Environmental Dust

- Iowa Administrative Code 567 – 23.3.c(1)
  - Attainment and unclassified areas
  - Reasonable precautions to prevent nuisance dust from traveling beyond lot line
  - Exceptions: Farming operations and ordinary travel on unpaved roads
- IAC 567 – 23.3.c(2)
  - Nonattainment areas
    - All areas of state are in attainment for particulates

Nuisance Dust

- IC 657.1 Nuisance — what constitutes — action to abate — electric utility defense.

1. Whatever is injurious to health, indecent, or unreasonably offensive to the senses, or an obstruction to the free use of property, so as essentially to interfere unreasonably with the comfortable enjoyment of life or property, is a nuisance, and a civil action by ordinary proceedings may be brought to enjoin and abate the nuisance and to recover damages sustained on account of the nuisance.

A petition filed under this subsection shall include the legal description of the real property upon which the nuisance is located unless the nuisance is not situated on or confined to a parcel of real property or is portable or capable of being removed from the real property.
Controlling Fugitive Dust

- IAC 567-23.3 provides six recommendations:
  1. Water and/or chemical dust suppression during demolition, construction, land clearing
  2. Applying suppressants to roads
  3. Enclose or contain
  4. Cover vehicles when hauling
  5. Street cleaning
  6. Reducing travel speeds

Fugitive Dust Polk County

- Polk Co. Air Quality Division Fact Sheet: Adopts IAC with additional specific language
  - Reasonable precautions
    - Specific chemicals, speed limits, and road cleaning techniques
  - Minimize Pollution
    - Broader definition of fugitive dust (ash, cinders, chaff, wastepaper, rubbish, etc.)
  - Adds “Residential Driveways” to exceptions

MS4-Controlling Fugitive Dust

- Section 2.2 in the Iowa Construction Site Erosion Control Manual
  - Chemical
    - Calcium chloride, resins, lignosulfonate, soybean oil
  - Mechanical
    - Seeding, roughening soil surface, snow fence
Fugitive Dust Controls

- Water
  - Water truck
  - Water sprays
  - Sprinklers
  - Wheel or truck washes
  - Wetting material w/ water truck
- Ventilation
  - Local (QC lab, welding shop)
  - General (wall fans in shop, bins)
- Dust collection/bag houses
- Enclose process
- Conditioned cabs
- Reduce speed
- Limit drop height
- Minimize travel distance
- Maintain travel ways
- Cover material
- Vegetation on exposed surfaces
- Wind breaks
- Respirators – LAST RESORT
Controlling Dust-Material Handling

- Load gently – limit height, reduce speed
- Dump slowly
- Water spray during dumping
- Enclose dump area partially or completely
- Minimize drop distance when building stockpile
- Limit height of stockpile
- Wet suppression using sprinklers
- Wet suppression using water truck

Controlling Dust-Haul Roads

- Driving on unpaved roads
  - Wet suppression w/ water truck or sprinkler
  - Use chemical additive - surfactant
  - Reduce speed of trucks
  - Maintain haul roads
  - Pave heavily used roads then use sweeper truck on them
- Driving over dust on paved (public) roads
  - Wet suppress (water truck) to gate
  - Wheel washes and wash racks
  - Reduce speed of trucks
  - Sweeper truck
**Occupational Exposure to Dust**

- Body’s respiratory defense system good at keeping out and removing most contaminants
- Filtration in nasal cavity removes large particles
- Mucus bathes exposed surfaces
- Cilia sweep debris trapped in mucus toward the pharynx (mucus escalator)
- Alveolar macrophages engulf small particles that reach lungs
- However, some contaminants can overwhelm body’s defense system

**Welding Fume**

- Shielded Metal Arc Welding (SMAW-stick)
  - Manganese
  - Cr VI
- Gas Metal Arc Welding (GMAW)
  - MIG (metal inert gas—nonferrous metals, AL)
  - MAG (metal active gas—CO2, O2, ArO2 (ferrous metals))
- Torching/Acetylene
- Brazing
General Dust

- 29 CFR 1910.1000 (Z-1)
- PNOC/PNOR

Total Dust

- Regulated by OSHA
- 15 mg/m³
- Includes:
  - Soil
  - Wood dust
  - General Particulates
  - Sizes up to 100 microns

Respirable Dust

- Regulated by OSHA
- 5 mg/m³
- Includes all types of dust, at smaller particle size
- Particle Size less that 10 microns

Silica

- Overexposure ~ lung disease
  - Silicosis
    - Serious, chronic, non-cancerous respiratory disease
    - Scarring of lung tissue interfering w/ oxygen exchange
  - Lung cancer
    - Listed by IARC, but studies show follows silicosis
- Silica particles toxic to macrophages in lung
Asbestos

- Overexposure to asbestos may cause disease
  - Mesothelioma
    - a rare form of cancer
  - Lung Cancer
  - Asbestosis

Lead (Pb)

- 29CFR 1910.1025
- 29CFR 1926.62
- Paint
- Soldering
- Plumbing
- Electrical work

