



**University of New Hampshire**

# **Indoor Air Quality Management Plan**

Revised:  
March 2016

© 2010 - 2016 University of New Hampshire – Office of Environmental Health and Safety. All rights reserved.

The most current version of this document can be found at:  
<http://www.unh.edu/research/environmental-health-and-safety>

**TABLE OF CONTENTS**

**INDOOR AIR QUALITY MANAGEMENT PLAN**

**1.0 INTRODUCTION..... 2**

**2.0 SCOPE AND APPLICABILITY ..... 2**

**3.0 RESPONSIBILITIES ..... 3**

3.1 IAQ Program Manager ..... 3

3.2 Facilities Division ..... 3

    3.21 Facilities Services and Energy and Utilities ..... 3

    3.22 Housekeeping..... 3

    3.23 Facilities Project Management..... 4

3.3 Housing..... 4

3.4 Sustainability Institute ..... 5

3.5 IAQ Teams..... 5

3.6 Department Managers/Supervisors/Building Coordinators ..... 5

**4.0 BUILDING PROFILES ..... 6**

4.1 IAQ Building Profile Assessment..... 6

4.2 Building Systems ..... 6

**5.0 PREVENTION..... 6**

5.1 Housekeeping..... 6

5.2 Construction Activities ..... 7

5.3 HVAC Systems..... 8

    5.31 Carbon Dioxide..... 8

    5.32 Carbon Monoxide ..... 8

    5.33 Radon..... 9

    5.34 Formaldehyde ..... 9

5.4 Hazardous Materials ..... 9

5.5 Moisture and Mold..... 9

**6.0 INVESTIGATING IAQ COMPLAINTS ..... 10**

**7.0 COMMUNICATION..... 11**

**8.0 TRAINING AND EDUCATION..... 11**

Appendix – Indoor Air Quality Management Plan Forms

## **1.0 INTRODUCTION**

Concerns with Indoor Air Quality (IAQ) have increased since energy conservation efforts were instituted in buildings during the 1970's that minimized the infiltration of fresh outside air and contributed to the build-up of contaminants in the indoor air. Complaints involving IAQ range from single isolated issues related to comfort parameters (temperature, humidity, drafty), unfamiliar smells/odors, to more complex issues where the air quality may be suspected of causing illness. Identifying the underlying cause(s) of an IAQ complaint is challenging as there are a number and variety of potential sources, causes, and varying individual sensitivities.

The University of New Hampshire (UNH) is committed to providing its students, faculty, staff, visitors, and guests indoor environments that are free of contaminants and airborne disease agents. To assist in the protection of indoor environments, the Office of Environmental Health and Safety (OEHS) has developed this Indoor Air Quality Management Plan. The objectives of the IAQ Management Plan are:

1. Reduce the levels of indoor air pollutants through preventative measures such as routine housekeeping, maintenance activities, periodic building evaluations and inspections, and IAQ-specific policies and procedures;
2. Provide and maintain adequate air flow by maintaining and repairing ventilation equipment, which will promote a comfortable and healthy environment for faculty, staff, and students; and
3. Respond to IAQ-related concerns and complaints in a prompt and thorough manner and effectively communicate the progress of investigative and corrective actions to all impacted parties.

## **2.0 SCOPE AND APPLICABILITY**

The following IAQ Management Plan applies to the UNH Durham campus and can involve any building. Whether it is an academic building, residence hall, dining facility, or administrative complex, the IAQ Management Plan applies to all UNH operations. The following departments are involved with IAQ complaints and the development of corrective actions.

1. Office of Environmental Health and Safety;
2. Facilities Division;
  - Facilities Services
  - Energy and Utilities
  - Facilities Project Management
  - Housekeeping
3. Housing; and
4. Sustainability Institute.

