OSC|12
Ohio Safety Congress & Expo

WELL AT HOME. SAFE AT WORK.

135 When the Dust Settles

John Vielhaber

Thursday, March 29, 2:30 to 3:30 p.m.

Ohio | Bureau of Workers' Compensation

Nilfisk Industrial Vacuum Division

Nilfisk | Nilfisk ALTO | Nilfisk CFM

WHEN THE DUST SETTLES:

HOUSEKEEPING AND MAINTENANCE SOLUTIONS IN ACCORDANCE WITH OSHA'S COMBUSTIBLE DUST NEP

Presenter:
John Vielhaber, District Manager, Nilfisk Industrial Vacuums

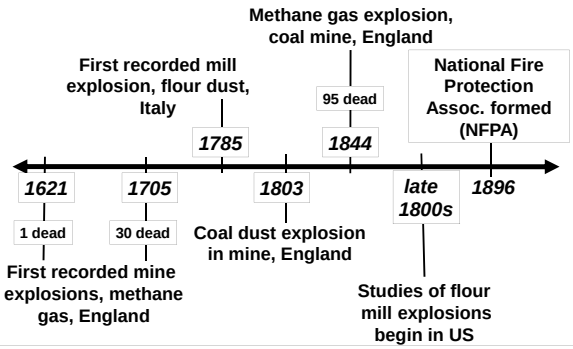
March 29, 2012

Overview

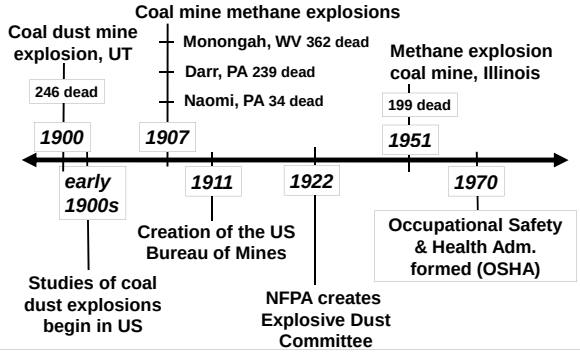
- History of Industrial Explosions
- What is Combustible Dust?
- Who's at Risk?
- Proper Maintenance and Housekeeping Practices
- Choosing the Right Industrial Vacuum
- Resources

History of Industrial Explosions

Early Timeline of Events



Early Timeline of Events



Recent OSHA investigations

February 25, 1999
Jahn Foundry
Springfield, MA

3 dead
9 Injured

Cause:
Phenolic resin dust accumulated in ventilation ducts exploded

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Recent OSHA investigations

February 20, 2003
CTA Acoustics
Corbin, KY

7 dead

Cause:
Phenolic resin dust accumulated in production area exploded

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Recent OSHA investigations

February 7, 2008
Imperial Sugar
Savannah, GA

14 dead
100's injured
$8 million in OSHA fines

Cause:
Sugar dust accumulated in production areas exploded

The explosion at the Imperial Sugar plant was a worldwide news event which led to the creation of new standards and policies that would forever change the public's awareness to the dangers of combustible dust.

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Recent OSHA investigations

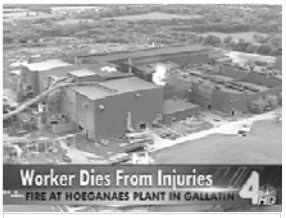
THREE Incidents

Hoeganaes
Gallatin, TN

January 31, 2011
(2 deaths)

March 29, 2011
(1 seriously injured)

May 27, 2011
(3 deaths, 2 injured)



As a result of these incidents, the CSB issued a report urging OSHA to publish a combustible standard in one year.

Cause:
Accumulations of fine iron powder with lack of engineering controls and basic housekeeping

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Recent ComDust News & Events

- 3/11/ 2008: OSHA issues their National Emphasis Program on Combustible Dust
- 10/2009: NEP Status Update
  - More than 1,000 inspections conducted
  - More than 4,900 violations pursuant to combustible dust
  - 20% of violations pertain to housekeeping
- 10/21/2009: OSHA publishes advanced notice of proposed rulemaking
- 12/2009-4/2010: Combustible dust stakeholder meetings
- 4/2011: Initiate SBREFA (determine small business impact)
- 1/2012: CSB puts additional pressure on OSHA to publish a rule within one year

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What is Combustible Dust?

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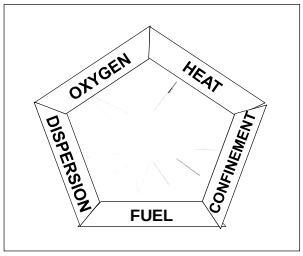
What is Combustible Dust?

