




## Industrial Hygiene in Review

2016 Safety and Loss Control Conference  
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## IH in Review





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


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## Exposure Monitoring




## Exposure Monitoring




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

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## Exposure Monitoring




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

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## Exposure Monitoring




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

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## Exposure Monitoring




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

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## Exposure Monitoring



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

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**Exposure Monitoring** *Admin Minnesota*

- 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<sup>©</sup>)

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**Exposure Monitoring** *Admin Minnesota*

- How to Sample.....

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**Exposure Monitoring** *Admin Minnesota*


- Particulate



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**Exposure Monitoring** *Admin Minnesota*

- Particle Size Selective Sampling




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**Exposure Monitoring** 


- Gas and Vapors




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**Exposure Monitoring** 


- Passive Samplers




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**Exposure Monitoring** 

- Real Time Monitors/Data-logging



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**Exposure Monitoring** 


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

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**Exposure Monitoring**

Admin Minnesota

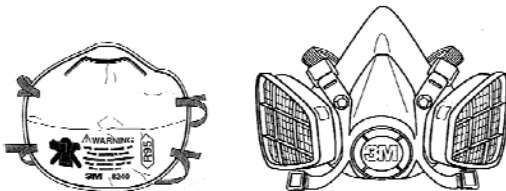
- Gas and Vapors – Active Sampling



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**Respirators**

Admin Minnesota



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**Respirators**

Admin Minnesota

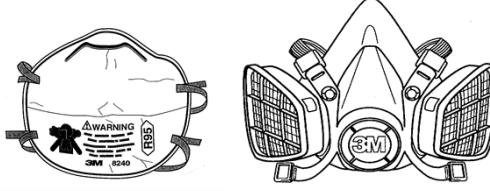
- What do you need to have in place for your program?
  - Exposure results if you have them.
    - Are respirators required?
    - What level of protection is needed?
    - Is respirator use voluntary?
  - Medical Evaluations
  - Fit Testing
  - Cleaning/Storage
  - Training

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**Respirators**


Admin Minnesota

- Voluntary Use
  - When can use of respirators be voluntary?
  - What do you need to do?

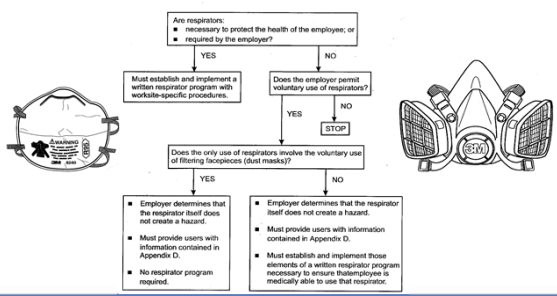




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## Respirators




**Respirator-Use Requirements Flow Chart**  
29 CFR 1910.134(c)







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## 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.

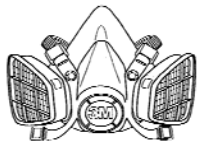


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## Respirators




- 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



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Noise



**Noise**

Admin  
Minnesota


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

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**Noise**

Admin  
Minnesota

- Area Spot Samples
  - Using SLM




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**Noise**

Admin  
Minnesota

- Noise Dosimeter




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**Noise**


Admin  
Minnesota

- 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

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## Noise





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

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## Managing IAQ




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## Managing Indoor Air Quality





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

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## Managing Indoor Air Quality




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- 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)




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## 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




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## Managing Indoor Air Quality

- 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


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## Managing Indoor Air Quality

- 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)

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## Managing Indoor Air Quality

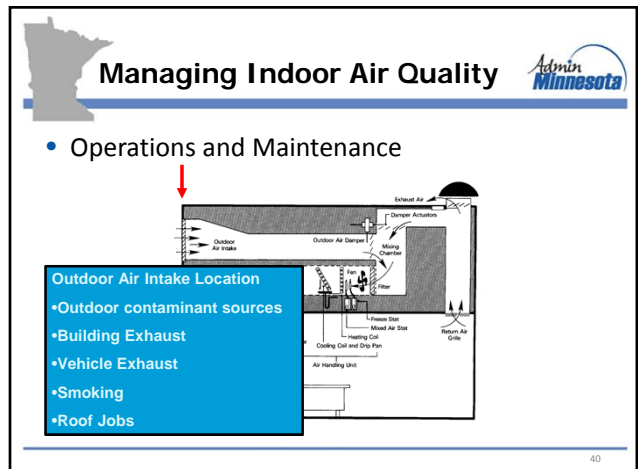
- Use of Carbon Dioxide
- Be careful using spot measurements
- Best to data-log over several days


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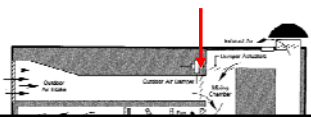


- ### Managing Indoor Air Quality
- Operations and Maintenance
    - Housekeeping
      - Quality Vacuums
        - Carpet and Rug Institute
        - <http://www.carpet-rug.org/certified-vacuums.html>
      - Upholstered chairs and furniture
        - Vacuum annually
      - Supply and Returns
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- ### Managing Indoor Air Quality
- Operations and Maintenance
    - Construction Projects
    - Renovations
    - Painting
    - New Carpet
    - Roof Jobs
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**Operations and Maintenance** 

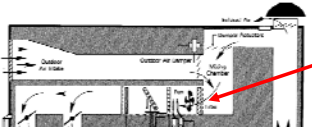


**Outdoor Air Intake/Damper - Check That:**

- 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


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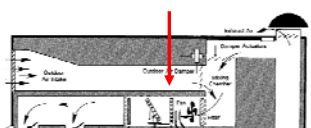
**Managing Indoor Air Quality** 



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

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**Heating Coil**

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

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**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

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**Drain Pan**

- Clean pan semiannually
- Verify proper drainage
- Install water trap if not present

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**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)

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**Operation and Maintenance**

**Supply and Return Diffusers**


- eliminate obstructions
- verify proper airflow
- periodically vacuum any dust accumulation from diffuser and surrounding ceiling tiles

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**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)


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## Water Intrusion Response




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## Water Intrusion Response




- One-Time Problems
- Chronic Problems



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## 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

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## Chronic Problems



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## 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

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## Water Intrusion Response






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

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## 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.

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## 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

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### Carpet Response




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

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### 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

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### Water Intrusion Response




For Property/Contents insured through Risk Management



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

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### Lab Hoods



 **Laboratory Hoods** 



- New Installations
- Annual Testing

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 **Laboratory Hoods** 

- New Installations
  - Should follow ASHRAE 110 standard
    - Smoke visualization
    - Air velocity measurements
    - Tracer gas monitoring


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 **Laboratory Hoods** 

- Annual Inspections
  - Sash condition
  - Flow monitors
  - Air velocity

Lab Hood Inspection	
Hood: S-2373-2	By: JSK
Date: 7/16/15	Sash Setting (in.): 18
Average Face Velocity (fpm): 109	
Inspection Due: 7/16/16	

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 **Questions?** 