INDOOR AIR QUALITY ASSESSMENT

**Department of Mental Health, Department of Transitional Assistance, Massachusetts Rehabilitation Commission**

**EOHHS Service Center**

**500 Main Street, Hyannis, MA**

**May 2025**

Front view:
Department of Mental Health, Department of Transitional Assistance, Massachusetts Rehabilitation Commission 
EOHHS Service Center
500 Main Street, Hyannis, MA


Prepared by:

Massachusetts Department of Public Health

Bureau of Climate and Environmental Health

Division of Environmental Health Regulations and Standards

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# BACKGROUND

|  |  |
| --- | --- |
| Building: | Executive Office of Health and Human Services (EOHHS) Service Center: Department of Mental Health (DMH), Department of Transitional Assistance (DTA), and Massachusetts Rehabilitation Commission (MRC) |
| Address: | 500 Main Street, Hyannis, MA |
| Coordinated Via: | Pedro Batista, Project Coordinator, EOHHS |
| Reason for Request: | General indoor air quality (IAQ) issues |
| Date of Assessment: | May 21, 2025 |
| Massachusetts Department of Public Health/Bureau of Climate and Environmental Health/**Division of Environmental Health Regulations and Standards** (MDPH/BCEH/EHRS) Staff Conducting Assessment: | Cory Holmes, Senior Advisor for Indoor Air Quality Inspections, Audits, Outreach and Training, EHRS |
| Building Description: | |  | | --- | | It is important to note that the building has been previously assessed by the MDPH. The reports and building description can be viewed at this webpage: <https://www.mass.gov/info-details/indoor-air-quality-reports-cities-and-towns-b#barnstable-> | |
| Windows: | Windows in the building are not openable. |
| **Building Population:** | The building is occupied by state employees on a hybrid work schedule. |

# RESULTS AND DISCUSSION

The following is a summary of indoor air testing results ([Table 1](#_Table_1))

|  |  |  |
| --- | --- | --- |
| * ***Carbon dioxide (CO2)*** | *a measure of the adequacy of ventilation* | Levels were below the MDPH guideline of 800 parts per million (ppm) in all areas surveyed, indicating adequate air exchange at the time of assessment. |
| * ***Temperature*** | *a measure of comfort* | It was within or close to the MDPH recommended range of 70°F to 78°F in most occupied areas, however some levels were below that range, and occupants reported temperature control issues. |
| * ***Relative humidity*** | *a measure of comfort and, when in excess for an extended period, a way to reflect the potential for mold and fungal growth* | It was within or close to the lower level of the MDPH recommended range of 40 to 60% in areas tested. |
| * ***Carbon monoxide***   ***(CO)*** | *a product of combustion that can result in acute and long term cardiovascular, respiratory, and neurological symptoms* | Levels were non-detect (ND) in all areas tested. |
| * ***Particulate matter (PM2.5)*** | *a way to measure inhalable particle distribution in the air* | Concentrations were below the National Ambient Air Quality Standard (NAAQS) of 35 micrograms per cubic meter (μg/m3) in all areas tested. |

## Ventilation

Ventilation refers to both the supply of fresh air and the removal of stale air from a room. The introduction of fresh air into an occupied space will dilute normally occurring pollutants that are generated by occupancy and other activities. In addition, a heating, ventilation and air conditioning (HVAC) system will remove pollutants from a building if operating appropriately. All ventilation systems throughout the building should operate continuously during periods of occupancy.

Fresh air is provided by air handling units (AHUs) located on the roof. Air from the AHUs is filtered, heated/cooled, and delivered to rooms via ducted supply diffusers. Air is returned/exhausted through ceiling-mounted grills. Some complaints of lack of temperature control were expressed by staff. It is recommended that HVAC systems be re-balanced every five years to ensure adequate air systems function (SMACNA, 1994). It is not known when the last time these systems were balanced.

The various types of ventilation components as well as devices that can move/redirect airflow that were identified in the building are listed in [Table 2A](#_Table_2A), [Table 2B](#_Table_2B_1) and [Table 2C](#_Table_2C).

### HVAC System Maintenance

It is recommended that AHUs be outfitted with pleated filters of a Minimum Efficiency Reporting Value (MERV) of 8 or higher, which are adequate in filtering out pollen and mold spores (ASHRAE, 2012). In addition, filters should be changed 2-4 times a year or in accordance with the manufacturer’s recommendations.

