Indoor Air Quality (IAQ)

(What is it, and what do I do about it?)

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Presentation Topics

✓ Acronyms and Jargon
✓ Health Effects
✓ Common Causes
✓ Regulations
✓ Resources
✓ Investigations
✓ Help
Acronyms and Jargon

• The IAQ/IEQ field is full of acronyms and jargon, that are often used to confuse and quiet members.
• These will be used throughout this presentation, and will be identified and explained as we go.
• So, if one is not explained ask, just as you should do if a report for your building was being reviewed!
Our Experiences

What health effects are members having?

What has been management’s response?

Has the problem been solved?

Have you made a plan to address it?
Health Effects

• BRI – Building Related Illness, EPA term for situation where a *medically diagnosed* illness is related to a specific building (for example Legionnaires’ Disease).

• SBS – Sick Building Syndrome, EPA term for the situation where building occupants experience *acute health and comfort effects that appear to be linked to time spent in a building*, but no specific illness or cause can be identified. Even though the direct cause of the symptoms is unknown, most sufferers report experiencing relief when they leave the building.
Common Causes - NIOSH

After performing over 500 IAQ investigations NIOSH identified the following most common causes of IAQ problems:

1. Inadequate Ventilation (53%)
2. Contamination Inside the Building (16%)
3. Undetermined (13%)
4. Contamination Outside the Building (10%)
5. Microbial Contamination (5%)
6. Off-gassing of Building Products (4%)
Common Causes - CSEA

CSEA Observed Common IAQ Causes:
• Relative Humidity
• Temperature
• Circulation
• Dust
• Chemicals
• Mold/Bacteria
• Others
Common Causes - Relative Humidity

Cause/Symptoms:

• Low RH: Winter, lack of humidification, and dried out buildings

• High RH: summer, roof leaks, improper building drainage, and insufficient air conditioning

• Low RH: eye irritation, nose bleeds, throad irritation, coughing, dry skin, and proliferation of illnesses

• High RH: excess mold and bacteria growth
Common Causes - Relative Humidity

Detection/Solutions:

• Monitor RH and use the ASHRAE Recommended Range (30% - 60%)
• Moisture testing for building surfaces
• Provide appropriate humidification, and monitor it (no central unless HVAC is designed for it)
• Repair roof leaks and provide proper building drainage
• Check to assure the air conditioning system is properly sized for the space
Planning for Action - Relative Humidity

Make your plan:
Common Causes - Temperature

Cause/Symptoms:

• Improperly placed thermostats, office redesign without ventilation system changes, excess solar loading, and an unbalanced ventilation system

• Temperature variations across the space

• Wide temperature swings during the day, and seasonally

• Fatigue, coughing, eye irritation, nose irritation, dry skin
Common Causes - Temperature

Detection/Solutions:

• Monitor temperatures and use the ASHRAE recommended ranges (Summer: 73 – 78 °F and Winter Range: 68 – 74 °F)
• ASHRAE ranges satisfy 80% of occupants that are dressed properly for the season.
• Proper window treatments for the south side of the building
• Properly locate system components (thermostats and diffusers)
• System balancing by NEBB contractor
Planning for Action - Temperature

Make your plan:
Common Causes - Circulation

Cause/Symptoms:
• Outside air intakes are restricted or closed and each room does not have a supply and return
• CO$_2$ and other indoor pollutants are able to concentrate
• Fatigue, headache and eye and throat irritation
Common Causes - Circulation

Detection/Solutions:

• Measure for CO$_2$, ASHRAE recommends max inside < outside + 700 ppm (1,000 – 1,200 ppm)
• Mechanical Code has required ventilation rates:
  offices – 20 CFMOA/person
• Every room with a supply and return
• Grandfathering applies
Planning for Action - Circulation

Make your plan:
Common Causes - Dust

Cause/Symptoms:
• Inexpensive air filters used and are not changed regularly
• Shed dust and filter fibers into the building air
• Inadequate janitorial services.
• Eye, nose and throat irritation; allergic reactions; and respiratory conditions (ex: asthma, RAS and COPD)
Common Causes - Dust

Detection/Solutions:
• Check for particulates in the air and excess on “staticy” surfaces.
• Recommend filter with MERV ≥8
• Filter changes at least semi-annually and preferably quarterly with regular inspections
• Inspect to see if duct cleaning is required
• No fiberglass filter media
• Have cleaners use HEPA filtered vacuum cleaners for floors and dusting.
Planning for Action - Dust