### **3.0 RESPONSIBILITIES**

#### **3.1 Office of Environmental Health and Safety - IAQ Program Manager**

The IAQ Program Manager is responsible for the development and implementation of the IAQ Management Plan. The IAQ Program Manager:

- Serves as the primary contact person for IAQ issues and concerns;
- Coordinates the development and management of the UNH IAQ Management Plan including oversight of building IAQ Teams;
- Conducts the annual review of the UNH IAQ Management Plan and modifies the plan as necessary;
- Coordinates building walk through assessments including initial building profiles and annual building reviews;
- Conducts investigative efforts involving IAQ complaints and concerns, documents investigative efforts, and communicates with applicable building occupants and representatives concerning complaints and corrective actions;
- Develops corrective recommendations, actions, and/or controls, and works collaboratively with the IAQ Team, colleges, and departments in their implementation; and
- Conducts training and education in the recognition, prevention, and resolution of IAQ related issues.

#### **3.2 Facilities Division**

##### **3.21 Facilities Services and Energy and Utilities**

Facilities Services and Energy and Utilities will be responsible for day-to-day routine maintenance activities that could potentially impact IAQ. Responsibilities include:

- Conducting appropriate preventative maintenance in accordance with Facilities Operations and Maintenance procedures on equipment such as Heating Ventilation and Air Conditioning (HVAC) systems that could impact IAQ;
- Assisting OEHS with investigative efforts following reports of compromised IAQ as necessary;
- Limiting the use of high VOC compounds in cleaning, painting, and maintenance activities; and
- Participating in regular IAQ awareness training.

##### **3.22 Housekeeping**

Housekeeping personnel play a critical role in maintaining interior campus locations in a clean and sanitary manner. Their role is critical in maintaining good IAQ. Housekeeping responsibilities include:

- Selecting appropriate cleaning equipment that minimize impacts to IAQ including utilizing vacuums equipped with High Efficiency Particulate Air (HEPA) filtration;
- Reviewing cleaning materials on a routine basis and, where possible, replacing them with “green” brands that can improve IAQ;
- Assisting OEHS with investigative efforts following reports of compromised IAQ as necessary;
- Performing comprehensive cleaning in areas where suspected IAQ issues may be associated with overall cleanliness; and
- Participating in regular IAQ awareness training.

### 3.23 Facilities Project Management

Facilities Project Management (FPM) plays a critical role in the prevention of IAQ issues related to new construction and/or renovation projects, as well as in the development and implementation of corrective actions. FPM responsibilities include:

- Overseeing the proper installation of supply and exhaust air to buildings as part of construction/renovation projects;
- Ensuring proper balancing of air supply and exhaust systems installed as part of new or renovated campus buildings/spaces;
- Assisting OEHS with investigative efforts following reports of compromised IAQ and the development of corrective actions as necessary;
- Ensuring that the proper use of materials, such as low VOC paint and adhesives, and proper construction practices are used to minimize impacts to finished and/or occupied areas during and following construction activities;
- Communicating with building occupants regarding pending construction/renovation projects and potential impacts to IAQ;  
Coordinating radon testing with OEHS in buildings following the completion of major renovations or new construction; and
- Participating in regular IAQ awareness training.

### 3.3 Housing

To assist in the implementation and ongoing management of the IAQ Management Plan in relation to residential halls, Housing responsibilities include:

- Responding to student IAQ complaints in a timely manner and reporting all complaints to the IAQ Program Manager;
- Responding to water/moisture issues in a timely manner and ensuring that the drying process is initiated within 24 hours of any and all water intrusion incidents;
- Promoting the IAQ Management Plan by providing IAQ Fact Sheets to all incoming students; and

- Participating in regular IAQ awareness training as necessary.

### 3.4 Sustainability Institute

To assist in the implementation and ongoing management of the IAQ Management Plan the Sustainability Institutes responsibilities include:

- Establishing building IAQ contacts;
- Participating in regular IAQ awareness training; and
- Providing outreach to the campus on the IAQ Management Plan.

### 3.5 IAQ Teams

Those buildings that wish to participate in the IAQ Management Plan by taking a building wide proactive approach to IAQ will establish an IAQ Team. The IAQ Team will assist in supporting the IAQ Management Plan by representing occupants and acting as a liaison with OEHS. The IAQ Team will be involved with inspection, investigation, and communication efforts. To support the IAQ Management Plan the team will be responsible for the following:

- Supporting the UNH IAQ Management Plan and IAQ Program Manager to assist with maintaining good IAQ for the building;
- Assisting in the annual review of the UNH IAQ Management Plan by providing feedback on implementation and overall management;
- Participating in investigative efforts as necessary and communicating the results of these efforts and established corrective actions with building occupants;
- Participating in routine building inspections; and
- Participating in regular IAQ awareness training.

