INDOOR AIR QUALITY ASSESSMENT

Seekonk Public Library 410 Newman Ave Seekonk, MA

April 2025



Prepared by: Massachusetts Department of Public Health Bureau of Climate and Environmental Health Division of Environmental Health Regulations and Standards

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EXECUTIVE SUMMARY

The Massachusetts Department of Public Health's (MDPH) Division of Environmental Health Regulations and Standards (EHRS) conducted an Indoor Air Quality (IAQ) assessment of the Seekonk Public Library located at 410 Newman Ave., Seekonk, MA on April 3, 2025. The case was referred to EHRS via the Massachusetts Department of Labor Standards.

(Results and Discussion)

The building is experiencing chronic water penetration issues that have resulted in waterdamaged building materials and visible mold growth on windowsills and ceiling vents. The major source of water appears to be penetration through damaged siding, which is prevalent around the building. In addition, a number of building components are outdated and past their service life including carpeting, windows, and the mechanical heating, ventilation, and air conditioning (HVAC) system. A Feasibility Study/Building Assessment was conducted by a private consultant in 2024, which concluded:

- HVAC System: Nearly all components of the HVAC system have reached the end of their anticipated service life (25 years), and compatible replacement parts are increasingly hard to find. Therefore, it is recommended to comprehensively renovate the system.
- Windows: Original to the building (~ 50 years old) they have exceeded their service life.
- Structural Assessment:
 - Water leaks observed in many areas, especially along the perimeter of the building, are causing deterioration of the exterior finishes.
 - Numerous cracks in the north, west, and south foundation walls due to settling.
- Architectural Assessment:
 - Exterior cladding is deteriorating in many places and will need to be replaced.
 It is likely that water infiltration has damaged plywood substate and metal wall studs/framing.
 - The roof was replaced in 2008, however it does not provide the required insulation value.

- Floor finishes are worn and dingy and ready for replacement.
- Acoustic ceiling tiles show some areas of damage and discoloration (Tappé Architects, 2024).

As a result of the MDPH/IAQ assessment, a number of primary recommendations were made at the time of assessment and are reiterated below. <u>(Conclusions and Recommendations)</u>

- Make repairs to the building envelope to prevent further water intrusion.
- Remove or clean any water-damaged/mold-contaminated material in accordance with the US EPA's "Mold Remediation in Schools and Commercial Buildings".
- Replace HVAC system.
- Replace windows.
- Replace carpeting, and
- Replace water-damaged/discolored ceiling tiles.

As climate change and global warming intensifies, the urgent need for modern, energy-efficient solutions becomes clear. Without significant upgrade of HVAC equipment and other interior components, building conditions and indoor air quality will continue to degrade.

(Conclusions and Recommendations)

BACKGROUND

Building:	Seekonk Public Library
Address:	410 Newman Avenue, Seekonk, MA
Requested by:	Referral by the MA Department of Labor Standards
Reason for Request:	General indoor air quality (IAQ) and mold issues
Date of Assessment:	April 3, 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:	The library is a one-story building with concrete foundation, wooden siding, and aluminum windows. The roof is flat rubber

membrane and was replaced in 2008. Interior
materials are carpeting, gypsum wallboard,
and suspended ceiling tiles.Windows:Windows in the building are openable but are older than
their service life; some are reportedly difficult to open.

RESULTS AND DISCUSSION

The following is a summary of indoor air testing results (Table 1)

