

Managing Indoor Air Quality

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2010 Safety and Loss Control Conference
October 26, 2010

Managing Indoor Air Quality

- Numerous IAQ evaluations over the years
- Majority of the findings can be placed into a short list of problem areas

Managing Indoor Air Quality

- Problems Areas
 1. _____
 2. _____
 3. _____
 4. _____
 5. _____

Thermal Comfort

Thermal Comfort

- Recommended Temperatures
 - 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)



Thermal Comfort

Common Causes of Temperature and Humidity 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

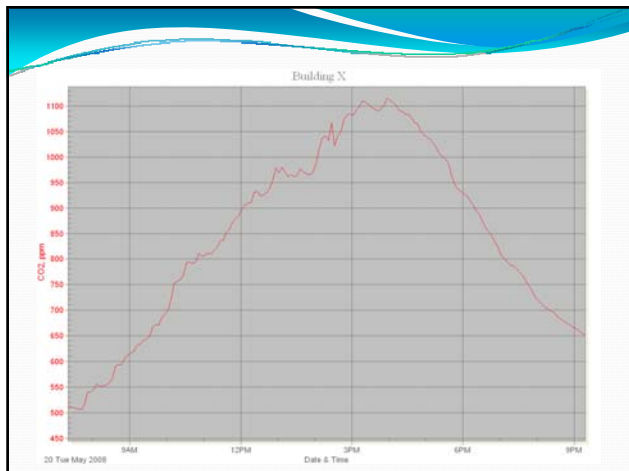
- Minnesota Rules 5205.0110 - Workroom Ventilation and Temperature
 - Outside air ventilation requirement of 15 cubic feet per minute per person
 - confirmed with average carbon dioxide levels below 1000 ppm
 - also identifies temperature and humidity extremes

Outdoor Air Ventilation

- ASHRAE 62.1-2007 - 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

Outdoor Air Ventilation

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



Operations and Maintenance

Operations and Maintenance

- Housekeeping Activities
- Construction Projects
- HVAC Preventative Maintenance

Operation and Maintenance

- Housekeeping
 - Quality Vacuums
 - Carpet and Rug Institute
 - http://www.carpet-rug.org/drill_down_2.cfm?page=8&sub=9
 - Upholstered chairs and furniture
 - Vacuum annually
 - Supply and Returns

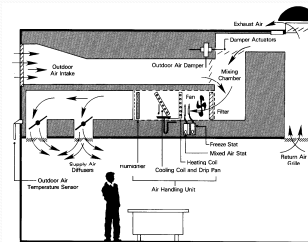


Operation and Maintenance

- Construction Projects
 - Renovations
 - Painting
 - New Carpet
 - Roof Jobs



HVAC Preventative Maintenance



Outdoor Air Intake Location

- Outdoor contaminant sources
 - Building Exhaust
 - Vehicle Exhaust
 - Smoking
 - Roof Jobs

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

System Filtration

ASHRAE Standard 52.1-1992

- Weight Arrestance
- Dust Spot Efficiency

The minimum efficiency recommended for office environments is 25 to 35 percent efficient (pleated type)

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

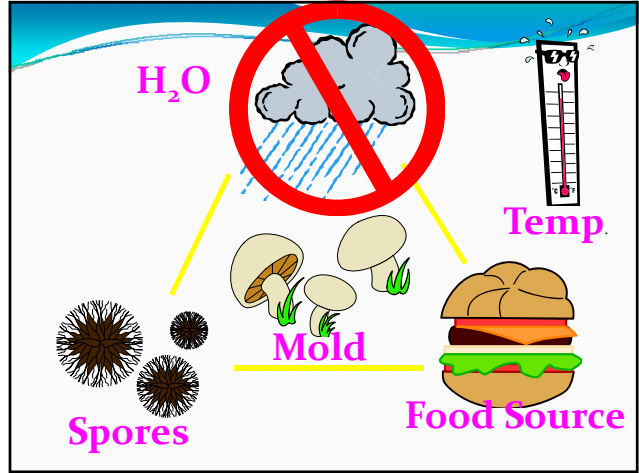
Humidification

- 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)

Supply and Return Diffusers

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

Water Intrusion and Moisture



Controlling Moisture Needs to be the Focus

Common Sources of Water/Moisture Problems

- One-Time Problems
- Chronic Problems

The illustration shows a silver faucet with a single blue drop of water falling from it, symbolizing a water leak.

