**INDOOR AIR QUALITY ASSESSMENT**

**Executive Offices of Health and Human Services**

**140 High Street**

**1st and 2nd Floors**

**Springfield, Massachusetts**

Department of Children and Families
140 High Street
2nd Floor
Springfield, Massachusetts


Prepared by:

Massachusetts Department of Public Health

Bureau of Environmental Health

Indoor Air Quality Program

December 2019

# Background

|  |  |
| --- | --- |
| Building: | Executive Office of Health and Human Services Agencies |
| Address: | 140 High Street, 1st and 2nd floors  Springfield, Massachusetts |
| Assessment Requested by: | Asya Rozental, Capital and Strategic Planning Manager, EOHHS Facilities |
| Reason for Request: | Odor and Indoor Air Quality (IAQ) concerns |
| Date of Assessment: | December 3, 2019 |
| Massachusetts Department of Public Health/Bureau of Environmental Health (MDPH/BEH) Staff Conducting Assessment: | Mike Feeney, Director, IAQ Program |
| Building Description: | The building was originally a hospital constructed in the early 1900s. A west wing addition was built in 1968. DCF has occupied the space since July of 2008. Other Executive Office of Health and Human Services (EOHHS) offices occupy adjacent space in the building. |
| Windows: | Openable |

# Introduction

This assessment was conducted in response to concerns regarding water damage from a steam leak. This event was unrelated to the water main break of November 2019, for which a separate report was written, and can be found at <https://www.mass.gov/info-details/indoor-air-quality-reports-cities-and-towns-s#springfield->. As noted in the November 2019 water damage assessment report, no water damage to EOHHS office space occurred during the water main break event. Following that, a steam leak occurred on the second floor of this building. Following the report of the steam leak, the IAQ Program conducted an IAQ assessment of the 1st and 2nd floors of 140 High Street.

# Methods

Please refer to the IAQ Manual for methods, sampling procedures, and interpretation of results (MDPH, 2015).

Note that this space has been visited by the MDPH IAQ program several times, including a full assessment in 2012 and a follow-up assessment in 2015. The 2015 report is available on the MDPH IAQ website at: <https://www.mass.gov/info-details/indoor-air-quality-reports-cities-and-towns-s>.

# IAQ Testing Results

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

* ***Carbon dioxide*** 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*** was within the MDPH recommended range of 70°F to 78°F in areas tested; however temperature complaints in this building are common.
* ***Relative humidity*** was below the MDPH recommended range of 40 to 60% in all areas tested, which is typical of the heating season.
* ***Carbon monoxide*** levels were non-detectable (ND) in all indoor areas tested.
* ***Fine particulate matter (PM2.5)*** concentrations measured were below the National Ambient Air Quality (NAAQS) limit of 35 μg/m3 in the areas tested.

## Ventilation

A heating, ventilating and air conditioning (HVAC) system has several functions. First it provides heating and, if equipped, cooling. Second, it is a source of fresh air. Finally, an HVAC system will dilute and remove normally-occurring indoor environmental pollutants by not only introducing fresh air, but by filtering the airstream and ejecting stale air to the outdoors via exhaust ventilation. Even if an HVAC system is operating as designed, point sources of respiratory irritation may exist and cause symptoms in sensitive individuals.

Fresh air is provided by air handling units (AHUs) ducted to several different types of ceiling-mounted supply diffusers. IAQ staff could not identify operating return/exhaust vents within the 115 suite. The closest exhaust vents appear to be the hallway exhaust vents outside suite 115 and the adjacent restrooms. Without proper exhaust ventilation, heat from the HVAC system and solar gain from the non-energy efficient widows can raise temperature, which can lead to IAQ/comfort complaints.

To maximize air exchange, the MDPH recommends that both supply and exhaust ventilation operate continuously during periods of occupancy. In order to have proper ventilation with a mechanical supply and exhaust system, the systems must be balanced to provide an adequate amount of fresh air to the interior of a room while 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). It is recommended that HVAC systems be re-balanced every five years to ensure adequate air systems function (SMACNA, 1994). It is unknown when the last time this system was balanced.

The relative humidity readings ranged from 17 to 24 percent, which were below the MDPH recommended comfort range the day of the assessment. The MDPH recommends a comfort range of 40 to 60 percent for indoor air relative humidity. Relative humidity in the building would be expected to drop during the winter months due to heating. The sensation of dryness and irritation is common in a low relative humidity environment. “Extremely low (below 20%) relative humidity may be associated with eye irritation [and]…may affect the mucous membranes of individuals with bronchial constriction, rhinitis, or cold and influenza related symptoms” (Arundel et al., 1986). Low relative humidity is a common problem during the heating season in the northeast part of the United States.