Wood Dust

- 29CFR 1910.1000
- PNOC/PNOR
- Sensitizer
- Carcinogenic

Conclusion

- Too much dust is bad for you, your families, the community, and for business! *CONTROL IT!*
- Use the controls necessary to minimize dust creation: water, ventilation, reduce speed, dry dust collection, enclosures
- Treat dust like you do safety issues: it is *not* an option to control it.
Dust and Fume Exposure in Construction

Paul Richmond, CIH, CSP
Dust Generation

- Sanding, grinding, drilling, cutting
- Construction (drywall)
- Welding, cutting
- Demolition
- Loading materials
- Blasting, crushing
- Conveying
- Mobile equipment driving on unpaved roads
- Driving over tracked materials on paved (public) roads
- Internal combustion engines
- Natural wind erosion (Loess Hills)
- Smokestacks
- Fires
- Volcanoes
Why do we care?

- Lung disease
- Heart attacks
- Asthma
- Allergies
- Decreased lung function
- Poor visibility
- Environmental impacts
- Dust bowl
Why do contractors care?

• Personal health

• Business need$  
  o Permit requirements  
  o Maintenance issues

• Community relations  
  o Future company growth  
  o Property values  
  o Nuisance effects – visual soiling of clean surfaces  
  o Health effects?

• Environmental stewardship  
  o Impact on aquatic plant and fish life  
  o Impact on crops/plants
Semantics
Fume vs. Vapor
Occupational vs. Environmental Exposure
Decision Time

Environmental  Occupational
Environmental
Fugitive Dust - Iowa

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  o Reasonable precautions to prevent nuisance dust from traveling beyond lot line
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  6. Reducing travel speeds
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  o Minimize Pollution
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  o Adds “Residential Driveways” to exceptions
Controlling Fugitive Dust

• Section 2.2 in the Iowa Construction Site Erosion Control Manual

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  - Wetting material w/ water truck
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- Enclose process
- Conditioned cabs
- Reduce speed
- Limit drop height
- Minimize travel distance
- Maintain travelways
- Cover material
- Vegetation on exposed surfaces
- Wind breaks
- **Respirators** – LAST RESORT
Controlling Dust

Material Handling

• Load gently – limit height, reduce speed
• Dump slowly
• Water spray during dumping
• Enclose dump area partially or completely
• Minimize drop distance when building stockpile
• Limit height of stockpile
• Wet suppression using sprinklers
• Wet suppression using water truck
Controlling Dust

Conveyors and Transfer Points

- Enclose
- Water spray at transfer
- Minimize drop distances
- Slow down material
- Reduce/eliminate/clean up spillage
- Bag houses
Controlling Dust

• Driving on unpaved roads
  o Wet suppression w/ water truck or sprinkler
  o Use chemical additive - surfactant
  o Reduce speed of trucks
  o Maintain haul roads
  o Pave heavily used roads then use sweeper truck on them

• Driving over dust on paved (public) roads
  o Wet suppress (water truck) to gate
  o Wheel washes and wash racks
  o Reduce speed of trucks
  o Sweeper truck
Dust Source
Dust Source
Dust Source
Dust Source
Dust Source
Dust Source
Dust Source
Dust Source?
Dust Source?
Dust Control
Dust Control
Dust Control
Dust Control
Dust Control
Dust Control
Dust Control?
Dust Control
Dust Control
Dust Control
Towers Implosion
Towers Implosion
Towers Implosion
Air Monitoring

Sampling Locations

1000 ft.
750 ft.
500 ft.
Air Monitoring

- **Specifics:**
  - Pumps used
  - Cassettes
  - Lead template
  - Calibration
  - Analysis
Air Monitoring

- # samples collected
  - Day 1 - 66
  - Day 2 - 71
  - Day 3 - 72
## Implosion Day

<table>
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<tr>
<th></th>
<th>Total Dust mg/m³</th>
<th>Lead Air mg/m³</th>
<th>Lead Surface µg/ft²</th>
<th>Asbestos s/mm²</th>
<th>Respirable Dust mg/m³</th>
<th>Silica Dust mg/m³</th>
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Decision Time

Environmental

Occupational
Occupational
Dust and its dangers, / by Mitchell Prudden.
Theophil Mitchell Prudden 1849-1924.
New York etc. G.P. Putnam's sons c1890
Available at Parks Library Storage
Building (QR101 P95d )
HUMAN HAIR
50-70 \( \mu \text{m} \) (microns) in diameter

PM\(_{2.5}\)
Combustion particles, organic compounds, metals, etc.
< 2.5 \( \mu \text{m} \) (microns) in diameter

PM\(_{10}\)
Dust, pollen, mold, etc.
< 10 \( \mu \text{m} \) (microns) in diameter

90 \( \mu \text{m} \) (microns) in diameter
FINE BEACH SAND

Image courtesy of the U.S. EPA
Dust Measurement
Dust Measurement
Health Effects of Dust

