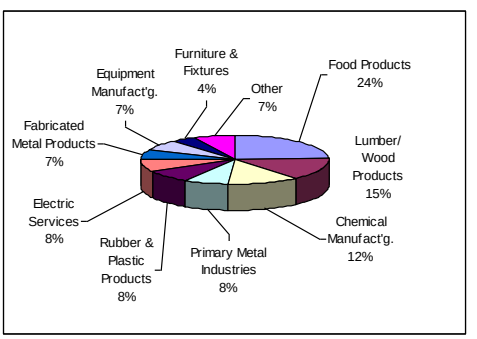
Combustible Dust Explosion History

- May 16, 2002
- Rouse Polymerics
  - Rubber Fabrication
- Vicksburg, MS
- 20 EE working-5 dead, 7 injured
- Rubber Dust
- Employed 100
- Chapter 11

Types of Industries Involved in Dust Incidents



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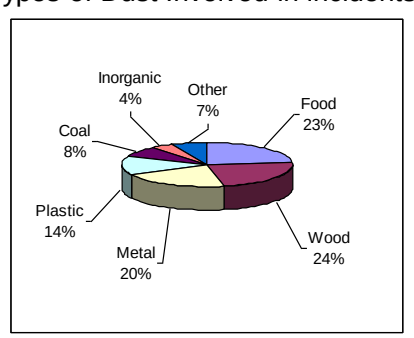
Types of Dust Involved in incidents



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Dust Incidents, Injuries & Fatalities 1980 - 2005

Not even close to being a complete summary of incidents

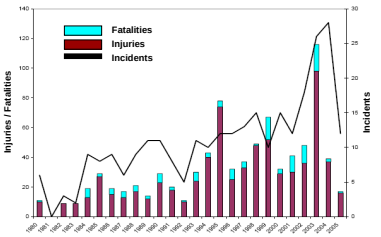

Figure 11. Dust incidents, injuries & fatalities, 1980-2005

Source: CSB

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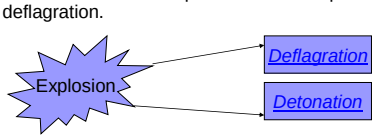
Definitions

- Class II locations: Locations that are hazardous because of the presence of combustible dust
- Combustible Dust: A combustible particulate solid that presents a fire or deflagration hazard when suspended in air or some other oxidizing medium over a range of concentrations, regardless of particle size or shape.
- Minimum Explosive Concentration (MEC): The minimum concentration of combustible dust suspended in air, measured in mass per unit volume that will support a deflagration.

Definitions and Terminology
Deflagration Vs. Explosion

- *Deflagration:* Propagation of a combustion zone at a speed that is less than the speed of sound in the unreacted medium.
- *Detonation:* Propagation of a combustion zone at a velocity that is greater than the speed of sound in the unreacted medium.
- *Explosion:* The bursting or rupture of an enclosure or a container due to the development of internal pressure from deflagration.



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Inspection Scheduling (Highlights)

- List of establishments in SIC/NAICS Codes from Appendices D-1 and D-2 will be prepared. Listing will include industries with an OSHA inspection history of combustible dust hazards and provided to Area Offices.
- Each Area Office can make appropriate additions/deletions to list based on prior knowledge, previous inspections.
- Remaining establishments inspected using random number table.
- Each Area Office must conduct at least 3 inspections from D-1 and 1 inspection from D-2 in each Fiscal Year.

Scheduling and Resource Allocation

- NEP conducted concurrently with SST (Site-Specific Targeting) inspections. SST has priority over NEP if this is not possible
- If a formal or informal complaint received, inspection required if Area Director determines the facility has not already been inspected per this instruction
- If fatality or catastrophic investigation arises at a facility, the accident must be investigated and inspected as required under this NEP.

Opening Conference

- If CSHO determines there is no combustible dust hazard, he/she may terminate the inspection or contact Area Office to determine.
- If CSHO determines that facility has had OSHA Consultation visit in past 3 years and verifies that combustible explosion hazards have been sufficiently addressed, he/she normally will terminate the inspection.
- Grain handling facilities are under a different OSHA instruction, CPL 02-01-004

Inspection Resources

- When possible, only CSHOs trained in recognizing the hazards associated with combustible dust shall be assigned to conduct inspections under this NEP
  - Area Director ensures there are adequate CSHO
- Area Director and Regional Office coordinate whether expert services from outside the Agency will be needed
- Regional Offices shall have available copies of NFPA standards and other documentation

NFPA Codes (www.nfpa.org)

- NFPA 654, Standard for the Prevention of Fires and Dust Explosions from the Manufacturing and Handling of CPS.
- NFPA 664, Wood Processing and Working
- NFPA 68, Venting of Deflagrations
- NFPA 484, Combustible Metals
- NFPA 499, Electrical Classification

CSHO Safety and Health

- PPE including non-spark producing clothing and flame-resistant clothing as appropriate
- Use equipment (photos and video) from locations within the plant that are not classified locations or use intrinsically safe equipment
- Safe practice when collecting samples to avoid generating a dust cloud
- Proper equipment for collecting samples (non-spark producing)
  - Natural bristle brush, dust pan, sample container, funnel

Inspection and Citation Procedure

- CSHOs should recognize the dust has to be combustible, dispersed such that concentration is at or above MEC, and ignition source (electrostatic discharge, hot surface, friction heat, or a flame) present before deflagration can occur.
- CSHOs should recognize that in addition to above, combustible mixture must be dispersed in confined enclosure before explosion can occur.

