**INDOOR AIR QUALITY ASSESSMENT**

**Massachusetts Department of Children and Families**

**185 Church Street**

**Village of Whitinsville**

**Northbridge Massachusetts**

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Village of Whitinsville
Northbridge Massachusetts


Prepared by:

Massachusetts Department of Public Health

Bureau of Environmental Health

Indoor Air Quality Program

May 2022

**BACKGROUND**

|  |  |
| --- | --- |
| Building: | Massachusetts Department of Children and Families (DCF) |
| Address: | 185 Church Street, Village of Whitinsville, Northbridge, Massachusetts |
| Assessment Requested by: | Pedro Batista, Project Coordinator, Executive Office of Health and Human Services (EOHHS) |
| Reason for Request: | General indoor air quality (IAQ) assessment |
| Date of Assessment: | May 6, 2022 |
| Massachusetts Department of Public Health/Bureau of Environmental Health (MDPH/BEH) Staff Conducting Assessment: | Cory Holmes, Assistant Director, IAQ  Program |

|  |  |
| --- | --- |
| **Building Description:** | The DCF occupies space in a 50-year-old, one-story building that formerly served as a supermarket. The DCF has occupied the space for approximately 30 years. The building has a red-brick exterior and an asphalt-shingled peaked roof. The DCF space reportedly underwent interior renovations approximately two years ago. |

|  |  |
| --- | --- |
| **Windows:** | Openable in some areas but not in most. |

# INTRODUCTION

The Whitinsville DCF Office has been previously visited by the IAQ program. These reports can be found on the Massachusetts Department of Public Health website. Reports for several of these visits can be viewed at: <https://www.mass.gov/info-details/indoor-air-quality-reports-cities-and-towns-n#northbridge->

# METHODS

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

# RESULTS and DISCUSSION

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 at the time of assessment, indicating adequate air exchange.
* ***Temperature*** was within the recommended range of 70°F to 78°F in all areas assessed.
* ***Relative humidity*** was below the recommended range of 40% to 60% in all areas assessed, which was reflective of outdoor conditions.
* ***Carbon monoxide*** levels were non-detectable (ND) in all areas tested.
* ***Fine particulate matter (PM2.5)*** concentrations measured were below the National Ambient Air Quality Standard (NAAQS) level of 35 μg/m3 in all 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.

The HVAC system consists of rooftop air-handling units (AHUs) ducted to ceiling-mounted diffusers. Air from the space is ducted back to the AHUs via ceiling-mounted return vents. The HVAC system is controlled by digital thermostats. Thermostats examined had a fan switch with two settings, *on* and *auto*. When the fan is set to *on,* the system provides a continuous source of air circulation and filtration. The *automatic* setting on the thermostat activates the HVAC system at a pre-set temperature. Once the pre-set temperature is reached, the HVAC system is deactivated. Some of the thermostats had a red warning light indicating a “low battery” message.

To maximize air exchange, the IAQ program recommends that both supply and exhaust ventilation operate continuously during periods of occupancy. To have proper ventilation with a mechanical ventilation system, the systems must be balanced after installation 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).

## Microbial/Moisture Concerns

In order for building materials to support mold growth, a source of water exposure is necessary. Identification and elimination of the source of water moistening building materials is necessary to control mold growth. The building has had a history of water damage from both exterior water infiltration and interior leaks. At the time of the assessment, no current water-damaged building materials were observed. However, an occasional leak in office 120 was reported and is believed to be originating from the rooftop HVAC unit. It is currently under investigation by building management and their HVAC vendor.

Light could be seen penetrating beneath the exterior door in area 171. Weather-stripping should be installed on the door to prevent drafts, moisture infiltration and pest entry.

The server room contains a dehumidifier and condensate pump. This equipment should be checked periodically to ensure proper function/drainage and prevent overflow that could moisten gypsum wallboard in the area and lead to mold growth.

## 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, BEH/IAQ staff examined rooms for products containing VOCs. BEH/IAQ staff noted cleaners, hand sanitizers, air fresheners 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.

Most areas were carpeted. Carpets should be cleaned annually (or semi-annually in soiled/high traffic areas) in accordance with Institute of Inspection, Cleaning and Restoration Certification (IICRC) recommendations, (IICRC, 2012). Regular cleaning with a high efficiency particulate air (HEPA) filtered vacuum in combination with an annual cleaning will help to reduce accumulation and potential aerosolization of materials from carpeting.

The MDPH recommends that HVAC equipment be outfitted with 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 manufacturers’ recommendations. It was reported that HVAC systems at DCF are under a preventative maintenance program that utilized MERV 10-13 filters and they are changed quarterly.