Carbon dioxide	a measure of the	Levels were below the MDPH guideline of 800 parts
(CO ₂)	adequacy of ventilation	per million (ppm) in areas surveyed, indicating adequate air exchange at the time of assessment. Levels would be expected to be higher with increased occupancy.
• Temperature	a measure of comfort	Was <u>within</u> the MDPH recommended range of 70°F to 78°F in occupied areas, however occupants reported temperature control issues, which would be expected with an outdated system past its service life.
• 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	Was <u>within or close</u> to the lower level of the MDPH recommended range of 40 to 60% in all areas tested. However, signs of chronic moisture exposure were evident in the form of damaged ceiling tiles and rust/corrosion on metal surfaces/vents.
• 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 occupied areas tested.
• Particulate matter (PM2.5)	a way to measure inhalable particle distribution in the air	Concentrations were <u>below</u> the National Ambient Air Quality Standard (NAAQS) of 35 micrograms per cubic meter (µg/m ³) 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 an air handling unit (AHU) located on the roof (Picture 1). Air from the AHU is filtered, heated/cooled, and delivered via ducted supply diffusers (Pictures 2 and 3). Air is returned/exhausted through wall-mounted exhaust grills (Picture 4). Several complaints of poor air circulation and 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 <u>Table 2A</u>, <u>Table 2B</u> and <u>Table 2C</u>.

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.

The rooftop AHU and HVAC components are beyond their service life. According to the American Society of Heating, Refrigeration, and Air-Conditioning Engineering (ASHRAE), the service life of this type of unit is 15-20 years, assuming routine maintenance of the equipment (ASHRAE, 1991).

(see Ventilation pictures)

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).

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 <u>Guidance Regarding Testing for Mold in</u> <u>Water-Damaged Public Buildings</u> | 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. <u>Climate fact sheet: mold growth | Mass.gov</u>

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 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 or with HVAC systems past their service date.

During these hot and wet summers, extended periods of outdoor relative humidity above 70% occurred and 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 develope mold colonization, particularly if located in areas that may experience condensation on floors and walls (e.g., below grade space).

In order to reduce mold in 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:

- Visible mold growth was observed on the wooden windowsill in the IT Room and on the surface of supply vents (Pictures 5 through 7; Table 1).
- Water-damaged ceiling tiles were noted in several areas (Pictures 8 through 11; Table 1), which can provide a source of mold and should be replaced after a water leak is discovered and repaired.
- **Corroded metal ceiling vents were found (Picture 12),** which indicate chronic issues with managing relative humidity with an outdated HVAC system.
- Windows in some areas were also sealed with plastic and tape to prevent drafts and moisture infiltration (Picture 13).
- A water-damaged laminate countertop was noted in the breakroom (Picture 14). If a sink backsplash is damaged, it becomes very difficult to keep clean and can lead to mold growth and additional damage to the material underneath.
- The cabinet was also water-damaged, causing swelling, and resulting in sawdust being generated from opening/closing the cabinet door (Picture 15).

An exterior evaluation was also conducted to identify potential pathways for water penetration and pest entry. The following issues were noted:

- Damaged exterior siding/panels (Pictures 16 through 20).
- Water infiltration around exterior windows, which can accelerate water damage, lead to mold growth and rot (Picture 5), allowing a pathway for drafts, moisture, and pest entry into the building.
- Overgrown bushes and shrubbery were noted against the building (Picture 21). Plants near the building can cause water damage to the exterior. In addition, plants shading exterior walls can slow drying. Water can eventually penetrate, subsequently freezing and thawing during the winter. This freezing/thawing action can weaken and damage building materials.

Each of these issues can accelerate water damage, lead to mold growth and rot, allowing a pathway for drafts, moisture, and pest entry into the building.

A list of water damage issues identified inside and outside the building is included as Table 3.

(see 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 (<u>Table 4</u>).

(see Sources of Respiratory Irritant Pictures)

- Some areas are covered with wall-to-wall carpet that is soiled/stained and past its service life (Pictures 22 and 23). Carpeting has a service life of approximately 10-11 years (IICRC, 2002). Carpeting that is beyond its service life becomes increasingly difficult to clean and may release fibers which can be irritating if airborne. 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).
- Supply, exhaust, return vents and surrounding ceiling tiles had accumulations of dust and debris (Pictures 24 through 27; Table 1). This dust/debris can be aerosolized under certain conditions, and should be cleaned periodically (e.g., during regular filter changes). It is important to note that the location of these tiles directly in the airstream of mechanical ventilation makes them more susceptible to collecting dust due to constant airflow over the surface of the tile. If these tiles (or vents) cannot be adequately cleaned, they should be replaced.
- In some areas dust and debris were seen accumulating on windowsills (Pictures 28 and 29; Table 1). This dust can be aerosolized under certain conditions and can also be a medium for mold growth.
- During the Covid-19 pandemic many schools and public buildings supplemented fresh air and filtration by using high-efficiency particulate arrestance (HEPA) air purifiers. HEPA units remove up to 99% of airborne contaminants as small as 0.1 microns including airborne mold/mushroom spores. These are good choices for use in occupied areas. A few of these types of units were observed in the building.
- Finally, the vacuum cleaner used by cleaning staff was observed to have a full bag (Picture 30). The bag should be checked regularly to ensure proper connection and changed when full to ensure proper operation.

