



# INDIANA UNIVERSITY

OFFICE OF THE EXECUTIVE VICE PRESIDENT  
FOR UNIVERSITY ACADEMIC AFFAIRS

University Environmental Health and Safety

## Indoor Air Quality Program

December 10, 2014

### 1. INTRODUCTION

#### 1.1. Purpose

Indiana University Environmental Health and Safety (IUEHS) has developed this Program to establish standard procedures for the management of indoor air quality (IAQ) concerns.

#### 1.2. Scope

The Indoor Air Quality Program applies to all Indiana University employees and all owned or leased indoor environments.

### 2. AUTHORITY AND RESPONSIBILITY

#### 2.1. Environmental Health and Safety is responsible for:

- 2.1.1. Developing and implementing the Indoor Air Quality Program;
- 2.1.2. Conducting indoor air quality investigations when there are reported employee health concerns and/or symptoms related to work environment;
- 2.1.3. Documenting and reporting indoor air quality investigations;
- 2.1.4. Collaborating with Facilities Services and/or Physical Plant for the respective campus in the remediation of indoor air quality concerns;
- 2.1.5. Conducting monitoring for indoor air quality parameters and mold as necessary; and
- 2.1.6. Reporting the finding of the investigation results to employees with concerns and departments.

#### 2.2. Departments are responsible for:

- 2.2.1. Notifying IUEHS for the respective campus when employees have health concerns or symptoms related to the work environment;
- 2.2.2. Implementing remedial recommendations;
- 2.2.3. Providing accommodations as necessary; and
- 2.2.4. Providing appropriate PPE for employees as needed.

#### 2.3. Employees are responsible for:

- 2.3.1. Completing the Indoor Air Quality Questionnaire found on the EHS website for each respective campus; and
- 2.3.2. Seeking a medical evaluation from the Medical Services provider, when requested by EHS for the respective campus, anytime it is believed that health symptoms are related to the work environment.

#### 2.4. Facility Services and/or Physical Plant (FS/PP) are responsible for:

- 2.4.1. Contacting IUEHS for the respective campus after receiving health related air quality complaints from building occupants;
- 2.4.2. Contacting IUEHS for the respective campus when they identify a health concern or an employee with reported symptoms related to the work environment;

- 2.4.3. Contacting IUEHS for the respective campus for assistance with odor complaints as needed; and
- 2.4.4. Acting as a member of the Indoor Air Quality Committee where applicable.

**2.5. Medical Services Provider** designated for each respective campus will be responsible for:

- 2.5.1. Providing a medical assessment of employees who have health concerns related to their work environment;
- 2.5.2. Providing a written opinion for each examination and include limitations on exposure if necessary; and
- 2.5.3. Determining if medical accommodations are necessary.

**2.6. University Affirmative Action Office** is responsible for:

- 2.6.1. Working with an employee's department in determining what accommodations are reasonable under the current essential job functions for that employee.

**2.7. IU Police Dispatch**

- 2.7.1. Contacting IUEHS for the respective campus immediately after receiving a call regarding a threat to the personal health and/or safety, as it relates to indoor air quality.

**2.8. University Architect's Office**

- 2.8.1. Ensuring indoor air quality requirements as identified in Appendix C are included in contractor specifications;
- 2.8.2. Ensuring contractors abide by the indoor air quality requirements determined by the project specifications.

### **3. PROGRAM ELEMENTS**

**3.1. Response to Concerns**

Indoor air quality concerns should be reported and reviewed according to the following procedures:

**3.1.1. Immediate Issues**

Any IAQ concern that poses an immediate threat to personal health or safety should be reported to the IU Police Dispatch for the respective campus.

**3.1.2. Physical Discomfort**

Contact Facilities Services or Physical Plant for the respective campus for the following concerns;

3.1.2.1. Temperature or humidity issues;

3.1.2.2. Air movement/drafts from diffusers;

3.1.2.3. Stale air;

3.1.2.4. Particulates or dirt coming from the air handling system diffusers; and

3.1.2.5. Mold odor or visible mold.

**3.1.3. Health Concerns and Symptoms**

Employees who have health related symptoms that they believe may be related to the work environment such as; headaches, nausea, dizziness, upper respiratory irritation, chest-tightness, dry/sore throat, fatigue, itching/irritated eyes, runny-nose, congestion, or

shortness of breath are requested to complete the online [Indoor Air Quality Questionnaire](#) located at:

3.1.3.1. Upon receipt of the completed questionnaire, IUEHS will contact the employee to schedule an investigation of the work area.