**Balancing**

To have proper ventilation with a mechanical supply and exhaust system, a system must be balanced to provide an adequate amount of fresh air to the interior of a room while also removing stale air from the room. It is recommended that HVAC systems be re-balanced every five years to ensure adequate air systems function (SMACNA, 1994).

[(see Ventilation pictures)](#_Ventilation_Pictures)

## Water Damage and Moisture Concerns

Please note that the MDPH does not recommend conducting mold testing in a typical water damage remediation. For details, please consult [Guidance Regarding Testing for Mold in Water-Damaged Public Buildings](https://www.mass.gov/info-details/guidance-regarding-testing-for-mold-in-water-damaged-public-buildings) | Mass.gov

The application of a mildewcide to moldy porous materials is not recommended.

Molds are found naturally in our environment both indoors and outdoors. Inside, mold growth may occur when items, particularly porous products such as paper or gypsum wallboard, are exposed to moisture. Typical water sources include leaks, floods, and condensation. To avoid mold growth, dry all water-damaged items and affected areas within 24-48 hours and reduce indoor humidity. Some people with chronic respiratory conditions, such as asthma, are more likely to experience health symptoms associated with molds, including allergic reactions and respiratory irritation. Controlling moisture is the key to preventing mold growth and potential health symptoms. [Climate fact sheet: mold growth | Mass.gov](https://www.mass.gov/info-details/climate-fact-sheet-mold-growth)

Hot, humid summers are becoming more frequent due to climate change. Massachusetts has experienced hot, humid, and rainy summers in 2018, 2021, and 2023. July of 2021 was the wettest ever recorded in Massachusetts, and the three-month period from June through August, known as the meteorological summer, was the fourth wettest on record, according to the National Oceanic and Atmospheric Administration’s (NOAA) Centers for Environmental Information (NOAA, 2021). The summers of of 2023 and 2024 were also hot, and wet, with 2023 being measured as the second rainiest on record (WBUR, 2023). These conditions are challenging for buildings, particularly those without central air conditioning.

During these hot and wet summers, extended periods of outdoor relative humidity above 70% occurred. Under this weather, public buildings experienced extended periods of water vapor exposure from high relative humidity. When exposed to these conditions, porous materials such as gypsum wallboard, cardboard, and other materials may become prone to developing mold colonization, particularly if located in areas that are prone to developing condensation on floors and walls (e.g., below grade space).

In order to remove mold from buildings, of primary importance is to identify, repair and/or limit the moisture source causing damage in the building. Once the moisture source is remediated, then discarding and/or cleaning of mold contaminated materials can be completed.

All areas examined were assessed for the presence of either mold, moisture, or visible water damage and an exterior evaluation was conducted to identify potential pathways for water penetration. The following issues were noted.

* **Water-damaged ceiling tiles were noted along the front/ceiling along windows in area 1130/1131 (Pictures 1 and 2),** which can provide a source of mold and should be replaced after a water leak is discovered and repaired.The occupant in this area reported occasional leaks during rainstorms but not water pooling on the floor. All materials were dry at the time of assessment. Although water stains were apparent, no mold was noted. The exterior of this area was observed for potential sources of water penetration and bent/damaged flashing was noted (Pictures 3 and 4).
* **Previous leaks were reported in the hallway outside of MRC restrooms (Picture 5).** The ceiling tiles were removed for inspection in this area; no musty odors were detected or visible mold observed on materials in the ceiling plenum (Picture 6). This area should be monitored to ensure the leak was properly repaired.
* **Visible mold growth (Pictures 7 and 8) was observed on the refrigerator/freezer gaskets (center fridge) in Kitchen 1067 (Table 1)**.
* **A mini-fridge was observed directly on carpeting in area 1022 (Picture 9).** These appliances should be placed on a non-porous surface like tile or a plastic mat to prevent mold growth on carpeting from moisture, condensation, or food spills.

[(see Water Damage Pictures)](#_Water_Damage_pictures)

**Mold Growth**

Porous materials (e.g., gypsum wallboard, ceiling tiles and carpeting) can be dried with fans and heating within 24 to 48 hours of becoming wet (US EPA, 2008).

If porous materials are not dried within this time frame, mold growth may occur.

Moldy materials should be cleaned following the guidance in EPA’s Mold Remediation in Schools and Commercial Building (US EPA, 2008).

## Sources of Respiratory Irritants/Possible Asthma Triggers

Asthma is a lung disease that can make breathing difficult. Without careful management of asthma, some people can have symptoms, like a tight feeling in the chest, shortness of breath, coughing, or wheezing. Although there is no cure for asthma, people with asthma can live healthy, active lives. A safe and healthy environment helps to reduce asthma symptoms.