Make your plan:
Common Causes - Chemicals

Cause/Symptoms:
• Chemicals from inside or outside the building
• New building materials, janitorial supplies, pesticides, office equipment, etc.
• Nearby industrial/business operations, vehicles, landfills, etc.
• Symptoms are specific to the chemicals involved
Common Causes - Chemicals

Detection/Solutions:
• Monitor for specific chemicals that are suspected of causing the problem
• Ask, “What does it smell like?”
• Check SDSs for odor description and health effects
• Use EPA NAAQS not PESH PELs (ex: CO - 9 ppm and O₃ - 75 ppb)
• For external, check building air intake location
• Use less toxic cleaners, heavy cleaning off shift or weekends
• Assure office equipment (copiers, printers, etc.) are properly placed and ventilated
Planning for Action - Chemicals

Make your plan:
Common Causes - Mold/Bacteria

Cause/Symptoms:

• Mold and bacteria are in almost all environments
• Mold mostly causes allergic reactions (ex: Aspergillus and Penicillium)
• Dust mites and bacteria with mold growth
• Mold can cause infections in immune compromised people (ex: Aspergillosis)
• AIHA position paper on mold (3/26/13)
Common Causes - Mold/Bacteria

AIHA position paper:

Common Causes - Mold/Bacteria
Detection/Solutions:
• No direct PESH regulation or PELs
• Air sampling not typically useful
  • Mold levels lower indoors than outdoors
  • Mold species the same inside and outside
• Removal or cleaning of mold without stopping the water does not work
• Surface sampling useful to determine species present if someone is allergic
• Usually visible before health effects occur
• Now must use NYS DOL certified contractors
Common Causes - Mold/Bacteria

Detection/Solutions:
• New NYS DOL regulations for mold contractors
• Article 32 of the NYS Labor Law
• Assessment, remediation contractors
• Have to complete training program
• Have to be licensed to perform work
• Assessment and remediation done separately
• Must follow EPA protocols and use EPA products
• Must do post remediation assessment
Common Causes - Mold/Bacteria

NYS DOL Mold Program Page:

https://labor.ny.gov/workerprotection/safetyhealth/mold/mold-program.shtm
Common Causes - Mold/Bacteria

EPA Guidance Book:

EPA 402-K-01-001, March 2001
Planning for Action - Mold/Bacteria

Make your plan:
Common Causes - Others

Others:

• Cancer (NYS DOH Bureau of Environmental and Occupational Epidemiology)
• Fibers (Asbestos/Fiberglass)
• Vermin
• Ergonomic Issues (e.g., lighting, glare, neck/head/back position)
Regulations

Is there a regulation that directly requires the resolution of IAQ problems?

Directly – No

Indirectly - Yes
Regulations

IAQ Related Regulations:

• PESH/OSHA – Sanitation, Permissible Exposure Limits (PELs), Asbestos, Lead, and Hazard Communication/Right-to-Know

• EPA/DEC – Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)

• NYS DOS – Building Code, Plumbing Code, Mechanical Code, and Building Maintenance Code

• NYS DOL – Mold Contractor Licensing
Resources

IAQ Related Standards of Practice:

• EPA: IAQ Building Education and Assessment Guide (I-BEAM), to download:
  www.epa.gov/iaq/largebldgs/i-beam/index.html
  (EPA Document: 402-C-01-001)

• NIOSH: Building Air Quality (BAQ) Action Plan
  https://www.cdc.gov/niosh/docs/98-123/
  (NIOSH Document: 98-123)
Resources

I-Beam Modules:
• Conducting an indoor air quality (IAQ) building audit.
• Diagnosing and resolving IAQ related health problems
• Establishing an IAQ management and maintenance program to reduce IAQ risks
• Planning IAQ compatible energy projects
• Protecting occupants from exposure to construction/renovation emissions
• Calculating the cost, revenue, and productivity impacts of planned IAQ activities

Resources

NIOSH BAQ Action Plan:
• Designate an IAQ Manger
• Building IAQ Profile
• Existing IAQ Problems
• Building Occupant Education
• IAQ Plan for Building Maintenance
• Manage Potential Pollutant Sources
• Communicate with Occupants
• IAQ Complaint Procedures

www.cdc.gov/niosh/98-123/
Investigations

The IAQ Investigation Big Four:

1. PEOPLE
2. POLLUTANTS
3. PRESSURES
4. PATHWAYS
Investigations

Investigation Steps:
1. Initial Walkthrough
2. Readings for IAQ Indicators (T, RH, CO₂, CO VOCs)
3. Occupant Complaint Information
4. HVAC System Information/Inspection
5. Identifying Potential Pollutants
6. Identifying Pathways
7. Forming and Testing Hypothesis
8. Additional Sampling for Confirmation
Contact Information
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