**3.1.4. Odor Complaints**

Contact the FS/PP for the respective campus for odors associated with rotten egg, sewer, fishy, or musty smells. Contact IUEHS for the respective campus when experiencing unusual or abnormal odors or for odors that cannot be identified by FS/PP. IUEHS will investigate odor concerns in accordance with the Odor Investigation Protocol and Work Stoppage Guidelines. If the source associated with the odor is potentially hazardous to persons in the area (e.g. natural gas), contact IU Police Dispatch for the respective campus.

**3.1.5. Mold**

Contact IUEHS for your respective campus when there is a concern of mold or potential mold in the work area with no obvious mold source being apparent. If there is visible mold or mold odors associated with a recent moisture/flood/leakage concern or air conditioning system, contact facilities personnel. IUEHS will investigate and make recommendations for corrective actions for those instances where facilities personnel are unable to address the concern.

**3.2. Air Quality Assessment Process**

When notified and if warranted, IUEHS will perform an initial indoor air quality assessment using the following steps:

3.2.1. Reviewing the Indoor Air Quality Questionnaire, if submitted;

3.2.2. Interviewing employees with concerns and other building occupants in the immediate area of concern;

3.2.3. Conducting a walk-through inspection of the building or area of concern;

3.2.4. Inspecting the building ventilation systems with the HVAC Technician from the respective campus; and

3.2.5. Conducting air monitoring for indoor air quality parameters as indicated including; temperature, relative humidity, carbon dioxide, volatile organic compounds (VOC), and particulates.

3.2.5.1. Additional monitoring for bioaerosols and chemical contaminants may be warranted, at the discretion of the investigator, to provide more detailed information regarding the nature of the IAQ concern.

**3.3. Medical Evaluations**

Employees who have health concerns they believe are related to indoor air quality in their work area should report the concerns to their supervisor and consider contacting the Medical Services provider for the respective campus for a medical evaluation.

If the Medical Service provider deems that a medical accommodation for the employee's position is necessary, the employee's supervisor should contact the Affirmative Action Office for the respective campus. Affirmative Action will work with the employee's department in determining

what accommodations are reasonable under the current essential job functions for that employee.

### **3.4. Reports**

IUEHS will prepare written findings of investigation results, including conclusions regarding possible causes of the IAQ concerns. Copies of the IAQ investigation ~~report~~ findings will be forwarded to the complainant and his or her supervisor, and other associated units.

### **3.5. Remedial Measures**

When necessary, EHS will recommend remedial measures. For example, when visual observations find significant mold in water-damaged environments, controlling and eliminating mold growth will be recommended in accordance with the Indiana University Mold Investigation Guidelines ([Appendix B](#)). IUEHS will determine if other IAQ risks are actionable by evaluating four variables:

- 3.5.1.1. Probable source of a suspected contaminant, and its extent or magnitude,
- 3.5.1.2. Number of occupants with symptoms and the severity of their symptoms,
- 3.5.1.3. The availability of reasonable and effective measures to mitigate the suspected contaminant, and
- 3.5.1.4. Temporal and spatial exposure issues related to the suspected contaminant(s).

When the source of an indoor air quality concern and appropriate remedial measures are difficult to discern or unknown, recommendations will rely on the judgment of FS/PP for the respective campus and IUEHS staff and will often involve interventions of some kind to ascertain a causative relationship with the symptoms.

#### **3.5.2. Implementation of Occupant-Responsible Remedial Measures**

Remedial action that needs to be implemented by the supervisor should be completed within a time frame determined by IUEHS. This type of action could include general housekeeping, the purchase of a non-fabric chair or chair mats, or the relocation of printers or paper storage.

#### **3.5.3. Implementation of Other Remedial Measures**

If the remedial measures require building maintenance or repair, FS/PP or Student Housing (as appropriate) will work with IUEHS and the building occupant to implement them.

### **3.6. After Action IUEHS Review**

The complainant's department and/or FS/PP for the respective campus will notify IUEHS for the respective campus when remedial actions have been completed. IUEHS will often inspect the work area after remedial measures have been completed to ensure that recommendations have been implemented and to evaluate their effectiveness. The building occupant and his or her department will be responsible for reporting any further problems to IUEHS after this follow-up.

