Indoor Air Quality (IAQ)

Health & Safety Department

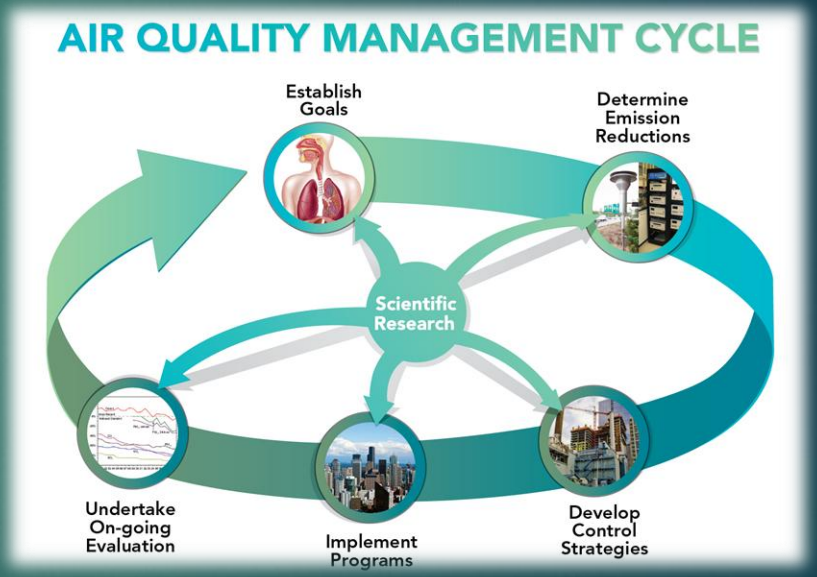
NEW YORK STATE

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

CSEA

Presentation Topics

- ✓ Acronyms and Jargon
- ✓ Health Effects
- ✓ Common Causes
- ✓ Regulations
- ✓ Resources
- ✓ Investigations
- ✓ Management
- ✓ CSEA Resources



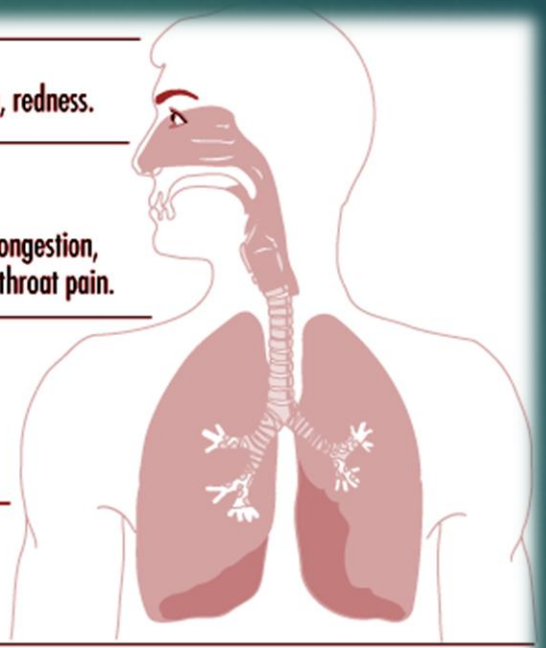
Acronyms and Jargon

- 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 is being reviewed!

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.

Health Effects

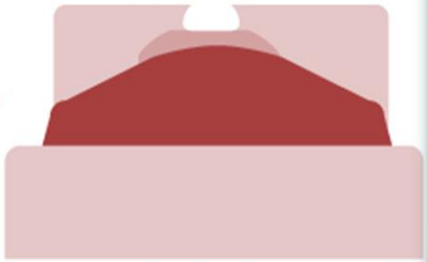


EYES
Dryness, itching/stinging, tearing, redness.

UPPER RESPIRATORY TRACT
(nose and throat)
Dryness, itching/stinging, nasal congestion, nasal drip, sneezing, nose bleed, throat pain.

LUNGS
Chest tightness, drowning sensation, wheezing, dry cough, bronchitis.

SKIN
Redness, dryness, general and localized itchiness.



GENERAL
Headache, weakness, drowsiness/lethargy, difficulty concentrating, irritability, anxiety, nausea, dizziness.

MOST COMMON ILLNESSES:

HYPERSENSITIVITY
Hypersensitivity pneumonitis, humidifier fever, asthma, rhinitis, dermatitis.