### 3.6 Department Managers/Supervisors/Building Coordinators

One of the key components to successfully identifying a source(s) of IAQ complaints is a quick response to and accurate documentation of reported issues. This starts in the area where the complaint/concern originates. Departments/managers/supervisors and/or building coordinators responsibilities include:

- Working within respective departments/building to ensure that all occupant complaints are well documented and communicated to OEHS;
- Assisting OEHS with investigative efforts and the development of corrective actions as necessary; and
- Participating in regular IAQ awareness training as necessary.

## **4.0 BUILDING PROFILES**

### **4.1 IAQ Building Profile Assessment**

The building profile is a baseline assessment intended to identify potential sources that could contribute to compromised IAQ and set criteria to compare any future assessments as conducted on a routine basis or as the result of an IAQ complaint or concern. In addition to establishing a baseline, the profile will allow those responsible for the building and selected occupants the opportunity to review potential sources and develop controls to prevent issues in a pro-active manner. The building profile assessment will involve a physical review of the building and its physical components including sources of combustion, HVAC units servicing the building areas, potential pollutant sources, hazardous building materials, and external sources. In addition a review of housekeeping procedures, pest control applications, and overall building condition will be documented.

The IAQ Program Manager, designated Facilities Division Representative(s), and building coordinator will conduct walk through assessments of all areas of a designated building. This includes functional spaces of the building that house administrative and/or educational/research activities. The assessment will include observations that assess factors that could potentially impact IAQ through the use of general senses (sight, smell, touch, and hearing). During the walk through, physical components that affect the air quality of functional spaces will be examined, including flooring or carpeting, walls, ceilings, furniture, air intakes and exhaust, entrances and exits, mechanical spaces, and roofs. The walk through will provide insight regarding the type, location, and magnitude of potential IAQ sources. Observations, recommendations, and comments collected during the walk through will be documented on the IAQ Building Profile Assessment Checklist (see appendix).

### **4.2 Building Systems**

Building systems evaluations will be accomplished by having a Facilities Division Maintenance HVAC Technician review the building HVAC system(s) and document findings on the IAQ Building Profile Assessment Checklist. All IAQ questions and issues related to building systems will be prioritized and referred to the respective Facilities Zone Manager for the development of corrective actions.

Building profiles and systems evaluation checklists will be documented and retained on file with OEHS. Copies will be provided to the Building Coordinator for distribution accordingly.

## **5.0 PREVENTION**

Preventative maintenance plays a critical role in maintaining the quality of air by assuring building systems are operating effectively and efficiently, and that procedures are in place to minimize non-system impacts to IAQ. In addition it helps to maintain comfortable temperature and humidity levels in occupied areas. The following sections describe basic fundamental preventative measures that can be conducted to reduce potential risks to IAQ.

### **5.1 Housekeeping**

Regular and thorough cleaning is an important means for the removal of air pollutant sources. However, the use of cleaning products may also contribute to indoor air pollution. To ensure that

cleaning practices remove pollutants, or prevent additional pollutant sources, the following guidelines should be adhered to while using cleaning products:

- Housekeeping staff should only utilize cleaning agents that have been reviewed and approved for use. All containers must be clearly labeled, tightly closed, and stored in a secured location when not in use.
- Areas must be kept clean. Vacuums equipped with high efficiency particulate air (HEPA) filtration and wet wiping techniques should be used to clean and control dust/particulate build up in indoor environments.
- Areas of frequent use and traffic should be cleaned on a more frequent basis.
- Large walk-off mats must be used to trap dirt and moisture at building entrances to help in maintaining the cleanliness of floors throughout buildings. Walk-off mats must be cleaned in accordance with the manufacturer's recommendations or on a more frequent basis as needed.
- Staff should discuss with other occupants the use of any outside odor causing item that could impact IAQ. This would include discussions prior to utilizing personal air fresheners, scented candles, or any other odor causing item.
- Pollutant releasing activities, such as sweeping, waxing of floors, bathroom cleaning, etc. should be conducted during time periods where occupancy is low. In addition, significant cleaning operations, such as carpet washing should be conducted when areas are scheduled to be unoccupied for extended periods, such as holiday breaks or during the summer for residential halls. Carpets should be thoroughly cleaned utilizing deep water extraction and properly dried. Proper drying must include carpet drying fans and dehumidification.

