

**INDOOR ENVIRONMENTAL QUALITY POLICY**  
Environmental Health and Safety  
Business Affairs  
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**OBJECTIVE**

Indoor environmental quality (IEQ) has become a significant issue at the University of Florida as well as in most other colleges and universities across the United States. This policy has been developed for the purpose of preventing or reducing the incidence of indoor environmental quality problems. The policy provides an organized approach to addressing indoor environmental quality issues from several different directions.

It is generally recognized that failing to respond to an indoor environmental quality concern in a timely and appropriate manner can have numerous detrimental consequences such as:

- Increasing long and short term health problems such as cough, eye irritation, headache, asthma attacks and allergic reactions and in rare instances, leading to life threatening conditions such as severe asthma attacks, Legionnaire's disease or carbon monoxide poisoning
- Promoting the spread of airborne infectious diseases
- Producing an unfavorable work and learning environment
- Reducing the productivity of faculty, staff and students due to discomfort, sickness, or absenteeism
- Accelerating the deterioration and thus reducing the efficiency of the physical plant and equipment
- Increasing the risk that areas of buildings will have to be closed and the occupants temporarily relocated
- Straining relationships among the administration, faculty, staff and students
- Generating negative publicity that could damage the University's image and effectiveness
- Creating potential liability problems.

The large number of faculty, staff and students as well as the number and variety of buildings making up the University community combine to present many unique indoor environmental quality challenges. The types of heating, ventilating and air conditioning (HVAC) systems may vary from building to building making the development of routine and standardized maintenance procedures difficult. The scheduled HVAC upkeep, ranging from daily cleaning to equipment service, must be carried out by a Physical Plant\* staff that may be undermanned or ill-equipped to provide anything above the most basic services required to keep a building running.

The specific objectives of this IEQ policy and of the program resulting from its implementation are:

- To reduce employee complaints, health related symptoms, and illness that may be due to indoor environmental problems;
- To reduce the frequency and number of employee lost-time incidents that can be attributed to indoor environmental problems;
- To improve the quality of the indoor work environment;
- To establish a pro-active policy and guidance in addressing issues that relate to indoor environments and will maintain good indoor environmental quality in the future;
- Provide guidance on whom to contact when a concern about the indoor environment is raised, and on the ways to proceed in evaluating concerns.

The following sections of this policy present general information regarding indoor environmental quality concerns as well as specific information relevant to the IEQ program at the University of Florida. This policy is meant to be a working document that will be reviewed and updated periodically as new information or policies become available.

\* The term Physical Plant (PPD) is used throughout this document to represent the designated maintenance group regardless of the University division.

## **AUTHORITY**

29USC§654, 5(a) 1; Health & Safety Best Management Practices

## **POLICY**

In recognition of the important role that good indoor environmental quality has in contributing to the health and comfort of University faculty, staff and students, this policy serves as both a source of general indoor environmental quality information and a statement of the items necessary to maintain a satisfactory work environment.

Members of the University community are expected to follow the requirements and recommendations contained in the policy and to recognize that indoor environmental quality issues may have multiple contributory causes and may, on occasion, not have a simple solution.

## **RESPONSIBILITIES**

### **Indoor Environmental Quality Coordinator:**

The indoor environmental quality coordinator will be responsible for overseeing most aspects of this indoor environmental quality program. This individual will have the professional training and experience necessary to serve as the primary point of contact for all indoor environmental quality issues within University of Florida.

The specific responsibilities of the indoor environmental quality coordinator are as follows:

- Receive IEQ complaints and make the appropriate determination as to what action is necessary.
- Conduct site investigations (when necessary) and initiate remedial measures.

- Document all IEQ activities and communicate relevant information related to findings, etc. to administrators, other staff and other interested and affected parties.
- Recognize the need for bringing in additional professionals to evaluate an IEQ situation. These professionals can be from either in-house sources or independent consultants.
- Serve as an information source of material related to maintaining good environmental quality.

The University of Florida IEQ Coordinator is:  
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Coordinator – Environmental Health and Safety  
Phone #: (352)392-3393

### **Physical Plant Department:**

The Physical Plant Department (PPD) is responsible for maintaining each site in a condition that provides for good indoor environmental quality. This includes the maintenance and repair of components associated with both the interior and exterior of a building. A more extensive list of PPD responsibilities as they relate to IEQ issues is provided later in this document.