# CONCLUSIONS AND RECOMMENDATIONS

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

## Ventilation Recommendations

1. Operate supply and exhaust ventilation in all areas during occupied periods. This includes using the “fan-on” setting for mechanical ventilation to supply fresh air circulation and filtration even when the temperature is within comfort limits.
2. Change batteries in thermostats with “low battery” warning indicators. Inspect periodically, consider keeping replacement batteries on-site for quick change.
3. Consider adopting a balancing schedule of every 5 years for all mechanical ventilation systems, as recommended by ventilation industrial standards (SMACNA, 1994).
4. Continue to change filters for HVAC equipment 2-4 times a year using *the highest* MERV rating a building’s ventilation system can accommodate to improve air filtration as much as possible without significantly reducing airflow.

## Water Damage Recommendations

1. Continue with plans to investigate HVAC/roof leak in office 120.
2. Install weather-stripping on bottom of exterior door near area 171.
3. Periodically check dehumidifier and condensate pump in server room to ensure proper function/drainage.

## Other Recommendations

1. Consider creating a log book for staff to submit specific cleaning/maintenance requests. Make log book available for staff/management in a central location. Cleaning/Maintenance requests should include date, requester, a detailed description of where and what the issue is as well as a section for cleaning/maintenance personnel to sign off or document progress of request.
2. Regularly clean/vacuum supply/exhaust/return vents and personal fans to avoid aerosolizing accumulated particulate matter.
3. 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, deodorizers and scented products.
4. Continue to have the carpets deep cleaned regularly once or twice a year in accordance with IICRC recommendations (IICRC, 2012) and regularly vacuum with a HEPA-equipped vacuum cleaner.
5. 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 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).
6. 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

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).

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: <https://www.mass.gov/lists/indoor-air-quality-manual-and-appendices#indoor-air-quality-manual->