* **Dust, a common respiratory and eye irritant, can collect on surfaces and items.** Although janitorial and maintenance staff perform routine cleaning, they may not be able to clean as effectively if accumulated items are not picked up or surfaces are cluttered.
* Even with a properly functioning ventilation system, it is necessary to **reduce the use of materials that can be a source of respiratory irritants** to prevent symptoms in individuals who have sensitivity to such pollutants.

Possible asthma triggers and/or airborne pollutants exist in the building. These are listed below as well as in ([Table 4](#_Table_4)).

[(see Sources of Respiratory Irritant Pictures)](#_Respiratory_Irritants_pictures_1)

* **Many areas had carpet tiles.** Carpets should be vacuumed regularly with a high efficiency particulate arrestance (HEPA) filter-equipped vacuum cleaner and cleaned annually (or semi-annually in soiled/high traffic areas) in accordance with Institute of Inspection, Cleaning and Restoration Certification (IICRC) recommendations, (IICRC, 2012).
* **In a few areas, dust and debris were seen accumulating on exhaust vents (Table 1; Picture 10).** This dust can be aerosolized under certain conditions and can also be a medium for mold growth. While a buildup of dust is normal because of the action of the vents, vents should be cleaned periodically.
* **Exposure to low levels of total volatile organic compounds (TVOCs) may produce eye, nose, throat, and/or respiratory irritation in some sensitive individuals.** To determine if VOCs were present, EHRS staff examined rooms for products containing VOCs. and noted cleaners, hand sanitizers, dry erase materials, and other products in use within the building. All of these products have the potential to be irritants to the eyes, nose, throat, and respiratory system of sensitive individuals.
* **Finally, no draw was detected from exhaust vents in the four-restroom cluster in the MRC (Table 1).** Exhaust ventilation is important in restrooms to remove odors and excess moisture.

# CONCLUSIONS AND RECOMMENDATIONS

|  |  |  |  |
| --- | --- | --- | --- |
|  | **HVAC System** | | **Helpful Links** |
| 1. If | Ensure all AHUs and restroom exhaust vents are on and operating continuously during occupied periods. |  | |
|  | Change HVAC filters 2-4 times a year, or per the manufactures’ recommendations, using MERV 8 or the best MERV-rating that can work with current equipment. | [ANSI/ASHRAE Standard 52.2-2017](https://www.ashrae.org/File%20Library/Technical%20Resources/COVID-19/52_2_2017_COVID-19_20200401.pdf) | |
|  | During filter changes, clean dust and debris from the inside of HVAC cabinets. |  | |
|  | Clean dust and debris from vents, ceiling fans, and personal fans periodically. |  | |
|  | Have the HVAC system balanced if it has been more than 5 years since the last balancing. |  | |
|  | To address staff comfort control complaints, staff should keep a log of where temperature extremes are occurring, to share with building management and their HVAC provider to make necessary adjustments.  The log should include the following information: area, date/time, and temp. |  | |
|  | **Water damage** | | |
|  | Consult with a roofing expert/building envelope specialist regarding water penetration and the condition of flashing or other issues contributing to water penetration along the windows in DMH area 1130-1131, clean water-stained windowsills and make repairs as needed. |  | |
|  | Continue to monitor area outside MRC restrooms to ensure leaks were repaired. |  | |
|  | Ensure there is a system for reporting and monitoring leaks. Building occupants should ensure they report active leaks to building management for investigation and repairs. |  | |
| 1. Cl | Inspect and clean refrigerator/freezer gaskets periodically, if they cannot be adequately cleaned, replace. |  | |
|  | Ensure refrigerators and water coolers are placed on a non-porous surface such as tile or plastic mat to prevent mold growth on carpeting. |  | |
|  | **Respiratory Irritants/Possible Asthma Triggers** | | |
|  | Reduce clutter. Periodically remove unwanted items. Store the remaining items neatly and off the floor. Where rooms have a history of moisture issues, consider storing items in waterproof totes. |  | |
|  | Reduce use of products and equipment that create irritating volatile organic compounds (VOCs) and only use in well-ventilated areas. Minimize the use of air fresheners (e.g., plug-ins), deodorizers, and scented products. | [Clean Air Is Odor Free](https://www.mass.gov/doc/clean-air-is-odor-free-removing-fragrances-to-improve-indoor-air-quality-in-schools-and-offices-0/download) | |
|  | Clean carpeting annually (or semi-annually in soiled high traffic areas) as per recommendations of the Institute of Inspection, Cleaning and Restoration Certification (IICRC, 2012). |  | |

# REFERENCES

ASHRAE. 2012. American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) Standard 52.2-2012 – Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size (ANSI Approved).