### **3.7. Indoor Air Quality Collaboration**

The evaluation and remediation of indoor air quality concerns requires the collaboration of many departments on campus. The communication and resolution of IAQ issues will be addressed through ad-hoc committees for the respective campus.

### **3.8. Construction and Renovation Projects**

Construction and renovation projects present a variety of situations which may release contaminants and pollutants that can impact the IAQ of a building. Contaminants and pollutants may be transported to other areas via the heating, ventilation and air conditioning system and affect populations beyond the immediate project area. Advance planning by Project Managers, appropriate contract language, material review and selection, and effective control strategies combined with proactive communication can successfully control pollutant levels, allay concerns, and maintain occupant comfort during and after construction activities. Guidelines for indoor air quality control during non-UAO renovation and construction projects within occupied buildings can be found in **Appendix C** of this document. All UAO renovation and construction projects shall include and follow specifications identified in Section 15061 - Airborne Contaminants Control found within contract specifications.

## **4. RECORDKEEPING**

IUEHS will document all IAQ investigation findings. Reports, questionnaires, field notes, sample results, and correspondence will be maintained by IUEHS.

## **5. REFERENCES**

- Recommendations from the Environmental Protection Agency (EPA) Tools for Schools.
- IAQ Building Education & Assessment Model (I-BEAM); Building Air Quality: A Guide for Building Owners and Facility Managers; Building Air Quality Action Plan.
- <http://ehs.iu.edu/topics/indoor-air/index.shtml>
- ANSI/IICRC S520

## **6. REVISIONS**

New Document: December 10, 2014

## **APPENDIX A – GLOSSARY**

### ***Area of Concern***

During the investigation, IUEHS will delineate an area of concern for indoor air quality problems and possible remediation. The area of concern will be delineated according to the locations of complainants, the probable source of the suspected contaminant, the design of the HVAC system, and physical barriers.

### ***Remedial Measures***

Remedial measures may be confined and temporary, or as extensive as renovation of a building's heating, ventilation, and air conditioning (HVAC) system. Less extensive remedial measures include better housekeeping, replacing furniture, cleaning mildew off of pipes, installing portable dehumidifiers or air cleaners, cleaning window air conditioners, and replacing carpet with vinyl tile flooring.

## **APPENDIX B – MOLD INVESTIGATION GUIDELINES**

The investigation and removal of mold in the workplace needs to be conducted in a thorough and consistent manner to avoid releasing mold spores into an occupied environment. Mold has been identified as a source of indoor air pollution and a health risk to all people and especially, susceptible individuals of the population. Health effects range from mild irritation, to severe life threatening illnesses such as asthma attacks or fungal infections. The actual effects are based on many factors, such as: the type of mold, amount of mold contamination, accessibility of the mold to air currents and the human population, and sensitivity of the exposed individuals.

In order to reduce the effects that mold has on building occupants, procedures regarding the investigation and removal of mold are necessary. Facility Services and/or the Physical Plant (FS/PP) for each respective campus and Indiana University Environmental Health and Safety (IUEHS) will work jointly to ensure that all complaints regarding mold and mold contaminated materials are handled in a manner that results in minimal release of mold spores within the building. OSHA and the US EPA have published guidelines that should be followed when appropriate.

### **Procedures**

While routine mold abatement associated with visible mold or moldy odors will generally be addressed by FS/PP for the respective campus, all other complaints or requests for investigation shall be referred to the IUEHS department for the respective campus.

Routine facilities mold remediation will generally involve HVAC systems and may remove and/or remediate mold contamination if materials being removed are:

- Ceiling tiles of 25 square feet or less; or
- Dry wall or other wall surface of 10 square feet or less.

Greater quantities of mold will often be remediated by a mold remediation contractor using established guidelines such as EPA guidance or ANSI/IICRC S520: Standard and Reference Guide for professional Mold Remediation.

The following procedures shall be followed for the investigation of mold concerns:

1. IUEHS personnel will investigate, in a timely manner, and report their findings to the originating party and to FS/PP for the respective campus;
2. If appropriate, the University Architect's Office (UAO) or FS/PP Renovations shall be notified;
3. When the amount of affected area is beyond the exempted amount listed above or if there are concerns regarding building occupant exposures, IUEHS will investigate and prepare a plan for remediation as necessary;
4. Remediation methods will be based on the size of the affected area, sensitivity of the potentially exposed population and established guidelines.
5. Appropriate personnel from Facility Services, Physical Plant, or University Architects Office (UAO) will coordinate the remediation of the mold with the IUEHS Asbestos Program Manager or qualified remediation contractor;
6. IUEHS will provide oversight or advice if requested or if the project size warrants.