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

| Location | **Carbon**  **Dioxide**  **(ppm)** | **Carbon Monoxide**  **(ppm)** | **Temp**  **(°F)** | **Relative**  **Humidity**  **(%)** | **PM2.5**  **(µg/m3)** | **Occupants**  **in Room** | **Windows**  **Openable** | **Ventilation** | | | **Remarks** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Intake** | **Exhaust** | |
| Background (outdoors) | 435 | ND | 70 | 23 | 2 |  |  |  | |  | Overcast, warm, cloudy |
| Lobby 100 | 642 | ND | 71 | 30 | 2 | 1 | N | Y | | Y |  |
| 101 | 619 | ND | 71 | 31 | 1 | 0 | N | Y | | N | Insect bodies in light fixture, stain on ceiling grid |
| 102 | 618 | ND | 71 | 30 | 1 | 0 | Y | Y | | N |  |
| 104 | 649 | ND | 71 | 30 | 1 | 0 | Y | Y | | N |  |
| 105 | 640 | ND | 71 | 31 | 1 | 0 | N | Y | | Y |  |
| 106 | 615 | ND | 71 | 31 | 1 | 0 | N | Y | | Y |  |
| Server Room | 791 | ND | 72 | 35 | 1 | 0 | N | Y | | Y | Area of former leak-no current evidence of water damage, condensate pump |
| 109A | 742 | ND | 72 | 34 | 1 | 1 | Y | Y | | Y |  |
| 109B/110 | 704 | ND | 72 | 33 | 1 | 0 | Y | Y | | Y |  |
| 111 | 758 | ND | 71 | 34 | 1 | 0 | N | Y | | N |  |
| 112 | 697 | ND | 71 | 33 | 1 | 0 | N | Y | | N |  |
| 113 | 710 | ND | 71 | 33 | 1 | 0 | Y | Y | | N |  |
| 114 | 713 | ND | 71 | 34 | 1 | 0 | N | Y | | N | Air deodorizer-spray |
| 115 | 673 | ND | 71 | 32 | 1 | 1 | Y | Y | | Y |  |
| 117 | 706 | ND | 72 | 32 | 1 | 4 | N | Y | | N |  |
| 119 | 721 | ND | 72 | 32 | 1 | 3 | N | Y | | Y |  |
| 120 | 669 | ND | 72 | 33 | 1 | 0 | N | Y | | N | Occasional leak reported-HVAC vent (under investigation) |
| 121 | 721 | ND | 72 | 32 | 1 | 3 | N | Y | | Y |  |
| 122 | 649 | ND | 71 | 31 | 1 | 0 | N | Y | | N | Thermostat-fan “auto” |
| 123 | 615 | ND | 71 | 32 | 1 | 0 | N | Y | | N |  |
| 124 | 673 | ND | 71 | 32 | 1 | 0 | N | Y | | N |  |
| 125 | 671 | ND | 71 | 33 | 1 | 0 | N | Y | | N |  |
| 126 | 657 | ND | 71 | 33 | 1 | 0 | N | Y | | N |  |
| 127 | 693 | ND | 71 | 32 | 1 | 0 | N | Y | | N |  |
| 128 | 740 | ND | 71 | 32 | 1 | 5 | N | Y | | N |  |
| 129 | 660 | ND | 72 | 31 | 1 | 0 | N | Y | | N |  |
| 130 | 784 | ND | 72 | 33 | 1 | 1 | N | Y | | N | Thermostat-fan “auto” |
| 131 | 743 | ND | 72 | 34 | 1 | 0 | N | Y | | N |  |
| 132 | 730 | ND | 71 | 34 | 1 | 1 | N | Y | | N |  |
| 134 | 768 | ND | 72 | 33 | 1 | 1 | N | Y | | N |  |
| 135 | 674 | ND | 72 | 29 | 1 | 0 | N | Y | | Y |  |
| 136 | 677 | ND | 72 | 31 | 1 | 0 | N | Y | | N |  |
| 137 | 643 | ND | 72 | 30 | 1 | 0 | N | Y | | N |  |
| 139 | 646 | ND | 73 | 29 | 1 | 1 | N | Y | | N |  |
| 140 | 693 | ND | 72 | 30 | 1 | 3 | N | Y | | N |  |
| 141 | 659 | ND | 72 | 29 | 1 | 1 | N | Y | | N |  |
| 142 | 645 | ND | 72 | 28 | 1 | 0 | N | Y | | N | Air deodorizer |
| Reception Area | 728 | ND | 72 | 31 | 1 | 1 | N | Y | | N | Personal fan |
| 143 | 772 | ND | 72 | 34 | 1 | 0 | N | Y | | N |  |
| 144 | 588 | ND | 72 | 30 | 1 | 0 | N | Y | | Y |  |
| 145A/B | 630 | ND | 71 | 30 | 1 | 0 | N | Y | | Y | Personal fan |
| 146 | 668 | ND | 72 | 29 | 1 | 0 | N | Y | | Y |  |
| 147 | 639 | ND | 71 | 30 | 1 | 1 | N | Y | | N |  |
| 148 | 770 | ND | 72 | 30 | 1 | 1 | N | Y | | N |  |
| 149 | 640 | ND | 72 | 29 | 1 | 0 | N | Y | | Y |  |
| 150 | 673 | ND | 72 | 30 | 1 | 1 | N | Y | | N |  |
| 151 | 604 | ND | 72 | 28 | 1 | 0 | N | Y | | N |  |
| 152 | 629 | ND | 72 | 28 | 1 | 4 | N | Y | | Y |  |
| 153 | 597 | ND | 72 | 29 | 1 | 0 | N | Y | | N |  |
| 154 | 620 | ND | 72 | 29 | 1 | 0 | N | Y | | N |  |
| 155 | 611 | ND | 72 | 29 | 1 | 0 | N | Y | | N |  |
| 158 | 620 | ND | 72 | 30 | 1 | 0 | N | Y | | Y |  |
| 160 | 613 | ND | 72 | 28 | 1 | 0 | N | Y | | Y |  |
| 161 | 585 | ND | 71 | 28 | 1 | 0 | N | Y | | N |  |
| 162 | 574 | ND | 72 | 28 | 1 | 0 | N | Y | | N |  |
| 163 | 587 | ND | 72 | 27 | 1 | 0 | N | Y | | N |  |
| 165 | 605 | ND | 72 | 29 | 1 | 0 | N | Y | | N |  |
| 166 | 604 | ND | 72 | 29 | 1 | 0 | N | Y | | Y |  |
| 167 | 620 | ND | 72 | 29 | 1 | 0 | N | Y | | N |  |
| 168 | 631 | ND | 71 | 29 | 1 | 1 | N | Y | | N |  |
| 169 | 628 | ND | 71 | 30 | 1 | 0 | N | Y | | N |  |
| 170 | 674 | ND | 71 | 31 | 1 | 1 | N | Y | | N |  |
| 171 | 586 | ND | 71 | 30 | 1 | 0 | N | Y | | N | Space around exterior door-needs weather-stripping |
| 172 | 609 | ND | 71 | 30 | 1 | 0 | N | Y | | N |  |
| 173 | 607 | ND | 71 | 30 | 1 | 1 | N | Y | | Y |  |
| 174 | 578 | ND | 70 | 30 | 1 | 0 | N | Y | | N |  |
| 175 | 564 | ND | 71 | 29 | 1 | 0 | N | Y | | N |  |
| 177 | 576 | ND | 70 | 31 | 1 | 0 | N | Y | | N |  |