1.0 Overview

Environmental Health and Safety (EHS) at Weill Cornell Medicine (WCM) has developed this Indoor Air Quality Program to outline the types of indoor air quality issues that could arise on campus, and the standard EHS response to those issues.

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CONTINUED: Indoor Air Quality (IAQ) Program

3.0 Objectives
The IAQ Program has been developed to identify various air quality issues that may affect WCM spaces, and to define how EHS evaluates and, where applicable, initiates corrective actions with Engineering & Maintenance for each issue.

The following environmental factors, among others, can influence air quality:
- Atypical odors
- Dusts and particulate matter
- Temperature
- Relative humidity
- Poorly operating or imbalanced HVAC
- Low levels of chemicals and other gases
- Noise levels
- Lighting issues
- Molds and other microbial material

All of the above can manifest themselves as mild or severe signs of indoor air discomfort, or may result in “Sick Building Syndrome.”

4.0 Applicability
This manual applies to all WCM faculty, staff, and students who have concerns that may be related to the indoor air quality in their work area, office or classroom. Symptoms or other concerns can range from mild discomfort to problems affecting health or work performance.

5.0 Responsibilities
This program establishes the following duties for each department or group.

5.1 ENVIRONMENTAL HEALTH AND SAFETY (EHS)
- Respond to and investigate IAQ incidents.
- Conduct applicable air monitoring.
- Provide recommendations to occupants and Engineering & Maintenance for IAQ remediation.
- Coordinate any repairs needed with Engineering & Maintenance.
- Communicate with occupants of affected spaces regarding the status of their air quality and related investigations.

5.2 ENGINEERING AND MAINTENANCE (E&M)
- Assist EHS in investigating IAQ assessments (IAQ’s) resulting from plumbing, HVAC systems, and other building maintenance systems.
- Repair any items identified by EHS as causing an IAQ incident.
- Communicate with EHS regarding the status of IAQ issues.

5.3 WCM BUILDING OCCUPANTS
- Notify EHS of any IAQ issues or malodors that last more than 10 minutes or cause illness.
- Be available to speak with EHS IAQ investigators at the time of the incident.
- Respond to any inquiries EHS may have regarding the air quality of the space.
CONTINUED: Indoor Air Quality (IAQ) Program

6.0 Types of IAQ Issues
Indoor Air Quality issues are divided into the categories described below.

6.1 ATYPICAL ODORS
Odors may arise in an IAQ situation from many sources. Some odors are fleeting, while others may linger for several hours or the duration of the day.

Odors can have many different sources, including, but not limited to:

- Outdoor or indoor (recirculated air) source through the HVAC system
- Plumbing, including unused sinks or floor drains with dry traps, or overhead plumbing lines that have worn seals where odors can escape
- Activity in construction areas
- Routine maintenance
- Problems with HVAC systems
- Improper chemical use outside of a chemical hood
- Inadequate housekeeping
- Plants
- Waste that has not been properly stored or disposed of

6.2 INDOOR AIR DISCOMFORT OR “SICK BUILDING SYNDROME”
Indoor air discomfort or “Sick Building Syndrome” is usually interpreted by complaints received such as “the air feels stale”, “everyone goes home sick” or “I feel lousy” during or at the end of the workday. These individuals usually feel better when they leave the building or go home at the end of their shift.

Issues affecting air quality may be caused by the following:

- Area temperature variations
- Insufficient supply and/or exhaust
- Low humidity, especially during the heating season
- High dust levels
- Presence of varying levels of contaminants
- Presence of combustion gases
- High levels of carbon dioxide, which is indicative of poor air circulation
- Insidious mold or other microbial contamination

6.3 MOLD AND OTHER MICROBIAL CONTAMINATION
Mold usually arises if liquid or moisture has been introduced to an area and not properly remediated in a timely fashion. This can be caused by, among other sources, a leak or accidental overflow. Many interior furnishings or construction materials such as walls, rugs, furniture, ceilings, and insulation will not readily dry when they become wet. If the material remains moist, particularly if exacerbated by high humidity, fungal amplification may occur.

There is a variety of mold species that can grow in indoor environments. However, most of these are allergen-forming hazards rather than overall health hazards.

Mold contamination is suspected under the following conditions:

- Recent leak or water situation
- Visible signs of mold on building or room materials
- Presence of moldy or musty smell
- Occupants exhibiting allergies or symptoms of mold sensitivity
CONTINUING: Indoor Air Quality (IAQ) Program

7.0 Investigation and Remediation Procedures

Resolving an IAQ incident requires the collaborative participation of the area occupants, EHS, and Engineering & Maintenance. The procedures for reporting IAQ incidents to EHS and for remediating the three main types of IAQ incidents (separated by group) are provided below.

