

Dickinson

INDOOR AIR QUALITY PLAN

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I. Table of Contents

II. Introduction..... 4

III. Responsibility 4

IV. Information and Training..... 5

V. Hazard Identification 6

 A. Building Profiles 6

 B. Building Audits [I-BEAM Forms A1, A2, and A-3]..... 6

 C. Complaint/Response Process [I-BEAM Forms D1 through D5]..... 8

 1. Reporting IAQ Complaints 8

 2. Response to IAQ Complaints..... 9

 D. Mold..... 9

 1. Background 9

 2. Health Effects of Mold..... 10

 3. Testing for Mold..... 10

 4. Mold Remediation..... 10

VI. Control Methods 12

 A. Source Management Protocols 12

 1. Remodeling/Renovation..... 12

 2. Painting..... 12

 3. Pest Control 13

 4. Shipping/Receiving 13

 5. Smoking 13

 6. Pets 13

 7. Managing Moisture and Mold..... 14

 B. HVAC Operations and Maintenance [Forms B-1, B-2] 14

 C. Housekeeping..... 15

VII. Record Keeping 15

II. Introduction

The Environmental Protection Agency (EPA) defines Indoor Air Quality (IAQ) as the quality of the air inside buildings as represented by concentrations of pollutants and thermal (temperature and relative humidity) conditions that affect the health, comfort, and performance of occupants.

Since the 1970s, efforts to conserve energy have created buildings that are sealed tighter than ever before. Couple this with the increase in consumer products and building materials containing hazardous pollutants, and its apparent why indoor air quality is a concern.

The goal of the Dickinson College Indoor Air Quality Plan is to provide a safe and healthy working environment by proactively identifying and controlling pollutants and thermal conditions that negatively impact indoor air quality.

The *IAQ Building Evaluation and Assessment Tool (I-BEAM)*, produced by the EPA was an invaluable resource for developing this program. References to I-BEAM protocols and forms appear in brackets throughout this document. You can download a copy of I-BEAM from the EPA website or contact the IAQ INFO Clearinghouse at 1-800-438-4318 for a free CD-ROM copy.

III. Responsibility

IAQ complaints vary from basic comfort issues (too hot, too cold, too humid) to complex issues resulting in lost worker productivity and illness. Although it may be difficult to identify a single cause of poor IAQ, Dickinson College is committed to meeting or exceeding existing IAQ standards. The IAQ program is coordinated by the Director of Environmental Health & Safety. For college buildings the Facilities Management Department has designated the Assistant Director for Operations, as the primary contact for IAQ issues.

- A. The President of Dickinson College has ultimate responsibility for health and safety and the IAQ program. General oversight responsibility is assigned to the Vice President for Campus Operations.
- B. The Director of Environmental Health & Safety is responsible for coordinating the IAQ program and:
 - Communicating with all college personnel about occupant responsibilities for IAQ
 - Providing IAQ training to college personnel who could impact IAQ
 - Coordinating a building walkthrough and IAQ building profile
 - Conducting baseline and periodic testing of IAQ to identify ensure safe concentrations of pollutants and appropriate thermal conditions.
 - Developing and maintaining an occupant complaint-response system
 - Assisting the Assistant Director for Operations in investigating occupant complaints

- Maintaining results of monitoring and corrective actions taken.
 - Ensuring department supervisors are maintaining up-to-date M.S.D.S in accordance with the Dickinson College Hazard Communication Program
 - Contracting for mold testing and/or remediation if necessary.
- C. The Associate VP for Campus Operations is responsible for:
- Maintaining up-to-date building drawings and records
 - Developing/reviewing maintenance and housekeeping plans and procedures for IAQ
 - Reviewing contracts for IAQ related specifications (e.g. – renovation contracts, pest control contracts)
 - Communicating with college personnel about building activities that could impact IAQ
- D. The Assistant Director for Operations serves as the primary contact for IAQ complaints and is responsible for:
- Creating IAQ profiles for each college owned building
 - Conducting a baseline and periodic walkthroughs of college owned buildings to look for indicators of poor IAQ
 - Investigating occupant complaints
 - Maintaining up-to-date manufacturer’s operating instructions for HVAC system components
 - Scheduling maintenance for HVAC system components
 - Establishing HVAC control system set points/ranges and pressure relationships
 - Adjusting HVAC operation during remodeling/renovation to maintain building air quality
- E. The Safety Committee assists the Director of Environmental Health & Safety and:
- periodically reviews the Indoor Air Quality Program
 - conducts safety audits
- F. All Employees of the College are responsible for ensuring that they follow the procedures and faithfully implement the appropriate responsibilities put forth in the Indoor Air Quality Program. Failure to do so is a serious breach of college policy and subject to disciplinary action that might include termination of employment at the college. The procedures to be followed in the event of such action shall be in keeping with existing guidelines as stated in the appropriate handbook for faculty, administrators, and staff.

IV. Information and Training

All employees of the College will be made aware of the IAQ plan, the factors that contribute to poor IAQ, their role in minimizing the problem, and the process used to identify and resolve IAQ problems.

The Department of Environmental Health & Safety (EHS) provides additional training to college personnel who could impact IAQ (e.g. Housekeeping staff, HVAC technicians)

V. Hazard Identification

A. Building Profiles

The Facilities Management and EHS departments will create an IAQ profile for each college building. These profiles should include but not be limited to the following:

- “As built” blue-prints including modifications and renovations that reflect current conditions.
- Commissioning reports (including testing and balancing reports)
- Drawings of tenants’ build-outs or interior renovations.
- Records of major space use changes not reflected in original design. (e.g. office space changed to laboratory; significant increases in occupant density)
- Up-to-date manufacturer’s operating instructions for HVAC system components
- Maintenance schedules for HVAC system components
- Documentation of HVAC control system set points and ranges.
- Drawings of pressure relationships.
- Records of equipment modifications/replacement.
- IAQ History including complaints, results of monitoring, and corrective actions taken.
- M.S.D.S. for products used in the building.

B. Building Audits [I-BEAM Forms A1, A2, and A-3]

The Facilities Management and EHS departments will conduct a baseline and periodic whole building walkthroughs to record IAQ parameters and look for indicators of poor IAQ, including but not limited to:

- Odors
- Dirty or unsanitary conditions
- Visible mold growth
- Moisture
- Stained or discolored building material
- Presence of hazardous substances
- Cracks or holes where soil gas may enter
- Poorly maintained filters
- Uneven temperatures
- Overcrowding
- Personal air cleaners (e.g. – ozone generators) or fans
- Inadequate ventilation
- Blocked vents

- Dirty or full drain pans
- HVAC equipment in need of repair/maintenance
- Contaminate sources (combustion appliances, photocopiers/printers, chemical storage)

and conduct testing to ensure that concentrations of pollutants do not exceed safe limits and thermal conditions are maintained within an appropriate range of comfort as indicated in Table 1.

TABLE 1: *Physical and Chemical Parameters*

Parameter	Limit/Range	References	Common Sources
Temperature	73-79°F summer; 68-74.5°F winter	ASHRAE Standard 55-1992: Thermal Environmental Conditions for Human Occupancy	
Relative Humidity	30—60% (less than 50% if possible to control dust mites)	EPA “Mold, Moisture, and Your Home”	
Wood Moisture Equivalent (Pine)	Less than 20%		
CO ₂	700 ppm over ambient (equates to 15 cfm per person for sedentary persons)	ASHRAE Standard 62-1999: Ventilation for Acceptable Indoor Air Quality	Building Occupants
CO	9 ppm	US EPA, National Ambient Air Quality Standard for a Maximum Allowable Outdoor Average Over 8 hours.	Leaking Vented or Unvented Combustion Appliances; Parking Garages; Outdoor Air
O ₃	0.05 ppm	World Health Organization	Electrostatic appliances; office machines; ozone generators; outdoor air
SO ₂	0.03 ppm	US EPA, National Ambient Air Quality Standard Long Term	Unvented space heaters (kerosene); diesel combustion; outdoor air
NO ₂	0.05 ppm	US EPA, National Ambient Air Quality Standard Long Term	Leaking vented or unvented combustion

			appliances; outdoor air
NO	25 ppm	ACGIH TLV and NIOSH REL NOTE: Rapidly converted in air to NO ₂	Combustion
H ₂ S	0.001 ppm	Minimum odor threshold per NIH National Library of Medicine	Sewar Gas
NH ₃	0.04 ppm	Minimum odor threshold per NIH National Library of Medicine	Cleaning Supplies; Fertilizer
Cl ₂	0.02 ppm	Minimum odor threshold per NIH National Library of Medicine	Cleaning Supplies; Pool Chemicals
Total VOCs	0.64 ppm	Molhave, Institute of Environmental and Occupational Medicine, 1990	Paints and Solvents; Waxes, Adhesives; Cleaning Supplies; New Building Materials and Furnishings
Radon	4 picoCuries/liter	US EPA	Soil Gas

When special equipment or laboratory analysis is necessary, outside contractors may be used to perform monitoring or to provide remediation.

C. Complaint/Response Process [I-BEAM Forms D1 through D5]

1. Reporting IAQ Complaints

The following emergency situations require immediate notification of Public Safety at ext. 1111:

- Hazardous material spill
- Flooding on porous materials
- Gray water (e.g. Sewer) spills
- Gas leak
- Sudden onset of headaches, dizziness, drowsiness, nausea, and/or combustion odors (could be carbon monoxide poisoning)
- Widespread breathing difficulties, chest tightness, or respiratory infection (potentially serious infectious or allergenic agent)
- Diagnosed Legionnaires disease or tuberculosis.

To report a non-emergent IAQ problem, contact the Facilities Management Department at ext. 1272 between the hours of 8:00am—5:00pm, Monday--Friday. Between 5:00pm—8:00am, Monday—Friday and on weekends, contact Public Safety at ext. 1111. Include the following information in your request:

- Nature of problem
- Where the problem occurs (one or more locations)
- When the problem was first experienced
- When the problem occurs or when it is the worst (time of day, day of week, during certain activities/events/seasons)

2. Response to IAQ Complaints

- i. IAQ complaints will be assigned to the Assistant Director for Operations
- ii. The Assistant Director for Operations will notify the Director of Environmental Health & Safety
- iii. The EHS Director:
 - Will log the Complaint
 - Will provide the complainant(s) with additional IAQ information as needed
 - Will schedule an interview with the complainant(s) to collect additional information
 - May ask the complainant(s) to keep a diary to record the time, place, and circumstances surrounding the occurrence of symptoms or problems
- iv. The Facilities Management and EHS departments will investigate the complaint promptly and track it through resolution. When special equipment or laboratory analysis is necessary, outside contractors may be used to perform monitoring or to provide remediation.
- v. The EHS Director will notify the complainant(s) of:
 - Progress of the investigation
 - Factors that have been investigated and ruled out as causes or contributors
 - Expected length of the investigation
 - When they will receive further notification
 - What they can do to help
- vi. The Facilities Management and EHS departments will follow-up to insure that remediation is effective.

D. Mold

1. Background

There are more than a million different fungi that could be described as mold, but less than a thousand of these are typically present in indoor

environments. To survive mold needs oxygen, organic nutrients, the right temperature, and moisture. Oxygen is plentiful, most common building materials provide organic nutrients, and molds thrive at indoor temperatures, thus controlling moisture is the best way to prevent mold growth.

Molds reproduce and spread by producing spores which are dispersed in the air. A single spore can germinate and spread millions more spores in just days. The ubiquitous nature of molds in outdoor and indoor environments makes positive testing a sure bet. Finding indoor mold growth and favorable conditions for mold growth are the real keys to determining if mold problems exist or are likely to occur.

2. Health Effects of Mold

The complexity of molds can lead to a variety of health effects including: allergies, respiratory irritation, asthma attacks, and infections; however, since the effects of mold varies with each individual, Dickinson College recommends that any person who believes they have health problems related to mold seek professional medical attention.

3. Testing for Mold

The main objective of any mold investigation should be to locate sites of indoor mold growth, in order to determine how to best control the underlying moisture problem and remove the contamination. Mold testing rarely answers the difficult question of “What is the health risk?”, and often leads to unrealistic expectations that can’t be met. The key to solving a mold problem will always be to correct the source of excess moisture and remove mold contamination and these can generally be achieved without mold testing.

If mold testing is performed, it must be done by experienced and competent investigators who have stated a hypothesis (es) and how the test results will be used in determining solutions to the problem. Investigators must describe the limitations of any testing method and the applicability of test results including uncertainties.

Testing should not delay corrective actions, or divert resources from moisture control and mold remediation.

4. Mold Remediation

From a public health perspective, there is no practical reason to test visible mold growth. Instead, the growth should be promptly removed by cleaning or disposal. However, testing may be appropriate to verify a

suspected material is mold in order to justify expenditures or corrective steps.

WARNING: Mold cleanup will cause the release of spores into the air. Wear appropriate personal protective equipment, including but not limited to:

- Unvented goggles
- nitrile gloves
- N-95 filtering face piece respirator (N-100 is strongly recommended for large areas of contamination)

The following guidelines shall be followed when cleaning and removing mold covering an area of less than 10 square feet:

- i. Identify the source of moisture and begin to remove excess moisture as soon as possible. NOTE: Dehumidification may take days or weeks to return to normal levels.
- ii. trap or capture as much surface mold growth as possible from accessible surfaces by vacuuming all visible mold with a HEPA vacuum or wet vacuum or carefully and systematically wipe up mold with a damp cloth (NOTE: damp not wet)
- iii. determine if the material(s) supporting mold growth can be cleaned or must be discarded;
 - Discard porous materials (e.g. – processed wood, ceiling tiles, and insulation) in sealed plastic bags.
 - clean non-porous materials (e.g. – solid wood) with an all-purpose cleaner or detergent)
- iv. Expand cleaning to areas and materials in the vicinity of the visible mold growth, where it is likely pedestrian traffic has carried contaminants from the primary growth site. Use HEPA vacuums and damp cleaning (do not sweep, dust, or brush)
- v. Determine if disinfection is needed. For example, when hard-surfaced porous materials (e.g. – concrete floors/walls; ceramic tiles, linoleum) are impractical to replace, they should be disinfected with a diluted bleach solution (10 parts water to 1 part bleach). The solution should be applied by light misting or wiping on to avoid runoff; treat the entire area that supported visible growth. The surfaces should be kept damp for at least 30 minutes, rinsed, and allowed to air dry. Facilitate drying with fans or dehumidifiers if needed. NOTE: It is critical to thoroughly clean off visible growth and soiling before disinfecting.
- vi. Monitor for signs of moisture return or mold growth before replacing building materials or furnishings. If growth reappears, repeat cleaning and disinfecting with a stronger bleach solution (e.g. -- 5:1) and allow a longer contact time.

Consider that regrowth may indicate that the material supporting the growth should be removed and/or that excess moisture has not been controlled adequately.

When mold covers an area greater than 10 square feet, professional remediation services will be necessary due to increased containment and PPE requirements. These services will be coordinated by the Departments of Facilities Management and Environmental Health & Safety.

VI. Control Methods

A. Source Management Protocols

The following protocols shall be followed to manage pollution sources with extremely high potential to cause IAQ problems

1. Remodeling/Renovation

- notify employees of planned remodeling/renovation
- create a complete physical enclosure of the construction zone
- keep construction areas under negative pressure and occupant areas under positive pressure
- seal return ducts to insure contaminants do not enter HVAC system
- schedule work during periods of minimum occupancy
- provide increased ventilation before, during, and after construction
- choose building materials and work processes (e.g. – wet sanding of walls) that are low-emitting
- minimize emissions from new furnishings (request information on potential indoor air contaminant emissions from product suppliers, air out furnishings before installation)
- during clean-up use vacuums with HEPA filters
- change air filters more frequently, especially after work is completed

2. Painting

- use low-emitting products (water based and fast-drying paints where feasible)
- paint during unoccupied hours
- provide increased ventilation before, during, and after painting
- avoid spraying when possible
- notify occupants

3. Pest Control

- ensure that pesticides are stored, used, and disposed of according to the label and MSDS
- choose non-chemical pest control strategies where possible (e.g. -- control dirt, moisture, clutter, foodstuff that attract or harbor pests, and close building penetrations which allow pest access)
- use baits and traps rather than sprays where possible
- avoid periodic pesticide application for “prevention” of pests
- apply pesticides only where pests are located
- choose a pesticide that is specifically formulated for the targeted pest
- apply pesticides during unoccupied hours
- provide increased ventilation before, during, and after application
- if applying outside, avoid areas near air intakes
- notify occupants of planned pest control activities.

4. Shipping/Receiving

- do not allow idling of vehicles at loading docks, post signs and enforce the ban
- maintain receiving area under positive pressure to insure contaminants from the loading area do not enter the building
- notify delivery companies of policy

5. Smoking

Smoking in any form is prohibited inside all college-owned or leased buildings including both residential and non-residential buildings and all recognized student housing including fraternities. In addition, smoking is prohibited in any college-owned or rented vehicles. Individuals who choose to smoke must smoke outside and must stand at least 15 feet away from any campus building.

6. Pets

With the exception of certified service animals and animals specially approved for the educational purposes of the College, the presence of animals in all college-owned or leased buildings, including residential and non-residential buildings is prohibited, with the possible exception of College rental housing. For rental properties, this issue will be addressed on a case-by-case basis. Dogs and other animals are permitted on campus roads, walks, and grounds, as they are in the local community, when they are on a leash and controlled by the owner. It is the owner's responsibility to clean up after the animal. All pets must be

tagged, registered, and vaccinated in accordance with Pennsylvania State Law.

7. Managing Moisture and Mold

- maintain relative humidity below 60% (50% if possible to control dust mites)
- insulate exterior walls and ceilings to avoid condensation on cold surfaces
- insulate cold water pipes to avoid sweating
- thoroughly clean and dry water from porous surfaces (such as carpet) within 24 hours or discard the material
- maintain proper drainage around the perimeter of buildings
- provide exhaust ventilation in showers and kitchens producing steam
- clean drain pans often and insure a proper slope to keep water draining
- insure proper maintenance of cooling towers and treat cooling water
- discard building materials and furniture having a persistent musty odor
- discard all ceiling tiles with visible water stains

B. HVAC Operations and Maintenance [Forms B-1, B-2]

The HVAC services department will perform or contract services to perform preventive and unscheduled maintenance to establish good indoor air quality, including but not limited to:

- Inspecting equipment for unusual conditions like excessive noise and heat
- Inspecting equipment for leaks, rust, dirt, and mechanical problems
- Performing mechanical and electrical adjustments (e.g. Adjusting belt tension, tightening bolts)
- Performing HVAC testing and balancing
- Inspecting outside air intakes for nearby sources of contaminants
- Maintaining air distribution dampers, diffusers, and grilles that are clear of obstructions and operating properly
- Changing filters per manufacturer's instructions
- Lubricating equipment per manufacturer's instructions
- Cleaning heating and cooling coils and inspecting for leaks
- Cleaning drain pans and inspecting for proper drainage
- Inspecting and cleaning the interior of air handling units
- Inspecting and replacing fan motors and belts
- Inspecting and cleaning air humidification systems

- Inspecting and cleaning cooling towers and treating water according to schedule
- Inspecting and cleaning air distribution pathways and CAV/VAV boxes as needed
- Cleaning boilers and performing combustion and flue gas tests
- Analyzing and adjusting chemicals for chiller
- Draining water from compressor tanks

C. Housekeeping

The Custodial Services department will perform or contract services to perform preventive and unscheduled maintenance to establish good indoor air quality, including but not limited to:

- Preventing dirt from entering and removing it once there (e.g. – cleaning outside buildings, using walk off mats)
- Purchasing products (e.g.. avoid aerosols) and choosing cleaning methods that minimize the introduction of pollutants and maximize removal of pollutants (e.g.. vacuums with HEPA filters, lint free dust clothes, no feather dusters)
- Restricting smoking outside building entrances
- Deep cleaning carpet at regular intervals
- Minimize use of ammonia, chlorine, and volatile acid products
- Drying wet carpet or other porous materials within 24 hours or discarding material.
- Removing trash from building as soon as possible
- Following storage, use, and disposal guidelines on container labels and in MSDS.

VII. Record Keeping

Records shall be kept in accordance with the Dickinson College Hazard Communication Program.

Appendix A:
I-BEAM Forms