CONCLUSIONS AND SHORT-TERM RECOMMENDATIONS

In subsequent conversation with Library Director Kate Hibbert, it was communicated that the following actions have reportedly been taken on-site as a result of the MDPH inspection:

- Mold has been removed from the IT Server Room.
- Ceiling vents and ceiling tiles around vents have been cleaned.
- HVAC filters are changed 2-4 times per year.
- Damaged/stained ceiling tiles were replaced in Staff Room/Kitchen.
- Corroded ceiling vents and return vents were replaced.
- Refrigerator gaskets in the Staff Room were cleaned.

In view of the findings at the time of the visit, the following further recommendations are provided to improve IAQ:

	HVAC System	Helpful Links
1.	Ensure all AHUs and restroom exhaust	
	vents are on and operating continuously	
	during occupied periods.	
2.	Continue to change HVAC filters 2-4 times a	ANSI/ASHRAE Standard 52.2-2017
	year using MERV 8 or the best MERV-rating	
	that can work with current equipment.	
3.	During filter changes, clean dust and debris	
	from the inside of HVAC cabinets.	
4.	Clean dust and debris from vents, ceiling	
	fans, and personal fans periodically, as	
	needed.	
5.	Have the HVAC system balanced if it has	
	been more than 5 years since the last	
	balancing.	
	Water damage	
6.	Consult with a building envelope specialist	
	regarding water penetration and the	
	condition of interior walls around windows,	
	make repairs as needed.	
7.	Remove or clean any water-damaged/mold-	http://www.epa.gov/mold/mold-remediation-
	contaminated material in accordance with	schools-and-commercial-buildings-guide
	the US EPA's "Mold Remediation in Schools	
	and Commercial Buildings".	Construction and renovation generated
		pollutants in occupied buildings Mass.gov
8.	Ensure any roof and plumbing leaks are	
	repaired promptly and replace any	
	remaining water-damaged suspended	
	ceiling tiles or other porous building	
	materials.	
9.	Replace water-damaged/rusted/corroded	
10	Supply, exhaust, of return vents.	
10.	and downshouts away from building	
11	And downspouls away nom building.	
<u> </u>	and papels	
12	Ensure there is a system for reporting and	
12.	monitoring leaks Building occupants should	
	ensure they report active leaks to building	
	management for investigation and renairs	
13	Replace/repair water-damaged counterton	
10.	and cabinet in Breakroom.	
14	Remove shrubbery and plants from away	
	from exterior walls to allow for better drying	

	of building materials and damage to exterior	
15.	If relative humidity cannot be controlled with the HVAC system, consider using dehumidifiers in combination with fans and AC during summer months/periods of	
	elevated relative humidity. Clean and maintain portable dehumidifying units in accordance with manufacturers'	
	recommendations. Drain units into sinks/floor drains where possible to reduce daily maintenance.	
	Respiratory Irritants/Possible Asthma Trigger	6
16.	Reduce clutter. Periodically remove unwanted items. Store the remaining items neatly and off the floor.	
17.	Clean supply, return, exhaust vents and surrounding ceiling tiles regularly to remove accumulated dust/debris. If ceiling tiles and/or vents cannot be adequately cleaned, replace them.	
18.	To control dusts, a high efficiency particulate arrestance (HEPA) filter equipped vacuum cleaner in conjunction with wet wiping of all surfaces is recommended.	
	Ensure vacuum bags are changed regularly. Avoid the use of feather dusters. Drinking water during the day can help ease some symptoms associated with a dry environment (throat and sinus irritations).	
19.	Reduce use of products and equipment that release 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.	<u>Clean Air Is Odor Free</u>
20.	Supplement mechanical ventilation with portable air purifiers equipped with high efficiency particulate arrestance (HEPA) filters. While these do not supply fresh air, they can remove particles including mold spores and microbes.	https://www.epa.gov/indoor-air-quality- iaq/ozone-generators-are-sold-air-cleaners