7.1 PROCEDURES FOR REPORTING AN IAQ ISSUE TO EHS

When reporting an IAQ complaint to EHS, building occupants should provide the following information:

- Type of IAQ (e.g., odor, mold)
- Length of time the issue has occurred (minutes, hours, days, weeks, etc.)
- Time of day the issue began
- Names of the affected person(s) and contact information
- Location(s) affected by the issue
- Description of the problems and symptoms
- The extent of the problem (i.e., how widespread it is)

The person who reports the IAQ issue to EHS, or a designee of this person aware of the issue, must be available when EHS personnel respond to the incident to describe the symptoms they are experiencing.

7.2 SIGNS OF ILLNESS

If an odor is present in which occupants are showing signs of illness, affected occupants should call EHS immediately and leave the area. Those affected should report to Workforce Health and Safety (WHS).

Someone aware of the issue should be available to meet EHS at another location to describe the nature and location of the odors.

7.3 ATYPICAL ODOR PROCEDURES

7.3.1 Occupant Procedures

If atypical odors are detected, occupants must do the following:

- Check the area for garbage or waste material that has not been properly disposed of or removed.
- Ensure plants are not rotting and soil is not smelly.
- Run all cup and other sinks that haven’t been run recently for 2-3 minutes.
- Fill floor drains with a half-gallon of water.
- Ensure no other area occupant is working with a strong smelling material outside of a functioning chemical hood.
- Ensure all chemical or biological waste is in a proper waste container.

If the above measures are taken and the odor does not abate after 10 minutes, occupants should contact EHS for further evaluation. The occupant who makes the complaint should be available when EHS arrives to describe the conditions or odors they are detecting.

If the odor is overpowering, arrangements should be made to meet with EHS at another location.

7.3.2 EHS Procedures

EHS will review the steps already taken by occupants (listed in 7.3.1) and investigate the following items to determine if they are causing the odor:

- Plumbing connections
- Supply air intakes
- Lighting fixtures
CONTINUED: Indoor Air Quality (IAQ) Program

- Other equipment in the area
- Work in nearby spaces in the building
- Construction sites inside and outside of the building
- Other potential sources of the odor

If any of these items are found to be causing the IAQ issue and they can be corrected, EHS will complete a Service Request through the Engineering and Maintenance online system and submit it for remediation.

7.3.3 Engineering & Maintenance Procedures

Engineering & Maintenance will check and, if necessary, remediate the following:
- All plumbing in the area
- HVAC sources
- Burning light bulbs and ballasts

7.4 BUILDING DISCOMFORT OR “SICK BUILDING SYNDROME” PROCEDURES

Investigations involving building discomfort are generally more complex and usually do not result from a single source, as in the case of odors and mold situations. Odors and mold may contribute to issues related to building discomfort, but most of the time, many parameters need to be examined.

7.4.1 Occupant Procedures

There are several things occupants can do to alleviate symptoms of building discomfort issues if the source can be controlled by the area occupant, including:
- Keep offices and work area clutter to a minimum.
- Discard food and other items that can attract vermin.
- Have thermostats adjusted to a temperature that is acceptable to all occupants.
- Have the carpet or floors shampooed or washed at least twice per year to avoid dust accumulation, and have them vacuumed regularly.
- Maintain plants by preventing the accumulation of dead leaves, overwatering, or spillage.
- Avoid keeping flowering plants in indoor environments.
- Promptly clean up all water and food spills.
- Notify EHS and E&M of leaks or floods from plumbing, roofing, or other sources immediately.

7.4.2 EHS Procedures

EHS will take the following steps to identify the source(s) of building discomfort:
- Interview area occupants and answer questions pertaining to Occupant Procedures in section 7.3.1 of this manual.
- Walk through the affected areas and take air quality measurements with the appropriate instruments, based on the nature of the complaints.
- Investigate adjacent areas, floors above and below, construction sites located nearby, and any area or work that may be contributing to the conditions in the affected space.