Inspection and Citation (Continued)

- CSHOs should recognize the following conditions that may indicate hazards:
  - Plant history of fires
  - Material Safety Data Sheet information (not necessarily reliable)
  - Dust Accumulations (see next slide)
  - Dust samples collected in "high spaces" (beams, pipes, ductwork) if it can be done safely, equipment and floors, interior of a dust collector, within ductwork

Dust Accumulations

"immediate cleaning is warranted whenever a dust layer of 1/32-inch thickness accumulates over a surface area of at least 5% of the floor area of the facility or any given room. The 5% factor should not be used if the floor area exceeds 20,000 ft2, in which case a 1,000 ft2 layer of dust is the upper limit. Accumulations on overhead beams, joists, ducts, the tops of equipment, and other surfaces should be included when determining the dust coverage area. Even vertical surfaces should be included if the dust is adhering to them. Rough calculations show that the available surface area of bar joists is approximately 5 % of the floor area and the equivalent surface area for steel beams can be as high as 10%."

Dust Layer Thickness Guidelines

- One-Eighth of an inch for:
  - Wood and Grain
- Rule of thumb in NFPA 654
  - 1/32" over 5% of area
  - Bar joist surface area equals about 5% of floor area
  - Max 20,000 SF
  - Idealized
- Consider point in cleaning cycle

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Dust collectors, ductwork, and other containers

- CSHOs determine whether plant has sound ignition control program preventing introduction of ignition sources into these containers
- CSHOs determine whether plant has hot work permit system addressing hot work on or around collection points and ductwork where hazardous levels of dust may occur

Information Gathered During Inspection

- Explosion prevention and mitigation controls (e.g. isolation or segregation of dust-generation processes, damage-limiting construction, explosion venting, process equipment relief, process isolation and explosion suppression)
- Dimensions of the room and areas of accumulation greater than 1/32 inch
- Design information on dust collection systems
- Size (volume) of dust collectors
- Warning signs or alerts on equipment referencing combustible dust
- Any sources of ignition including welding, forklifts, etc.
- Information on electrical equipment and whether it is designed for classified locations

Primary Applicable OSHA Standards

- 1910.22 General – Housekeeping
- 1910.307 Hazardous (Classified) Locations
- 1910.178 Powered Industrial Trucks
- 1910.263 Bakery Equipment
- 1910.265 Sawmills
- 1910.272 Grain Handling
- General Duty Clause
  - Public Law 91-596, Section 5(a)(1)

Citations

- Typical hazards
  - Accumulation of combustible dust in areas which have/may have ignition sources
  - Lack of, or inadequate, explosion mitigation
  - Failure to control ignition sources inside equipment
  - Cleaning dust with non-explosion proof equipment (e.g., vacuums)

Ignition Sources

- Electrical equipment
- Static electricity control
- Mechanical sparks & friction
- Open flame control
- Design of heating systems & heated surfaces
- Use of tools, & vehicles
- Maintenance

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Citations

- Typical hazards (con't)
  - Cleaning dust with compressed air (electrostatic issue)
  - PPE
  - Inadequate Ventilation
  - HazCom training

Citations

- Cite the HAZARD!!!
- Where possible, use OSHA/State OSHA standards
  - 1910.22(a)(1) – General Housekeeping
  - 1910.176(c) – Housekeeping in storage areas
  - 1910.307 (See Class II Locations)
    - Class III and Class I Locations may be an issue, too
  - 1910.269(v)(11)(xii) – Electrical Power Generation
  - State specific standards

Citations

- 5(a)(1)
  - See the Sample Citations File
  - NFPA standards are used as both
    - Evidence of industry recognition
    - Feasible and Acceptable Abate method
  - Reference Mandatory “shalls” in NFPA to ensure standard requirements
  - Use “shoulds” for abatement recommendations

Citations

- Other important standards
  - 1910.1200 – HazCom
    - Failure to train
    - Inadequate MSDS
    - Also a possible source of employer knowledge
  - 1910.132(a)
    - Properly assess workplace hazards & provide
    - Non-static clothing
    - Flame retardant clothing
    - Footwear

Citations

- Other important standards
  - 1910.119
    - When dust is listed in Appendix A, 1910.119 can be cited in its entirety
    - Possible citations if dust explosion hazard not evaluated in Process Hazard Analysis and could affect covered processes
      - May lead to additional citations such as:
        - Training
        - Operating procedures, etc.

Citations

- Other important standards
  - 1910.178 (Powered Industrial Trucks)
  - 1910.252 (Welding, Cutting and Brazing)
  - 1910.145(c)(3) – Warning signs
  - 1910.156 (or 1910.38)
  - 1910.263(k)(2) – Bakery Equipment
  - 1910.265(c)(20)(i) – Sawmills
  - Agriculture
    - HazCom
    - General Duty

Citations, General Duty

- NFPA 654:
  - Sealing areas inaccessible to housekeeping
  - Equipment operated and maintained in a manner to prevent escape of dust
  - Regular cleaning frequencies
  - Inspection, testing, and maintenance of systems to ensure fire and explosion systems are functioning properly

Citations, General Duty

- NFPA 484:
  - Hoods and enclosures designed and maintained so that the fine particles will either fall or be projected into the hoods and enclosures in the direction of airflow.
  - Dry type dust collectors must be located outside of the building.
  - All components of dust collection systems shall be electrically bonded and grounded.
  - The dust collector shall be arranged so that contact between dust particles and parts moving at high speed is prevented.