	Units that may produce ozone should not be used. Maintain all in accordance with the manufacturer's instructions.	
	Place them so the filtered airstream is in the breathing zone of occupants and away from open doors.	
21.	Until old, worn, soiled carpeting can be replaced, clean annually (or semi-annually in soiled high traffic areas) as per recommendations of the Institute of Inspection, Cleaning and Restoration Certification (IICRC, 2012).	

Long-Term Recommendations

1.	Make repairs to the building envelope to prevent further water intrusion.
2.	Work with an HVAC engineering firm to determine the operational lifespan of existing equipment and the feasibility of repair vs. replacement.
3.	Replace windows with modern energy effect ones.
4.	Replace carpeting that is beyond its lifespan.

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(Click to link back to report)

PICTURES Ventilation Pictures

Picture 1



Rooftop AHU past its service life



Picture 2

Ceiling-mounted supply diffuser in Library Director's Office, note rust/corrosion



Round ceiling-mounted supply diffuser in Children's Library

Picture 4



Wall-mounted return vent in breakroom, note dust/debris accumulation and corrosion

Water Damage Pictures

Picture 5



Mold growth (dark staining) on wooden windowsill in IT Room; wood was saturated with moisture at the time of assessment

Picture 6



Mold colonies on supply vent in main library area (along windows/rear exit)



Mold colonies on supply vent in main library area (along windows/rear exit)





Water-damaged ceiling tiles



Water-damaged ceiling tiles

Picture 10



Water-damaged ceiling tiles



Water-damaged ceiling tiles

Picture 12



Rusted/corroded metal vent in Library Director's office



Windows sealed with plastic sheeting and tape to prevent drafts



Picture 14

Water-damaged countertop in breakroom



Sawdust (light colored material) accumulated in corner of breakroom cabinet

External Damage Pictures Picture 16



Damaged exterior siding



Damaged exterior siding

Picture 18



Damaged exterior siding



Damaged exterior siding, note pieces on the ground

Picture 20



Damaged exterior siding



Overgrown bushes and shrubbery, which can lead to chronic moisture exposure of exterior siding

Respiratory Irritants Pictures

Picture 22



Old, worn/soiled carpeting past its service life



Old, worn/soiled carpeting past its service life

Picture 24



Accumulated dust/debris on supply vent and surrounding ceiling tiles



Accumulated dust/debris on supply vent and surrounding ceiling tiles

Picture 26



Accumulated dust/debris on exhaust vent



Close-up of clogged vent in the Children's Library



Dust/debris, dead insects and cobwebs on windowsill

Picture 28



Dust/debris, dead insects and cobwebs on windowsill

Picture 30



Full bag in vacuum cleaner

Table 1 **IAQ Testing Results** Seekonk Public Library 410 Newman Ave., Seekonk, MA

