Introduction

Faculty, staff, students and visitor concerns with Indoor Air Quality (IAQ) have increased since energy conservation measures were instituted in office and commercial buildings during the 1970s, minimizing the leakage of outside air into buildings and contributing to the buildup of contaminants in the indoor air. Complaints about IAQ range from simple complaints of comfort issues (too hot/cold/drafty, etc.) and odd smells, to more serious perceived and actual health hazards, where the air quality may be suspected of causing illness and lost work time.

It may not be easy to identify a single reason for IAQ complaints because of the number and variety of possible sources, causes, and varying individual sensitivities. Nevertheless, Tufts University is committed to providing its students, employees, and visitors an indoor air free of unhealthful contaminants including airborne disease agents.

IAQ Coordinators at Tufts

The IAQ Coordinators at Tufts University are the Campus EHS Managers and representatives of Facilities Services.

IAQ Coordinator responsibilities include:

- Training employees in the recognition, prevention, and resolution of IAQ problems;
- Communicating with building occupants concerning IAQ issues or problems;
- Developing a procedure for documenting and responding to IAQ complaints and problems; and
- Maintaining IAQ records:
  - IAQ records include: IAQ complaints and resolutions; and documentation of any maintenance, repair, or remodeling activity that could adversely impact indoor air quality.

Conducting walkthroughs to assess the current IAQ situation

The IAQ coordinator conducts periodic walkthrough inspections which involves both occupied areas and mechanical rooms. During the walkthrough, IAQ problem indicators are checked and noted on a floor plan or comparable drawing, including:

- Odors;
- Dirty or unsanitary conditions;
- Visible fungal growth or moldy odors;
- Evident moisture in inappropriate locations (e.g., moisture on walls, floors, or carpets);
- Staining or discoloration of building material(s);
- Smoke damage;
- Presence of hazardous substances;
- Unusual odors from equipment;
- Poorly-maintained filters;
- Uneven temperatures;
• Personal air cleaners (e.g., ozone generators, portable filtration units) or fans;
• Inadequate ventilation;
• Inadequate exhaust air flow;
• Blocked vents; and
• Other conditions that could impact IAQ, especially risk factors that need regular inspection to prevent IAQ problems from occurring (e.g., drain pans that do not fully drain).

The condition and operation of the HVAC system are inspected, including:

• Assessing components that need to be repaired, adjusted, cleaned, or replaced;
  o Determining if those components have been maintained or replaced, and if not, have work orders been prepared;
• Verifying if actual control settings and operating schedules for each air handling unit have been recorded and filed, and checked against the design intent; and
• Verifying that areas with significant sources of contaminants (e.g., copy rooms, food service areas, printing/photographic areas) are provided with adequate exhaust. Other significant sources are moved as close to exhaust as possible.

Existing and Potential IAQ Problems

The IAQ Coordinator conducts an ongoing assessment of university buildings for existing IAQ problems. Working together, Tufts EHS and Facilities Services work to correct IAQ concerns and steps are taken to control critical IAQ factors, including both source-related IAQ problems (e.g. scented candles, humidity and water leaks) and ventilation-related IAQ problems (e.g. inadequate supply and exhaust air into each occupied space).

Training

*Tufts University* employees and contract personnel whose functions could impact IAQ (e.g., housekeeping staff and maintenance contractors) have been identified and trained. Tufts University provides IAQ training and information to university personnel and contractors - especially regarding use of hazardous chemicals.

Plan for Facility Operations and Maintenance

*HVAC Operations*

Operating schedules for HVAC equipment have been written and are updated as needed.

*Preventive Maintenance*

A *preventive* maintenance plan has been written for each HVAC system in each building and is followed on a regular schedule; the task schedule is updated as needed. The more complex the building, the more detailed the maintenance plan.
The preventive maintenance plan or contract includes the following maintenance items:

- Inspecting outside air intakes are for nearby sources of contaminants;
- Maintaining air distribution dampers and ensuring that they are clear of obstructions and operating properly;
- Monitor air filters for pressure drops, and replacement or cleaning of affected air filters;
- Inspecting and cleaning drain pans to ensure proper drainage;
- Inspecting and cleaning heating and cooling coils;
- Inspecting and cleaning interior of air handling units;
- Inspecting and replacing fan motor and belts, as warranted;
- Inspecting and cleaning air humidification equipment controls;
- Inspecting and cleaning cooling towers;
- Treating cooling tower water according to an established schedule; and
- Inspecting and cleaning air distribution pathways, unit ventilators and variable air volume mixing boxes.

The preventive maintenance plan and operations manuals are updated when equipment is added, removed, or replaced.

### Unscheduled Maintenance

Procedures for unscheduled maintenance events (e.g., equipment failure) have been written and communicated to building staff.

They include:

- University personnel immediately contact the IAQ Coordinator that a maintenance event has occurred;
- The IAQ Coordinator ensures that notification to occupants is provided in a timely manner, addressing how IAQ is being protected;
- Any necessary remedial action is then taken; and
- The IAQ Coordinator then informs occupants that corrective actions have been completed.