### **Building Occupants:**

Building occupants have both a responsibility to themselves for their own health and safety and to their fellow workers and the students, the community and to their employer. In the performance of their duties, occupants are expected to observe safe and healthy work practices. A more extensive list of Building Occupant responsibilities as they relate to IEQ issues is provided later in this document.

### **Construction Project Managers**

Project managers are responsible for assuring that renovation projects in occupied buildings do not create IEQ problems due to the failure of a contractor to adequately isolate a work area from other areas of a building.

### **Contractors:**

Outside contractors conducting work on University facilities have a responsibility to assure that their actions do not result in the deterioration of the indoor environmental quality at that site. Work must be done with the proper controls in place to prevent a contamination or exposure risk to occupants either inside or outside of the work area. Work areas must also be appropriately cleaned-up by the contractor prior to leaving the work site. As part of the federally mandated Right-to-Know program, contractors are required produce the appropriate Material Safety Data Sheets (MSDS) for any chemical they intend to use on site.

A separate policy specific to IEQ issues during construction and renovation activities is in place and can be found on the EH&S web site.

## **PROCEDURES**

Several factors are recognized as being important towards contributing to an acceptable indoor environment. In general, an indoor environment is expected to be free of any noxious odors and dust and to be maintained at a comfortable temperature and humidity. More specific factors that must be present to assure an acceptable indoor environment include adherence to applicable ventilation guidelines and standards designed to maintain comfort factors acceptable to most occupants. All mechanical equipment, including air handling units and exhaust fans, must be maintained in working order and in a clean, uncontaminated state. Any significant sources of contaminant emissions must be kept isolated from occupied spaces and any major sources of contamination must be promptly controlled. Maintenance and construction activities must be conducted in a manner that does not adversely affect the indoor environmental quality in occupied areas.

Common terms used to describe the conditions in a building when an IEQ concern is suspected are defined below.

### **Sick Building Syndrome (SBS)**

This term refers to a condition in which the occupants of a building experience various health and/or comfort related effects that are attributed to the time spent in that building. The reported symptoms usually include headaches, eye irritation and respiratory irritation. No specific illnesses are identified and usually no specific cause for the complaints is found.

### **Building Related Illness (BRI)**

These illnesses can be directly linked to an exposure to an airborne pollutant within a building. Examples of building related illnesses include Legionnaire's disease and hypersensitivity pneumonitis. These conditions can be serious and life threatening and require immediate investigation for a suspected source.

Most legitimate IEQ problems can be linked to either ventilation deficiencies and/or an exposure to some biological or chemical contaminant present in the indoor environment. Chemical exposures can range from the use of improper cleaning solutions to the presence of room deodorizers or heavy perfumes worn by individuals. Biological exposures can be due to the presence of allergens in an indoor environment (i.e. dust mite antigen, cat antigen) or to the presence of any number of bioaerosols (i.e. molds and bacteria). The presence of mold is a particular problem in Florida due to the favorable climatic conditions that are present throughout most of the year.

Attention must also be paid to the time of year that a respiratory illness occurs. There are clearly identified seasonal patterns to respiratory illnesses that are not necessarily indoor air quality related. The cold and flu season during the late fall and winter months and the increase in allergy symptoms in the early fall and spring are two examples of these patterns.

Some building occupants may be particularly susceptible to the effects of indoor air contaminants. Because of varying sensitivity among people, one individual may react to a particular indoor environmental quality stressor while nearby occupants display no ill effects. Examples of those who might be more susceptible to conditions in a building include:

- Allergic or asthmatic individuals
- People with respiratory disease
- People whose immune systems are suppressed due to chemotherapy, radiation therapy, disease or other causes
- People on certain types of medications
- Contact lens wearers.

It has also been shown that individuals who smoke or who are exposed to environmental tobacco smoke away from the work environment are at a higher risk of developing a respiratory illness.

The indoor environment of any building is a result of the interactions among the site, climate, building structure and mechanical systems, construction techniques, contaminant sources and building occupants.

An IEQ problem may exist when there are sources of pollution or discomfort indoors, outdoors or within the mechanical ventilation system. These sources are connected to building occupants through a pathway, with a driving force to move pollutants along this pathway. The heating, ventilating and air conditioning (HVAC) system often serves as both the pathway and driving force for moving these pollutants.