INFECTIONS
Legionellosis (Legionnaire's disease), Pontiac fever, tuberculosis, common cold, flu.
Of unknown chemical or physical origins, including cancer.

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Common Causes - NIOSH

In over 500 IAQ investigations NIOSH identified

these common causes:

52% - Inadequate Ventilation

16% - Building Contamination

13% - Unknown

10% - Outdoor Contamination

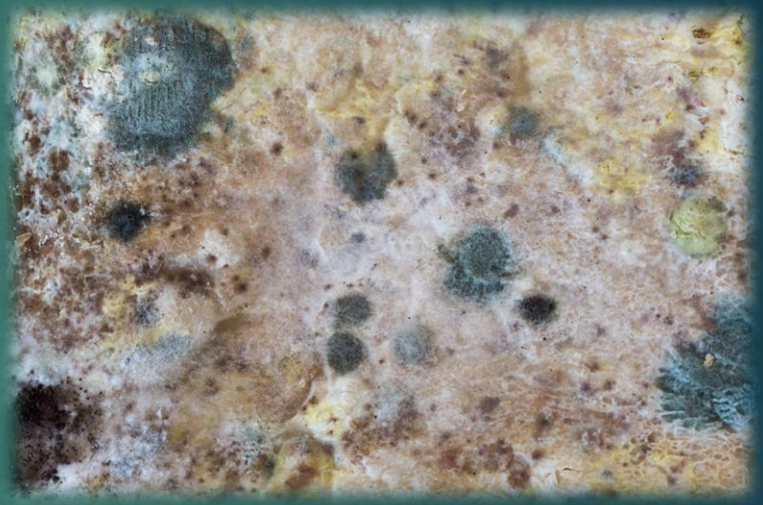
5% - Microbial Contamination

4% - Emissions from Building Materials

Common Causes - CSEA

CSEA Observed Common IAQ Causes:

- HVAC System
  - Relative Humidity
  - Temperature
  - Outside Air
- Building Maintenance
  - Dust
  - Chemicals
- Water
  - Mold/Bacteria
- Building Age/Design



HVAC - Relative Humidity

Causes/Symptoms:

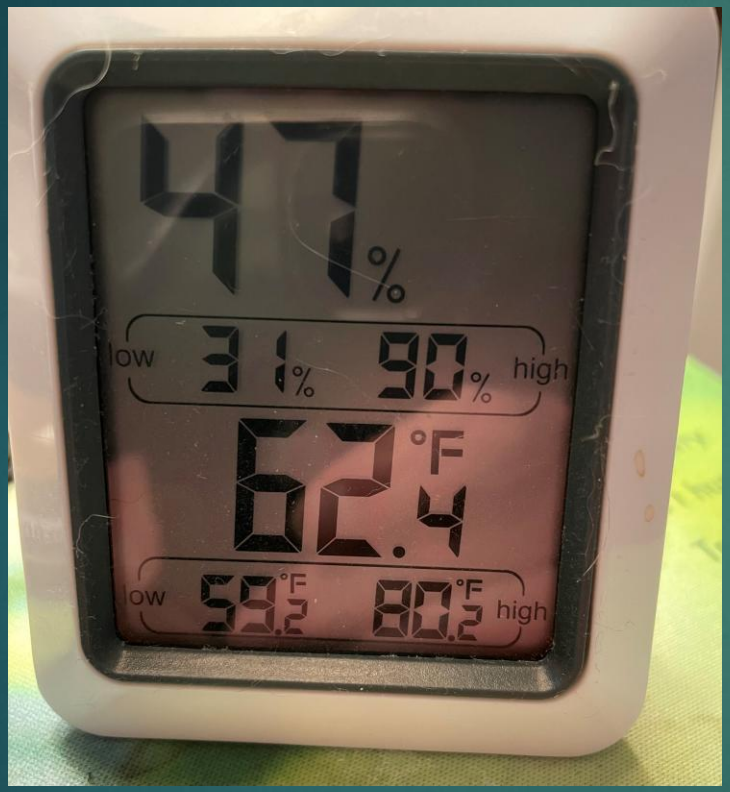
- Low RH: winter, lack of humidification, and dried out building materials
- High RH: summer, roof leaks, improper drainage, and insufficient air conditioning
- Low RH: eye irritation, nose bleeds, dry throat, coughing, dry skin, and proliferation of common illnesses
- High RH: mold and bacteria growth leading to allergic response and other respiratory problems

HVAC - Relative Humidity

Detection/Solutions:

- Monitor RH and use the ASHRAE Recommended Range (30% - 60%)
- Provide local humidification and monitor it (local unless HVAC system designed for central)
- Repair roof leaks and provide proper building drainage
- Have management determine if the air conditioning system is properly sized for the space (also affects temperature)

HVAC - Relative Humidity



HVAC - Temperature

Cause/Symptoms:

- Improperly placed thermostats, office redesign without ventilation system adjustment, excess solar loading, and unbalanced HVAC system
- Wide temperature swings throughout the day
- Personal temperature tolerances vary greatly
- High temperature: fatigue, eye irritation, dry nose and throat (lowers relative humidity)
- Low temperature: Headaches, fatigue, joint pain

HVAC - Temperature

Detection/Solutions:

- Monitor temperatures and use the ASHRAE recommended ranges (Summer: 73 – 78 °F and Winter Range: 68 – 74 °F)
- Stay above minimum required temperatures of 65 °F for indoor workspaces from the PMC
- 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 HVAC system components (thermostats and diffusers)
- System balancing by NEBB contractor if needed

HVAC - Outside Air

Cause/Symptoms:

- Outside air intake louvers are stuck in place, blocked or closed
- This allows CO_2 and other indoor pollutants to concentrate
- Each room does not have at least one HVAC supply and return diffuser
- Fatigue, headache and eye and throat irritation

HVAC - Outside Air

Detection/Solutions:

- Have management or CSEA measure for CO_2 (ASHRAE recommends max inside < outside + 700 ppm (maximum 1,000 – 1,200 ppm))
- MC has required outside air ventilation rates: offices – 20 CFMOA/person and classrooms – 15 CFMOA/person
- Every room has a supply and return
- Under Building Code, "Grandfathering" applies

Building Maintenance - Dust

Cause/Symptoms:

- Inefficient (inexpensive) air filters used and are not changed regularly (also decreases circulation)
- Release dust and filter fibers into the building air
- Inadequate cleaning frequency
- Inefficient dusting methods
- Eye, nose and throat irritation; allergic reactions and respiratory problems

Building Maintenance - Dust

Detection/Solutions:

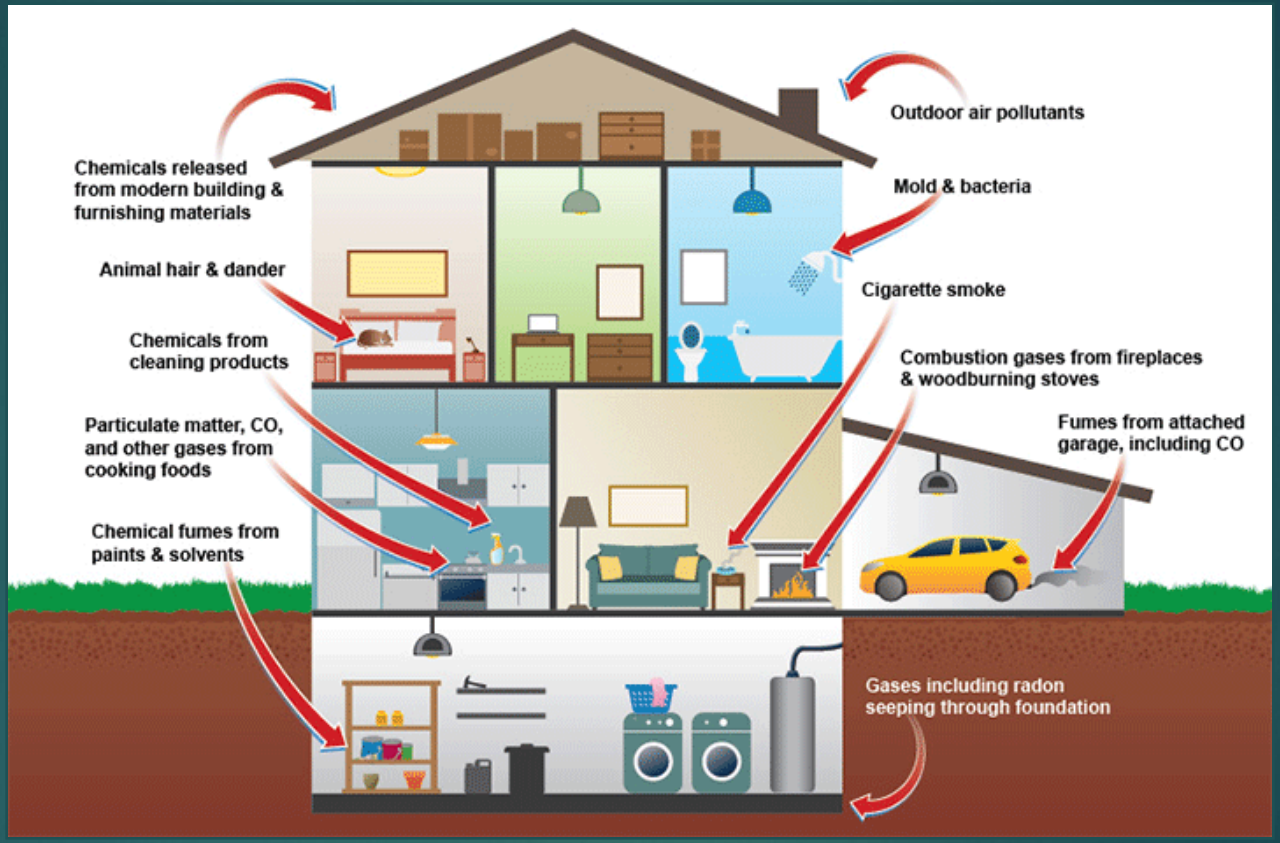
- Monitor particulates on surfaces.
- Recommend filter with MERV ≥8
- Filter changes at least semi-annually and preferably quarterly with regular inspections
- Inspect to see if duct cleaning is required
- No fiberglass filter media
- Cleaners use HEPA filtered vacuums
- Dust with vacuum and not chemically treated wands or cloths

HVAC Filter MERV Ratings

MERV Rating	Average Particle Size Efficiency in Microns
1-4	3.0 - 10.0 less than 20%
6	3.0 - 10.0 49.9%
8	3.0 - 10.0 84.9%
10	1.0 - 3.0 50% - 64.9%, 3.0 - 10.0 85% or greater
12	1.0 - 3.0 80% - 89.9%, 3.0 - 10.0 90% or greater
14	0.3 - 1.0 75% - 84%, 1.0 - 3.0 90% or greater
16	0.3 - 1.0 95% or greater, 1.0-3.0 95% or greater

Home filters typically MERV 4-8 and 8 standard for commercial

Building Maintenance - Chemicals



Building Maintenance - Chemicals

Cause/Symptoms:

- Chemicals from inside or outside the building
- Inside: new building materials, janitorial supplies, pesticides, office equipment
- Outside: nearby industrial/business operations, vehicles, landfills, WWTPs, etc.
- Symptoms are specific to the chemical(s) involved

Building Maintenance - Chemicals

Detection/Solutions

- Ask, "What does it smell like and when?"
- Check SDSs for odor description and health effects to find a match
- Chemical use times must precede health effects
- For external, check building air intake location and operations close to the building
- Less toxic cleaners and heavy cleaning off shift
- Office equipment, especially high-volume copiers, are properly placed and ventilated

Water - Mold/Bacteria

Cause/Symptoms:

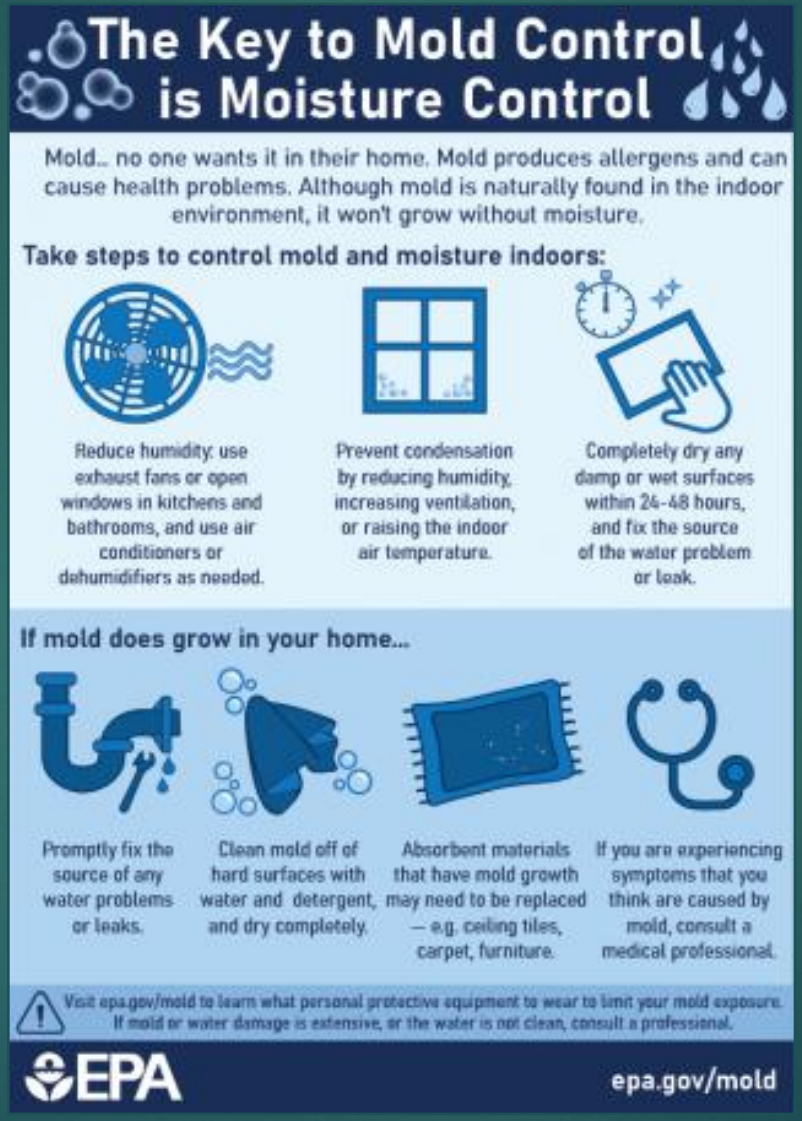
- Mold and bacteria are in almost all environments
- Uncontrolled water allows excess growth
- Most often mold causes allergic reactions
- Dust mites and bacteria often present with mold, can also cause allergies
- Can cause infections in immune compromised people (ex: Aspergillosis)
- IOM Damp Spaces and Health Report

Water - Mold/Bacteria

Detection/Solutions:

- Can normally be seen before health effects occur, so start with visual inspection for mold and water per EPA
- Air sampling expensive and typically not useful but:
  - Mold levels expected to be lower indoors than outdoors
  - Mold species expected to be the same inside and outside
- Wipe sampling only to determine species present if a person with allergies is being affected
- Cleaning off mold without stopping the water is a temporary fix
- Must remove and replace wetted materials and eliminate the water source
- Hard materials can be cleaned and disinfected

Water - Mold/Bacteria



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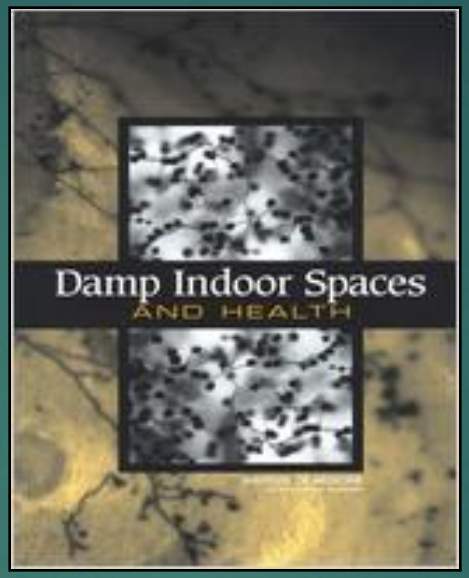
Water - Mold/Bacteria

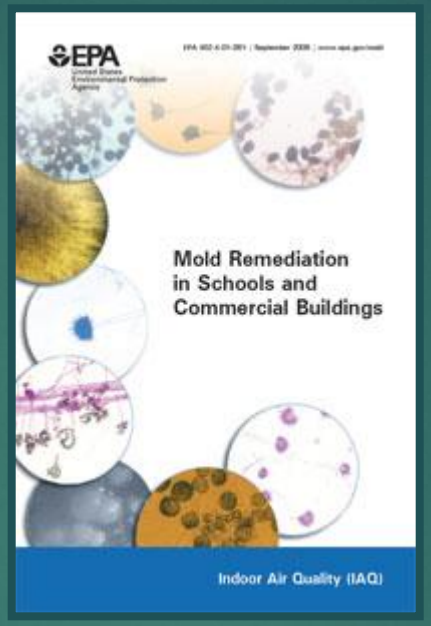


IOM Damp Spaces and Health Report from:

https://www.ncbi.nlm.nih.gov/books/NBK215643/

Water - Mold/Bacteria

EPA Guidance Book:



EPA 402-K-01-001

https://www.epa.gov/mold/printable-version-mold-remediation-schools-and-commercial-buildings

Water - Mold/Bacteria

New York City Department of Health and Mental Hygiene:

Guidelines on Assessment and Remediation of Fungi in Indoor Environments

- Preface
- Introduction
- Environmental Assessment
- Remediation
- Communication with Building Occupants
- References
- Appendix A
- Fact Sheet

https://www1.nyc.gov/site/doh/health/health-topics/mold.page

Building Age/Design

- Asbestos
- Lead
- Vermin
- Ergonomic Issues (body positioning)
- Lighting (LED upgrades)
- Rare Diseases and Cancer (NYS DOH BEOE)

Regulations

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

Directly – No

Indirectly - Yes

Regulations

IAQ Related Regulations:

- PESH/OSHA/DOL – Sanitation, Permissible Exposure Limits (PELs), Asbestos, Lead, and Hazard Communication/Right-to-Know, Mold Contractor Certifications
- EPA/DEC – Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), NAAQSs
- NYS DOS – Building Codes: Property Maintenance Code, Existing Building Code, and Mechanical Code
- NYC DOHMH – Mold Guidelines

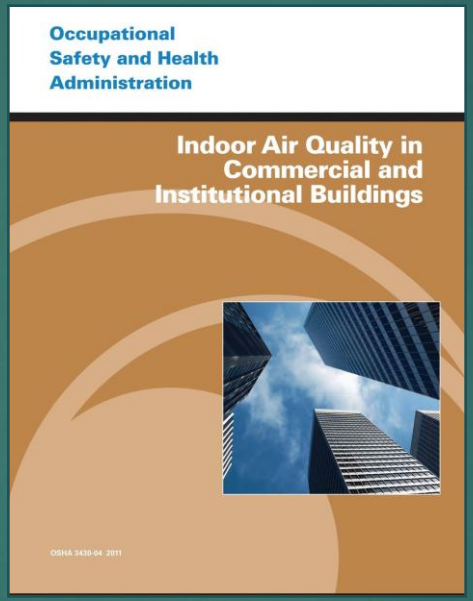
Resources

EPA – An Office Occupants Guide to Indoor Air Quality - EPA-402-K-97-003

https://www.epa.gov/indoor-air-quality-iaq/office-building-occupants-guide-indoor-air-quality

Resources

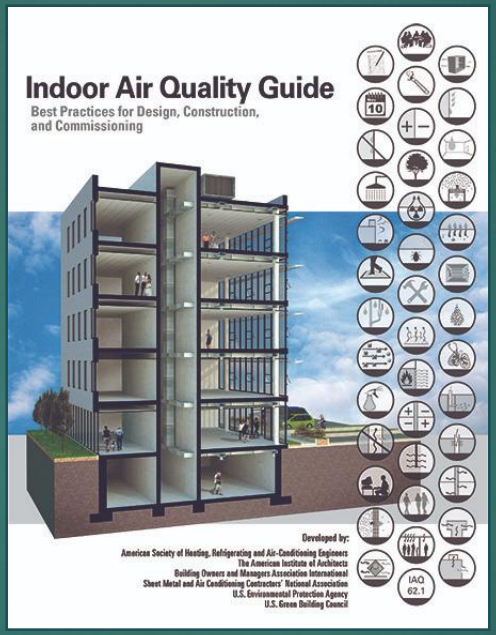
OSHA – IAQ in Commercial and Institutional Buildings – Publication 3430



https://www.osha.gov/sites/default/files/publications/3430indoor-air-quality-sm.pdf

Resources

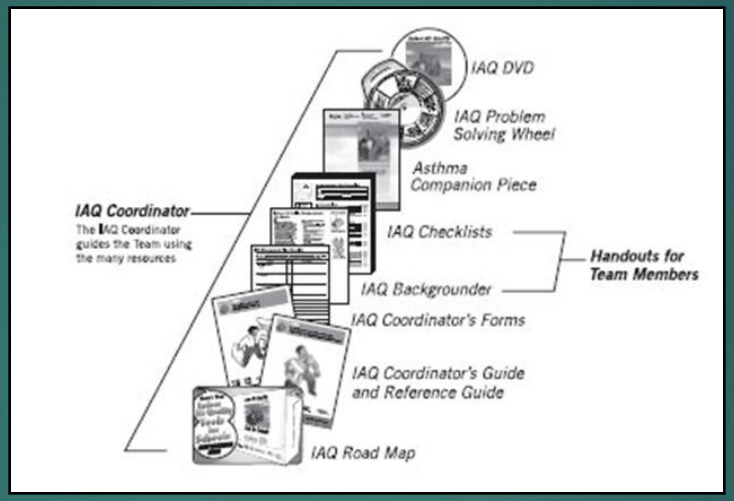
ASHRAE Indoor Air Quality Guide (free "technical" resource through EPA)