Click to link back to report Table 1

	Carbon	Carbon	-	Relative	5140 5		14.00	Ventil	ation	
Location	Dioxide (ppm)	Monoxide (ppm)	Temp (°F)	Humidity (%)	PM2.5 (g/m ³)	occupants in Room	Windows Openable	Supply	Exhaust	Remarks
Background (outside)	448	ND	49	100	ND					Cold, wet, rainy & windy
Library Director Office	621	ND	71	41	ND	2	Y	Y	Y	3 WD CT, vent corroded, old/soiled carpeting
Team Lead	577	ND	71	42	ND	0	N	Y	Ν	Wall to wall carpeting, PF
Sullivan Room	610	ND	71	38	ND	0	Y	Y	Y	WD CT, plant, PF, wall to wall carpeting
Storage Room	617	ND	71	39	ND	0	N	U	N	15 WD CTs
Lounge	770	ND	71	41	ND	0	Y Open	Y		WD countertop/cabinet, (sawdust under cabinet), AP, WD CTs
Staff Bathroom							N	N	Y	Exhaust not functioning
Technical Services	600	ND	71	42	ND	3	N	Y	Y	2 WD CTs
Mechanical Room		ND			ND					Vacuum cleaner bag full (HEPA)
IT Room	503	ND	70	43	ND	0	Y	Y		Dust and debris on vent and surrounding CTs
Customer Service	593	ND	72	41	ND	0	N	Y	Y	
Circulation Desk	600	ND	72	42	ND	1	N	Y	Y	

ppm = parts per million

AP = air purifier

ND = non-detect

 $\mu g/m^3$ = micrograms per cubic meter

CT = ceiling tile

PF = personal fan

WD = water-damaged

Comfort Guidelines

Carbon Dioxide:	< 800 ppm = preferable	Temperature:	70 - 78 °F
	> 800 ppm = may be indicative of ventilation problems	Relative Humidity:	40 - 60%

Table 2ASupply VentilationTypes and/or Components

(Click to link back to report) 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				
Х	Rooftop Air Handling Units	Х		8	
	Outdoor, Ground-Installed Air Handling Units				
	Attic/Crawlspace Air Handling Units				
	Ceiling-Mounted Air Handling Units (including inside plenum)				
	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				
Х	Windows	Х	Building-wide		
	Fan in window (blowing in)				
Х	Built in wall fan (switched)	Х	Sullivan Room		
	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 2BExhaust VentsTypes and/or Components

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	
	Unit Exhaust			
	Ceiling Return Vent			
	Ceiling Return Vent, Plenum			
	Wall Return Vent			
	Ceiling fan			
	Kitchen Stove Hood			
Х	Restroom Exhaust Vent	Х		Some not working
	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 2CFree Standing Equipment that Circulates or Filters Air

Table 2C

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

Table 3Water-Damaged Materials in Building

(Click to link back to report)

Table 3

Found in Building	Water-Damaged Materials, Building Components or Stored Materials	Location	Visible Microbial Growth?	Musty odor detected?	Comments
<u> </u>	Books other bound materials		<u> </u>	<u> </u>	
	Brick walls - broken missing				
	morter				
	Brick walls - blocked ween boles				
	Cardboard boxes				
	Carnet tiles				
	Carpet - Area rugs				
	Carpet wall-to-wall				
	Ceiling tiles - affixed directly to ceiling surface				
Х	Ceiling tiles - bowing-in suspended ceiling	Offices, common areas			
	Ceiling tiles - water-stained in splined ceiling				
Х	Ceiling tiles - water-stained in suspended ceiling	Offices, common areas			
	Chairs - laminated				
	Cloth				
Х	Countertops (around sinks)	Breakroom			Missing/damaged caulking
	Curtains				
	Dust/debris within AHU, uninvent, HVAC, chilled beam units, etc. (WD through condensation, humidity, or leaks)				
	Efflorescence (i.e., mineral deposits)				
Х	Engineered woods - particleboard, plywood, Masonite	Breakroom Cabinet			
	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				

Table 3 Water-Damaged Materials in Building (continued)

		(continued)			
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
	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				
	Musical instrument cases				
	Plaster ceilings				
	Records/files				
	Refrigerator - door gasket				
	Refrigerator - drin nan				
	Refrigerator - Interior surfaces				
	Room divider - ceiling-mounted, sliding				
Х	Sink backsplash	Breakroom			Missing/damaged caulking
	Tables – laminated				
	Wallpaper				
	Wood - attic/roof materials				
	Wood - floor joists in basement ceiling				
	Wood - wall framing				
Х	Wood - window sills	IT Room	Х		Saturated with moisture
	Wood - window-mounted air conditioner framing				
X	OTHER	Exterior wall panels and siding			Damaged in many areas, moss growth and staining due to chronic water exposure

