Industrial Hygiene in Review

Exposure Monitoring

- Why Sample?
  - OSHA Compliance (PEL)
  - Verification that engineering controls are effective
  - Respiratory Protection Programs
    - Proper respirator (half-mask, full-face, etc.)
    - Cartridge change schedules
  - Hearing Conservation Program
  - Do you have a forklift?

IH in Review

- Exposure Monitoring
- Respirators
- Noise
- Managing IAQ
- Water Intrusion
- Lab Hoods
Exposure Monitoring

• Who do you monitor?
  – Inventory workplace hazards
    ▪ Hazardous Substances
    ▪ Harmful physical agents
  – Monitor employees with routine exposure to the various hazards identified

Exposure Monitoring

• What do you sample for?
  – Hazardous Substances
    ▪ Dusts
      o Particle Size
      o ‘Total dust’, inhalable, respirable
      o Silica, wood dust, lead
    ▪ Gasses/Vapors
      o Various solvents
      o CO from forklifts
    ▪ Fume
      o Welding – hexavalent chromium, manganese
  – Harmful Physical Agents
    ▪ Noise
    ▪ Heat Stress Monitoring

Exposure Monitoring

• When do you sample?
  – Periodically
  – New equipment
  – Change of procedure
  – Change of chemical/material used

Exposure Monitoring

• Where do you sample?
  – Personal Samples - used to compare the occupational exposure limits
    ▪ Breathing Zone
    ▪ Hearing Zone
  – Area
    ▪ Noise
    ▪ Hot Environments
  – Source
Exposure Monitoring

• What do you compare results to?
  – OSHA Permissible Exposure Limits (PEL)
    ▪ 8-Hour Time Weighted Average (8-hour TWA)
    ▪ Short Term Exposure Limit (STEL)
    ▪ Action Limits
    ▪ Ceiling Limit
  – American Conference of Governmental Industrial Hygienists (ACGIH)
    ▪ Threshold Limit Values (TLV©)

Exposure Monitoring

• How to Sample......

Exposure Monitoring

• Particulate

Exposure Monitoring

• Particle Size Selective Sampling
• Gas and Vapors

• Passive Samplers

• Real Time Monitors/Data-logging

• Confined Space Monitoring
  – Keep units calibrated/sensors up to date
  – Test equipment in known clean atmosphere prior to use
  – Must test (in this order)
    o oxygen level
    o combustible gases and vapors
    o toxic contaminants
  – Test atmosphere at bottom, top and middle
Exposure Monitoring

• Gas and Vapors – Active Sampling

Respirators

• What do you need to have in place for your program?
  – Exposure results if you have them.
    ▪ Are respirators required?
    ▪ What level of protection is needed?
    ▪ Is respirator use voluntary?
  – Medical Evaluations
  – Fit Testing
  – Cleaning/Storage
  – Training

Respirators

• Voluntary Use
  – When can use of respirators be voluntary?
  – What do you need to do?
Respirators

- Filtering Face-piece respirators
  - Employer determines that the respirator itself does not create a hazard.
  - Must provide users with info contained in Appendix D.
  - No written respirator program required.

- Elastomeric Respirators
  - Employer must have written program that covers the elements that could affect the health of any employee including:
    - Medical Evaluation
    - Cleaning
    - Disinfecting
    - Storage
    - Maintenance
Noise

• What do you need to have in place for your program.
  – Find out what the exposure is....

Noise

• Area Spot Samples
  – Using SLM

Noise

• Noise Dosimeter

Noise

• Monitoring results
  – HC Amendment
    ▪ Integrating 80 to 130 dBA
    ▪ Greater than or equal to 85 dBA (8 hour TWA) – Action Level
      ▪ Annual hearing checks
      ▪ Training
        – Effects of noise on hearing
        – Hearing protection devices
        – Explanation of audiometry
Noise

- PEL
  - Integrating 90 to 140 dBA
  - Greater than 90 dBA 8 Hour TWA
    - Hearing protection mandatory

Managing Indoor Air Quality

- Problem Areas
  - Thermal Comfort
  - Outdoor Air Ventilation
  - Operations and Maintenance
  - Water Intrusion and Moisture
  - Communication

Managing Indoor Air Quality

- Thermal Comfort
  - Fall, Winter and Spring
    - 70 - 74 degrees
    - 68 - 70 and 74 - 76 are considered borderline
    - below 68 or above 76 is unacceptable
  - Summer
    - 72 - 76 degrees
    - 68 - 72 and 76 - 78 are considered borderline
    - below 68 or above 78 is unacceptable
  - Governors Executive Order
    - Summer 76 – 78 °F
    - Winter 68 – 70 °F
- Recommended Humidity
  - 20 to 50 percent (60 percent upper limit)
Managing Indoor Air Quality

Common Causes of Temp. Problems
- Poor Thermostat Location
- Solar Radiation
- Improperly Designed HVAC System
- Restricted Air Flow Patterns
- Excessive Personnel or Equipment Loading
- Excessive Outdoor Air

Introduction

Outdoor Air Ventilation
- Minnesota Rules 5205.0110 - Workroom Ventilation and Temperature
- Outside air ventilation requirement of 15 cubic feet per minute per person
- also identifies temperature and humidity extremes