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# PICTURES

## Water Damage Pictures

Picture 1



Water-damaged ceiling tiles (arrows) along windowsill in DMH area 1130-1131

Picture 2



**Water stains on wooden windowsill below leak**

Picture 3



Metal overhang/flashing in area outside of 1130-1131 where leaks were reported

Picture 4



Closeup of metal overhang/flashing in area outside of 1130-1131 where leaks were reported, note flashing looks bent/damaged

Picture 5



Area outside restrooms 1031-1032 where leaks had occurred previously

Picture 6



Above ceiling tiles in area outside restrooms 1031-1032

Picture 7



Mold growth (dark staining) on freezer gasket/center refrigerator in Kitchen 1067

Picture 8



Mold growth (dark staining) on bottom of refrigerator gasket/center refrigerator in Kitchen 1067

Picture 9



Refrigerator on carpet in 1022

## Respiratory Irritants Pictures

Picture 10



Dust/debris on exhaust vent in restroom 1066

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# Table 1

| **Location** | **Carbon**  **Dioxide**  **(ppm)** | **Carbon Monoxide**  **(ppm)** | **Temp**  **(°F)** | **Relative**  **Humidity**  **(%)** | **PM2.5**  **(g/m3)** | **Occupants**  **in Room** | **Windows**  **Openable** | **Ventilation** | | **Remarks** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Supply** | **Exhaust** |
| Background | 401 | ND | 52 | 60 | 10 |  |  |  |  | Unseasonably cool and cloudy |
| Lobby | 714 | ND | 69 | 40 | ND | 5 | N | Y | Y |  |
| Reception | 741 | ND | 68 | 42 | ND | 3 | N | Y | Y |  |
| 1007 | 718 | ND | 69 | 41 | ND | 1 | N | Y | Y |  |
| 1009 | 721 | ND | 69 | 40 | ND | 1 | N | Y | Y |  |
| 1010 | 718 | ND | 68 | 41 | ND | 0 | N | Y | Y |  |
| 1012 | 731 | ND | 69 | 40 | ND | 1 | N | Y | Y |  |
| 1014 | 712 | ND | 68 | 41 | ND | 0 | N | Y | Y |  |
| 1016 | 710 | ND | 68 | 41 | ND | 0 | N | Y | Y |  |
| Corridor by MRC Restrooms |  |  |  |  |  |  |  |  |  | Area of previous leaks – no odors or visible mold above ceiling |
| Restroom 1 |  |  |  |  |  |  | N | Y | Y | No draw from exhaust vent |
| Restroom 2 |  |  |  |  |  |  | N | Y | Y | No draw from exhaust vent |
| Restroom 3 |  |  |  |  |  |  | N | Y | Y | No draw from exhaust vent |
| Restroom 4 |  |  |  |  |  |  | N | Y | Y | No draw from exhaust vent |
| 1019 | 662 | ND | 70 | 38 | ND | 0 | N | Y | Y |  |
| 1021 | 667 | ND | 67 | 43 | ND | 1 | N | Y | Y |  |
| 1022 | 679 | ND | 65 | 45 | ND | 1 | N | Y | Y | Checked GW with moisture meter – dry, minifridge on carpet |
| 1023 | 678 | ND | 66 | 42 | ND | 0 | N | Y | Y |  |
| 1026 | 679 | ND | 70 | 38 | ND | 0 | N | Y | Y |  |
| 1031/1032 | 686 | ND | 69 | 50 | ND | 0 | N | Y | Y |  |
| 1037 | 729 | ND | 68 | 40 | ND | 1 | N | Y | Y |  |
| 1040 | 710 | ND | 63 | 46 | ND | 0 | N | Y | Y |  |
| 1041 | 711 | ND | 70 | 37 | ND | 0 | N | Y | Y |  |
| 1042 | 718 | ND | 70 | 37 | ND | 0 | N | Y | Y |  |
| 1047 | 690 | ND | 71 | 37 | ND | 1 | N | Y | Y |  |
| 1050 | 687 | ND | 69 | 39 | ND | 0 | N | Y | Y |  |
| 1053 | 690 | ND | 70 | 39 | ND | 0 | N | Y | N |  |
| Women’s Restroom 1066 |  |  |  |  |  |  | N | Y | Y | Dusty vents |
| Men’s Restroom |  |  |  |  |  |  | N | Y | Y | Urinal broken |
| 1067 Kitchen | 710 | ND | 71 | 38 | ND | 0 | N | Y | Y | Center refrigerator – mold on fridge and freezer gaskets |
| 1071 | 702 | ND | 71 | 38 | ND | 0 | N | Y | Y |  |
| 1075 Conference Room | 712 | ND | 70 | 36 | ND | 0 | N | Y | Y |  |
| 1107/1112 | 686 | ND | 68 | 40 | ND | 1 | N | Y | Y |  |
| 1113/1115 | 728 | ND | 68 | 41 | ND | 2 | N | Y | Y |  |
| 1116/1121 | 716 | ND | 67 | 43 | ND | 2 | N | Y | Y |  |
| 1118 | 682 | ND | 70 | 38 | ND | 0 | N | Y | Y |  |
| 1124/1128 | 718 | ND | 63 | 47 | ND | 2 | N | Y | Y | Plants |
| 1130/1131 | 710 | ND | 69 | 38 | ND | 1 | N | Y | Y | Water-stained wooden windowsill below WD CTs, moisture testing - dry, reported leaks during rainstorms, damaged flashing (exterior) |
| 1132/1139 | 751 | ND | 69 | 38 | ND | 3 | N | Y | Y |  |
| 1136/1141 | 712 | ND | 71 | 36 | ND | 1 | N | Y | Y |  |
| 1142/1146 | 712 | ND | 71 | 36 | ND |  | N | Y | Y |  |