## 5.2 Construction Activities

IAQ must be considered when planning construction and renovation projects. Renovation and construction activities can create many sources that can lead to compromised IAQ. To minimize potential impacts to occupants the following preventative measures can be implemented.

- UNH Project Managers should communicate with building occupants and ensure that construction areas in occupied buildings are isolated from the occupied areas. This can be achieved through the construction of temporary barriers or the use of plastic sheeting. In addition areas can be placed under negative air pressure.
- Ensure construction activities utilize methods to minimize dust and odors such as wet cutting of concrete and/or the use of low odor/low VOC paints and adhesives. Painting and drying, or any other construction tasks that requires the use of chemical materials should occur during periods of low occupancy and with proper ventilation.
- Floor coverings should be closely evaluated and selected. Carpets can offer acoustical and comfort benefits but can retain contaminants that are difficult to remove. In addition, carpets can become a reservoir for microbiological growth



should they become wet and not dried in a timely manner (refer to section 5.5 Water/Mold Management). Resilient flooring does not offer the same acoustical or comfort benefits of carpets but can significantly reduce the potential for microbial growth should a water/moisture intrusion occur. It is preferred in high traffic areas to allow for easier cleaning of dust and debris. However, they do require regular cleaning and potential waxing that can in itself create odors.

### 5.3 HVAC Systems

Preventative maintenance involves routine inspections, adjustments, and repair of building structures and systems that include HVAC systems, unit ventilators, local exhaust, fresh air intakes, and flooring. Preventative maintenance plays a major role in maintaining the quality of air by assuring that the building systems are operating effectively and efficiently. Moreover it helps to maintain comfortable temperature and humidity in occupied spaces.

Efforts will be made to maintain buildings in accordance with the American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE) recommended comfort parameters. To achieve this UNH has established construction standards regarding thermal comfort to maintain temperatures within 68°F to 78°F based on the time of year and heating/cooling cycles. *It must be noted that the recommended temperatures as established by ASHRAE are only that. They are values in which most individuals, but not all, will feel comfortable.* In addition to thermal comfort, common IAQ contaminants and recommended indoor guidelines are listed below.

#### 5.31 Carbon Dioxide

Carbon dioxide (CO<sub>2</sub>) is found in the atmosphere as a normal constituent at background levels of approximately 350 ppm – 450 ppm. Studies have indicated that CO<sub>2</sub> is an excellent surrogate indicator of good IAQ. Since CO<sub>2</sub> is given off by humans when exhaling, its levels in the air provide a good indication of the quality of air circulation and how effectively the ventilation system, if present, is diluting and removing pollutants from the air. CO<sub>2</sub> levels will accumulate in any building space when occupied and will rise when not enough fresh air is introduced. The State of New Hampshire has established a recommended guideline of 1,000 ppm for acceptable IAQ in office buildings. ASHRAE Standard 62-2001 for Ventilation for Acceptable Indoor Air Quality has established a maximum of 700 ppm above outside background as a recommended guideline. UNH will utilize the State guideline for office buildings of 1,000 ppm in the evaluation of IAQ.