### **Guidelines for Removal of Small Areas of Mold Contamination**

These guidelines are designed to minimize the release of mold spores into an office, laboratory or similar environment. Other types of occupancies or extenuating circumstances may require more or less stringent procedures. If there is any doubt as to whether these procedures are appropriate, contact IUEHS for the respective campus for recommendations.

As a general rule, simply killing the mold with a biocide is not effective to eliminate the hazard. The mold must be removed, since the chemicals and proteins, which can cause a reaction in humans, are still present in non-viable mold.

### ***Non-Porous Surfaces***

Mold can generally be removed from nonporous surfaces by wiping or scrubbing with water and detergent. It is important to begin drying dry these surfaces, within 24-hours, to discourage further mold growth. Instructions for cleaning surfaces, as listed on product labels, should always be read and followed. [Materials that are not completely dried within 72 hours should be considered for removal.](#)

### ***Non-Salvageable Items***

Building materials and furnishings contaminated with mold growth that cannot be cleaned and decontaminated should be placed in sealed impermeable bags while in the remediation area. These materials can ~~usually~~ be discarded as ordinary solid waste. It is important to contain mold-contaminated materials in this fashion to minimize the dispersion of mold spores into the building space.

The work area where mold removal is occurring should not be occupied. Removing people from spaces adjacent to the work area is not necessary, but is recommended for infants (less than 12 months old), persons recovering from recent surgery, immune-suppressed people, or people with chronic inflammatory lung diseases (e.g., asthma, hypersensitivity pneumonitis, and severe allergies).

Containment of the work area is not always necessary but return airs should be blanked off and the room should be isolated from the building occupants, doors shut etc... Dust suppression methods, such as misting (not soaking) surfaces prior to remediation, are recommended.

The work area and areas used by remediation workers for egress should be cleaned with a damp cloth or mop and a detergent solution as necessary.

All areas should be left dry and visibly free from contamination and debris.

### ***Personal Protective Equipment***

Respiratory protection, such as an N-95 disposable respirator is required.

Gloves and eye protection ~~should be worn~~ are required. Appropriate personal protective equipment shall be worn and obtained from the area supervisor.

If upholstered or other soft material is contaminated, IUEHS and the FS/PP shall be consulted to determine the appropriate method of remediation.



## **APPENDIX C – IAQ DURING NON-UAO RENOVATION AND CONSTRUCTION PROJECTS IN OCCUPIED BUILDINGS**

### **General Air Quality Specifications**

- Develop a site-specific plan to control demolition and reconstruction materials in renovation areas as guided by the 'Air Quality Considerations' below.
- Identify the specific air quality measures needed for the renovation project, including appropriate performance metrics.
- Require each prime contractor to designate an air quality representative to manage air quality issues.
- Specify conditions that would require an emergency response, such as asbestos release or a major water loss.

### **Air Quality Considerations**

- Schedule renovation work during periods of low building occupancy when possible.
- Isolate work areas from occupied areas using critical barriers, air pressure control and high-efficiency particulate air (HEPA) filtration.
- Minimize the number of building penetrations necessary for entry into the renovation area. Choose the penetration sites carefully to minimize the potential for occupant exposure.
- Modify HVAC operations according to specifications of University Environmental Health and Safety and IU staff engineers prior to and during renovation activities to ensure isolation of renovation areas from occupied spaces.
- Maintain an adequate unoccupied buffer zone around renovation areas according to design specifications. This may require temporarily relocating building occupants in the immediate vicinity of renovation areas.
- Increase housekeeping activities in adjacent occupied areas during renovation activities that create dust.

### **Work Practice Measures for Air Quality Assurance**

- Employ local exhaust when dust, hazardous vapors, fumes, or gases are generated. If local exhaust is not feasible, portable air cleaning devices (such as the use of HEPA-filtration) may be used.
- Minimize dust generation by using wet methods for cutting or sanding.
- Locate dumpsters for debris away from operating HVAC outdoor air intakes and exterior doors to occupied areas when possible.

