



ENVIRONMENTAL AND OCCUPATIONAL HEALTH INDOOR AIR QUALITY MANAGEMENT GUIDANCE

The University of Wisconsin-Madison (UW Madison) is committed to providing a work environment that is free of recognized hazards, and to investigate complaints that may be related to poor indoor air quality (IAQ). Acceptable indoor air quality is air in which there are no known contaminants at harmful concentrations. Although specific regulations for indoor air have not been developed, the Environmental and Occupational Health (EOH) Department of Environment, Health & Safety (EH&S) will assess workplace air quality concerns using published guidance from a variety of relevant organizations. EOH considers recommendations from the Occupational Safety and Health Administration (OSHA), American Conference of Governmental Industrial Hygienists (ACGIH), American Industrial Hygiene Association (AIHA), Environmental Protection Agency (EPA), and the American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE).

Most IAQ complaints are related to odors, mucous membrane irritation, respiratory complaints, headache and fatigue. Many symptoms associated with IAQ complaints are not unique to indoor air quality issues. In most cases there are no definitive signs or laboratory tests available to differentiate building air quality related to symptoms from other causes.

Poor indoor air quality may be caused by vapors, dust generated in the work environment, materials infiltrating from transient or seasonal outside sources (such as pollen or engine exhaust), contaminants associated with fungal growth or deficiencies in the ventilation system. Unfortunately, due to scientific limitations and variations in individual sensitivity, EOH is not always able to definitively identify an indoor air quality problem when complaints or symptoms are reported. Occupants who experience health effects thought to be caused by workplace indoor air, have the option to contact UW Madison Occupational Medicine (265-5610), or their personal medical provider for consultation. Medical consultation could be valuable if the medical provider can identify specific items or issues that should be considered as part of the investigation.



FACTORS ASSOCIATED WITH POOR INDOOR AIR QUALITY

Factors associated with poor indoor air quality can include inadequate ventilation, contamination from inside buildings, contamination from outside the building, microbial contamination and building material contamination. Factors that may affect the actual or perceived air quality are odors, temperature, humidity, air movement, heat or glare from sunlight, glare from indoor lights, stress, feelings about physical aspects of the location and environment, noise and vibration levels, and work space ergonomics.

PREVENTION OF INDOOR AIR QUALITY PROBLEMS

Many IAQ issues can be avoided with timely maintenance and repair of building heating, ventilating and air conditioning (HVAC) systems and rapid response to water intrusion into a building. Water damaged areas must be dried within 48-72 hours to prevent initiation of fungal growth. Building occupants should notify their supervisor and Building Manager immediately of leaks or HVAC malfunctions so appropriate Facilities Planning & Management (FP&M) staff and EOH can respond quickly to these problems.

Occupants are also responsible for maintaining certain aspects of their work space to prevent air quality problems:

- Refrigerate and store food in airtight containers, as necessary to prevent spoilage, and dispose of food waste in break room trash disposal areas
- Keep offices and other areas clean and orderly to prevent contamination of indoor air. Excess storage and clutter creates surfaces for dust to accumulate and conditions conducive to insect or rodent infestations
- Keep supply air diffusers and return air grills free and clear of any obstructions within their workspace
- Clean up all spills promptly and properly
- Dispose of materials used to clean up hazardous chemical spills according to applicable federal, state, and local laws
- Stay home if you are ill in accordance with the University leave policy
- Avoid an over-accumulation of plants and over-watering plants
- Limit or avoid the use of fragrance emitting devices such as air fresheners, or potpourri; avoid use of strong personal fragrances.



EOH INDOOR AIR QUALITY INVESTIGATION

Evaluation of building related complaints requires the cooperation of Facilities Planning & Management staff and EOH. Following the initial complaint, EOH will interview the complainant using the “IAQ Occupant Interview Form” located in Appendix A to determine if the symptoms are potentially related to air quality. When such a potential exists, EOH will conduct an investigation with appropriate FP&M staff according to the following procedures. Complaints received by FP&M involving specific symptoms, should be forwarded directly to EOH for collaboration once all building systems have been determined to be functioning as designed. Environment Health and Safety (EH&S) staff, custodial and maintenance staff, and building managers who identify IAQ problems or risks should contact EOH directly.

Initial On-Site IAQ Investigation

When notified and if warranted, an EOH staff member will conduct an initial on-site investigation.

The following conditions will typically be evaluated:

- Qualitative/visual survey of overall environmental conditions where complaint originated
- Location of outside air intake(s)
- Immediate outside environment
- Ventilation rate and outside air supplied to the building
- Operation and maintenance of HVAC system
- Relative humidity
- Temperature
- Carbon dioxide concentration
- Carbon monoxide concentration
- Signs of water intrusion including plumbing, roof, and foundation leaks

EOH will also evaluate the work area and building for probable sources of contaminants, such as chemical use and storage; pests; general housekeeping; recent renovations and/or new furnishings, activities in work area, and the building HVAC system. Many investigations will require the assistance of FP&M.