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# Table 2A

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Equipment Present in Building**  **(X = Yes)** | **Type of Heating/Cooling Ventilation**  **Equipment** | **Fresh**  **Air**  **Supply**  **(X = Yes)** | **Type of Location(s)** | **Air Filters Installed**  **MERV Rating**  **(1-15, U\*)**  **(X = Yes)** | **Comments** |
|  | Univents |  |  |  |  |
| X | Rooftop Air Handling Units | X |  |  |  |
|  | Outdoor, Ground-Installed Air Handling Units |  |  |  |  |
|  | Attic/Crawlspace Air Handling Units |  |  |  |  |
| X | Ceiling-Mounted Air Handling Units (including inside plenum) |  | Conference Rooms |  |  |
|  | Basement/Crawlspace-Installed Air Handling Units |  |  |  |  |
|  | Mechanical Room-installed Air Handling Units |  |  |  |  |
|  | Fan Coil Units |  |  |  |  |
|  | Window-Mounted Air Conditioners |  |  |  |  |
|  | Portable air conditioners |  |  |  |  |
|  | Wall Louver-Controlled Gravity Air Supply |  |  |  |  |
|  | Windows |  |  |  |  |
|  | Fan in window (blowing in) |  |  |  |  |
|  | Built in wall fan (switched) |  |  |  |  |
|  | Heat recovery ventilator unit |  |  |  |  |
|  | Energy recovery ventilator unit |  |  |  |  |
|  | Chilled Beam |  |  |  |  |
|  | Passive combustion supply vent in basement/boiler room |  |  |  |  |

\*U = Filter Rating underdetermined due to inaccessibility during building visit

# Table 2B

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Equipment Present in Building**  **(X = Yes)** | **Type of Exhaust Ventilation**  **Equipment** | **Ducted**  **To Outdoors**  **(X = Yes)** | **Type of Location(s)** | **Comments** |
| X | Rooftop Motors/Fans | X | Offices and common areas |  |
|  | Unit Exhaust |  |  |  |
|  | Ceiling Return Vent |  |  |  |
| X | Ceiling Return Vent, Plenum |  | Offices and common areas |  |
|  | Wall Return Vent |  |  |  |
|  | Ceiling fan |  |  |  |
|  | Kitchen Stove Hood |  |  |  |
| X | Restroom Exhaust Vent | X |  | No draw from some |
|  | Photocopier Exhaust Vent |  |  |  |
|  | Garage |  |  |  |
|  | Chemical Hood(s) |  |  |  |
|  | Locker Rooms |  |  |  |
|  | Showers |  |  |  |
|  | Clothes Dryers |  |  |  |
|  | Gas Water Heaters |  |  |  |
|  | Furnace-Flue to Chimney |  |  |  |
|  | Furnace/Boiler direct vent or power vent (no combustion air supply) |  |  |  |
|  | Kiln, Pottery |  |  |  |
|  | Dark Room |  |  |  |
|  | Generator Room |  |  |  |
|  | Wood Shop Dust Collector |  |  |  |
|  | Spray Paint Booths |  |  |  |
|  | Fan in window (blowing out) |  |  |  |

# Table 2C

|  |  |  |  |
| --- | --- | --- | --- |
| **Equipment Present in Building**  **(X = Yes)** | **Type of Equipment** | **Type of Location(s)** | **Comments** |
|  | Floor Fans, pedestal |  |  |
|  | Floor Fans, portable |  |  |
|  | Air Purifier (HEPA, other) |  |  |
|  | Floor heaters, portable |  |  |
| X | Refrigerators, Cold Beverage Vending Machines | Kitchen, breakrooms, offices |  |
|  | Radiator, wall-mounted |  |  |
|  | Radiator, floor-mounted |  |  |
|  | Passive Vents (Wall/Door) |  |  |

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# Table 3

| **Found in Building**  **X = Yes** | **Water-Damaged Materials, Building Components or Stored Materials** | **Location** | **Visible Microbial Growth?**  **X = Yes** | **Musty odor detected?**  **X = Yes** | **Comments** |
| --- | --- | --- | --- | --- | --- |
|  | Books-other bound materials |  |  |  |  |
|  | Brick walls – broken, missing mortar |  |  |  |  |
|  | Brick walls – blocked weep holes |  |  |  |  |
|  | Cardboard boxes |  |  |  |  |
|  | Carpet tiles |  |  |  |  |
|  | Carpet - area rugs |  |  |  |  |
|  | Carpet wall-to-wall |  |  |  |  |
|  | Ceiling tiles - affixed directly to ceiling surface |  |  |  |  |
|  | Ceiling tiles - bowing-in suspended ceiling |  |  |  |  |
|  | Ceiling tiles - water-stained in splined ceiling |  |  |  |  |
| X | Ceiling tiles - water-stains in suspended ceiling | 1130/ 1131 |  |  | Water staining on wooden windowsill below leaks, damaged flashing on exterior (possible source) |
|  | Chairs - laminated |  |  |  |  |
|  | Cloth |  |  |  |  |
|  | Countertops (around sinks) |  |  |  |  |
|  | Curtains |  |  |  |  |
|  | Dust/debris within AHU, uninvent, HVAC, chilled beam units, etc. (WD through condensation, humidity, or leaks) |  |  |  |  |
|  | Efflorescence (i.e., mineral deposits) |  |  |  |  |
|  | Engineered woods - particleboard, plywood, Masonite |  |  |  |  |
|  | Flooring – loosened tiles |  |  |  |  |
|  | Flooring - wooden |  |  |  |  |
|  | Furniture - laminated |  |  |  |  |
|  | Furniture - upholstered |  |  |  |  |
|  | Gypsum wallboard - ceiling |  |  |  |  |
|  | Gypsum wallboard - restroom wall |  |  |  |  |
|  | Gypsum wallboard - interior wall |  |  |  |  |
|  | Gypsum wallboard – located on exterior wall |  |  |  |  |
|  | HVAC drain pan – lack of draining |  |  |  |  |
|  | HVAC filters |  |  |  |  |
|  | Insulation- attic (paper-backed) |  |  |  |  |
|  | Insulation - inside air handling unit |  |  |  |  |
|  | Insulation - on pipe(s) fiberglass |  |  |  |  |
|  | Insulation - on pipe(s) other/plaster-like material |  |  |  |  |
|  | Insulation - wall cavity |  |  |  |  |
|  | Insulation – ceiling plenum |  |  |  |  |
|  | Modular furniture – walls/cloth partitions |  |  |  |  |
|  | Musical instrument cases |  |  |  |  |
|  | Plaster ceilings |  |  |  |  |
|  | Records/files |  |  |  |  |
| X | Refrigerator - door gasket | Kitchen (center fridge) | X |  |  |
|  | Refrigerator - drip pan |  |  |  |  |
|  | Refrigerator - Interior surfaces |  |  |  |  |
|  | Room divider - ceiling-mounted, sliding |  |  |  |  |
|  | Sink backsplash |  |  |  |  |
|  | Tables – laminated |  |  |  |  |
|  | Wallpaper |  |  |  |  |
|  | Wood - attic/roof materials |  |  |  |  |
|  | Wood - floor joists in basement ceiling |  |  |  |  |
|  | Wood - wall framing |  |  |  |  |
|  | Wood - window sills |  |  |  |  |
|  | Wood - window-mounted air conditioner framing |  |  |  |  |
|  | OTHER |  |  |  |  |

WHAT ARE ENVIRONMENTAL ASTHMA TRIGGERS?