### **Specific Control Measures for HVAC Protection**

- Ventilation shall be provided in order to maintain a negative pressure in all areas of occupied buildings where there is potential for dust contaminant generation from a construction project. The contained area shall be kept under negative pressure relative to the surrounding areas by the use of HEPA filtered negative air machine(s). A minimum of -.02 column inches of water pressure differential, relative to outside pressure, shall be maintained within the work area as evidenced by manometer measurements provided by the contractor on a continuous basis.
- Construction documents shall specify modifications required to existing mechanical systems or temporary equipment to be installed to properly ventilate the affected building areas.
- Construction documents shall include temporary ductwork layouts (as necessary) as well as sizing and specifications of fans.
- Contractors shall not make design decisions for temporary ventilation of occupied areas of buildings.

- Isolate portions of the HVAC system that may become contaminated from renovation activities as specified by consulting and IU staff engineers.
- Seal return air grills in renovation areas.
- Upgrade filtration efficiency in the HVAC systems that could be affected during renovation (if possible) as directed by specifications.

### **Specific Housekeeping Measures for Air Quality Assurance**

- Identify the route(s) for removing construction debris from the building.
- Identify traffic routes for renovation workers within the building, using pathways away from occupied spaces if possible.
- Identify specific locations within buildings that contractors may use, including restrooms (if appropriate).
- Eliminate demolition/renovation debris by bagging on site and/or the use of covered wheelbarrows or cart to transport debris to containers outside of the building.
- Contractors shall clean areas inside of construction exits to minimize dirt and debris from entering occupied spaces in the building.
- Contractors shall clean occupied areas adjacent to renovation site (such as hallways) if construction debris or soil has caused an area to be notably dirtier than other similarly occupied areas.
- Place walk-off mats at all entrances and exits from the renovation area. These mats must be regularly cleaned or replaced to minimize migration of dust from the project site.

### **Specific Control Measures for Painting Occupied Areas**

- Schedule work during evening hours or periods of low building occupancy.
- Use low odor/ low VOC products.
- Provide IUEHS copies of Safety Data Sheets for all products being used.
- Provide ventilation in the area. If necessary, maintain a negative pressure in all areas being painted.
- Collaborate with Facilities Services and/or Physical Plant for the respective campus to adjust the air handler settings so paint fumes are not redistributed into the occupied spaces.

### **Roof Leaks, Pipe Breaks and other Water Losses caused by Renovation Contractors**

- Contractors are responsible for all water losses inside buildings that happen as a result of their renovation activity.
- Contractors shall inform Facilities Services and/or Physical Plant for the respective campus of all water losses that occur due to construction activities.
- Facilities Services and/or Physical Plant for the respective campus will manage the water remediation process and be reimbursed by contractor for all expenses involved with the remediation.
- Only University-approved contractors will be employed for water remediation.
- Water must be removed and damaged building materials must be dried effectively within 24-hours or replaced as necessary.

### **Outdoor Work with Hazardous or Odorous Materials near Air Intakes**

- Locate portable toilets away from air intakes.
- Use or application of chemical/odorous materials shall be located at least 25 feet away from all outside air intakes (if feasible).
- When work including chemical/odorous materials must be done at or near air intakes, outside air intake should be minimized or the task should be performed when the building is not occupied (such as evenings or weekends).

- For long-term projects that use chemicals or produce combustion exhaust near air intakes, install charcoal filters in the air handling units serving the occupied space of the building.

### **Measures for Maintaining Good Air Quality**

- Discuss air quality issues at regularly-scheduled construction meetings. The contractor indoor air quality representative needs to be included in these meetings.
- Monitor renovation activities carefully to ensure that all work conforms to the stated air quality control measures.
- Monitor pressurization at project sites, using a pressure monitoring device, to ensure that proper isolation and ventilation is in effect.
- Monitor for visible or odorous airborne contaminants in adjacent occupied areas.
- Promptly respond to occupant complaints in order to resolve issues that involve contractor work activities.

### **Measures for Enforcement of Air Quality Assurance**

- Contractors are responsible for meeting all specifications involved in maintaining acceptable air quality for building occupants and the IU Construction Manager for the project will be responsible for daily contract compliance associated with air quality.
- Contractors shall coordinate with the University Architect's Office, Construction Management for the respective campus, and University Environmental Health and Safety for any variations to the specifications or circumstances outside of their control involving air quality in occupied buildings.
- If an acceptable air quality condition is not maintained by contractors IUEHS may halt construction operations until suitable measures have been taken to restore acceptable air quality for building occupants.