ASHRAE 62.1 - Ventilation for Acceptable Air Quality (American Society of Heating Refrigerating and Air-Conditioning Engineers)
- Guidelines established by the HVAC Industry Professionals (constant revision)
- establishes ventilation rates for various types of occupied spaces based on number occupants and floor area (default of 17 cfm/person)

Use of Carbon Dioxide
- Be careful using spot measurements
- Best to data-log over several days
• Operations and Maintenance
  – Housekeeping
    ▪ Quality Vacuums
      o Carpet and Rug Institute
    ▪ Upholstered chairs and furniture
      o Vacuum annually
    ▪ Supply and Returns

• Operations and Maintenance
  – Construction Projects
  – Renovations
  – Painting
  – New Carpet
  – Roof Jobs

Outdoor Air Intake Location
- Outdoor contaminant sources
- Building Exhaust
- Vehicle Exhaust
- Smoking
- Roof Jobs
**Operations and Maintenance**

**Outdoor Air Intake/Damper - Check That:**
- Dampers open and close freely
- Minimum setting established for dampers
- Bird screen in place and clean
- No dirt, debris or water accumulating in intake area

**Managing Indoor Air Quality**

**System Filtration**
ASHRAE Standard 52.2-1999
- MERV Rating (MERV 8 – 9 minimum)

**Heating Coil**
- Inspect after filter failure or Annually
- Clean every 10 years minimum

**Cooling Coils**
- High humidities create excellent breeding ground for microbials
- Clean cooling coils and adjacent ductwork (within 5 - 10 feet) semiannually
- Annual cleaning acceptable if filtration efficiency is greater than 60% dust spot efficiency
Drain Pan
- Clean pan semiannually
- Verify proper drainage
- Install water trap if not present

Humidification
- Steam systems
  - Should be "clean steam" not treated boiler water
  - Wand and adjacent surfaces should be cleaned semiannually
- Non-steam systems
  - Potential source of bioaerosols (e.g., bacteria)

Operation and Maintenance
Supply and Return Diffusers
- Eliminate obstructions
- Verify proper airflow
- Periodically vacuum any dust accumulation from diffuser and surrounding ceiling tiles

Managing Indoor Air Quality
- Communication
  - The Basics
    - Have a mechanism in place for occupants to relay concerns
    - Follow-up important
    - Keep occupants updated on any IAQ investigation planned or on-going, corrective actions, etc.
    - Notify occupants of planned projects (e.g., roofing project)
Water Intrusion Response

• One-Time Problems
  – Rainwater/roof leaks
  – Pipe breaks
  – Floodwater
  – Sewage back-up
• Chronic Moisture Problems
  – Condensation Problems
    ▪ Cold Water Pipes
    ▪ Mechanical Systems

Chronic Problems
Water Intrusion Response

- Respond within 24 to 48 hours
- Determine the source of water
- Stop the water
- Determine the scope of the water intrusion
- Inventory the types of materials that got wet.
  - Porous, Semi-Porous and Non-Porous

Water Intrusion Response

- Determining Scope of Water Damage
  - Visual Inspection
  - Use Moisture Meters
  - Infrared Cameras

Water Intrusion Response

- If floodwater or sewage - remove and discard of all wet materials.
- Make all attempts to dry out materials - floor fans, HVAC operation, carpet extraction, dehumidifiers.

Drywall Response

- One solution is to remove water damaged sheetrock within 24 hours
- New sheetrock installed 1/2 inch from floor
- Might try if prior contamination is not present....
- Remove vinyl/carpet wall covering/baseboards
- Cut ventilation holes (interior/non-insulated walls)
- Fans and dehumidification
- Contact Restoration Firm
Carpet Response

- Remove all items from carpet including movable office furniture
- Following cleaning procedure prescribed by UofM web site [http://www.dehs.umn.edu/iaq/flood.html](http://www.dehs.umn.edu/iaq/flood.html)
- Multiple pass extraction (dry) necessary
- If carpeting develops odor or visible mold growth, replace carpeting

Water Intrusion Response

- Sewage back-up or dirty water
  - Remove and dispose all contaminated building materials
  - Disinfect entire area
  - Need to consider worker safety issues

Water Intrusion Response

For Property/Contents insured through Risk Management

- Flood claims reporting:
  - Business Hours - Risk Management Division 651-201-2592

Lab Hoods
Laboratory Hoods

• New Installations
• Annual Testing

• New Installations
  – Should follow ASHRAE 110 standard
  § Smoke visualization
  § Air velocity measurements
  § Tracer gas monitoring

Laboratory Hoods

• Annual Inspections
  – Sash condition
  – Flow monitors
  – Air velocity

Lab Hood Inspection

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<th>Hood: S-2373-2</th>
<th>By: JSK</th>
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<tr>
<td>Date: 7/16/15</td>
<td>Sash Setting (in.): 18</td>
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<tr>
<td>Average Face Velocity (fpm): 109</td>
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</tr>
<tr>
<td>Inspection Due: 7/16/16</td>
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Questions?