

**University of Minnesota**

**Indoor Air Quality Program  
Operational Instructions**

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## **Section 1 - Introduction**

The University of Minnesota is committed to providing the students, employees, and occupants an indoor environment appropriate to the designed occupancy of the space. It looks not only to solve complaints and problems, but to address issues in a proactive manner, as to prevent problems from happening in the first place. The expense and effort required to prevent most IAQ problems may often be less than the expense and effort required to solve problems once they develop.

The causes of occupant IAQ concerns are multi-factorial and often elusive. It can involve chemical, microbiological, physical, and psychological mechanisms. Concerns about air quality may also be caused by non-IAQ related factors, such as stress, poorly designed work stations, lighting levels, or seasonal illnesses or colds. From a rational perspective, however, contaminate source control and adequate ventilation is the most effective, general means to improve IAQ.

Good indoor air quality depends on the actions of everyone in the area; a partnership between management and occupants is the best way to maintain a healthy and productive workspace.

## **Section 2 - Indoor Air Quality Program Goals**

The goals of the University of Minnesota's Indoor Air Quality Program are to maintain acceptable indoor air quality levels within its buildings and addresses indoor air quality concerns by:

- ⊙ A comprehensive and proactive management approach to maintain appropriate indoor air quality conditions for campus building occupants.
- ⊙ Commitment to effective communication and a timely response to building occupants on indoor air quality complaints and concerns.
- ⊙ Enhanced education and awareness of the University community about building indoor air quality issues, concerns and reporting procedures
- ⊙ Implementation of pro-active operational, maintenance, and construction program activities to minimize occupant exposure to the major contributors to indoor environmental concerns which include odors, dusts, moisture and noise inside buildings.
- ⊙ Fast, effective response to building emergencies involving leaks, floods, spills, and other sources of water/moisture which could lead to mold growth inside buildings

### **Section 3 - Definition of Acceptable IAQ and Typical Sources of Pollutants**

Acceptable IAQ is something that all building occupants at the University of Minnesota are entitled to. It refers to an indoor environment where:

- an adequate amount of clean air is supplied and distributed
- airflow is neither too still nor too drafty
- comfortable temperature and humidity ranges are maintained
- major sources of objectionable odors, dust, and contamination are promptly identified and controlled

Many different sources can contribute to poor IAQ, and they can originate from either inside or outside the building. Some common factors and pollutant sources include:

- ventilation system deficiencies, poor design, poor maintenance, inadequate circulation
- uncontained renovation or construction projects emitting dust and odors
- poor pest control management releasing excessive pesticides or herbicides
- office equipment, computer equipment, furnishings, and structural/building components
- Ozone or negative ion generators and humidifiers
- poor housekeeping, odors, air fresheners, food preparation
- outside air pollutants, traffic smoke, tobacco smoke, carbon monoxide (from poorly ventilated combustion sources), pollen
- persistent moisture, stagnant water, damp surfaces and materials, past floods resulting in microbiological contamination
- occupant respiration, perspiration, and personal cosmetics
- temperature, lighting, and relative humidity

## **Section 4 - Roles and Responsibilities to Maintain Good Indoor Air Quality**

An important aspect of IAQ is that everyone in the University needs to do their part. Some general guidelines that all building occupants should follow to help prevent IAQ problems are:

- ☑ Clean staff refrigerators, microwaves, cupboards, and utensils regularly to prevent foods from spoiling
- ☑ Use scented products sparingly (colognes, perfumes, lotions, air fresheners)
- ☑ Properly maintain plants to prevent mold growth or decay and properly disposing of plant material
- ☑ Perform odor generating work in an appropriately ventilated and designed facility
- ☑ Keep all air intake and exhaust vents free of obstruction
- ☑ Provide adequate space for air circulation around electrical equipment (including photocopiers, and computers)
- ☑ Report all moisture or mold problems immediately to FM
- ☑ When problems or concerns arise, report them as soon as possible using Section 5: Response Procedures for Indoor Air Quality Complaints.

In order to achieve and maintain acceptable IAQ in all the buildings on the U OF MN campus the following responsibilities have been identified for a variety of groups and individuals:

### **Employee/Faculty/Staff**

- ◆ Comply with above listed guidelines
- ◆ Inform a supervisor of concerns or problems
  - ◆ Provide an accurate history with specific details and facts
  - ◆ Participate in the solution and provide ongoing feedback
  - ◆ Understand any personal medical conditions or diagnoses as they pertain to IAQ problems
  - ◆ Keep log with date and times of intermittent IAQ events
  - ◆ Report leaks, major spills, or dampness immediately to FM

### **Department Heads, Directors and Supervisors of Affected Occupants**

- ◆ Work closely with FM project managers on all construction/renovation projects affecting subordinate work spaces
- ◆ Communicate to occupants in the area with information about the project and all updates
- ◆ Verify with project managers that engineering controls are in place to isolate and ventilate work areas if necessary
- ◆ Respond to IAQ concerns raised by building occupants
- ◆ Report leaks, major spills, moisture problems, damp conditions, visible mold, or odors immediately to FM.

### **Facilities Management Project Managers**

- ◆ Work closely with Department Heads, Directors, Supervisors, EHS, and with employees potentially affected by renovation projects.
- ◆ Assess project prior to its start to determine if work might introduce excessive airborne contaminants or noise into occupants' workplace and whether workers should be moved during project. Assure that controls are in place to address these concerns.
- ◆ Coordinate and communicate with occupants, FM workers, and outside contractors to minimize project's affect on occupants
- ◆ Act as first point of contact for occupants with questions, concerns comments about the project
- ◆ Provide updates on progress of projects

### **Facilities Management Mechanics**

- ◆ Operate and provide regular maintenance to ventilation, plumbing and other building systems
- ◆ Respond to temperature and comfort complaints as they relate to building systems, resolve if possible
- ◆ Respond to IAQ complaints as directed by supervisors, determine if concern is building system related
- ◆ Enter findings and any important observations on work order form
- ◆ Contact supervisor if additional resources are needed
- ◆ Refer occupant questions about space to their supervisor
- ◆ Report leaks, water infiltration, damp conditions, visible mold, or contaminated areas immediately to a supervisor
- ◆ Assist FM Supervisor in filling out HVAC system checklist when necessary

### **Facilities Management Trade Supervisors**

- ◆ Support and assist mechanics with IAQ investigations
- ◆ Follow up all IAQ complaints with an on-site visit to have first-hand knowledge of the environment in question.
- ◆ Inform zone manager of findings relevant to HVAC or other building systems performance
- ◆ Directly contact EHS with information to make investigation process as smooth as possible by providing occupant's schedule, known issues, etc.
- ◆ Identify additional resources and when to involve them
- ◆ Collaborate on course of action

### **Facilities Management Custodial Staff/Custodial Supervisors**

- ◆ Meet service level agreements with departments with respect to level of custodial service and provide the standard cleaning schedule.
- ◆ Keep affected individual/department updated on progress of non routine cleaning schedule.
- ◆ Notify building department contact of non routine cleaning projects that might affect occupants such as floor wax stripping, carpet shampooing, etc.

- ◆ Work with the building department contact to schedule the non routine cleaning to minimize impact on building occupants
- ◆ Use less toxic, water based cleaning products when feasible

#### **Facilities Management Director of Building Services**

- ◆ Identify projects requiring HEAPR (Higher Education Asset Preservation and Remodeling) funding or capital requests
- ◆ Prioritize funding for recommended projects

#### **Facilities Management Call Center**

- ◆ Take incoming IAQ complaints. Notify EHS Office and FM of all IAQ related complaints. Complaints about room temperature hot and cold calls are forwarded to FM.
- ◆ Dispatch FM mechanic as needed.
- ◆ Write work orders to document dispatch of FM crews or EHS personnel for investigation.
- ◆ Ensure incoming IAQ complaints are responded to in a timely and consistent manner
- ◆ Report water intrusion events affecting building occupants to FM zone supervisor, FM custodial and EHS for immediate response.

#### **Environmental Health and Safety Office**

- ◆ Create and manage a database for IAQ complaints
- ◆ Respond immediately to emergency calls
- ◆ If contacted with IAQ complaint assure that FM zone is contacted to prepare work orders for investigation of complaint
- ◆ Provide recommendations for investigation or resolution of complaint
- ◆ Perform data collection, sampling, and analysis as determined appropriate for the situation
- ◆ Interpret data collection and sampling results
- ◆ Provide written documentation and interpretation of all test results to responsible FM supervisor or zone manager.
- ◆ Provide affected individual with written response to any EHS test results
- ◆ Work collaboratively with occupants, departments, safety committee, and FM to resolve IAQ concerns
- ◆ Provide recommendations for additional evaluation
- ◆ Respond and notify individual of need to file an Employee Incident Report with the Department of Human Resources, if additional investigation is needed
- ◆ Complete necessary IAQ forms to document the actions taken
- ◆ Assist in interpreting results and writing final summary report of case resolution
- ◆ Perform environmental monitoring and verify controls of project work areas in coordination with project manager's requests.
- ◆ If scope of the work is large or significant, recommend the hiring of a consultant
- ◆ Work with FM Project Managers prior to the start of the projects to assess controls needed for renovation and construction projects to minimize exposure of dust and odors to nearby occupants
- ◆ Assist in identifying concerns that require HEAPR funding or capital requests



## **Section 5 - Response Procedures for Indoor Air Quality Complaints**

Indoor air quality complaints can be categorized in two ways, either a comfort issue, or a health related or long term issue.

Comfort issues include short-term complaints involving temperature, humidity, odors, stuffiness, etc. Comfort issues can usually be remedied by minor adjustments of heat or ventilation or contaminant removal. Customer service staff responding to comfort complaints need only request standard trouble call information from the occupant (name, nature of problem, location, and contact telephone number). Based on the information received, the customer service staff can then dispatch the appropriate crew to respond to the correct problem. Comfort issues are usually resolved within the day that they are received. Unless there is a larger underlying problem with the heating or ventilation system, they do not reoccur.

Occupants may express concerns about a long term issues or health concerns they believe to be directly related to their work environment. These complaints may come through a call on the FM call line 612-624-2900, but are sometimes referred to FM through EHS. All concerns coming in to FOCUS <http://www.dehs.umn.edu/forms/>, the 612-626-6002 line or the EHS office are directed to the EHS IAQ coordinator for initial documentation and dispatch of FM and EHS personnel to evaluate the situation. The complaint can also be a referral from another U OF MN Department including HR or Disability Services.

### **IAQ Incoming Complaint Response Procedures**

1. Occupant identifies IAQ concern
2. Occupant advises supervisor of those concerns which are not comfort or odor related
3. Supervisor investigates and determines if FM or DEHS needs to be contacted.
4. If concern is not resolved, the FM Call center is contacted.
  - **IAQ complaint form** may be completed to document the problem
  - **Work Related Employee Incident Report form** <http://www.dehs.umn.edu/forms/> may be completed. Individuals experiencing negative health symptoms wanting to work elsewhere or work from home are required by University policy to file the Incident Report with the U OF MN Department Human Resources. The purpose of this report is to provide valuable documentation for both the employee and the University at the time the symptoms are first reported. All information on this form remains confidential
  - The FM zone supervisor assigns a work order for FM mechanic to investigate problem.
  - The EHS IAQ Specialist will be notified, investigates area, and will complete **Occupant Interview Forms** as needed.
  - If problem identified, schedule repair and document case

5. If problem not readily identified all or some of the following can be employed to resolve the concern.
  - FM mechanic can investigate and complete an **HVAC Checklist**
  - EHS can distribute **IAQ Diary Forms** to concerned occupants, and complete a **Pollutant & Source Inventory Form**, and determine the scope of IAQ testing that may be needed
  - Department head, supervisor and occupants notified
  - **Hypothesis Form** can be completed and tested
  - Problem identified, schedule repair and document case
  
6. If problem still not identified, set IAQ Review process in motion
  - IAQ Incident Review Team meets to analyze all information obtained on case to date.
  - Decision made whether case is an IAQ problem. If more information is needed, decision will be made about additional resources needed to address the concerns.
  - Department head, supervisors and occupants notified and updated
  - Problem Identified, schedule repair and document case
  
7. Follow up on corrective actions to ensure they have been effective

IAQ Review Team may include any of the following depending on the actions recommended:

- Facilities Management Director
- Facilities Management Zone Manager
- Facilities Management Zone Supervisor
- Environmental Health & Safety IAQ Specialist
- Human Resources representative
- U OF MN Health Services Physician or Occupational Health Physician
- Supervisors of affected employees
- Disability Services (UReturn)
- Union Representative
- Affected Individuals
- Others as needed; housing, space allocation, police, medical school

## **Section 6 - HVAC Operations and Preventative Maintenance**

Engineering controls are the first and most important preventative measure to be considered in the control of airborne indoor air contaminants. Ventilation systems in large buildings are designed and operated not only to heat and cool the air, but to efficiently supply and circulate a sufficient quantity of air to each occupied space. If the system is poorly designed, operated, or maintained, it can affect the indoor environment. Issues often center on the mechanical operation and effectiveness of the Heating, Ventilation, and Air Conditioning (HVAC) system, or even distribution of contaminated air. Research by NIOSH has shown that up to 60% of IAQ related problems are caused by HVAC systems, but fortunately, 80% of common issues are resolved through HVAC repair or modification. These systems can have a significant impact on how pollutants are distributed and removed. Attention must be paid to:

### **Ventilation and building systems design:**

- \* Air delivery capacity and outside air intake must be adequate for number of occupants and uses of the space
- \* Building envelope must not leak or foster fungal growth
- \* Addressed during building design and modified as building use or design changes
- \* Abide by building baselines of ASHRAE parameters (temperature, air exchange rate, humidity, CO<sub>2</sub>, carbon monoxide)
- \* Controls for spread of contaminants or microbiological agents within the system
- \* Controls for other pollutant pathways (stairwells, elevator shafts, etc.)

### **Outside air supply and quality:**

- \* Adequate supply is necessary for comfort and to dilute background pollutant levels
- \* Outdoor air intakes are located properly as to not bring in outdoor pollutants
- \* Filters are properly selected, installed and maintained providing the level of filtration recommended for the use of the space.

### **Space planning:**

- \* Air supply or return vents in rooms are not blocked by use or placement of furniture
- \* Air supply and return vents are positioned so that adequate amount of replacement air reaches the breathing zone of all room occupants
- \* Airflow and temperature control are appropriate for occupancy and space
- \* Heat-generating equipment should not alter temperature and air delivery

**Equipment maintenance:** Facilities Management performs routine maintenance on the following parts or equipment of the HVAC:

- \* Outside air intakes inspected for contaminant sources and obstructions to airflow.
- \* Air distribution dampers clear of obstructions and operating properly
- \* Drain pans inspected and cleaned to ensure proper drainage
- \* Heating and cooling coils inspected and cleaned

- \* Air filters have the pressure drops monitored, and replacement or cleaning is performed regularly. Upstream and downstream particle counts may be taken as part of an investigation
- \* Fan motor belts inspected and replaced
- \* Air humidification controls inspected and regularly cleaned
- \* Cooling towers inspected, cleaned, and water treated according to schedule.
- \* Cooling towers are located an appropriate distance away from air intakes according to U of MN construction standards.
- \* Cooling tower drainage instructions address indoor flooding concerns and appropriate discharge to sanitary or storm water.

## **Section 7 - Communication during Renovation and Construction**

### **Communication**

Communication is the best way to solve IAQ problems and to keep all parties involved well informed. Communication is needed not only when large projects or problems arise, but on a regular basis. The status of any remediation, construction, remodeling, or investigation should be openly communicated, including information on any known or suspected health risks. To open lines of communication between occupants and the renovation project manager, take the following steps:

- Establish that the health and safety of building occupants are top priorities
- Demonstrate that the occupants' concerns are understood and taken seriously
- Set up a contact person (**Project Manager**) whom building occupants can contact directly to discuss questions, concerns, and comments

Preceding any major renovation project, potentially impacted occupants should be given a brief description of the work planned and precautions being taken for air quality protection. Supervisors are responsible for relaying initial and update information obtained from the FM or CPPM Project Manager for the project to his/her subordinates, especially those most directly affected by the project. Any occupant concerns should be discussed at this point and resolved whenever possible. Occupants whose history suggests they may have adverse reactions (i.e. allergic to dust, chemicals) should be accommodated where possible. As demolition and construction progresses, occupants should be periodically updated on type of work being done, the materials being used and the controls in place.

#### *Preplanning with open and quality communication:*

- Allows for a successful construction or maintenance project without occupant worry or anxiety as occupants will be informed from the beginning and through whole process
- Addresses concerns about potential construction related health impacts for individuals with
  - Asthma
  - Allergies
  - Compromised immune system
- Provides for the accommodate and possible relocation of people with disabilities
- Ensures timely and efficient responses to occupant concerns and does not distract from the project
- Reduces problems with the relocation process because scheduling and the logistics of remediation/project will be considered and communicated ahead of time
- Provides health risk information to occupants. Informed occupants can take an active role and be invited to participate in finding solutions
- Resolves issues and concerns as they arise.

## **Section 8 - Housekeeping and General Maintenance**

### **Coordinating Custodial Service with Building Occupants to Improve IAQ:**

- ◆ Provide the department contacts information about the daily/weekly cleaning schedule. Specify the employee housekeeping responsibilities in personal offices, cubicles, and labs. The head of custodial service and the custodial supervisors are responsible for this information.
- ◆ Inform department contacts and EHS of scheduled and unscheduled general custodial and building maintenance, odor or dust inducing activities (location, times, equipment, products to be used). Post information about major maintenance activities in building elevators.
- ◆ Substitute hazardous or odor emitting chemicals with less hazardous/odorous products whenever possible. Consult EHS for purchase of new products and maintain accurate MSDS files on all chemicals/products used
- ◆ Ensure all custodians and tradespersons are trained on proper use of chemicals and maintenance techniques
- ◆ Schedule high impact, odor producing activities after occupant work hours
- ◆ Keep ventilation systems on at night/weekends during special cleaning projects ( e.g. floor wax removal) to help dissipate any odors or fumes
- ◆ Ensure carpet shampooing protocol procedures are carefully followed
- ◆ Ensure carpet is dry after shampooing and that no mats or runners are laid back onto damp carpet (see carpet shampooing protocol)
- ◆ Custodial supervisors maintain communications with occupants/department contacts during major cleaning/maintenance activities
- ◆ Ensure all floor stripping and waxing application activities are adequately ventilated by natural or mechanical means. Mechanical ventilation may include floor fans, increased HVAC air supply or exhaust, and filtered air mover machines.
- ◆ Respond immediately to water leaks, floods, etc. and following water infiltration protocol
- ◆ Report visible mold and moisture problems immediately to their supervisor. This information is subsequently reported to EHS.
- ◆ Report evidence of pests anywhere in the work area

### **General Maintenance**

General maintenance activities can create dust, odors, noise, and vibration.

- ◆ Painters use low odor water based paints almost exclusively. On some surfaces, such as metal door frames, stair railings, etc., oil based paint is used. Notification of surrounding occupants will be made before these projects are started. Provisions for scheduling these projects during times of low occupancy are made on a case by case basis depending on the area impacted and the paints product used.

- ◆ Floor tile application involves the use of adhesives and leveling compounds, which occasionally may cause dust and odors. In certain areas, plywood or thick plastic barrier controls and with exhaust fans may be required. The maintenance supervisor or project manager will notify the departmental contacts prior to the start of these projects.
  
- ◆ A project involving tile replacement or wall construction involves cutting materials, which releases dust. Dust can be more than just a nuisance for occupants, especially those with asthma or other respiratory illnesses. The maintenance supervisor or project manager is responsible for notifying departmental contacts and designing appropriate controls.

## **Section 9 - Integrated Pest Management**

### **Pest Control Schedule**

Pesticide applications are scheduled for unoccupied periods when possible, so that the affected areas can be ventilated before occupants return. Pesticides are only applied in target locations, with minimum treatment to exposed surfaces. Pesticides are used in strict conformance with manufacturer instructions and EPA labels. In problem areas, general periodic spraying is usually necessary. If occupants are present, they are notified prior to the pesticide application by a representative from Guardian Pest Control. Particularly susceptible individuals that could develop serious illness, even though they are only minimally exposed, are relocated if necessary.

### **Materials Selection, Handling, and Storage**

Pesticides that are species-specific are chosen, and attempts are made to minimize toxicity for humans and non-target species. The contractor provides EPA labels and MSDS's with information on all chemicals used. Pesticides are stored and handled properly, consistent with their EPA labels. Pesticides and other chemicals used are kept on a chemical inventory form by Guardian or a U OF MN designated representative. A sample form is found in the appendix of this manual.

If only limited areas of the building are being treated, the HVAC system is adjusted so that it does not distribute contaminated air throughout the rest of the building. Temporary exhaust systems to remove contaminants during the work are used where deemed necessary, and HVAC system operation may be modified during and after pest control activities (e.g. running air handling units on 100% outdoor air for some period of time or running the system for several complete air exchanges before occupants re-enter the space).



## **Section 10 - Construction and Renovation Projects**

The Project Manager of construction and renovation projects must oversee budgets, schedules, any complaints or concerns, IAQ strategies, commissioning, and overcoming opposition or indifference to the IAQ plan. Project managers and work crew lead persons will have complete knowledge of IAQ and containment procedures and other specific controls as well as back up contingency plans in events of failure. Lead persons are responsible to train and ensure their workers effectively implement the IAQ plan.

Initial project planning involves identification of all possible emission sources. Each stage of the project is categorized according to the potential for emissions, proximity to occupants, and availability of controls. The Environmental Health and Safety IAQ Manager is consulted in this process.

Acceptable IAQ is maintained throughout the project by effective ongoing management. Leadership of the FM Project Manager is crucial to the achievement of the goal. Timely information is also needed throughout the project to help assess the effectiveness of the IAQ measures being taken.

Appropriate IAQ controls are selected based upon the needs of the project. Final control selections are based upon the following process:

- Identify all potential sources of odor and dust
- Locate occupied areas potentially affected by the project
- Identify construction activities likely to produce detectable odor or dust in occupied areas
- Classify potential IAQ problems by severity
- Identify available control options
- Select specific control measures
- Identify contingency plans for problems discovered during construction
- Identify contact list for project
- Develop procedures for flood response during project and know the location of water shut off valves

### **Occupant Notification of Work**

- Project Managers work with department heads, directors, or supervisors in advance of need to move building occupants directly affected by the work, and determine whether nearby occupants with severe sensitivities to dust or organic odors may also need relocation.
- Sometimes, advance notice may not be possible, as in the event of an emergency. Immediate notification of supervisors and evacuation of affected occupants, if necessary, will be commenced in these instances.
- FM and contractors will have available MSDS of hazardous materials to be used in the course of completing the project available for review.

- Work that may result in shutdown of an HVAC system is either done after regular hours and/or advance notice to occupants will be provided about the shutdown by the project manager.

### **Exterior Work and Events**

- Exterior work and events producing a contaminant should not take place in the proximity of any building entrance, exit, or air intake without controls to prevent contaminants from entering the building or air intake
- If work must be done in one of these areas, FM/CPPM will take required precautions such as posting signs, changing fan scheduling, relocating air intakes, or scheduling work off hours.
- Vehicles should not be left running in the proximity of any building entrance, exit, or air intake. It is the responsibility of all University departments to advise employees and service contractors of this requirement

Interior and exterior construction-related dust, contaminants and odors can cause significant problems for university students and staff and even disrupt normal university operations. Dust is not merely a nuisance, but can cause sensitive individuals to become ill. Dust also can damage scientific equipment or ruin experimental data. Often, if construction will affect several floors or large areas of the building, it is easier to move occupants. Moving will eliminate disruptions, minimize containment because occupants are not present, and minimize complaints.

The following types of controls may be selected for project control measures to ensure that construction related dust; contaminants and odors do not migrate from the job site and cause unacceptable indoor air quality in occupied areas. The EHS Office IAQ Manager will advise in the selection of reasonable dust control measures and risk assessments that fit the situation.

Methods to maintain IAQ during construction and renovation projects are noted previously in section 8.

The following guidelines have been taken from the UM Construction Standards *Appendix B- Dust, Containment, Odor, and Fungal Control Measures University of Minnesota*

<http://www.cppm.umn.edu/standards/AppendixB.pdf>

## **Section 11 - Mold and Fungal Prevention and Abatement**

For large fungal abatement projects follow the University of Minnesota EHS: *Fungal Abatement Safe Operating Procedure* <http://www.dehs.umn.edu/iaq/sop.html>

Background:

Mold and fungi occur naturally in nature and are present in all environments. They reproduce through spores that travel through the air and are invisible to the naked eye. They can grow on any damp or wet area, and potentially can cause health problems through their production of allergens. Inhaling or touching mold or mold spores may cause allergic reactions in sensitive people such as those with asthma. The key to mold control and prevention is moisture control. Solving moisture problems will prevent them from becoming mold problems.

*Occupant responsibilities to prevent mold in buildings:*

- \* Report leaky plumbing and leaks in the building envelope to FM as soon as possible.
- \* Report condensation and wet spots to FM immediately
- \* Do not improvise plumbing set ups – including the installation of water purification systems without FM approval
- \* Seek approval prior to set up of personal heating or humidification systems.

*Facilities Management Mold Control strategies*

- \* Building managers can prevent moisture due to condensation by increasing surface temperature or reducing the moisture level in air (humidity).
  - o To increase surface temperature, insulate or increase air circulation.
  - o To reduce the moisture level in air, repair leaks, increase ventilation (if outside air is cold and dry), or dehumidify (if outdoor air is warm and humid).
- \* Keep heating, ventilation, and air conditioning (HVAC) drip pans clean, flowing properly, and unobstructed.
- \* Vent moisture-generating appliances, such as dryers, to the outside where possible.
- \* Maintain low indoor humidity, below 60% relative humidity (RH) in summer through fall, and between 20 – 35% if possible in winter. Some specially designed buildings may operate outside these parameters.
- \* Perform regular building/HVAC inspections and maintenance as scheduled.
- \* Clean and dry wet or damp spots within 48 hours and report to EHS
- \* Don't let foundations stay wet. Provide drainage and slope the ground away from the foundation.
- \* Do not leave improvised water filling activities unattended
- \* Manage the location of sprinklers – not directed at buildings
- \* Keep downspouts clean and directed away from buildings and attached.
- \* Keep gutters clean

*Taken in part from the Environmental Protection Agencies' "Mold Remediation in Schools and Commercial Buildings"*

## **Section 12 - Water Infiltration Remediation Procedures**

Immediately report floods or water damage to Facilities Management and EHS.

When water leaks into buildings from weather, leaks, or flooding, the first step in the clean-up process is to inventory all water damaged areas, building materials and furnishings. Special care should be taken to identify areas under furnishings or that may not be outwardly visible.

Categories of possible water damaged materials include:

- ◆ Ceiling Tile
- ◆ Drywall/Lathe Plaster
- ◆ Electrical
- ◆ Furniture
- ◆ Files/Papers
- ◆ Carpet

Occupants need to removal all personal items out of water damaged areas and discard wet or moldy boxes and papers. Please provide a diagram of known flooded areas to FM.

For a complete description of the procedures please refer to: University of Minnesota EHS: *Managing Water Infiltration into Buildings* <http://www.dehs.umn.edu/iaq/flood.html> and The U.S. Environmental Protection Agencies' *"Mold Remediation in Schools and Commercial Buildings"*.

## **Section 13 - Personal Air Filtering Devices and Humidifiers**

Air cleaning and purifying devices are not the appropriate, single solutions to indoor air quality problems, but may sometimes be useful. Air cleaning alone cannot adequately remove all pollutants typically found in indoor air. The best way to resolve indoor air quality problems is to remove the pollutant sources or prevent emissions in the first place, and to improve fresh air ventilation. The University of Minnesota recommends that air purifying devices, with the exception of HEPA filtering-only devices, not be used at any time. Ideally, Facilities Management or the EHS Department should be contacted with any IAQ problems or questions, as to help eliminate the need for an air purifying device.

Sizing a portable air filter for a private office:

The Clean Air Delivery Rate (CADR) of the filter should be  $\frac{2}{3}$  the square feet of the space. A fan with a CADR of 80 is designed to work in a single close room with up to 120 square feet.

Portable air cleaner Links:

USEPA does not recommend devices with ozone generation:

<http://www.epa.gov/iaq/pubs/ozonegen.html>

USEPA recommendations on portable or home air cleaners

<http://www.epa.gov/iaq/pubs/airclean.html>

### **Humidifiers (See also Appendix 3 – Humidifier Notification and Compliance Form)**

Humidifiers are commonly used to relieve the physical discomforts of dry nose, throat, lips, and skin. The moisture they add to dry air also helps alleviate common nuisances brought on by winter heating, such as static electricity. However, excess moisture can encourage the growth of biological organisms in the office. These organisms include dust mites, which are microscopic animals that produce materials causing allergic reactions to household dust, and molds. Recent studies by the Environmental Protection Agency (EPA) and the Consumer Product Safety Commission (CPSC) have shown that ultrasonic and impeller (or "cool mist") humidifiers can disperse materials, such as microorganisms and minerals, from their water tanks into indoor air.

The two types of humidifiers which generally appear to produce the greatest dispersions of both microorganisms and minerals are:

- **Ultrasonic**, which create a cool mist by means of ultrasonic sound vibrations.
- **Impeller**, or "cool mist," which produces a cool mist by means of a high speed rotating disk.

Two additional types of humidifiers can allow for growth of micro-organisms if they are equipped with a tank that holds standing water, but generally disperse less, if any, of these pollutants into the air. These are:

- **Evaporative**, which transmit moisture into the air invisibly by using a fan to blow air through a moistened absorbent material, such as a belt, wick, or filter.
- **Steam vaporizer**, which create steam by heating water with an electrical heating element or electrodes. "Warm mist" humidifiers are a type of steam vaporizer humidifier in which the steam is cooled before exiting the machine

Proper care and cleaning of ultrasonic and impeller humidifiers are important for reducing potential exposures to microorganisms, such as bacteria and molds. Microorganisms often grow in humidifiers which are equipped with tanks containing standing water. Breathing mist containing these pollutants has been implicated as causing a certain type of inflammation of the lungs.

For the above reasons, the University of Minnesota believes it is important to use a humidifier only when conditions require it, to use the correct moisture setting for existing conditions, and to clean it thoroughly. It is prudent to reduce the potential for personal exposures to these materials by taking the following precautions, particularly when using ultrasonic and impeller humidifiers. The following cleaning and care procedures should be done when in the possession of a humidifier on campus.

- Make the Department Head, Supervisor, or Director in coordination with the EHS Dept. aware of your intent to use a humidifier. Please see Appendix 4 – Optional permit for use of portable humidifier
- Unplug the unit from the electrical socket after use each day and before cleaning
- Empty the tank, wipe all surfaces dry, and refill the water in portable humidifiers daily to reduce any growth of microorganisms;
- Use brush or scrubber to clean every third day, removing any build-up on surfaces
- Follow the manufacturer's instructions for use, changing water, upkeep, and cleaning of humidifiers, and for suggestions on use of cleaning products.
- Do not humidify to indoor relative humidity levels exceeding 50 percent. Higher humidity levels may encourage the growth of biological organisms. If water condenses on windows, walls, or pictures, relocate the humidifier, lower its humidistat setting, or reduce its use.
- Do not permit the area or materials around the humidifier to become damp or wet. Follow the manufacturer's instructions regarding the use, maintenance, and replacement of any materials supplied with the humidifier. Use appropriate materials as recommended by the product manufacturer.

- Stop using your humidifier and contact your physician if you have respiratory symptoms which you believe are associated with periods of use of your home humidifier, even if you are following maintenance directions

*U.S. Environmental Protection Agency*

<http://www.epa.gov/iaq/pubs/humidif.html>

## **Section 14 - Record Keeping**

The following system will be in place to document IAQ problems at U OF MN:

**Complaints and Recommendations:** records of initial and follow-up of complaints and recommendations will be kept by the EHS Office on the FOCUS system.

**Assessment and Test Results:** copies of the EHS reports of indoor air quality and test results will be kept by the EHS Office.



## **Appendix 1: Checklist for Mold Remediation**

### *Investigate and evaluate moisture and mold problems*

- Assess the size of the moldy area (square feet)
- Provide a map of the known affected area
- Consider the possibility of hidden mold
- Clean up small mold problems and fix moisture problems before they become large problems
- Select remediation manager for medium or large size mold problem
- Investigate areas associated with occupant complaints
- Identify source(s) or cause of water or moisture problem(s)
- Note type of water-damaged materials (wallboard, carpet, etc.)
- Check inside air ducts and air handling unit
- Throughout process, consult occupants and qualified professionals

### *Communicate with building occupants at all stages of process, as appropriate*

- Designate a contact person for questions and comments about medium or large scale remediation as needed

### *Plan Remediation*

- Adapt or modify remediation guidelines to fit your situation; use professional judgment
- Plan to dry wet, non-moldy materials within 48 hours to prevent mold growth
- Select clean-up methods for moldy items
- Select Personal Protective Equipment
- Select containment equipment
- Select remediation personnel who have experience and trained needed to implement the remediation plan and use PPE and containment as appropriate

### *Remediate moisture and mold problems*

- Fix moisture problem, implement repair plan and/or maintenance plan
- Dry wet, non-moldy materials within 48 hours to prevent mold growth
- Clean and dry moldy materials
- Discard moldy, porous items that can't be cleaned

For large fungal abatement projects follow the University of Minnesota EHS: *Fungal Abatement Safe Operating Procedure* <http://www.dehs.umn.edu/iaq/sop.html>

## **Appendix 2: Assessment Forms**

These forms may be used for non-comfort related IAQ issues:

1. **IAQ Complaint Form:** completed by complainant or supervisor and forwarded to EHS IAQ coordinator, will assist in inspection and document IAQ complaint
2. **IAQ Occupant Interview:** this will help to collect information on the occupant's concern, health symptoms, and the work environment. This will assist to see what furthers actions to take, what sampling tests may be needed, and a general understanding of the problem.
3. **IAQ Occupant Diary:** for recording incidents of symptoms and associated observations as they occur.
4. **IAQ Hypothesis Form:** to be used for summarizing what has been learned during the building investigation; a tool to help the investigator gather their thoughts
5. **HVAC IAQ Checklist- Quick Form;** to be used for most investigations or inspections of a HVAC system.
6. **HVAC IAQ Checklist- Short Form;** to be used for detailed investigations or inspections of a HVAC system, usually for a recommissioning project
7. **Log of Activities and System Operation:** for recording activities and equipment operating schedules as they occur.
8. **Pollutant and Source Inventory:** will help identify pollutants that may be generated in the building or that are being brought into the building
9. **Pollutant Pathway Form for Investigations:** to be used in conjunction with a floor plan of the building

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# Indoor Air Quality Complaint Form

This form can be filled out by the building occupant or by a member of the building staff

**Occupant Name:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**Department/Location in Building:** \_\_\_\_\_ **Phone:** \_\_\_\_\_

**Completed By:** \_\_\_\_\_ **Title:** \_\_\_\_\_ **Phone:** \_\_\_\_\_

Indoor air quality complaints can be categorized in two ways, either a comfort issue, or a health related or long term issue. Comfort issues are temperature, humidity, odors, and stuffiness. The second category of complaints involves health concerns or long-term issues believed to be directly related to the work environment. **This form should be used if your complaint may be a non-comfort, health related issue.** Your observations can help resolve the problem as quickly as possible. Please use the space below to describe the nature of your complaint and any potential causes.

We may need to contact you to discuss your complaint. What is the best time? \_\_\_\_\_

For a prompt response, please return this from to: **EHS IAQ Coordinator, W140 BHS**

**Office Use Only:** \_\_\_\_\_

**File Number:** \_\_\_\_\_ **Received By:** \_\_\_\_\_ **Date Received:** \_\_\_\_\_

Modified Indoor Air Quality Complaint Form from: "Indoor Air quality Forms." EPA/NIOSH Building Air Quality.

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# IAQ Occupant Interview

Page 1 of 2

Building Name: \_\_\_\_\_ Date: \_\_\_\_\_

Address: \_\_\_\_\_

Occupant Name: \_\_\_\_\_ Work Location: \_\_\_\_\_

Completed By: \_\_\_\_\_ Phone: \_\_\_\_\_

## SYMPTOM PATTERNS

What kind of symptoms or discomfort are you experiencing?

Are you aware of other people with similar symptoms or concerns? Yes \_\_\_\_\_ No \_\_\_\_\_

If so, what are their names and locations? \_\_\_\_\_

Do you have any health conditions that may make you particularly susceptible to environmental problems?

contact lenses       chronic cardiovascular disease       undergoing

chemotherapy/radiation therapy

allergies       chronic respiratory disease       suppressed immune system

chronic neurological problems

## TIMING PATTERNS

When did your symptoms start?

When are they generally worst?

Do they go away? If so, when?

Have you noticed any other events (such as weather, temperature or humidity changes, or activities in the building) that tend to occur around the same time as your symptoms?

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# **IAQ Occupant Interview**

**Page 2 of 2**

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## **SPATIAL PATTERNS**

Where are you when you experience symptoms or discomfort?

Where do you spend most of your time in the building?

## **ADDITIONAL INFORMATION**

Do you have any observations about building conditions that might need attention or might help explain your symptoms (e.g., temperature, humidity, drafts, stagnant air, and odors)?

Have you sought medical attention for your symptoms?

Do you have any other comments? Please add additional pages if necessary.

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# **IAQ Occupant Diary**

**Occupant Name:** \_\_\_\_\_ **Title:** \_\_\_\_\_

**Location:** \_\_\_\_\_ **Phone:** \_\_\_\_\_

On the form below, please record each occasion when you experience a symptom of ill-health or discomfort that you think may be linked to an environmental condition in this building.

It is important that you record the time and date and your location within the building as accurately as possible, because that will help to identify conditions (e.g., equipment operation) that may be associated with your problem. Also, please try to describe the severity of your symptoms (e.g., mild, severe) and their duration. Any other observations that you think may help in identifying the cause of the problem should be noted in the "Comments" column. Feel free to attach additional pages or use more than one line for each event if you need more room to record your observations.

| <b>Time/<br/>Date</b> | <b>Location</b> | <b>Symptom</b> | <b>Severity/Duration</b> | <b>Comments</b> |
|-----------------------|-----------------|----------------|--------------------------|-----------------|
|                       |                 |                |                          |                 |
|                       |                 |                |                          |                 |
|                       |                 |                |                          |                 |
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|                       |                 |                |                          |                 |

Modified from "Building Air Quality: A Guide for Building Owners and Facility Managers". EPA/400/1-91/033. DHHS (NIOSH) Publication No. 91-114. December 1991.

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# IAQ Hypothesis Form

**Building Name:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**Completed By:** \_\_\_\_\_ **Phone:** \_\_\_\_\_

**Complaint Area** (may be revised as the investigation progresses): \_\_\_\_\_

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**Complaints** (e.g., summarize patterns of timing, location, number of people affected): \_\_\_\_\_

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**HVAC:** Does the ventilation system appear to provide adequate outdoor air, efficiently distributed to meet occupant needs in the complaint area? If not, what problems do you see? \_\_\_\_\_

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Is there any apparent pattern connecting the location and timing of complaints with the HVAC system layout, condition, or operating schedule? \_\_\_\_\_

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**Pathways:** What pathways and driving forces connect the complaint area to locations of potential sources? \_\_\_\_\_

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Are the flows opposite to those intended in the design? \_\_\_\_\_

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**Sources:** What potential sources have been identified in the complaint area or in locations associated with the complaint are (connected by pathways)? \_\_\_\_\_

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Is the pattern of complaints consistent with any of these sources? \_\_\_\_\_

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# IAQ Hypothesis Form

**Hypothesis:** Using the information you have gathered, what is your best explanation for the problem(s)?

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**Hypothesis Testing:** How can this hypothesis be tested? \_\_\_\_\_

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If measurements have been taken, are the measurement results consistent with this hypothesis?

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**Results of Hypothesis Testing:** \_\_\_\_\_

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**Additional Information Needed:** \_\_\_\_\_

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Environmental Health and Safety

**HVAC IAQ Checklist - Quick Form**

**Building Name:** \_\_\_\_\_ **File Number:** \_\_\_\_\_

**Completed By:** \_\_\_\_\_ **Phone:** \_\_\_\_\_

Listed below are ten of the most common factors that will cause or contribute to a HVAC system related IAQ problem. Once discovered, fixing the HVAC system problem will most likely eliminate the IAQ problem. If a HVAC related IAQ problem is suspected, check the following items during your investigation.

- Outside air intakes checked for obstructions and sources of contaminants
- Air distributing dampers clear of obstruction and operating correctly
- Air supply/ return vents not blocked or obstructed
- Filters clean, operating properly, pressure drops checked
- Drain pans checked and cleaned
- Heating and cooling coils inspected and cleaned
- Fan motor belts in good condition and operating correctly
- Air humidification controls inspected and cleaned
- Cooling towers inspected and cleaned, water treated
- Inspect the interior of air handling units and clean as needed

Note: If the remains unresolved after reviewing these items, proceed to the HVAC Short Form. Use the HVAC long form when the problem is not identified using the short form

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# HVAC Checklist- Short Form

Page 1 of 4

Building Name: \_\_\_\_\_ Date Checked: \_\_\_\_\_

Completed By: \_\_\_\_\_ Phone: \_\_\_\_\_

## MECHANICAL ROOM

- Clean and dry? \_\_\_\_\_ Stored refuse or chemicals? \_\_\_\_\_
- Describe items in need of attention \_\_\_\_\_

## MAJOR MECHANICAL EQUIPMENT

- Preventative maintenance (PM) plan in use? \_\_\_\_\_

### Control System

- Type \_\_\_\_\_
- System operation \_\_\_\_\_
- Date of last calibration \_\_\_\_\_

### Boiler

- Rated Btu input \_\_\_\_\_ Condition \_\_\_\_\_
- Combustion air: is there at least one square inch free area per 2,000 Btu input? \_\_\_\_\_
- Fuel or combustion odors \_\_\_\_\_

### Cooling Tower

- Clean? No leaks or overflow? \_\_\_\_\_ Slime or algae growth? \_\_\_\_\_
- Eliminator performance \_\_\_\_\_
- Biocide treatment working? (list type of biocide) \_\_\_\_\_
- Spill containment plan implemented? \_\_\_\_\_ Dirt separator working? \_\_\_\_\_

### Chillers

- Refrigerant leaks? \_\_\_\_\_
- Evidence of condensation problems? \_\_\_\_\_
- Waste oil and refrigerant properly stored and disposed of? \_\_\_\_\_

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## **HVAC Checklist- Short Form**

Page 2 of 4

Building Name: \_\_\_\_\_ Date Checked: \_\_\_\_\_

Completed By: \_\_\_\_\_ Phone: \_\_\_\_\_

### **AIR HANDLING UNIT**

- Unit identification \_\_\_\_\_ Area served \_\_\_\_\_

### **Outdoor Air Intake, Mixing Plenum, and Dampers**

- Outdoor air intake location \_\_\_\_\_
- Nearby contaminant sources? (describe) \_\_\_\_\_
- Bird screen in place and unobstructed? \_\_\_\_\_
- Design total cfm \_\_\_\_\_ outdoor air (O.A.) cfm \_\_\_\_\_ date last tested and balanced \_\_\_\_\_
- Minimum % O.A. (damper setting) \_\_\_\_\_ Minimum cfm O.A. \_\_\_\_\_
- Current O.A. damper setting (date, time, and HVAC operating model) \_\_\_\_\_
- Damper control sequence (describe) \_\_\_\_\_
- Condition of dampers and controls (note date) \_\_\_\_\_

### **Fans**

- Control Sequence \_\_\_\_\_
- Condition (note date) \_\_\_\_\_
- Indicate temperatures supply air \_\_\_\_\_ mixed air \_\_\_\_\_ return air \_\_\_\_\_ outdoor air \_\_\_\_\_
- Actual temperatures supply air \_\_\_\_\_ mixed air \_\_\_\_\_ return air \_\_\_\_\_ outdoor air \_\_\_\_\_

### **Coils**

- Heating fluid discharge temperature \_\_\_\_\_ cooling fluid discharge temperature \_\_\_\_\_
- Controls (describe) \_\_\_\_\_
- Condition (note date) \_\_\_\_\_

### **Humidifier**

- Type \_\_\_\_\_ If biocide used, note type \_\_\_\_\_
- Condition (no overflow, drains trapped, all nozzles working?) \_\_\_\_\_
- No slime, visible growth, or mineral deposits? \_\_\_\_\_

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**HVAC Checklist- Short Form**

Building Name: \_\_\_\_\_ Date Checked: \_\_\_\_\_

Completed By: \_\_\_\_\_ Phone: \_\_\_\_\_

**DISTRIBUTION SYSTEM**

| Zone/Room | System Type | Supply Air          |     | Return Air          |     | Power Exhaust |         |        |
|-----------|-------------|---------------------|-----|---------------------|-----|---------------|---------|--------|
|           |             | ducted/<br>unducted | cfm | ducted/<br>unducted | cfm | cfm           | control | serves |
|           |             |                     |     |                     |     |               |         |        |
|           |             |                     |     |                     |     |               |         |        |
|           |             |                     |     |                     |     |               |         |        |
|           |             |                     |     |                     |     |               |         |        |
|           |             |                     |     |                     |     |               |         |        |

**Condition of distribution system and terminal equipment (note location of problems)**

- Adequate access for maintenance? \_\_\_\_\_
- Ducts and coils clean and unobstructed? \_\_\_\_\_
- Air paths unobstructed? Supply \_\_\_\_\_ return \_\_\_\_\_ transfer \_\_\_\_\_ exhaust \_\_\_\_\_ make-up \_\_\_\_\_
- Note locations of blocked air paths, diffusers, or grilles \_\_\_\_\_
- Any unintentional openings into plenums? \_\_\_\_\_
- Controls operating properly? \_\_\_\_\_
- Air volume correct? \_\_\_\_\_
- Drain pans clean? Any visible growth or odors? \_\_\_\_\_

**Filters**

| Location | Type/Rating | Size | Date Last Changed | Condition (give date) |
|----------|-------------|------|-------------------|-----------------------|
|          |             |      |                   |                       |
|          |             |      |                   |                       |
|          |             |      |                   |                       |
|          |             |      |                   |                       |
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**HVAC Checklist- Short Form**

Building Name: \_\_\_\_\_ Date Checked: \_\_\_\_\_

Completed By: \_\_\_\_\_ Phone: \_\_\_\_\_

**OCCUPIED SPACE**

Thermostat types \_\_\_\_\_

| Zone/Room | Thermostat Location | What Does Thermostat Control? | Set points |        | Measured Temperature | Day/Time |
|-----------|---------------------|-------------------------------|------------|--------|----------------------|----------|
|           |                     |                               | Summer     | Winter |                      |          |
|           |                     |                               |            |        |                      |          |
|           |                     |                               |            |        |                      |          |
|           |                     |                               |            |        |                      |          |
|           |                     |                               |            |        |                      |          |
|           |                     |                               |            |        |                      |          |

Humidistat/Dehumidistat types \_\_\_\_\_

| Zone/Room | Humidistat/Dehumidistat Location | What Does it Control? | Set points (%RH) | Measured Temperature | Day/Time |
|-----------|----------------------------------|-----------------------|------------------|----------------------|----------|
|           |                                  |                       |                  |                      |          |
|           |                                  |                       |                  |                      |          |
|           |                                  |                       |                  |                      |          |
|           |                                  |                       |                  |                      |          |
|           |                                  |                       |                  |                      |          |

- Potential problems (note location) \_\_\_\_\_
- Thermal comfort or air circulation problems (drafts, obstructed airflow, stagnant air, overcrowding, poor thermostat location) \_\_\_\_\_
- \_\_\_\_\_
- Malfunctioning equipment \_\_\_\_\_
- Major sources of odors or contaminants \_\_\_\_\_

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# Log of Activities and System Operation

**Building Name:** \_\_\_\_\_ **File Number:** \_\_\_\_\_

**Completed By:** \_\_\_\_\_ **Phone:** \_\_\_\_\_

On the form below, please record your observation of the HVAC system operation, maintenance activities, and any other information that you think might be helpful in identifying the cause of IAQ complaints in this building. Please report any other observations (e.g., weather, other associated events) you may think may be important as well.

Feel free to attach additional pages or use more than one line for each event.

Equipment and activities of particular interest:

Air Handler(s): \_\_\_\_\_

Exhaust Fan(s): \_\_\_\_\_

Other equipment or activities: \_\_\_\_\_

| <b>Date/<br/>Time</b> | <b>Day of Week</b> | <b>Equipment Item/Activity</b> | <b>Observations/Comments</b> |
|-----------------------|--------------------|--------------------------------|------------------------------|
|                       |                    |                                |                              |
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|                       |                    |                                |                              |

Modified from "Building Air Quality: A Guide for Building Owners and Facility Managers". EPA/400/1-91/033. DHHS (NIOSH) Publication No. 91-114. December 1991.

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# Pollutant and Source Inventory

Page 1 of 5

Building Name: \_\_\_\_\_ Date: \_\_\_\_\_

Completed By: \_\_\_\_\_ Phone: \_\_\_\_\_

Using the list of potential categories below, record any indications of contamination or suspected pollutants that may require further investigation or treatment. Sources of contamination may be constant or intermittent or may be linked to single, unrepeated events. For intermittent sources, try to indicate the time of peak activity or contamination production, including correlations with weather.

| Source Category                                       | Checked | Needs Attention | Location | Comments |
|---|---------|-----------------|----------|----------|
| <b>SOURCES OUTSIDE BUILDING</b>                       |         |                 |          |          |
| <b>Contaminated Outdoor Air</b>                       |         |                 |          |          |
| Pollen, dust  |         |                 |          |          |
| Industrial contaminants                               |         |                 |          |          |
| General vehicular contaminants                        |         |                 |          |          |
| <b>Emissions from Nearby Sources</b>                  |         |                 |          |          |
| Vehicle exhaust (parking areas, loading docks, roads) |         |                 |          |          |
| Dumpsters   |         |                 |          |          |
| Re-entrained exhaust                                  |         |                 |          |          |
| Debris near outside air intake                        |         |                 |          |          |
| <b>Soil Gas</b>                                       |         |                 |          |          |
| Radon   |         |                 |          |          |
| Leaking underground tanks                             |         |                 |          |          |
| Sewage smells   |         |                 |          |          |
| Pesticides  |         |                 |          |          |

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Environmental Health and Safety

# Pollutant and Source Inventory

**Building Name:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**Completed By:** \_\_\_\_\_ **Phone:** \_\_\_\_\_

Using the list of potential categories below, record any indications of contamination or suspected pollutants that may require further investigation or treatment. Sources of contamination may be constant or intermittent or may be linked to single, unrepeated events. For intermittent sources, try to indicate the time of peak activity or contamination production, including correlations with weather.

| Source Category                                      | Checked | Needs Attention | Location | Comments |
|--|---------|-----------------|----------|----------|
| <b>Moisture or Standing Water</b>                    |         |                 |          |          |
| Rooftop  |         |                 |          |          |
| Crawlspace   |         |                 |          |          |
| <b>EQUIPMENT</b>                                     |         |                 |          |          |
| <b>HVAC System Equipment</b>                         |         |                 |          |          |
| Combustion gases                                     |         |                 |          |          |
| Dust, dirt, or microbial growth in ducts             |         |                 |          |          |
| Microbial growth in drip pans, chillers, humidifiers |         |                 |          |          |
| Leaks of treated boiler water                        |         |                 |          |          |
| <b>Non HVAC System Equipment</b>                     |         |                 |          |          |
| Office Equipment                                     |         |                 |          |          |
| Supplies for Equipment                               |         |                 |          |          |
| Laboratory Equipment                                 |         |                 |          |          |
|  |         |                 |          |          |
|  |         |                 |          |          |



University of Minnesota

Environmental Health and Safety

# Pollutant and Source Inventory

**Building Name:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**Completed By:** \_\_\_\_\_ **Phone:** \_\_\_\_\_

Using the list of potential categories below, record any indications of contamination or suspected pollutants that may require further investigation or treatment. Sources of contamination may be constant or intermittent or may be linked to single, unrepeated events. For intermittent sources, try to indicate the time of peak activity or contamination production, including correlations with weather.

| Source Category                          | Checked | Needs Attention | Location | Comments |
|--|---------|-----------------|----------|----------|
| <b>HUMAN ACTIVITIES</b>                  |         |                 |          |          |
| <b>Personal Activities</b>               |         |                 |          |          |
| Smoking                                  |         |                 |          |          |
| Cosmetics (odors)                        |         |                 |          |          |
| <b>Housekeeping Activities</b>           |         |                 |          |          |
| Cleaning Materials                       |         |                 |          |          |
| Cleaning procedures                      |         |                 |          |          |
| Stored supplies                          |         |                 |          |          |
| Stored refuse                            |         |                 |          |          |
| <b>Maintenance Activities</b>            |         |                 |          |          |
| Use of materials with volatile compounds |         |                 |          |          |
| Stored supplies with volatile compounds  |         |                 |          |          |
| Use of pesticides                        |         |                 |          |          |
|  |         |                 |          |          |
|  |         |                 |          |          |

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# Pollutant and Source Inventory

**Building Name:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**Completed By:** \_\_\_\_\_ **Phone:** \_\_\_\_\_

Using the list of potential categories below, record any indications of contamination or suspected pollutants that may require further investigation or treatment. Sources of contamination may be constant or intermittent or may be linked to single, unrepeated events. For intermittent sources, try to indicate the time of peak activity or contamination production, including correlations with weather.

| Source Category   | Checked | Needs Attention | Location | Comments |
|---|---------|-----------------|----------|----------|
| <b>BUILDING COMPONENTS FURNISHINGS</b>                            |         |                 |          |          |
| <b>Locations Associated with Dust or Fibers</b>                   |         |                 |          |          |
| Dust-catching areas   |         |                 |          |          |
| Deteriorated Furnishings  |         |                 |          |          |
| Asbestos-containing materials                                     |         |                 |          |          |
| <b>Unsanitary Conditions/Water Damage</b>                         |         |                 |          |          |
| Microbial growth in or on soiled or water-damaged furnishings     |         |                 |          |          |
| <b>Chemicals Released From Building Components or Furnishings</b> |         |                 |          |          |
| Volatile compounds  |         |                 |          |          |
| <b>OTHER SOURCES</b>  |         |                 |          |          |
| <b>Accidental Events</b>  |         |                 |          |          |
| Spills  |         |                 |          |          |
| Water leaks or flooding   |         |                 |          |          |
| Fire Damage   |         |                 |          |          |

Modified from "Building Air Quality: A Guide for Building Owners and Facility Managers". EPA/400/1-91/033. DHHS (NIOSH) Publication No. 91-114. December 1991.

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# Pollutant and Source Inventory

**Building Name:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**Completed By:** \_\_\_\_\_ **Phone:** \_\_\_\_\_

Using the list of potential categories below, record any indications of contamination or suspected pollutants that may require further investigation or treatment. Sources of contamination may be constant or intermittent or may be linked to single, unrepeated events. For intermittent sources, try to indicate the time of peak activity or contamination production, including correlations with weather.

| Source Category                         | Checked | Needs Attention | Location | Comments |
|---|---------|-----------------|----------|----------|
| <b>Special Use/Mixed Use Areas</b>      |         |                 |          |          |
| Food preparation areas                  |         |                 |          |          |
| Underground or attached parking garages |         |                 |          |          |
| Laboratories                            |         |                 |          |          |
| Print shops, art rooms                  |         |                 |          |          |
| Exercise rooms                          |         |                 |          |          |
| <b>Redecorating/Repair/Remodeling</b>   |         |                 |          |          |
| Emissions from new furnishings          |         |                 |          |          |
| Dust, fibers from demolition            |         |                 |          |          |
| Odors, volatile compounds               |         |                 |          |          |
|   |         |                 |          |          |
|   |         |                 |          |          |
|   |         |                 |          |          |
|   |         |                 |          |          |
|   |         |                 |          |          |
|   |         |                 |          |          |
|   |         |                 |          |          |

Modified from "Building Air Quality: A Guide for Building Owners and Facility Managers". EPA/400/1-91/033. DHHS (NIOSH) Publication No. 91-114. December 1991.

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**Pollutant Pathway Record for IAQ Profiles**

**Building Name:** \_\_\_\_\_ **File Number:** \_\_\_\_\_

**Address:** \_\_\_\_\_

**Completed By:** \_\_\_\_\_ **Date:** \_\_\_\_\_

| Building Area<br>with Controlled<br>Pressure<br>(Room #) | Use | Intended Pressure |                 | Desired<br>Pressure<br>Present?<br>(Y/N/?) | Comments<br>(note areas<br>with variable<br>pressure) |
|--|-----|-------------------|-----------------|--|---|
|  |     | Positive<br>(+)   | Negative<br>(-) |  |   |
|  |     |                   |                 |  |   |
|  |     |                   |                 |  |   |
|  |     |                   |                 |  |   |
|  |     |                   |                 |  |   |
|  |     |                   |                 |  |   |
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|  |     |                   |                 |  |   |
|  |     |                   |                 |  |   |

Modified Pollutant Pathway record for IAQ Profiles from "Building Air Quality: A Guide for Building Owners, Facility Managers, and Agency Contacts." Minnesota Dept. of Administration, Facilities Management Bureau, June 16<sup>th</sup>, 1995.

Notes: This form should be used in combination with a floor plan, such as a fire evacuation plan.

Building areas that contain contaminant sources (e.g. bathrooms, print rooms, etc.) should be maintained under negative pressure. Building areas that need to be protected from the infiltration of contaminants (e.g. computer rooms, lobbies) should be maintained under positive pressure.

List the building areas in which pressure relationships need to be controlled. Fill out the chart as you inspect the building. Mark the floor plan with arrows, plus signs (+) and minus signs (-) to show the airflow patterns you observe using chemical smoke or a micromanometer (digital pressure gauge).

Building areas that appear isolated from each other may be connected by airflow passages such as air distribution zones, utility tunnels, crawl spaces, etc. If you are aware of pathways connecting the room to identified pollutant sources, note that in the comments section. Some locations may have variable pressure due to proximity to adjacent buildings or loading docks.

## Appendix 3: Humidifier Notification and Compliance Form

### HUMIDIFIER NOTIFICATION AND COMPLIANCE FORM

Date \_\_\_\_\_

Name \_\_\_\_\_ Office \_\_\_\_\_ Department \_\_\_\_\_

Humidifier Type and Model \_\_\_\_\_

Reason for Humidifier Use \_\_\_\_\_

- My supervisor/department head/director has been notified of humidifier use
- The humidifier is a warm mist or evaporative humidifier
- The humidifier is **not** a cool mist or ultrasonic humidifier
- A humidity gauge is in the same room as the humidifier.
- The Environmental Health and Safety Office has been notified of humidifier use
- I have received, read, and understand the Humidifier Care and Maintenance informational pamphlet
- I agree to the terms of use described for humidifiers in the Humidifier Care and Maintenance pamphlet

Staff Signature \_\_\_\_\_ Date \_\_\_\_\_

Supervisor Signature \_\_\_\_\_ Date \_\_\_\_\_

Please Return to: Environmental Health and Safety Office, w140 BHS 612-626-6002

## **Appendix 3: Space Heater Notification and Compliance Form**

### **SPACE HEATER NOTIFICATION FORM**

Date \_\_\_\_\_

Name \_\_\_\_\_ Office \_\_\_\_\_ Department \_\_\_\_\_

Space Heater Type and Model \_\_\_\_\_

Reason for Space Heater Use \_\_\_\_\_

- I have notified Facilities Management of temperature control issues.
- My supervisor/department head/director has been notified of space heater use
- I accept personal liability for fires or other damage caused by the use of the space heater.
- The space heater is electric and does not consume fuel.

Staff Signature \_\_\_\_\_ Date \_\_\_\_\_

Supervisor Signature \_\_\_\_\_ Date \_\_\_\_\_

Please Return to: Environmental Health and Safety Office, w140 BHS 612-626-6002