https://www.ashrae.org/technical-resources/bookstore/indoor-air-quality-guide

Resources

EPA Tools for Schools – Guide for Implementing an IAQ Program – EPA 402-K-07-008

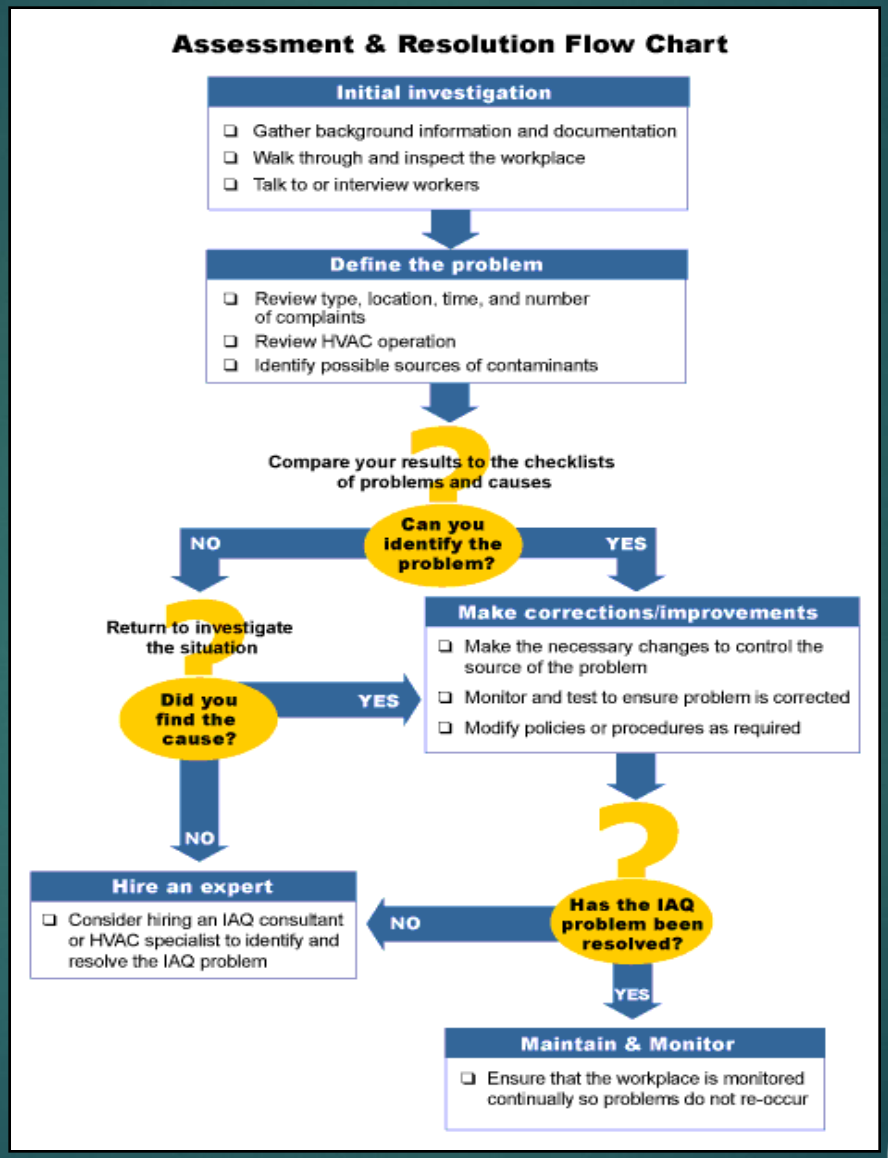


https://www.epa.gov/iaqschools/coordinators-guide-indoor-air-quality-section-1

Resources

There's an app for that!

IAQ Investigations



IAQ Management

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