Common Sources of Water/Moisture Problems

- One-Time Problems
 - Rainwater/roof leaks
 - Pipe breaks
 - Floodwater
 - Sewage back-up

Common Sources of Water/Moisture Problems

- Chronic Moisture Problems
 - Condensation Problems
 - Cold Water Pipes
 - Mechanical Systems

Common Sources of Water/Moisture Problems

- Condensation Problems
 - Exterior Walls

Common Sources of Water/Moisture Problems

- Condensation Problems
 - Windows

Common Sources of Water/Moisture Problems

- Window Leakage

Common Sources of Water/Moisture Problems

- Drainage Problems
 - Groundwater
 - Rainwater/Runoff

Immediate Response Actions

Water Intrusion and Moisture

- 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 and Moisture

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

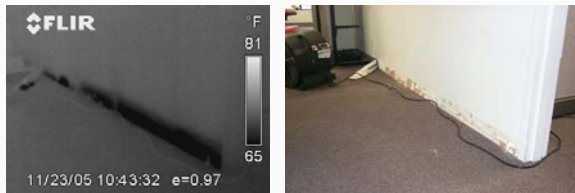


Infrared Camera Background

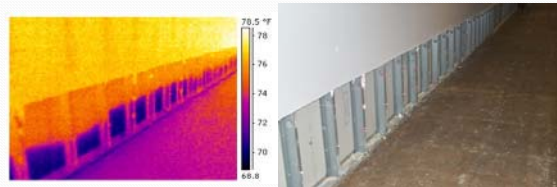
- What does it do?



Infrared Camera Background



Infrared Camera Background



Water Intrusion and Moisture

- 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 Actions

- 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 Actions

- 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>
- Multiple pass extraction (dry) necessary
- If carpeting develops odor or visible mold growth, replace carpeting

Sewage Backup or Dirty Water Response Actions

- Remove and dispose all contaminated building materials
- Disinfect entire area
- Need to consider worker safety issues

Water Intrusion Events

For Property/Contents insured through Risk Management

- Flood claims reporting:
 - Business Hours - Risk Management Division 651-201-2592
 - After Hours - Allied Adjusters 612-766-3700 or 1-800-799-9509

If Mold Develops.....

Remediation of Mold Contaminated Building Materials

- Several organizations have guidelines published on removal methods.
 - The American Conference of Governmental Industrial Hygienists (ACGIH)
 - The Environmental Protection Agency (EPA)
 - University of Minnesota - Department of Environmental Health and Safety
 - The New York City Department of Public Health
 - Institute of Inspection Cleaning and Restoration

Remediation of Mold Contaminated Building Materials

- Response Actions Vary
 - Type of Material Affected
 - Porous, Semi Porous or Non-Porous
 - Extent of Contamination
 - Small Scale <10 square feet
 - Medium Scale 10 to 100 square feet
 - Large Scale >100 square feet
 - Level of Containment During Cleaning
 - Source Containment
 - Local Containment
 - Full Containment

Remediation of Mold Contaminated Building Materials

HVAC System

- If Fibrous Glass Internal Liners
 - Hire a contractor that specializes in cleaning fibrous glass lined ductwork.
 - Verify that contractor is certified by the National Air Duct Cleaners Association (NADCA).

Small-Medium Scale Removal Work Includes:

Worker Training

PPE

**Proper
Equipment/Supplies**

Written Work Procedures

Communication

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)

Resources

- http://www.admin.state.mn.us/risk/safety/IAQ_IH_Communications.html
- Jim Kubisiak 651-201-3016
james.kubisiak@state.mn.us

Managing Indoor Air Quality

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

Questions?