Asthma triggers are any chemical, pollutant, or allergen that can make your asthma worse. Asthma triggers can also be strong chemical smells, dust, or pets. Your asthma triggers may be different from those of other people. Not all asthma triggers affect people the same way. Environmental asthma triggers are found both indoors and outdoors. DPH link: [Asthma and Your Environment (mass.gov)](https://www.mass.gov/doc/asthma-and-your-environment-english/download)

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# Table 4

| **Condition Present**  **X = Yes** | **Possible asthma symptom-inducing environmental pollutant** | **Recommendation to reduce or eliminate the pollutant** |
| --- | --- | --- |
| X | Water Damage and/or Mold  (allergen) | Identify water source and repair to eliminate.  Clean non-porous materials.  Remove and replace porous materials susceptible to mold growth.  Perform regular water damage assessments as a tool to ensure timely mitigation as needed.  Use NIOSH water damage assessment protocol as a guide: [NIOSH water damage assessment guideline](https://www.cdc.gov/niosh/docs/2019-115/pdfs/2019-115.pdf?id=10.26616/NIOSHPUB2019115&inf_contact_key=241b5c2ed98c27d94b530dedc36f1623f651f238aa2edbb9c8b7cff03e0b16a0). |
|  | Moistening of building components during hot, humid weather (>2 days in length) (mold, allergen) | Remove materials not dried in <2 days in a manner consistent with [US EPA Mold Removal in Commercial Buildings guideline](https://www.epa.gov/mold/pdf-version-checklist-mold-remediation-mold-remediation-schools-and-commercial-buildings).  Use dehumidification in occupied basement areas and other areas with chronic dampness. |
|  | Vegetation against exterior of building (water damage-mold) | Remove all vegetation preventing building exterior drying.  Remove all vegetation capable of falling onto a building or depositing debris onto the roof. |
|  | Personal humidifiers (lack of proper maintenance)  (pollutant and allergen) | Clean and maintain properly.  Use distilled water to eliminate metal and water treatment odors.  Maintain hydration by increasing water consumption. |
|  | Drains: Floor drains, Sink drains (abandoned use)  Water bubblers (abandoned use) | If in use, pour water into drain at least twice a week.  If not in use, seal the drain with appropriate material in accordance with the Massachusetts Plumbing Code (248 CMR 10.00). |
|  | Live Animals (turtles, gerbils, birds, rabbits, etc.) | Ensure cleanliness or remove animals from the location. |
|  | Improperly maintained aquariums and terrariums (allergen) | Maintain such equipment properly to eliminate odor.  Discontinue use. |
| X | Plants and flowers  (allergen and mold) | Keep indoor plants well maintained and not overwatered. Monitor for signs of mold and pests.  Ensure water for cut flowers does not become stagnant.  Ensure dried plant material is free of odors, mold, and pests and handled carefully  If asthma risks are high, eliminate plants and flowers. |
|  | HVAC system moisture issues  (mold, allergen) | Consult ASHRAE’s minimum standards for HVAC maintenance and inspection of commercial HVAC systems (<https://www.ashrae.org/technical-resources/bookstore/standards-180-and-211>). |
|  | HVAC system contaminant issues (allergen) | Consult ASHRAE’s minimum standards for HVAC maintenance and inspection of commercial HVAC systems (<https://www.ashrae.org/technical-resources/bookstore/standards-180-and-211>). |
|  | Indoor swimming pool odors outside of swimming pool (mold, chemical) | Maintain and operate pool HVAC systems to vent odors from building.  Ensure locker room exhaust vents operate during building hours.  All doors leading to the pool should be rendered airtight and be closed. |
|  | Pollen (allergen) | Recommend installation of MERV 8 or better filters if HVAC engineer confirms HVAC system can be so equipped without adversely affecting function.  Cut grass after hours.  Cut grass in a pattern to direct clippings away from exterior wall.  Remove trees and shrubs from in front of windows and air intakes. |
|  | Dry air | Maintain hydration.  Avoid overheating of air. |
|  | Dust mites  (allergen) | Recommendation to remove non-official upholstered furniture, area rugs, pillows, cushions, etc.  Cleaning with use of HEPA-filtered vacuum cleaner.  Eliminating clutter, storing items in dust and moisture-proof containers, and regularly removing dust through wet wiping. |