Phase II IAQ Investigation

In some cases, the initial investigation indicates the need for a Phase II IAQ investigation to provide more detailed information regarding the nature of the problem. This phase of the investigation may include the following:



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- Monitoring for a specific chemical of relevance
- Bioaerosol monitoring
- Particulate monitoring
- Total Volatile Organic Compound (TVOC) monitoring
- Detailed HVAC evaluations
- Consultation with Environment, Health and Safety (EH&S) specialists
- Consultation with FP&M Engineering staff
- Referral to the Occupational Medicine Clinic at 333 E. Campus Mall

Fungal Sampling

In most cases, if visible mold growth is present, sampling is unnecessary. Air sampling for mold is not usually part of a routine assessment because decisions about appropriate remediation strategies often can be made on the basis of a visual inspection for any evidence of water damage and visible mold growth. There are no standards for acceptable or safe levels of mold in buildings, and the lack of a definitive correlation between exposure levels and health effects makes interpreting the data difficult.

In some circumstances, EOH might determine that testing could be useful. These limited circumstances may include attempting to locate a hidden source inside the building, to provide evidence supporting or rejecting a hypothesis that investigators have formulated, or based on a medical diagnosis. Sampling results might also be used as a loose guide to determine the effectiveness of the cleanup, but caution should be taken when attempting to utilize sampling results to verify remediation (i.e. clearance sampling). While a single sample may establish the presence of a biological agent, sampling to demonstrate absence usually requires extensive testing.

Rather than focusing on specific kinds of fungi or on quantitative measures of fungal prevalence, the American Conference of Industrial Hygienists (ACGIH) emphasizes that active fungal growth in indoor environments is inappropriate, and the conditions leading to such growth should be corrected and the growth removed.

Interpretation of Fungal Sampling Results

Due to lack of guidelines, indoor/outdoor relationships and comparison between problem and non-problem areas are often used when evaluating sampling results. If outdoor air is the primary source



for the fungi present indoor, the concentration of fungi in indoor air is typically similar to or lower than the concentration seen outdoors, but this relationship may not always be true. During the winter when the ground is snow covered, outdoor concentrations can be near zero, so higher concentrations indoor might not indicate a problem environment. Conversely, when fungal counts outdoor are extremely high during damp summer periods, indoor/outdoor ratios for total fungi may be low, even in the presence of significant indoor growth. Regardless of whether the total fungal concentration indoors is higher than outdoors, exposure to actively growing fungi indoors may present a health risk.

Fungi whose presence may indicate excessive moisture (e.g., *A. fumigatus*) or the risk for a health hazard (e.g., *Histoplasma capsulatum* often found in bird or bat droppings), have been termed indicator species. Interpreting the presence or absence of an indicator species requires identification to the species level (i.e. culture) and a knowledge of the prevalence of various fungal species in indoor and outdoor environments. The mere presence of an indicator species should be interpreted with caution, as the presence of a particular fungus in an indoor environment does not conclude that building occupants are exposed to antigenic or toxic agents.

LIMITATIONS OF IAQ INVESTIGATIONS

Sampling methodologies and acceptable limits have been established for many contaminants. However, occupants may continue to experience discomfort at contaminant levels below standards for occupational exposure because individual sensitivities vary.

IAQ INVESTIGATION REPORT AND REMEDIAL MEASURES

EOH will prepare a written report of investigation results, including conclusions regarding possible causes of the IAQ problems. Copies of the IAQ investigation report will be forwarded to the complainant and their supervisor, and other associated individuals.

REMEDIAL MEASURE DECISION-MAKING

When indicated, EOH will recommend remedial measures. Remedial measures might include items such as pest control, cleaning, or HVAC evaluation and adjustment. When visual observation finds



significant fungal growth in water-damaged environments, controlling and eliminating fungal growth will be recommended which requires identifying and eliminating the moisture source.

EOH will determine if other IAQ risks are actionable by evaluating four variables:

- Probable source of a suspected contaminant, and its extent or magnitude
- Number of occupants with symptoms appropriate for the suspected contaminant, and the severity of their symptoms
- The availability of reasonable and effective measures to mitigate the suspected contaminant
- Time of exposure of the symptomatic employees to the suspected contaminant

When the source of an indoor air quality problem and appropriate remedial measures are difficult to discern, recommendations will rely on the judgment of FP&M and EOH staff.