### Housekeeping

All housekeeping equipment and products used in the building are communicated to the IAQ Coordinator. Additionally, housekeeping maintains an inventory of all chemicals used, and keeps the IAQ Coordinator updated on the inventory.

The products used at *Tufts University* may produce strong odors, are potential irritants, or may have been determined to have other IAQ impacts. Where possible, these products have been replaced by products without such impacts.

The housekeeping staff or contractors are educated about the IAQ implications, appropriate use of products which create IAQ impacts,

The following measures have been implemented to improve IAQ:
• Proper cleaning methods;
• Cleaning schedules;
• Proper materials storage and use; and
• Proper trash disposal.

Management of Processes with Potentially Significant Pollutant Sources

Purchasing Practices
When new products are purchased, information on potential indoor air contaminant emissions is requested from product suppliers. [Note: Emission information may not be readily available for many products; however information that is available is collected.] When the services of architects, engineers, contractors, or other professionals are used, IAQ concerns, such as special exhaust needs, are discussed.

Remodeling and Renovation
Procedures to minimize the generation and migration of contaminants or odors to occupied areas of the building are used and required of contractors.

The procedures are:

• The IAQ Coordinator review designs and construction activities for all proposed remodeling and renovation activities prior to their initiation;
• Work is scheduled during periods of minimum occupancy;
• Ventilation is provided in order to isolate work areas;
• Lower-emitting work processes are used (e.g., wet-sanding dry wall);
• Specialized cleaning procedures are used (e.g., use of HEPA vacuums);
• Filters are changed more frequently, especially after work is completed;
• Emissions from new furnishings are minimized (e.g., buying lower-emitting furnishings, airing out furnishings before installation, increased amount and duration off gassing time after installation, prior to reestablishing building/space occupancy); and
• Ventilation and distribution equipment are protected from contamination during construction.

Painting
Exposure to paint vapors is minimized by using low-emitting products, scheduling work during periods of minimum occupancy, and increasing ventilation.

Pest Control
Integrated Pest Management procedures are used to the extent possible:

• The pest control products being used in the building are communicated to the IAQ Coordinator;
• Written procedures and contract language ensure that all people who use pest control products read and follow all label directions for proper use, mixing, storage and disposal;
• Non-chemical pest control strategies are used where possible; and
• The safest available pest control products that meet the building’s needs are used or reviewed with pest control contractor.

**Shipping or Receiving Activities**

Vehicle exhaust has been prevented from entering the building (including through air intakes and building openings) by installing barriers to airflow from loading dock areas (e.g., doors, curtains, etc.) and using pressurization to prevent mixing of vehicle exhaust with building air.

**Smoking**

Smoking is prohibited in all *Tufts University* buildings, subject to the *Tufts University* Smoking Policy.

**Maintaining Cooperative Relations with Occupants**

The IAQ Coordinator keep occupants routinely informed about building conditions and policies that may impact IAQ (e.g., practices that attract insects or smoking policy clarifications). Additionally, occupants are notified about planned major renovation, remodeling, maintenance or pest control activities.

**Procedures for Responding to IAQ Complaints**

Procedures for responding to IAQ complaints have been written and are followed, including:

• IAQ problems are logged into the existing work-order system;
• Information is collected from complainants;
• Information and records obtained from complainants are kept confidential;
• The capability of in-house staff to respond to complaints is assessed; and
• Appropriate outside sources of assistance are identified, if needed.
• Once the assessment of the IAQ conditions is made, feedback is provided in a timely manner to the complainant;
• Remedial actions are taken; and
• Remedial actions are followed-up to determine if the action has been effective.

Building staff have been informed of these procedures. Building occupants have also been informed of these procedures and are periodically reminded of how to locate responsible staff and how to submit a complaint.

**Air contaminant testing and ventilation system evaluation**

Air contaminant sampling and analysis will be based on the recommendations of OSHA, EPA, NIOSH, Massachusetts Department of Public Health and the other recognized standard setting organizations.
Ventilation system testing and analysis will be based on the Massachusetts Building Code, ASHRAE standards and other recognized standard setting organizations.

**References and Resources**

Tufts University has adopted the recommendations of the following organizations in assuring that the indoor air in areas where hazardous materials and operations are conducted are safe and healthful.

While the **Occupational Safety and Health Administration** (OSHA) does not regulate indoor air quality, OSHA does provide guidance documents that Tufts uses to assess and evaluate indoor air quality.

The **National Institute for Occupational Safety and Health** (NIOSH) and the US Environmental Protection Agency has developed evaluation methods and recommendations for the quality of indoor air.

The **Massachusetts Department of Public Health, Bureau of Environmental Health**, have published two documents: Indoor Air Quality Evaluation Methods Chapter 1 and Results Interpretation Chapter 2 (September 2015).

The **American Society of Heating Refrigeration and Air-conditioning** (ASHRAE) Engineers have published a detailed Indoor Air Quality Guide (2009).