|  | Pests, including rodents and cockroaches  (allergen) | Use of integrated pest management guidelines, including:   * Proper disposal of food containers * Proper storage of food products in airtight containers * Elimination of use of food as art projects * Remove pest harborages/clutter * Regular monitoring for pests   [EPA IPM guideline link](https://www.epa.gov/ipm/introduction-integrated-pest-management) |
|  | Latex-containing materials | Remove tennis balls from furniture legs. |
|  | Fragrances  (chemical) | Eliminate point sources, such as:   * Plug-in air fresheners * Aroma/oil reed diffusers * Scented sprays * Discontinue use of other scented materials * Consult DPH fragrance guideline: [*Clean air is odor-free*](https://www.mass.gov/doc/clean-air-is-odor-free-removing-fragrances-to-improve-indoor-air-quality-in-schools-and-0/download) |
|  | Strong smells from /use of Chemicals (such as cleaning products)  (chemical) | Use building-issued cleaning products.  Use products in accordance with manufacturer’s instructions including dilution, application, and ventilation.  Avoid using products that are stronger than needed for the situation. |
|  | Strong odors from new building materials (carpeting/furniture)  (chemical) | Use low VOC-emitting materials.  Air out materials (outside or in an unoccupied area) prior to installation. |
|  | Tobacco smoke  Secondhand Smoke  (pollutant) | Eliminate tobacco smoking.  Seal all shared wall penetrations. |
|  | Products with strong odor such as paint, perfume, hairspray, air fresheners, bug-spray, laminators, candles, wax melters, dry erase markers and other VOC-containing products  (chemical) | If essential:   * Provide proper exhaust ventilation to eject aerosolized products directly outdoors. * Avoid/reduce use during occupied hours.   If not necessary, remove and eliminate. |
|  | Vehicle exhaust  (pollutant) | Enforce anti-idling regulations and post signs to give notice.  Relocate vehicles away from fresh air intakes.  Require cars to park face-in at building walls.  [MA anti-idling law FAQs](https://www.mass.gov/files/documents/2018/02/20/idling-faq.pdf#:~:text=The%20Massachusetts%20Anti-Idling%20Law%20The%20goal%20of%20the,sometime%20wonder%20when%20idling%20might%20be%20considered%20necessary.) |
|  | Vapors and or fumes from gas, oil, or kerosene stoves  (pollutant) | Operate stove hood when stove is in use.  Install stove hood if not present.  Ensure the equipment is in good working order. |
|  | Ozone (pollutant) | Eliminate use of ozone generating equipment. |
|  | Window Air Conditioners (if not properly maintained) (allergen) | Equip with proper filter and clean periodically.  Clean drip pans.  Install in window with weathertight, non-mold-growth sustaining material. |
|  | Pottery (pollutant) | Do not operate kiln during occupied hours.  Operate kiln with exhaust system activated.  Seal all seams and holes in kiln vent.  Ensure kiln exhaust discharge terminates outdoors. |
| X | Carpeting (allergen) | Clean carpeting in a manner consistent with IICRC standards, including regular vacuuming with a high efficiency particulate air (HEPA) filtered vacuum in combination with annual cleaning or semi-annual cleaning in soiled high traffic areas. |
|  | Sweeping/dusting vs HEPA vacuuming/wet wiping  (allergen or pollutant) | Refrain from using feather dusters or brooms.  Utilize HEPA vacuums and wet wiping to minimize aerosolizing particulate matter. |
|  | Lack of adequate air exchange/mechanical ventilation | Make repairs as necessary and ensure all HVAC system components are operating continuously when building is occupied. |
|  | Lack of local exhaust at source of pollution (vocational shop activities, kitchen exhaust hood) (all) | Recommend installation of exhaust ventilation to direct pollutants directly outdoors. |
|  | Renovating buildings while occupied  (chemical) | Use all SMACNA guidelines for Renovation While Buildings Are Occupied. For information, visit <https://www.mass.gov/service-details/construction-and-renovation-generated-pollutants-in-occupied-buildings>. |
|  | Chemistry program chemical storage  (chemical) | Repair (if needed) and operate chemical storeroom vents appropriately.  Reduce or eliminate unneeded or overstocked chemicals.  Store all chemicals in a manner to separate incompatible chemicals.  Keep chemical storerooms clean. |
| X | Photocopiers/duplicating machines | All machines should have dedicated exhaust vents. |