- At present there is no universal definition for combustible dust.
- The OSHA NEP defines it as “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.”
- The NFPA defines it as “any finely divided solid material that is 420 microns or smaller in diameter that presents a fire or explosion hazard when dispersed and ignited in air.”
- Most solid organic materials, as well as many metals and some nonmetallic inorganic materials, will burn or explode if finely divided and dispersed in sufficient concentrations.

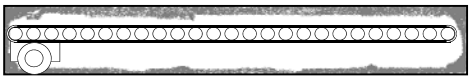
Dust Explosion Pentagon

5 basic elements needed for an explosion:

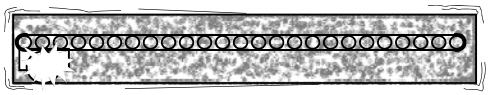
1. A fuel is needed to burn (combustible dust)
2. Oxygen is needed to sustain the fire (air)
3. Heat from an ignition source is needed (spark)
4. A high concentration of dust is dispersed into the air (deflagration)
5. The dust must be confined within an enclosure or structure (explosion)



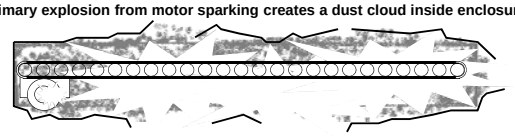
Secondary Explosions



Enclosed conveyor belt with dust build up on inside



Primary explosion from motor sparking creates a dust cloud inside enclosure



Dust cloud ignites causing much larger secondary explosion

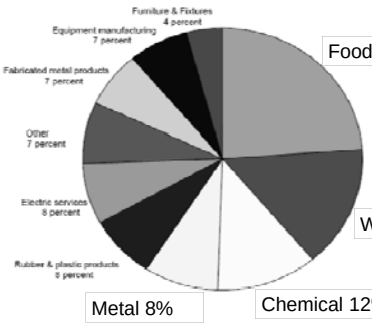
Is My Dust Combustible?

- It is up to YOU, the manufacturer, to know the composition of the material(s) you process and all applicable laws
- MSDS sheets are a starting point, but most do not address explosivity
- NFPA standards 664, 654, 499, 484 and 61 are helpful resources
- Ideally, have your dust TESTED
  - Many states offer consultation through their Department of Labor’s Division of Occupational Safety eg. www.mass.gov/dos
  - Private testing labs (Fauske, Chilworth, Fike, Gexcon)
  - OSHA can also provide dust testing

Who’s at Risk?

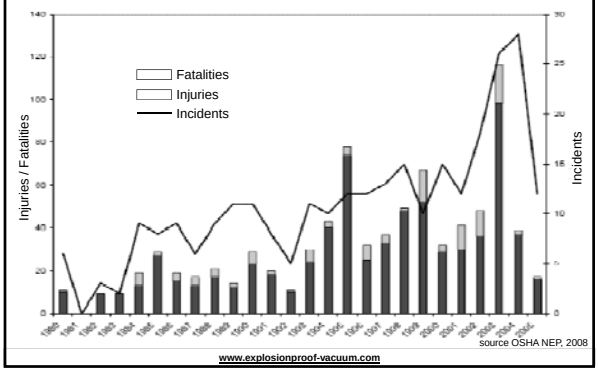
Who’s at Risk?

Industries having high incidence of combustible dust issues



source OSHA NEP, 2008

Findings from OSHA NEP



source OSHA NEP, 2008

OSHA Poster

Proper Maintenance and Housekeeping Practices

Maintenance and Housekeeping

- Develop and maintain a housekeeping program (this is something OSHA inspectors are checking for).
- Replace mops, brooms and blow guns with more effective cleaning tools/practices. These products push dust around without removing it and can create dangerous dust clouds.
- Limit/reduce the amount of overhead horizontal surfaces (racks, piping, ductwork, drop ceilings). These areas are hard to clean and trap dust.
- Make sure equipment is grounded to avoid electrical and static sparking.

Maintenance and Housekeeping

NFPA 654 (2013 version) will include a Safe Housekeeping Hierarchy

1. Vacuum dust with a certified vacuum that is bonded and grounded, so it doesn't become an ignition source.
2. Where the vacuum cannot reach, conduct a water wash down or ***carefully*** sweep with a broom in a manner that does not stir up dust.
3. Finally, if the previous two measures are not effective, cleaning with compressed air is permissible ***only*** in small areas with operating equipment shut down.

