**INDOOR AIR QUALITY ASSESSMENT**

**Tewksbury Hospital**

**Saunders Building**

**Rooms C142, C151 and C152**

**365 East Street Tewksbury, MA**



Prepared by:

Massachusetts Department of Public Health

Bureau of Environmental Health

Indoor Air Quality Program

June 2018

# Background

|  |  |
| --- | --- |
| Building: | Tewksbury Hospital, Saunders Building, Rooms C142, C151 and C152 |
| Address: | 365 East Street, Tewksbury, MA |
| Assessment Requested by: | Scott J. Consaul,  Interim Director of Facilities Management/Director of Environment of Care Department |
| Reason for Request: | Water damage and general Indoor Air Quality (IAQ) |
| Date of Assessment: | May 25, 2018 |
| Massachusetts Department of Public Health/Bureau of Environmental Health (MDPH/BEH) Staff Conducting Assessment: | Michael Feeney Director, IAQ Program |
| Building Description: | The offices examined are on the 1st floor of a U-shaped, five-story building with a flat rubber membrane roof. The building was originally built in the 1960s with additional wings added in the early 1970s. |
| Windows: | Not openable |

# Methods

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

# 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.
* ***Temperature*** was within the recommended range of 70°F to 78°F in the areas tested.
* ***Relative humidity*** was within the recommended range of 40 to 60% in the areas tested.
* ***Carbon monoxide*** levels were non-detectable (ND) in the 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 supplied by air handling units (AHU) and delivered to ceiling-mounted supply vents. The building uses 100% fresh air so that no air is returned to the AHUs. Stale air is drawn through grates and ejected out of the building through roof-mounted exhaust units.

It is important to note that this complex of interconnected offices were originally one room. All but one ceiling-mounted vent is a supply vent. The area originally had a single exhaust vent which is now located in room C151G. All air from the other offices is drawn to that room, and, with it, all normally-occurring environmental pollutants. In addition, some areas (C152A) have personnel who report being in direct airflow of vents, which is causing eye irritation.

The MDPH typically recommends 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. Balancing should also occur when the space is significantly rearranged.

## Microbial/Moisture Concerns

Concerns related to water damage from a drain prompted this request. No visible mold growth was found. The wall that was wet from the leak is plaster, which is resistant to mold growth due to its pH and lack of carbon-containing materials. Moisture sampling throughout the office suite found moisture levels were normal (i.e., dry). One water-damaged ceiling tile was found in the office suite unrelated to the reported water leak.

## Lighting

IAQ staff noted that some work areas appeared to be significantly darker than others. The office suite is entirely artificially lit with no exterior windows. To assess this, IAQ staff conducted light measurements in areas within the office suite and the main hallway outside at tabletop level (approximately three feet above the floor). Work/interior areas with no windows had light measurements ranging from 18 to 60 foot-candles (190 to 650 lux)(Table 1).

The American National Standard Institute (ANSI) recommends approximately 30–100 foot-candles (300-1,000 lux). Increasing lighting would likely serve to reduce the reported symptoms in these work areas. Low light conditions are associated with headaches, tired eyes, and/or irritation (NIOSH, 2013). Lack of light has also been associated with seasonal affective disorder, which has among its symptoms excessive tiredness (NMHA, 2006).

# Conclusions/Recommendations

Based on observations at the time of assessment, the following is recommended:

1. Examine the feasibility of providing an exhaust vent for room C152A.
2. Consider removing a fresh air supply from room C152A.
3. Examine the feasibility of improving lighting in the office suite.
4. Replace the water-damaged ceiling tile.
5. 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

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/>.

NIOSH. 2013. Health hazard evaluation report: lighting, indoor environmental quality concerns, and job stress at a call center – California. By Wiegand D, Ramsey J, Burr G, Choi J. Cincinnati, OH: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, NIOSH HETA No. 2012-0081-3169.

NMHA. 2006. Seasonal Affective Disorder Fact Sheet. National Mental Health Association. <http://www.namihelps.org/assets/PDFs/fact-sheets/Illnesses/Seasonal-Affective-Disorder.pdf>

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)** | **Light**  **(foot/**  **candles)** | **Occupants**  **in Room** | **Windows**  **Openable** | **Ventilation** | | | **Remarks** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Intake** | **Exhaust** | |
| Background (outdoors) | 385 | ND |  |  | 24 |  |  |  |  | |  |  |
| C 142 | 578 | ND | 74 | 44 | 15 | 18 | 1 | N | Y | | N |  |
| C 152 A | 615 | ND | 74 | 43 | 14 | 28 | 1 | N | Y | | N |  |
| C 151 E | 470 | ND | 75 | 41 | 19 | 22 | 0 | N | Y | | N |  |
| C 151 | 483 | ND | 75 | 40 | 20 | 21 | 2 | N | Y | | N | 1 water-damaged ceiling tile |
| C 151 F | 462 | ND | 74 | 40 | 20 | 62 | 0 | N | Y | | N |  |
| C 151 G | 458 | ND | 75 | 40 | 20 | 21 | 0 | N | Y | | Y |  |
| C 151 D | 432 | ND | 74 | 40 | 21 | 26 | 0 | N | Y | | N |  |
| Hallway | 420 | ND | 74 | 40 | 20 | 26 | 4 | N | Y | | N |  |