• Body’s respiratory defense system good at keeping out and removing most contaminants

• Consists of a series of filtration mechanisms to remove particles and pathogens
Health Effects of Dust
Respiratory Defense System

• Filtration in nasal cavity removes large particles
• Mucus bathes exposed surfaces
• Cilia sweep debris trapped in mucus toward the pharynx (mucus escalator)
• Alveolar macrophages engulf small particles that reach lungs
• However, some contaminants can overwhelm body’s defense system
## Particle Size Chart

Common types of particulate matter

<table>
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<tr>
<th>Particle size in microns</th>
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<th>0.05</th>
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</table>

**ULPA**
- up to 99.9995% efficient to 0.12 microns

**HEPA**
- up to 99.97% efficient to 0.3 microns

*Common air filters*

*Image credit: Sentry Air Systems*
Welding Fume

• Shielded Metal Arc Welding (SMAW-stick)
  o Manganese
  o Cr VI

• Gas Metal Arc Welding (GMAW)
  o MIG (metal inert gas—non ferrous metals, AL)
  o MAG (metal active gas—CO2, O2, ArO2 (ferrous metals)

• Torching/Acetylene

• Brazing
Welding Fume

• Other Hazards
  o Eyes
  o Fire
  o UV exposure
  o Ozone
  o Fine particulate
  o CO
  o Confined Spaces
  o Unknown contaminants (fly ash, paint)
Welding Fume Testing
Employee Welding Fume Exposure

- Chromium
- Copper
- Iron Oxide
- Manganese
- Nickel
Fume Exposure
Fume Control
Fume Control
Fume Control
General Dust

• 29 CFR 1910.1000 (Z-1)
• PNOC/PNOR
## General Dust

### Total Dust
- Regulated by OSHA
- 15 mg/m³
- Includes:
  - Soil
  - Wood dust*
  - General Particulates
  - Sizes up to 100 microns

### Respirable Dust
- Regulated by OSHA
- 5 mg/m³
- Includes all types of dust, at smaller particle size
- Particle Size less that 10 microns
General Dust Sampling
Dust Control
Dust Control
Silica

- Overexposure ~ lung disease
  - Silicosis
    - Serious, chronic, non-cancerous respiratory disease
    - Scarring of lung tissue interfering with oxygen exchange
  - Lung cancer
    - Listed by IARC, but studies show follows silicosis

- Silica particles toxic to macrophages in lung
Silica Sampling
Silica Source
Silica Source
Silica Source
Silica Source
Dust Control
Asbestos

• 29 CFR 1910.1001
• 29 CFR 1926.1101

• Overexposure to asbestos may cause disease
  o Mesothelioma
    • a rare form of cancer
  o Lung Cancer
  o Asbestosis
Asbestos Sampling
Lead

- 29CFR 1910.1025
- 29CFR 1926.62
- Paint
- Soldering
- Plumbing
- Electrical work
Testing
Lead Source
Lead Paint
Lead Paint
Lead Interior Paint
Dust Control
Dust Control
Dust Control
Dust Control
Dust Control
Wood Dust

- 29CFR 1910.1000
- PNOC/PNOR
- Sensitizer
- Carcinogenic
Dust Control

Diagram showing a dust control system with various components such as Table Saw, Jointer, Miter Box, Floorsweep, Long Sweep 90 Elbow, Adjustable Elbow, Reducer, Long Sweep 45 Elbow, Lateral Wye, Blast Gate, Sanding, and Dust Collector.
Dust Control
Dust Control
Dust Control
Dust Control
Dust Control
Dust Control
Decision Time

Environmental  Occupational
Dust control?

- Must be NIOSH approved
- Must have two straps (wear them BOTH!)
- Different design features improve fit and comfort
- Different levels of efficiency, 95, 99, 100

Various styles of N95 respirators
Health Effects of Dust:

Smoking

Dust + smoking. Bad combo. 1+1>2
Smoking Cessation

CIGNA Quit Today™
Tobacco Cessation Program

Quit today.
Live better tomorrow.

With the CIGNA Quit Today tobacco cessation program you can design a personal plan to quit that's just right for you.

Call to enroll in the telephone-based program and receive:

- Support and advice from your personal wellness coach, including an assessment to make sure your participation will be safe and successful;
- Optional group coaching sessions by telephone for added support;
- Nicotine replacement products* to help you fight cravings;
- A workbook filled with valuable information and practical tips; and
- A relaxation CD.
Medical Monitoring

• Medical testing vans
• Occupational Medicine Clinics
  o Offering
    ✓ Hearing tests, as usual
    ✓ Lung function tests (blow in tube)
    ✓ Chest x-rays
    ✓ Respirator medical clearances, for those who may need it
Conclusion

• Too much dust is bad for you, your families, the community, and for business! CONTROL IT!

• Use the controls necessary to minimize dust creation: water, ventilation, reduce speed, dry dust collection, enclosures

• Treat dust like you do safety issues: it is not an option to control it.
Questions?

Thank you!!!