The HVAC system includes all heating, ventilation and cooling equipment serving a building. A properly designed and operating HVAC system will

- Control temperature and relative humidity to provide thermal comfort
- Distribute sufficient amounts of outdoor air to meet the ventilation needs of University operations
- Isolate and remove odors and contaminants through pressure control, filtration and exhaust fans.

Thermal comfort and ventilation needs are met by supplying conditioned air that is a mixture of outdoor and recirculated air that has been filtered, heated or cooled and dehumidified. A number of variables interact to determine whether people are comfortable with the temperature and relative humidity of the indoor air. The amount of clothing, activity level, age, and physiology of people at the University varies widely, so thermal requirements for comfort varies among individuals. The American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Standard 55 describes the temperature and humidity ranges that are comfortable for most people engaged in non-strenuous activities. These ranges are presented on the following chart.

#### **Recommended Ranges of Temperature and Relative Humidity**

Relative Humidity	Temperature (Heating)	Temperature (Cooling)
30%	68.5°F - 75.5°F	74.0°F - 80.0°F
40%	68.0°F - 75.0°F	73.5°F - 80.0°F
50%	68.0°F - 74.5°F	73.0°F - 79.0°F
60%	67.5°F - 74.0°F	73.0°F - 78.5°F

Humidity is also a factor in thermal comfort. Raising the relative humidity reduces a person's ability to lose heat through perspiration and evaporation, so that the effect is similar to raising the temperature. Humidity extremes can also create IEQ problems. High relative humidity (over 60%) can promote the growth of mold and the presence of dust mites, while low relative humidity (below 30%) can accelerate the release of fungal spores into the air. Low humidity has been associated with irritation of the mucous membranes of the eyes and upper respiratory tract. Contrary to popular belief, lowering the temperature in a space does not lower the relative humidity. This will in fact raise the relative humidity by causing the room temperature to approach the dewpoint temperature. When the room temperature meets the dewpoint temperature, the relative humidity is 100% and condensation on interior surfaces is likely.

Carbon dioxide levels are often measured during the course of an indoor environmental quality investigation. The CO<sub>2</sub> level is an easy to measure indicator of the general effectiveness of a ventilation system. ASHRAE Standard 62.1 suggests that indoor CO<sub>2</sub> levels of 700 parts per million (ppm) or less above the measured outside air level are indicative of a ventilation system that is providing an amount of outside air sufficient to control bioeffluents and odors within the space. The typical outside air CO<sub>2</sub> level usually falls between 350 and 400 ppm. The OSHA Permissible Exposure Limit for CO<sub>2</sub> is 5000 ppm for an 8 hour Time Weighted Average exposure. Serious health effects from an elevated carbon dioxide exposure would not be expected to appear until levels exceed 15000 ppm.

The following table summarizes the University's allowable ranges and limits for various parameters associated with the indoor environment in occupied buildings.

<b>Parameter</b>	<b>Criteria</b>
Carbon Dioxide	≤ 700 ppm above ambient levels
Carbon Monoxide	< 4 ppm
Radon	≤ 2 pCi/L
Relative Humidity	30% - 60%
Drybulb Temperature	69° - 79°F
Airborne dust levels	< 50 ug/m <sup>3</sup>
Volatile Organic Compounds (VOC)	500 ug/m <sup>3</sup> (as measured with a direct reading PID)

### Complaint Reporting and Investigation Process

Indoor environmental quality concerns should be reported directly to EH&S.

A log of IEQ complaints received is maintained. Each new complaint is recorded in this log by the date received. Any action taken involving the complaint is also included in this log.

If the nature of the complaint is strictly comfort or mechanical in nature (i.e. reports of a malfunctioning piece of HVAC equipment), the IEQ coordinator will forward the concern to the Physical Plant Department.

If the nature of the complaint is health related, a field investigation by the IEQ coordinator will be completed in a timely manner (within 72 hours whenever possible). Emergencies are addressed immediately.

A written summary outlining the findings of this initial investigation and any relevant recommendations will be completed by the IEQ coordinator with copies provided to the appropriate parties.

The cost of laboratory analysis for any collected samples will be charged to the department responsible for the area being evaluated. No sampling will be conducted until authorized by the affected department.

All indoor environmental quality concerns will be investigated with a goal of reaching a mutually satisfactory resolution.

### Sampling as part of an IEQ investigation

Although bioaerosol or chemical air sampling might seem to be the logical first response to an indoor environmental quality problem, such an approach is usually not required to solve the problem and can even be misleading if not done properly. Air sampling should not be considered until some or all of the other investigative activities have been used to collect information related to the complaint. Various direct reading survey instruments are typically used to provide a characterization of an indoor environment. In most cases, the information provided during this initial survey is sufficient to identify any problems that may be responsible for the IEQ concerns.

When air sampling is proposed, a sampling strategy must be developed that is based on a comprehensive understanding of how the building operates and the nature of the complaints. It is important to remember that there currently are no regulatory limits covering allowable mold levels in an indoor environment and that the permissible exposure limits (PEL) for chemical contaminants mandated by OSHA are generally applicable to an industrial setting rather than to an office or classroom environment.

Measurement of specific chemical or biological contaminants can be very expensive. Before expending any time or money to obtain measurements of indoor air pollutants, it must be decided how the results will be used, what substances should be measured, when and where to take samples, and what sampling and analysis method is to be used so that the results provide useful information.

When sampling is considered necessary, the associated costs will be passed on to the affected department.

### Communication Issues

Perhaps the most important aspect of any indoor environmental quality investigation process is maintaining open lines of communication between all of the involved parties. It is vitally

important to keep these lines of communication open so that any findings and planned remedial efforts can be shared with those interested. Failure to maintain good communication could potentially result in feelings of mistrust between the staff and administration and misplaced accusations. In more involved IEQ cases that deal with numerous staff members, it is prudent to arrange for informational meetings between any affected individuals and the IEQ Coordinator to provide an opportunity for concerns to be voiced and for information to be shared.

### Training

While there are currently no legally mandated training requirements for University staff conducting IEQ related remediation work at the University, it is recommended that general IEQ awareness training be provided for any staff involved with such activities.

IEQ awareness training as well as task specific training related to IEQ issues can be arranged through EH&S.

### Portable Air Cleaners and Filters

Under normal conditions, the filtration provided by the air conditioning system combined with an adequate cleaning regimen of the space should preclude the need for any portable air-cleaning units. On occasion, a staff member will provide his or her own air-cleaning device to supplement the filtration within a work area. In these instances, it is recommended that only units equipped with a High Efficiency Particulate Air (HEPA) filter be allowed. These devices are available in various sizes from numerous manufacturers.

It should be noted that the amount of filtration benefit provided by these air cleaners is limited by their size. The small table-top models provide very little, if any, benefit.

Questions regarding the use of portable air cleaners should be directed to Environmental Health and Safety. EH&S does not endorse the use of portable air cleaners and will not approve the use of institutional funding for their purchase.

Another type of air cleaner that can occasionally be found in buildings is ozone generators. Manufacturer claims regarding these units maintain that the air in a space is cleaned by the introduction of ozone gas that reacts with any contaminants present. The fact is that ozone gas is a toxic substance with many potentially harmful effects. Numerous studies have concluded that ozone provides no positive benefit to the indoor environment and that in many cases, the introduction of ozone will result in a degradation of the air quality in a space.

The use of air cleaners that purposely generate ozone is prohibited.

For additional information regarding the use of ozone generators, please contact the IEQ coordinator.

## **INDOOR ENVIRONMENTAL QUALITY CHECKLIST**

### **Building Occupants:**

The following list notes items or procedures that should be followed in order to minimize the risk of creating a potential IEQ problem. This list should also be used as a guideline for an initial site-based investigation if an IEQ complaint is reported.

- Clean-up any spills or leaks immediately.
- Eating should be limited to designated areas due to the potential for the development of vermin and cleaning problems.
- Limit the amount of clutter. Excess supplies and personal items stored on the floor or on open shelves make it difficult to adequately clean a room. Closed cabinets are preferable for storage rather than open shelving.
- Take measures to limit settled dust on horizontal surfaces. Note that due to manpower and time constraints, PPD will typically not perform routine dusting of surfaces.
- The use of chemical air fresheners (i.e. “Plug-ins”, sprays) is prohibited due to their tendency to emit volatile organic compounds (VOC) that may trigger a sensitive individual’s asthma or other respiratory condition.
- Do not bring in an air cleaner from home without first checking with the IEQ coordinator. Some air cleaners are potentially dangerous and should not be used.
- Do not alter or block air flows to and from air conditioning diffusers without first contacting PPD. Realize that, depending on the type of air conditioning system, it may not be possible to open windows and doors without affecting air flows and temperatures throughout the whole system.
- Do not bring in insecticides from home. Pest control concerns need to be brought to the attention of Pest Management.
- Do not over water potted plants. Eliminate standing water in the bottoms of plant pots. Note that potted plants can be a significant source of mold in an indoor environment.
- Sewer gas odor issues are often due to dried out sink or floor drain traps. Pouring a bucket of water into a floor drain or running the water in a sink for a minute or two will often eliminate the odor.
- Wash hands frequently to help prevent the spread of infectious illnesses such as the flu and colds.

## **INDOOR ENVIRONMENTAL QUALITY CHECKLIST**

### **Physical Plant Department:**

The following list notes items or procedures that should be followed in order to minimize the risk of creating a potential IEQ problem. Scheduling for some of the noted items is subject to internal PPD program directives.

#### **Dust Control and Cleaning:**

- Surfaces in occupied spaces should be cleaned regularly to prevent the build-up of dust. Dusting should be done in such a manner as to avoid reintroducing the settled dust into the air stream. Research has indicated that the amount of allergenic material in a room is directly proportional to the amount of dust present.
- Floors should be vacuumed regularly. All vacuum cleaners should be equipped with “micro-filtration” disposable filter bags.
- Spills on carpet need to be cleaned-up immediately.
- Carpet cleaning should be done periodically in order to remove accumulated dust and other potential contaminants. Cleaning techniques should not add excessive amounts of moisture to the carpet since it’s important for the carpet to dry as rapidly as possible. Supplemental dehumidification methods (dehumidifiers) may be necessary to speed the drying process.
- Flooded areas of carpet must be wet vacuumed and extracted as soon as the problem is discovered. Wet areas of carpet must be dried within 24 hours in order to minimize the risk of mold growth. See water intrusion/flooding guidelines on EH&S website.
- If carpet is flooded due to a sewage back-up or due to flooding from outdoors, the affected carpet must be replaced. The area should not be reoccupied until the carpet is replaced.
- Follow all label directions when using cleaning chemicals.

#### **Air Conditioning:**

- Regularly change filters on air conditioning units. Please note that this does not necessarily mean every 30 days. Some filters, particularly the higher efficiency, pleated variety, may last considerably longer. Air handling units should be shut off while filters are being changed.
- Whenever possible, low efficiency filters should be upgraded to at least a 30-35% efficient pleated variety. Filter efficiency should never be downgraded.
- Verify that the filters fit properly with no gaps between or around the sections.
- The condition of fan belts and other mechanical components should be checked at least as often as the filters are changed.
- Periodically inspect the interiors of air handling units to look for visible biological growth on any interior components.
- Drain pan anti-fouling tablets should only be used during the cooling months. These tablets should be removed during the traditional heating months since they need to be under water to be effective. If these tablets dry-out, there is a risk of chemical off-gassing from the tablets.

- Chilled water temperature (on applicable systems) should be maintained at a temperature determined to maximize dehumidification efficiency.
- Supply and return diffusers should be periodically cleaned to remove any accumulated dust.
- Outside air intakes should be periodically inspected for the presence of insect or bird nests. Grills and screens over intakes must remain clean to allow unrestricted outside air flow. Make sure no pollutant sources (i.e. dumpsters) have been positioned near an intake.
- Exhaust fans should be checked for proper operation on a regular basis.
- Chemicals (cleaning or other types) should not be stored in a mechanical room.

Miscellaneous:

- Water damaged and/or ceiling tiles exhibiting visible mold growth must be replaced, not painted over.
- Porous building materials with visible mold growth due to water damage must be replaced. The guidelines for remediation of mold in buildings, posted on the EH&S web site, must be followed whenever moldy materials are being addressed.
- If an IEQ concern involves some foul odor in a particular room, an inspection should be made for a dead animal, a forgotten lunch or some other possible cause within that room prior to contacting the IEQ coordinator.

**Additional IEQ related information concerning how to address flooding and mold remediation issues can be found on the EH&S web site:**

<http://www.ehs.ufl.edu/IH/IEQ.htm>

## REFERENCES

1. U.S. Environmental Protection Agency. 1991. Building Air Quality - A Guide for Building Owners and Facility Managers. EPA/400/3/91/002. Washington D.C.  
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2. U.S. Environmental Protection Agency. 1995. Indoor Air Quality Tools for Schools. EPA 402- K-95-001. Washington D.C.  
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