## Microbial/Moisture Concerns

The heating system experienced a steam leak, which building management reportedly repaired as necessary. Methods to address water damage were undertaken, and were reportedly performed in a manner consistent with the US Environmental Protection Agency (US EPA) and the American Conference of Governmental Industrial Hygienists (ACGIH) recommendations. This includes porous materials (e.g., wallboard, carpeting) being dried with fans and heating within 24 to 48 hours of becoming wet (US EPA, 2008; ACGIH, 1989). If porous materials are not dried within this time frame, mold growth may occur. It is important to have a system to inspect, identify and report leaks and other problems so that drying can begin promptly0 (including removal of plastic coving).

Water-damaged ceiling tiles not related to the stream leak or the water main break were noted (Table 1). These ceiling tiles should be removed in a manner consistent with US EPA mold remediation guidelines. Plants, observed in a few areas (Table 1) should be well maintained, not overwatered and kept away from the airstream of ventilation equipment to prevent odors, water damage, and pests.

## Other IAQ Evaluations

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, IAQ staff examined rooms for products containing VOCs. Sources of TVOCS such as dry erase markers, cleaning and air freshening products were also present. All of these products have the potential to be irritants to the eyes, nose, throat, and respiratory system of sensitive individuals. It is especially important that there be good ventilation in areas where pollutants may be generated.

Carpets and area rugs 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). It was reported that carpets had not been cleaned for several years prior to the BEH/IAQ site visit but that cleaning had been scheduled for the following week.

# Conclusions/Recommendations

In view of the findings at the time of the visit, the following recommendations are made:

1. Implement recommendations made in previous DPH IAQ reports.
2. For buildings in New England, periods of low relative humidity during the winter are often unavoidable. Therefore, scrupulous cleaning practices should be adopted to minimize common indoor air contaminants whose irritant effects can be enhanced when the relative humidity is low. To control for dusts, a high efficiency particulate arrestance (HEPA) filter equipped vacuum cleaner in conjunction with wet wiping of all surfaces is recommended. 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).
3. Operate supply and exhaust ventilation continuously in all areas during occupied periods. Ensure all HVAC equipment is maintained and supply and return vents are cleaned periodically to prevent dust re-aerosolization.
4. Have the HVAC system rebalanced every 5 years in accordance with SMACNA recommendations (SMACNA, 1994).
5. Determine if the 115 suite has any return ventilation, and if not, consider adding return vents to improve temperature control.
6. Ensure there is a system in place to report issues such as steam leaks so that remediation activities can begin promptly.
7. Replace water-damaged ceiling tiles. Examine the area above them for additional water damage and clean/repair as needed.
8. Keep plants in good condition, avoid overwatering, and remove from the airstream of heating and ventilation equipment.
9. Reduce the use of products that may generate VOCs and use them in well-ventilated areas.
10. Clean carpeting in accordance with IICRC recommendations (IICRC, 2012).
11. Refer to resource manual and other related IAQ documents located on the MDPH’s website for further building-wide evaluations and advice on maintaining public buildings. These documents are available at: <http://mass.gov/dph/iaq>.

# References

ACGIH. 1989. Guidelines for the Assessment of Bioaerosols in the Indoor Environment. American Conference of Governmental Industrial Hygienists, Cincinnati, OH.

Arundel et al. 1986. Indirect Health Effects of Relative Humidity on Indoor Environments. Env. Health Perspectives 65:351-361.

IICRC. 2012. Institute of Inspection, Cleaning and Restoration Certification. Carpet Cleaning: FAQ.

MDPH. 2015. Massachusetts Department of Public Health. Indoor Air Quality Manual: Chapters I-III. Available at: <http://www.mass.gov/eohhs/gov/departments/dph/programs/environmental-health/exposure-topics/iaq/iaq-manual/>.

SMACNA. 1994. HVAC Systems Commissioning Manual. 1st ed. Sheet Metal and Air Conditioning Contractors’ National Association, Inc., Chantilly, VA.

US EPA. 2008. “Mold Remediation in Schools and Commercial Buildings”. Office of Air and Radiation, Indoor Environments Division, Washington, DC. EPA 402-K-01-001. September 2008. Available at: <http://www.epa.gov/mold/mold-remediation-schools-and-commercial-buildings-guide>.