7.4.3 Type of Measurements

EHS will take the following measurements to determine the cause of the complaints:
- Supply and exhaust flow rates (number of room air changes per hour – Engineering and Maintenance can provide this information)
CONTINUED: Indoor Air Quality (IAQ) Program

- Temperature and relative humidity levels
- Carbon dioxide and carbon monoxide levels
- Total organics level
- The level of combustion gases (if determined needed)
- Moisture levels and mold sampling (if determined needed)

7.4.4 Some Common Issues Examined

Building discomfort issues are often traced to one or more of these factors:

- **Temperature variation:** malfunction of thermostat, resetting of variable air control dampers (VAV), or a heat load for an area that is higher than the temperature cooling setting to keep the area at comfort levels.
- **Insufficient supply and exhaust:** design issues, closed dampers, or malfunction of fan units.
- **Low humidity:** lack of general building humidification in the heating season.
- **High dust levels:** poor housekeeping, especially with carpeting (may need to be vacuumed and shampooed on a more regular basis), particulates coming out of supply vents, inadequate filtration of outside air.
- **Presence of low levels of contaminants:** sources of organic vapors, such as chemicals stored inadequately or preservatives on carpeting or furniture.
- **High levels of carbon dioxide:** insufficient supply and/or exhaust, poor air mixing.
- **Insidious mold or other microbial contamination:** area subject to leaks or flooding and not dried out properly.

7.4.5 Engineering & Maintenance Procedures

As part of an IAQ investigation, Engineering & Maintenance will:

- Assist EHS in identifying any problems that may be causing building discomfort.
- Remediate any problems identified by EHS as causing the IAQ issue. The severity of the problem will determine the response time. In some instances, outside contractors may need to be brought in to correct the issue.

7.5 WATER, MOLD AND OTHER MICROBIAL CONTAMINATION PROCEDURES

7.5.1 Occupant Procedures

The following procedures should be taken by occupants to prevent mold and other microbial contamination.

- Keep the area dry. Do not over water plants, and promptly clean all water and beverage spills.
- Examine the ceiling (if the space is under a roof) after heavy rains or snow for signs of leak or water damage.
- **Promptly report all leaks and water intrusion to EHS and Engineering & Maintenance.**

7.5.2 EHS Procedures

EHS will visually inspect for mold, and will test for mold and other microbial contamination by taking the following measurements:

- Moisture readings of surfaces to determine saturation level.
- Bulk samples of visibly moldy materials for analysis.
- Airborne mold samples to be grown in a laboratory for analysis.

If the area has substantial mold contamination, EHS will contact an outside abatement company to abate and disinfect the area.
7.5.3 Engineering & Maintenance Procedures

In the case of excess moisture due to flooding or leaks, Engineering & Maintenance will fully remediate the area(s) by extracting flood water and drying the area with the use of a combination of housekeeping response, dehumidification, fans, and alteration of building HVAC settings to increase airflow to the affected areas. Engineering and Maintenance will coordinate drying procedures with EHS, and maintain communication when working to dry any affected area.

8.0 Record Retention and Availability

8.1 INCIDENTS

All Indoor Air Quality complaints, as well as the response to any water incidents, are recorded, and the responses tracked, through ServiceNow and Salute.

All updates to the status of the IAQ investigation, as well as any relevant information, should be uploaded to the same ServiceNow ticket or Salute incident as the initial investigation. A hard copy, if used, and all follow-up data are kept on file if the incident requires further investigation, and any written data should be uploaded in some way to the relevant ServiceNow ticket or Salute incident.

8.2 REPORTS

EHS generates an IAQ report (shown in Appendix A) for situations where a more extensive survey is required. These reports are sent to the Director with a copy to the complainant or representative of the complainant. They are kept on file in the EHS office with any laboratory analysis and survey notes.

9.0 Frequently Asked Questions

The following are a list of Frequently Asked Questions, which are also available on the EHS Website.

- I work in a lab and am getting chemical or bleach odors, but I am not working with these materials. What should I do?

  Check cup sinks and any unused sinks, and flush with water for 2-3 minutes, which is typically enough time for the sink traps to fill. Check for floor drains and pour approximately 1 gallon of water into each drain. Smells should begin to dissipate in a few minutes.

  You may also want to check for activities around the lab. Is there construction or cleaning going on near your lab? Is someone in the lab working with something you are unfamiliar with?

- I smell something burning in my area. What should I do?

  If you smell something burning, call EHS (646-962-7233) immediately. EHS will investigate. Do not pull a fire alarm pull station unless you see visible smoke or fire.

- I smell something moldy, and I see blackish stains. What should I do?

  Call EHS. These signs may not necessarily be indicative of mold. Samples must be taken and the area examined to determine if this is indeed mold actively growing. Samples can be taken both of the moldy material and the air in the space to determine if there is viable mold growth.