#### 5.32 Carbon Monoxide

Carbon Monoxide (CO) is a colorless and odorless gas generated by incomplete combustion, is not a natural component of indoor air, and is considered an indoor air pollutant. Overexposure to CO can deprive the body of oxygen-carrying hemoglobin and cause immediate or chronic health effects to those individuals exposed to elevated levels of the gas. As a point of reference, various industrial exposure limits have been established that range from 25 – 50 ppm. In addition, the World Health Organization (WHO) uses 9 ppm as a "concentration of concern" and notes that indoor concentrations of CO should not exceed those found outdoors by more than 3 ppm. Finally, the State of New Hampshire has established a maximum concentration of 5 ppm for office buildings. In buildings with combustion sources UNH will utilize the State maximum concentration of 5 ppm as a value not to be exceeded.

### 5.33 Radon

Radon is a colorless and odorless gas resulting from the decay of naturally occurring uranium. Radon can diffuse through the rock and soil and enter buildings as soil gas through crack, sumps, or around concrete slabs. Radon testing will be conducted in those buildings following the completion of major renovations or new construction. Sampling will be conducted in a representative breathing zone location on the lowest occupied floor of a building or structure. Sampling results will be compared to the United States Environmental Protection Agency (US EPA) and State of New Hampshire maximum interior value of 4.0 picocuries per liter of air (pCi/L). Questions related to radon and radon testing should be directed to the Radiation Safety Officer in OEHS.

### 5.34 Formaldehyde

Formaldehyde and formaldehyde resins have been used in a variety of products that can impact the air quality in indoor environments. Formaldehyde can be found in products such as adhesives in pressed wood, particle board, medium density fiberboard, plywood, textile treatments, finish coatings, and urea formaldehyde foam insulation. It is also used in rubber/latex manufacture, dye manufacture and use, laboratory fixatives (formalin solutions), disinfectants, and preservatives. While the use of formaldehyde in new building products and materials has decreased, new products that contain formaldehyde can off gas creating the potential for impacting IAQ. The evaluation for formaldehyde will be conducted by OEHS and will include a review of safety data sheets for products used during renovation/construction activities and, if necessary, the collection of air samples. Results of indoor air sampling for formaldehyde will be compared to the State of New Hampshire maximum value of 0.1 ppm for office buildings.

### 5.4 Hazardous Materials

It is important to handle hazardous materials according to manufacturers' guidelines. Wastes generated from hazardous materials use must be stored in proper containers in designated locations. Hazardous materials can be encountered in many areas at UNH. The proper use of hazardous materials are more specifically covered in the UNH Hazard Communication Program, Chemical Hygiene Plan, and Hazardous Waste Management Plan.

The presence of hazardous building materials, such as lead and asbestos, typically do not pose a risk to building occupants unless they become damaged during maintenance operations or as part of construction/renovation activities. To ensure their proper management, UNH has established a comprehensive Hazardous Building Material Operations and Maintenance Program to outline procedures for the identification, inspection, and management of known and/or suspected materials.

### 5.5 Moisture/Mold

Microbiological growth from mold and bacteria can be a significant cause of illness, health symptoms, discomfort, and odors. It is important to understand that the easiest way to control microbiological growth is to control moisture.

Signs of water intrusion and microbiological growth will be evaluated during building inspections, system evaluations, and other efforts. Facilities Operations should also be concerned about damaged building systems and components that can cause water leaks and condensation. Necessary repairs must be made in a timely manner to reduce the risk subsequent to microbiological growth.

To prevent the propagation of microbiological growth those materials that become impacted by water/moisture must be dried in a prompt manner. Within 24 hours efforts must be initiated. Materials must exhibit drying within 48 hours and must be dry within 72 hours. Those materials that are not dried within the 72 hour window must be re-assessed or removed and replaced. Drying must include fans and dehumidification.

Materials contaminated with microbiological growth will be promptly cleaned or replaced. Mold growth can be removed from non-porous surfaces utilizing a brush and appropriate anti-microbial cleaner. New York City and the United States Environmental Protection Agency have established guidelines on the assessment and remediation of fungi in indoor environments. They establish response actions into four categories as outlined below:

- Category 0: Drying water damaged items within 48 hours of occurrence.
- Category 1: Small isolated areas, less than 10 square feet.
- Category 2: Mid-size isolated areas, between 10 – 100 square feet.
- Category 3: Extensive contamination, greater than 100 square feet in an area, or contaminated HVAC equipment.