Identification of Asthma Triggers by MDPH During Building Assessments and Recommendations to Reduce or Eliminate from the Indoor Environment

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: <u>Asthma</u> and Your Environment (mass.gov)

(click to link back to report)

Table 4 Condition Possible asthma symptom-inducing Recommendation to reduce or eliminate the pollutant environmental pollutant Present X = Yes Х Water Damage and/or Mold Identify water source and repair to eliminate. (allergen) 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. Remove materials not dried in <2 days in a manner Moistening of building components consistent with US EPA Mold Removal in Commercial during hot, humid weather (>2 days in length) (mold, allergen) Buildings guideline. Use dehumidification in occupied basement areas and other areas with chronic dampness. Х Vegetation against exterior of Remove all vegetation preventing building exterior building (water damage-mold) drying. Remove all vegetation capable of falling onto a building or depositing debris onto the roof. Х Personal humidifiers (lack of proper Clean and maintain properly. Use distilled water to eliminate metal and water maintenance) (pollutant and allergen) treatment odors. Maintain hydration by increasing water consumption. Drains: Floor drains, Sink drains If in use, pour water into drain at least twice a week. If not in use, seal the drain with appropriate material in (abandoned use) Water bubblers (abandoned use) accordance with the Massachusetts Plumbing Code (248 CMR 10.00). Ensure cleanliness or remove animals from the Live Animals (turtles, gerbils, birds, rabbits, etc.) location. Improperly maintained aquariums Maintain such equipment properly to eliminate odor. and terrariums (allergen) Discontinue use.

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Condition Present X = Yes	Possible asthma symptom-inducing environmental pollutant	Recommendation to reduce or eliminate the pollutant
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 (<u>https://www.ashrae.org/technical-</u> <u>resources/bookstore/standards-180-and-211</u>).
	HVAC system contaminant issues (allergen)	Consult ASHRAE's minimum standards for HVAC maintenance and inspection of commercial HVAC systems (<u>https://www.ashrae.org/technical-</u> <u>resources/bookstore/standards-180-and-211</u>).
	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.

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Condition Present X = Yes	Possible asthma symptom-inducing environmental pollutant	Recommendation to reduce or eliminate the pollutant
	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 <u>EPA IPM guideline link</u>
	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: <u>Clean air is</u> <u>odor-free</u>
	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. <u>MA anti-idling law FAQs</u>

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Condition Present X = Yes	Possible asthma symptom-inducing environmental pollutant	Recommendation to reduce or eliminate the pollutant
	Vapors and or fumes from gas, oil, or	Operate stove hood when stove is in use.
	kerosene stoves	Install stove hood if not present.
	(pollutant)	Ensure the equipment is in good working order.
	Ozone (pollutant)	Eliminate use of ozone generating equipment.
	Window Air Conditioners (if not	Equip with proper filter and clean periodically.
	properly maintained) (allergen)	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.
Х	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	Refrain from using feather dusters or brooms.
	vacuuming/wet wiping	Utilize HEPA vacuums and wet wiping to minimize
	(allergen or pollutant)	aerosolizing particulate matter.
	Lack of adequate air	Make repairs as necessary and ensure all HVAC system
	exchange/mechanical ventilation	components are operating continuously when building
		is occupied.
	Lack of local exhaust at source of	Recommend installation of exhaust ventilation to direct
	pollution (vocational shop activities,	pollutants directly outdoors.
	kitchen exhaust hood) (all)	
	Renovating buildings while occupied	Use all SMACNA guidelines for Renovation While
	(chemical)	Buildings Are Occupied. For information, visit
		https://www.mass.gov/service-details/construction-
		and-renovation-generated-pollutants-in-occupied-
		buildings.
	Chemistry program chemical storage	Repair (if needed) and operate chemical storeroom
	(chemical)	vents appropriately.
		Reduce or eliminate unneeded or overstocked
		chemicals.
		Store all chemicals in a manner to separate
		incompatible chemicals.
		Keep chemical storerooms clean.
Х	Photocopiers/duplicating machines	All machines should have dedicated exhaust vents.