- We have been feeling lousy in our office for several weeks, but when we leave for the day or the weekend, we feel better. What should we do?

  Call EHS and ask for an Indoor Air Quality investigation. EHS will take your name and the names of all complainants. They will come at a mutually agreed on a time to interview and make notes of all the complaints and will tailor their investigation based on the complaints received. Different types of sampling may require long-term measurement or the analysis of an outside lab, so results may not be obtained immediately. Actions will be determined based upon the results.

of the sampling. A report will be generated at the end of the investigation and will be made available to the individuals who initially cited the issue, as well as appropriate department representatives.

10.0 Definitions

- **Air Exchange Rate**: The rate at which outside air replaces indoor air in a space. This rate is expressed in one of two ways: the number of changes of outside air per unit of time – air changes per hour (ACH); or the rate at which a volume of outside air enters per unit of time - cubic feet per minute (CFM).
- **Allergen**: A substance capable of causing an allergic reaction because of an individual's sensitivity to that substance.
- **Antimicrobial**: Agent that kills microbial growth. See “disinfectant,” “sanitizer,” and “sterilizer.”
- **Building-Related Illness (BRI)**: Diagnosable illness whose symptoms can be identified and whose cause can be directly attributed to airborne building pollutants (e.g., Legionnaire's disease, hypersensitivity pneumonitis). Also: A discrete, identifiable disease or illness that can be traced to a specific pollutant or source within a building. (Contrast with “Sick building syndrome”).
- **Chemical Sensitization**: Evidence suggests that some people may develop health problems characterized by effects such as dizziness, eye and throat irritation, chest tightness, and nasal congestion that appear whenever they are exposed to certain chemicals. People may react even to trace amounts of chemicals to which they have become “sensitized.”
- **CO**: Carbon monoxide.
- **CO2**: Carbon dioxide.
- **Conditioned Air**: Air that has been heated, cooled, humidified, or dehumidified to maintain an interior space within the “comfort zone”, sometimes referred to as “tempered” air.
- **Constant Air Volume Systems**: Air handling system that provides a constant airflow while varying the temperature to meet heating and cooling needs.
- **Diffusers and Grilles**: Components of the ventilation system that distribute and return air to promote air circulation in the occupied space. As used in this document, supply air enters a space through a diffuser or vent and return air leaves a space through a grille.
- **Exhaust Ventilation**: Mechanical removal of air from a portion of a building (e.g., a piece of equipment, room, or general area).
- **Fungi**: Any of a group of parasitic lower plants that lack chlorophyll, including molds and mildews.
- **HEPA**: High-efficiency particulate arrestance (filters).
- **HVAC**: Heating, ventilation, and air-conditioning system.
- **IAQ**: Indoor air quality.
- **Indoor Air Pollutant**: Particles and dust, fibers, mists, bioaerosols, and gases or vapors.
- **Multiple Chemical Sensitivity (MCS)**: A condition in which a person reports sensitivity or intolerance (distinct from “allergic”) to some chemicals and other irritants at very low concentrations. There are different views among medical professionals about the existence, causes, diagnosis, and treatment of this condition.
- **Organic Compounds**: Chemicals that contain carbon. **Volatile organic compounds** vaporize at room temperature and pressure. They are found in many indoor sources, including many common household products and building materials, and their effects can vary widely depending on the identity of the compound in question.
- **Outdoor Air Supply**: Air brought into a building from the outdoors (often through the ventilation system) that has not been previously circulated through the system. Also known as “Make-Up Air.”.
- **PPM**: Parts per million.
CONTINUED: Indoor Air Quality (IAQ) Program