| **Location** | **Carbon**  **Dioxide**  **(ppm)** | **Carbon Monoxide**  **(ppm)** | **Temp**  **(°F)** | **Relative**  **Humidity**  **(%)** | **PM2.5**  **(µg/m3)** | **Occupants**  **in Room** | **Windows**  **Openable** | **Ventilation** | | **Remarks** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Supply** | **Exhaust** |
| Outdoor (background) | 402 | ND | 34 | 35 | 12 |  |  |  |  |  |
| 202 | 465 | ND | 73 | 20 | 2 | 3 | Y | Y | Y | 2 water-damaged ceiling tiles |
| 201 | 443 | ND | 74 | 17 | 1 | 0 | Y | Y | Y |  |
| 229 | 428 | ND | 75 | 18 | 2 | 0 | Y | Y | Y |  |
| 203 | 422 | ND | 76 | 17 | 2 | 1 | Y | Y | Y | 1 water-damaged ceiling tile |
| 227 | 450 | ND | 77 | 17 | 2 | 0 | Y | Y | Y |  |
| 204 | 421 | ND | 76 | 16 | 1 | 0 | Y | Y | Y |  |
| 226 | 417 | ND | 74 | 16 | 2 | 0 | Y | Y | N |  |
| 205 | 424 | ND | 74 | 16 | 2 | 0 | Y | Y | Y | 1 missing ceiling tile |
| 224 | 621 | ND | 75 | 22 | 3 | 0 | Y | Y | Y |  |
| 222 | 532 | ND |  | 18 | 1 | 1 | N | Y | Y |  |
| 221 | 515 | ND |  | 19 | 1 | 2 | Y | Y | Y |  |
| 220 | 502 | ND | 75 | 18 | 2 | 0 | Y | Y | N | Oil diffuser |
| 219 | 491 | ND | 75 | 18 | 1 | 0 | Y | Y | Y |  |
| 218 | 486 | ND | 74 | 17 | 2 | 0 | Y | Y | N |  |
| 217 | 489 | ND | 75 | 18 | 1 | 0 | Y | Y | Y |  |
| 215 | 531 | ND | 75 | 17 | 2 | 1 | N | Y | Y | Wall-mounted air conditioner |
| 214 | 592 | ND | 75 | 18 | 2 | 3 | Y | Y | Y |  |
| 213 | 486 | ND | 75 | 17 | 1 | 0 | Y | Y | Y |  |
| 212 | 475 | ND | 78 | 18 | 2 | 1 | Y | Y | Y |  |
| 211 | 433 | ND | 74 | 17 | 2 | 0 | N | Y | Y |  |
| 209 | 408 | ND | 74 | 16 | 2 | 0 | N | Y | Y | Wall-mounted air condition |
| 208 | 444 | ND | 74 | 17 | 1 | 0 | N | Y | Y | 7 water-damaged ceiling tiles |
| 115c | 430 | ND | 70 | 24 | 1 | 0 |  | Y | N |  |
| 115 west | 417 | ND | 70 | 24 | 1 | 0 | Y | Y | N |  |
| 115 south | 391 | ND | 70 | 23 | 1 | 0 | Y | Y | N |  |
| 115a | 398 | ND | 71 | 23 | 1 | 0 | Y | Y | Y | Refrigerator |
| 117 | 413 | ND | 70 | 22 | 1 | 0 | N | Y | N |  |
| 112 | 411 | ND | 71 | 22 | 2 | 0 | N | Y | Y |  |
| 110b | 631 | ND | 72 | 24 | 1 | 2 | N | Y | Y |  |
| 110 | 588 | ND | 75 | 19 | 1 | 3 | N | Y | N |  |
| 110d | 502 | ND | 75 | 18 | 1 | 1 | Y | Y | N |  |
| 113 | 411 | ND | 75 | 18 | 1 | 0 | Y | Y | N |  |
| 108 | 393 | ND | 75 | 19 | 1 | 0 | Y | Y | Y |  |
| 111 | 397 | ND | 75 | 18 | 1 | 0 | N | Y | Y | Wall-mounted air conditioner |
| 109 | 443 | ND | 75 | 18 | 1 | 1 | Y | Y | Y |  |
| 106 | 439 | ND | 75 | 18 | 1 | 1 | Y | Y | Y | Plants |
| 107 | 435 | ND | 76 | 18 | 2 | 1 | Y | Y | Y |  |
| 105 | 448 | ND | 76 | 17 | 2 | 1 | Y | Y | Y |  |
| 105b | 456 | ND | 75 | 18 | 2 | 0 | Y | Y | Y |  |
| 105a | 452 | ND | 75 | 18 | 2 | 0 | N | Y | Y |  |
| 103 | 441 | ND | 75 | 19 | 1 | 1 | Y | Y | Y |  |
| 102 | 440 | ND | 75 | 17 | 1 | 0 | Y | Y | Y |  |
| 104 | 634 | ND | 75 | 21 | 3 | 3 | Y | Y | Y |  |
| 101b | 494 | ND | 75 | 19 | 1 | 1 | Y | Y | Y |  |
| 101 | 469 | ND | 74 | 18 | 1 | 0 | N | Y | Y |  |
| 101a | 462 | ND | 74 | 18 | 2 | 0 | N | Y | Y |  |