UNH Facilities may conduct Category 0 or Category 1 actions only. In addition, those conducting Category 1 actions must have received training in the proper use of respiratory protection and PPE. All other actions will be coordinated with one of the USNH Emergency Response and Restoration Services and/or asbestos abatement term contractors. Response actions, whether by UNH personnel or term contractor, must be documented. When UNH makes an evaluation to determine the extent of microbiological contamination and the appropriate response, the following must be considered:

- The source(s) of water intrusion and ensuring that the source has been remediated.
- The location and type of impacted materials.
- The size and limits of visible or known microbiological contamination.
- The possibility of hidden microbiological growth.
- The potential to render microbiological contamination airborne during remediation activities.
- The nature of the building, type, occupancy, and mechanical systems.

## **6.0 INVESTIGATING IAQ COMPLAINTS**

All students and employees are encouraged to report any and all IAQ concerns regardless of how minor they may seem. Prompt reporting will allow for the quick assessment and resolution to IAQ issues that can assist in preventing serious problems such as potential discomfort, potential health effects, and unnecessary costs.

Should any student or employee have an IAQ concern they should notify their direct supervisor and contact OEHS. In addition the person filing the complaint should document the concern in writing. A written description of the concern reduces misunderstanding and creates a history that can be referred to at a future date. All written concerns should also be forwarded to OEHS to initiate the investigating process. The resolution of IAQ concerns must be documented and the impacted parties informed in writing of the corrective actions. All IAQ complaints, written descriptions, and investigative reports will be filed with OEHS.

Complaints can be filed via telephone, e-mail, or electronic reporting from the OEHS IAQ Webpage.

Upon receipt of an IAQ concern or complaint, OEHS will notify the Facility Zone Manager, Facilities Executive Director, Department Manager/chair, Dean, or any other key building representatives to inform them of the issue and make them aware of pending investigative actions. All correspondence related to the investigation will be forwarded to appropriate representatives as described above.

## **7.0 COMMUNICATION**

Communication is a critical element to successful IAQ management. Misinformation on IAQ concerns through ineffective communication methods or from those not properly trained on IAQ can lead to confusion and unnecessary reactions to minor issues. In order to maintain proper lines of communication related to IAQ issues and misinformation, all IAQ concerns will be communicated in a prompt, honest, and courteous manner until such time that the issue is resolved. For every IAQ concern the IAQ Coordinator will report on the issues, measures taken, and the resolution of the identified concern to the appropriate parties.

Communication will be conducted via electronic correspondence (e-mail), written documentation, personal meetings, or group/open forum discussions. The form of communication will be determined based on the IAQ concern, its severity, and employees affected.

In the unlikely event of an IAQ emergency, UNH will accommodate the needs of students, faculty, staff, and parents (if warranted). UNH Media Relations will coordinate all communications and disseminate information to those as necessary.

## **8.0 TRAINING AND EDUCATION**

All employees play an important role in maintaining and improving IAQ since their behavior can affect the quality of air in the building they work or reside. For example placing objects on unit ventilators, blocking air supply diffusers, or improperly using chemical materials can impact the air quality in a room or rooms. An IAQ educated employee is more likely to take steps to avoid creating an IAQ concern and maintain good air quality. In addition those employees with a solid understanding of IAQ are more likely to report a concern quickly and accurately. For those reasons, training will be required for all those personnel who participate in the IAQ Management Plan. Training will include an overview of the management plan. In addition discussions will include the following:

- Basic IAQ concepts;
- IAQ concerns and contaminants;
- Mold awareness;

- Preventative and corrective measures;
- IAQ communication; and
- Common IAQ misconceptions.

Those Facilities personnel who would be required to conduct Category 1 tasks as described in Section 5.5 will also receive training in the proper use of respiratory protection (refer to the UNH Respiratory Protection Program for more details).

All participants will be required to sign in documenting their participation. All training records will be maintained by OEHS.

In addition to the training described above, information related to IAQ will be provided to assist with informing building occupants of pro-active measures that can be taken to maintain good air quality.

**Appendix**  
Indoor Air Quality Management Plan Forms