- **Preventive Maintenance**: Regular and systematic inspection, cleaning, and replacement of worn parts, materials, and systems. Preventive maintenance helps to prevent parts, material, and systems failure by ensuring they are in good working order.
- **Radiant Heat Transfer**: The transfer of heat between two objects that occurs when there is a large difference between the temperatures of two surfaces that are exposed to each other, but are not touching.
- **Short-Circuiting**: Situation that occurs when the supply air flows to return or exhaust grilles before entering the breathing zone (area of a room where people are). To avoid short-circuiting, the supply air must be delivered at a temperature and velocity that results in mixing throughout the space.
- **Sick Building Syndrome (SBS)**: Term that refers to a set of symptoms that affect some number of building occupants during the time they spend in the building; then diminish or go away during periods when they leave the building. These issues cannot be traced to specific pollutants or sources within the building. (Contrast with “Building-Related Illness”).
- **Sources**: Sources of indoor air pollutants. Indoor air pollutants can originate within the building or be drawn in from outdoors. Common sources include people, preservatives on room furnishings such as carpeting, photocopiers, art supplies, etc.
- **Variable Air Volume System (VAV)**: Air handling system that conditions the air to constant temperature and varies the outside airflow to ensure thermal comfort.
- **Volatile Organic Compounds (VOCs)**: Compounds that vaporize (become a gas) at room temperature. Common sources which may emit VOCs into indoor air include housekeeping and maintenance products, and building and furnishing materials. VOCs encompass a wide variety of compounds, and their effects can vary greatly. In significant quantities, certain VOCs can cause eye, nose, and throat irritations, headaches, dizziness, visual disorders, memory impairment; some are known to cause cancer in animals; some are suspected of causing, or are known to cause, cancer in humans. At present, not much is known about what health effects occur at the levels of VOCs typically found in public and commercial buildings.

11.0 References

Appendix A – IAQ Report Template

Indoor Air Quality Report (INSERT LOCATION)

<table>
<thead>
<tr>
<th>Report Date</th>
<th>Insert Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Survey Date(s)</td>
<td>Insert Date(s)</td>
</tr>
<tr>
<td>Affected Employee(s)</td>
<td>Insert Name(s)</td>
</tr>
<tr>
<td>Department</td>
<td>Insert Department</td>
</tr>
<tr>
<td>Location</td>
<td>Insert Building and Room Location(s)</td>
</tr>
<tr>
<td>Survey Completed By</td>
<td>Insert Name(s)</td>
</tr>
<tr>
<td>Report Completed By</td>
<td>Insert Name(s)</td>
</tr>
<tr>
<td>Distribution</td>
<td>Insert Name(s)</td>
</tr>
</tbody>
</table>

Introduction

(REPLACE THIS TEXT WITH: Introduction to what type of procedure is being performed, e.g.: exposure monitoring, indoor air quality survey, mold survey. Discuss area and reason for sampling and analysis to take place, department, location, symptoms.)

Observations / Sampling Strategy

(REPLACE THIS TEXT WITH: Describe area where sampling is being performed in relation to the complaint: size, function, occupancy, etc. Discuss sampling strategy, equipment being used, and other pertinent information to the survey. Discuss regulatory limits or professional organizations’ recommended levels, if any exist.)

Sampling Results

(TABLES SHOULD BE CREATED FOR ALL CONTAMINANTS SCREENED. ONE TABLE IS OKAY FOR STANDARD PARAMETERS. HOWEVER, IF ADDITIONAL PARAMETERS ARE MONITORED, OR IF SAMPLES ARE COLLECTED, EACH ADDITIONAL ANALYTE SHOULD GET AN ADDITIONAL TABLE. AS SEEN IN THE VOC TABLE HERE)

<table>
<thead>
<tr>
<th>Table 1 - VOC Screening Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location/Material</td>
</tr>
<tr>
<td>Outdoor Control</td>
</tr>
</tbody>
</table>

1. ppb = parts per billion (may be ppm, depending on instrument)
2. AIHA Investigators: Guide Table 6.2 Selected Standards and Guidelines for Indoor Air Quality
Table 2: Ambient Indoor Air Quality Results

<table>
<thead>
<tr>
<th>Room</th>
<th>CO (ppm)</th>
<th>CO₂ (ppm)</th>
<th>RH (%)</th>
<th>Temp (°F)</th>
<th>Common Pollutants/Particles (mg/m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>INSERT LOCATION</td>
<td>INSERT RESULTS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outdoor Control</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Levels commonly found in office environments</td>
<td>0 - 4³</td>
<td>&lt;1000²</td>
<td>N/A</td>
<td>N/A</td>
<td>0.03 – 0.03²</td>
</tr>
</tbody>
</table>

1. ppm = parts per million
2. mg/m³ = milligrams per cubic meter of air
3. AHA Investigators Guide Table 8.2 Selected Standards and Guidelines for Indoor Air Quality

Discussion

(REPLACE THIS TEXT WITH: Discuss data in relation to sampling and applicable regulatory or recommended parameter levels. If any conclusions are drawn based on the data and samples collected, describe them here)

Recommendations

(REPLACE THIS TEXT WITH: Recommendations made to help alleviate problems. If levels are low and there are no recommendations that need to be made, the statement "No recommendations required at this time" should be placed in this section)

References

(REPLACE THIS TEXT WITH: Regulations, publications, or professional guidelines that pertain to this investigation)