Source: Feed & Grain, 2012

Maintenance and Housekeeping

- Utilize vacuums for source capture and as portable suction devices to prevent fugitive dust from accumulating.
- Make housekeeping as easy and ergonomic as possible by using lightweight, adjustable tools, flexible hoses and overhead cleaning accessories.
- Keep dust below 1/32" on horizontal surfaces as directed in OSHA's NEP.
- Inspect all equipment (especially older) for possible ignition sources and for needed deflagration venting upgrades.

Choosing the Right Industrial Vacuum

Choosing the Right Industrial Vacuum

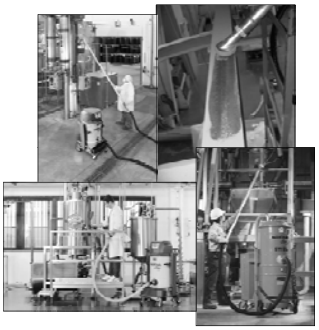
- OSHA NEP raises the issue of using "properly-equipped" industrial vacuums as defined by NFPA 654.
- Classed materials may require an "explosion-proof/dust ignition proof" vacuum, as determined by Authorities Having Jurisdiction (AHJ) www.reedconstructiondata.com/building-codes.
- Shop-style vacuums can add to the risk!

Industrial Strength Vacuums

Filtration
- Multiple stages/types of filtration
- HEPA/ULPA efficiency
- Automatic filter cleaning options
- Large surface area (Low ATC)

Accessories
- Overhead Cleaning
- Confined, hard-to-reach spaces
- High-temperature hose and tool options
- Conductive tools

Features/Benefits
- Cleanable/shakable filters
- Rugged, durable construction
- Collection/containment options
- Stainless steel, wet/dry models
- Ergonomic design for easy transport and disposal



Electric Hazardous Location Vacuums

Electric vacuums certified as Explosion Proof/Dust-Ignition Proof by a Nationally Recognized Testing Lab

- CSA, UL, ETL
- EXP rated TEFC motors
- EXP rated sealed switches/connections
- Internally/externally grounded (filters, body, tank, wheels, etc.)
- Conductive hose and accessories

Beware of posers!
- Some companies offer "dressed up" models with antistatic accessories

Remember, investing in the proper equipment is only one part of the equation. Inspect your facility to ensure you have proper safety measures in place, including Explosion Prevention (NFPA 69) and Deflagration Venting devices (NFPA 68).

Pneumatic Hazardous Location Vacuums

- Powered by compressed air (Venturi principle)
- No electrical components
- No moving parts
- Used when electricity is prohibited or unavailable

Air-operated $\neq$ Explosion Proof

- Meet the requirements for use in Class II areas
- Made of non-sparking materials
- Outfitted with conductive hose/accessories
- Grounded (bonded)

Common HazLoc Applications

Industry: Aircraft Manuf., Maintenance and Refurb.

Location: Aircraft Hanger (Military Base)

Application: Dust recovery from sanding aluminum aircraft bodies. Combination of Class II, Group E (aluminum dust) being collected in a Class I, Group D rated area (presence of jet fuel)

Common HazLoc Applications

Industry: Paper
Location: Ceiling rafters and HVAC piping system.
Application: Vacuuming dust from overhead piping. Class II, Group G area.

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Common HazLoc Applications

Industry: Aircraft Manuf., Maintenance and Refurb.

Location: Aircraft Hanger (Military Base)

Application: Vacuuming up flammable fuel spill in Class I, Group D area using a combination "wet/dry" hazardous location vacuum

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Overhead Cleaning

- Conductive hose and accessories
- Lightweight flexible hose
- Lightweight extension wands
- Colored pipe nozzles
- Wall nozzles

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Resources

OSHA resources:

Combustible Dust NEP:

www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=DIRECTIVES&p_id=3830

Fact Sheet:

http://www.osha.gov/OshDoc/data_General_Facts/OSHAcombustibledust.pdf

Poster:

www.osha.gov/Publications/combustibledustposter.pdf

NFPA resources:

NFPA 654Standard for the Prevention of Fire and Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids

http://www.nfpa.org/aboutthecodes/

FREE NFPA Codes: www.nfpa.org

- Click on "codes and standards," then on the left hand side click "List of NFPA codes and standards." Choose the standard you want to view.
- Choose "view the standard online."
- You will be prompted to log-in or create an account. Follow the prompts to create an account. Once you validate your email address, you'll be able to view electronic versions of the codes for free.

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Resources

Other resources:

Authorities Having Jurisdiction:

www.reedconstructiondata.com/building-codes

Combustible Dust Policy Institute:

www.dustexplosions.blogspot.com

Nilfisk Industrial Vacuums EXP microsite:

www.explosionproof-vacuum.com

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