Air Duct Cleaning

EOH cannot perform testing to determine if air ducts should be cleaned. Knowledge about air duct cleaning is in its early stages and duct cleaning has not been shown to prevent health problems. Studies do not conclusively demonstrate that particulate levels in rooms increase because of dirty air ducts, because much of the dirt in air ducts adheres to duct surfaces and does not necessarily enter the room. If desired, air duct cleaning will generally be at the expense and responsibility of the desiring department.

IMPLEMENTATION OF OCCUPANT-RESPONSIBLE REMEDIAL MEASURES

Remedial action that needs to be implemented by the supervisor should be completed within a reasonable time. This type of action could include general housekeeping, replacing or disposal of water damaged furniture, or the relocation of printers or paper storage.

IMPLEMENTATION OF OTHER REMEDIAL MEASURES

If the remedial measures require building maintenance or repair, Facilities Planning & Management will work with EOH and the building occupant to implement them. If contracted remediation is appropriate, Facilities Planning & Management, in conjunction with EH&S Abatement Specialists will arrange for the abatement to be contracted through an approved and qualified vendor.



BUILDING OCCUPANTS WITH CONTINUING IAQ COMPLAINTS

Occupants who experience symptoms after the remedial measures have been implemented have the option to contact Occupational Medicine (265-5610), or their personal medical provider for consultation. Medical consultation could be valuable if the medical provider can identify possible causes (i.e. specific allergies or sensitivities) that were not evaluated as part of the initial investigation.

Sometimes an employee with a specific sensitivity might require a workplace accommodation as recommended by a medical provider. If an employee presents medical documentation to their supervisor from the employee's personal physician, the supervisor should forward the note to the Divisional Disability Representative (DDR) for the School, College, or Division. DDRs are designated by their deans/directors to facilitate requests for reasonable accommodation. The DDRs receive training on disability processes and are authorized to request, receive, and maintain confidential medical records for employing units.



REFERENCES

American Conference of Governmental Industrial Hygienists. 1999. *Bioaerosols Assessment and Control*

American Industrial Hygiene Association. 2016. *The IAQ Investigators Guide, 3rd Edition*

Environmental Protection Agency. 1997. *Should You Have the Air Ducts In Your Home Cleaned?* [Publication EPA 402-K-97-002]. Retrieved from <https://www.epa.gov/indoor-air-quality-iaq/should-you-have-air-ducts-your-home-cleaned>

Occupational Safety and Health Administration. 2005. *Mold* [Fact sheet]. Retrieved from https://www.osha.gov/OshDoc/data_Hurricane_Facts/mold_fact.pdf

Occupational Safety and Health Administration. 2013. *A Brief Guide to Mold in the Workplace* [Safety and Health Information Bulletin]. Retrieved from <https://www.osha.gov/dts/shib/shib101003.html>

Policy Adapted from University of North Carolina at Chapel Hill, Indoor Quality Policy (June 2002)



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Appendix A: IAQ Occupant Interview Form



Indoor Air Quality Occupant Interview Form

Date:	Building/Room:
Employee name:	
Describe Issue: First noticed issue? Pattern? Times? Days? Seasons? Outside of work?	
Are you taking any actions to treat symptoms due to these complaints? YES NO Effective?	
How long have you worked in this building? Position? Office? Previous work location?	
Number of occupants? Work Schedule?	
Activities conducted by neighboring tenants:	
Do you have any allergies , sensitivities, wear contact lenses?	
Housekeeping Closet? Cleaning Chemicals? Cleaning Schedule? Proximity to occupant?	
Pesticide Use? Signs of pests?	

Leaks? Past water events? Mold?

Are you bothered by any of the following (If yes, please describe):

Odors? YES NO

Irritation? YES NO

Air Circulation? GOOD POOR

Drafts? YES NO

Temperature? WARM COOL DRAFTY SWINGS OK

Temperature swings? TOO HIGH TOO LOW NO

Humidity? YES NO

Dust? YES NO

Others? YES NO

Any changes in the work environment?

New type of job or duties? YES NO

New equipment? YES NO

New products (chemicals? materials? paper?) YES NO

New personnel in area or department? YES NO

Have you changed where you spend most of your time in the last 3-6 months? 1 year? YES NO

Are there any problems with your workstation?

Lighting? YES NO

Glare? YES NO

Chair? Seating comfort? YES NO

Ergonomics? YES NO

Any building renovation/repairs recently in your area?

What?

When?

Did this trigger any specific comfort or health complaints? YES NO

Describe:

Furnishings and Finishes (floor, wall, partitions, ceilings, furniture)

Floor

Wall coverings

Partitions

Ceilings

Furniture

Type of Heating/Cooling? Operable windows?

What do you think is the cause of the problem? Ideas for solutions?

Notes

Follow up Plan: