# INDOOR AIR QUALITY REASSESSMENT

**Massachusetts Registry of Motor Vehicles**
**165 Liberty Street**
**Springfield, Massachusetts**

Prepared by:
Massachusetts Department of Public Health
Bureau of Environmental Health
Indoor Air Quality Program
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## Background/Introduction

In response to a request from Aric Warren, Director of Administrative Services, Massachusetts Registry of Motor Vehicles (RMV), the Massachusetts Department of Public Health (MDPH), Bureau of Environmental Health (BEH), provided assistance and consultation regarding indoor air quality (IAQ) concerns at the Springfield RMV office located at 165 Liberty Street, Springfield, Massachusetts. The request was prompted by concerns regarding the heating, ventilating, and air-conditioning (HVAC) system and water damage. On April 12, 2013, a visit to conduct an IAQ assessment was made by Michael Feeney, Director of BEH's IAQ Program.

The RMV is a state-owned two-level building constructed in the early 1970s. The upper floor of the RMV contains a large open service area/waiting room, storage space and offices. The lower floor contains additional RMV offices, the license plate storeroom and general storage space. The building has no openable windows.

Mr. Feeney previously visited the building in April of 2012 to investigate mold/water damage concerns and issued a report based on observations made at that time, with recommendations to improve air quality (MDPH, 2012). Actions taken on recommendations made in that report are listed in Appendix A.

## Methods

Air tests for carbon monoxide, carbon dioxide, temperature and relative humidity were conducted with the TSI, Q-Trak, IAQ Monitor, Model 7565. Air tests for airborne particle matter with a diameter less than 2.5 micrometers were taken with the TSI, DUSTTRAK™ Aerosol Monitor Model 8520. BEH/IAQ staff also performed visual inspection of building materials for water damage and/or microbial growth.

## Results

The RMV has an employee population of approximately 30 and is visited by up to several hundred individuals daily. The tests were taken during normal operations. Test results appear in Table 1.

## Discussion

### Ventilation

It can be seen from Table 1 that carbon dioxide levels were above 800 parts per million (ppm) in 12 of 14 areas, indicating less than optimal air exchange at the time of assessment. It is important to note that a number of areas were sparsely populated or unoccupied at the time measurements were taken, which generally results in reduced carbon dioxide levels. Carbon dioxide levels would be expected to be higher with full occupancy. The fact that levels were above 800 ppm in the RMV service area/waiting room (a large open area with high ceilings) further illustrates the lack of adequate air exchange for the number of people present at the time of this visit. Without adequate air exchange, typical indoor pollutants can build up over the course of the business day and lead to IAQ/comfort complaints.

Mechanical ventilation on the upper floor is provided by rooftop air-handling units (AHUs). Fresh air is drawn into the AHUs and delivered to occupied areas via ductwork and directed into office spaces by ceiling-mounted fresh air diffusers. Return air is ducted back to the rooftop AHUs. At the time of assessment, the HVAC system on the upper floor was activated.

Mechanical ventilation on the lower floor is provided by ceiling-mounted AHUs located in the license plate storeroom. Fresh air for these AHUs is drawn through an intake vent on the

east exterior wall that is roughly at the same level as the parking lot. Exhaust ventilation appears to be provided by an exhaust fan located beneath the front entrance walkway, which was operating at the time of assessment. As noted in the previous report, the AHUs in the license plate storeroom were corroded due to failure of the drip pans to provide appropriate drainage of condensation when the AHUs are operating in cooling mode. The corrosion has affected the structural integrity of the cabinets, resulting in air from the license plate storeroom being drawn into the AHUs. In addition, the corrosion is an indication that the AHUs are aging/becoming damaged through routine use and at the end of their useful service life.

These AHUs are likely original equipment, over 40 years old. Function of equipment of this age is difficult to maintain, since compatible replacement parts are often unavailable. According to the American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE), the service life[1] for a unit heater, hot water or steam is 20 years, assuming routine maintenance of the equipment (ASHRAE, 1991). Despite attempts to maintain the equipment, the operational lifespan has been exceeded. Maintaining the balance of fresh air to exhaust air will become more difficult as the equipment ages and as replacement parts become increasingly difficult to obtain.

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

[1] The service life is the median time during which a particular system or component of …[an HVAC]… system remains in its original service application and then is replaced. Replacement may occur for any reason, including, but not limited to, failure, general obsolescence, reduced reliability, excessive maintenance cost, and changed system requirements due to such influences as building characteristics or energy prices (ASHRAE, 1991).

adequate air systems function (SMACNA, 1994). Repairs were reportedly made to this system, however it was not reported whether these systems were balanced after the repairs.

Minimum design ventilation rates are mandated by the Massachusetts State Building Code (MSBC). Until 2011, the minimum ventilation rate in Massachusetts was higher for both occupied office spaces and general classrooms, with similar requirements for other occupied spaces (BOCA, 1993). The current version of the MSBC, promulgated in 2011 by the State Board of Building Regulations and Standards (SBBRS), adopted the 2009 International Mechanical Code (IMC) to set minimum ventilation rates. **Please note that the MSBC is a minimum standard that is not health-based**. At lower rates of cubic feet per minute (cfm) per occupant of fresh air, carbon dioxide levels would be expected to rise significantly. A ventilation rate of 20 cfm per occupant of fresh air provides optimal air exchange resulting in carbon dioxide levels at or below 800 ppm in the indoor environment in each area measured. MDPH recommends that carbon dioxide levels be maintained at 800 ppm or below. This is because most environmental and occupational health scientists involved with research on IAQ and health effects have documented significant increases in indoor air quality complaints and/or health effects when carbon dioxide levels rise above the MDPH guidelines of 800 ppm for schools, office buildings and other occupied spaces (Sundell, J. et al., 2011). The ventilation must be on at all times that the room is occupied. Providing adequate fresh air ventilation with open windows and maintaining the temperature in the comfort range during the cold weather season is impractical. Mechanical ventilation is usually required to provide adequate fresh air ventilation.

Carbon dioxide is not a problem in and of itself. It is used as an indicator of the adequacy of the fresh air ventilation. As carbon dioxide levels rise, it indicates that the ventilating system

is malfunctioning or the design occupancy of the room is being exceeded. When this happens, a buildup of common indoor air pollutants can occur, leading to discomfort or health complaints. The Occupational Safety and Health Administration (OSHA) standard for carbon dioxide is 5,000 parts per million parts of air (ppm). Workers may be exposed to this level for 40 hours/week, based on a time-weighted average (OSHA, 1997).

The MDPH uses a guideline of 800 ppm for publicly occupied buildings. A guideline of 600 ppm or less is preferred in schools due to the fact that the majority of occupants are young and considered to be a more sensitive population in the evaluation of environmental health status. Inadequate ventilation and/or elevated temperatures are major causes of complaints such as respiratory, eye, nose and throat irritation, lethargy and headaches. For more information concerning carbon dioxide, consult Appendix B.

Temperature readings ranged from 65°F to 74°F during the assessment, which were within the MDPH recommended comfort guidelines in upper level areas surveyed and within or slightly below the guidelines in lower level rooms (Table 1). The MDPH recommends that indoor air temperatures be maintained in a range of 70°F to 78°F in order to provide for the comfort of building occupants. In many cases concerning indoor air quality, fluctuations of temperature in occupied spaces are typically experienced, even in a building with an adequate fresh air supply.

The relative humidity measured during the assessment ranged from 34 to 41 percent, which was within or close to the MDPH recommended comfort range in areas surveyed (Table 1). The MDPH recommends a comfort range of 40 to 60 percent for indoor air relative humidity. Relative humidity levels 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. Low relative humidity is a very common problem during the heating season in the northeast part of the United States. 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.

**Microbial/Moisture Concerns**

It is believed that the RMV building may have been subjected to stress and damage on November 23, 2013, when a gas explosion leveled a building at 453 Worthington Street, located about 1000 feet to the south (Figure 1; Walsh, 2012). According to RMV officials, doors were blown open throughout the RMV from the blast. After examining the building, BEH/IAQ staff believe the window system was damaged by the explosion pressure and shock waves from the gas explosion, resulting in water leaks/envelope breaches in areas not seen during the April 2012 visit. As an example, the seam of the window system in the area where the RACE office is located has opened (Picture 1). BEH/IAQ staff could see through this opening to the outdoors. In addition, original window panels on the ground floor had been replaced with plywood (Picture 2), and gaskets for the lower level window system were either detached (Picture 3) or were failing as evidenced by sliding panels (Picture 4).

Water-damaged ceiling tiles and wallpaper were noted in many locations (Table 1), and other ceiling tiles were missing. The missing ceiling tiles were likely removed because of repeated water damage due to water penetration through the building envelope. A number of ceiling tiles exhibited water damage that was not previously noted in the 2012 report.

Note that this assessment occurred during a rainstorm. The ceiling above the break room was equipped with a water-catching device to collect water leakage. BEH/IAQ staff also

examined the roof and found a large section of roof membrane that was detached from the building edge (Picture 5), which may be responsible for the observed leaks.

Repairs to this building will need to include the roof and window systems. Water-damaged ceiling tiles, wallpaper and other porous materials can provide a source of mold and should be replaced after a water leak is discovered and repaired. The US Environmental Protection Agency (US EPA) and the American Conference of Governmental Industrial Hygienists (ACGIH) recommend that porous materials be dried with fans and heating within 24 to 48 hours of becoming wet (US EPA, 2001; ACGIH, 1989). If not dried within this time frame, mold growth may occur. Once mold has colonized porous materials, they are difficult to clean and should be removed.

**Other IAQ Evaluations**

Indoor air quality can be negatively influenced by the presence of respiratory irritants, such as products of combustion. The process of combustion produces a number of pollutants. Common combustion emissions include carbon monoxide, carbon dioxide, water vapor, and smoke (fine airborne particle material). Of these materials, exposure to carbon monoxide and particulate matter with a diameter of 2.5 micrometers (μm) or less (PM2.5) can produce immediate, acute health effects upon exposure. To determine whether combustion products were present in the indoor environment, BEH/IAQ staff obtained measurements for carbon monoxide and PM2.5.

*Carbon Monoxide*

Carbon monoxide is a by-product of incomplete combustion of organic matter (e.g., gasoline, wood and tobacco). Exposure to carbon monoxide can produce immediate and acute

health effects. Several air quality standards have been established to address carbon monoxide and prevent symptoms from exposure to these substances. The MDPH established a corrective action level concerning carbon monoxide in ice skating rinks that use fossil-fueled ice resurfacing equipment. If an operator of an indoor ice rink measures a carbon monoxide level over 30 ppm, taken 20 minutes after resurfacing within a rink, that operator must take actions to reduce carbon monoxide levels (MDPH, 1997).

The American Society of Heating Refrigeration and Air-Conditioning Engineers (ASHRAE) has adopted the National Ambient Air Quality Standards (NAAQS) as one set of criteria for assessing indoor air quality and monitoring of fresh air introduced by HVAC systems (ASHRAE, 1989). The NAAQS are standards established by the US EPA to protect the public health from six criteria pollutants, including carbon monoxide and particulate matter (US EPA, 2006). As recommended by ASHRAE, pollutant levels of fresh air introduced to a building should not exceed the NAAQS levels (ASHRAE, 1989). The NAAQS were adopted by reference in the Building Officials & Code Administrators (BOCA) National Mechanical Code of 1993 (BOCA, 1993), which is now an HVAC standard included in the Massachusetts State Building Code (SBBRS, 2011). According to the NAAQS, carbon monoxide levels in outdoor air should not exceed 9 ppm in an eight-hour average (US EPA, 2006).

*Carbon monoxide should not be present in a typical, indoor environment*. If it *is* present, indoor carbon monoxide levels should be less than or equal to outdoor levels. Outdoor carbon monoxide concentrations were non-detect (ND) at the time of assessment (Table 1). No measureable levels of carbon monoxide were detected in the building during the assessment (Table 1). As reported by building occupants, the RMV does not have parking to accommodate all patrons at peak times, which results in lines of cars circling the building. As discussed in the

2012 report, given that the lower level's fresh air intakes are at ground level and that the rear exterior door of the building has gaps beneath it, heavy traffic around the RMV may result in vehicle exhaust and associated odors penetrating the building.

*Particulate Matter*

The US EPA has established NAAQS limits for exposure to particulate matter. Particulate matter includes airborne solids that can be irritating to the eyes, nose and throat. The NAAQS originally established exposure limits to PM with a diameter of 10 μm or less (PM10). In 1997, US EPA established a more protective standard for fine airborne particulate matter with a diameter of 2.5 μm or less (PM2.5). The NAAQS has subsequently been revised, and PM2.5 levels were reduced. This more stringent PM2.5 standard requires outdoor air particle levels be maintained below 35 $\mu g/m^3$ over a 24-hour average (US EPA, 2006). Although both the ASHRAE standard and BOCA Code adopted the PM10 standard for evaluating air quality, MDPH uses the more protective PM2.5 standard for evaluating airborne PM concentrations in the indoor environment.

Outdoor PM2.5 concentration was measured at 8 $\mu g/m^3$ (Table 1). PM2.5 levels measured indoors ranged from 1 to 4 $\mu g/m^3$ (Table 1), which were below the NAAQS PM2.5 level of 35 $\mu g/m^3$. Frequently, indoor air levels of particulates (including PM2.5) can be at higher levels than those measured outdoors. A number of activities that occur indoors and/or mechanical devices can generate particulates during normal operations. Sources of indoor airborne particulates may include but are not limited to particles generated during the operation of fan belts in the HVAC system, use of stoves and/or microwave ovens in kitchen areas; use of photocopiers, fax machines and computer printing devices; operation of an ordinary vacuum cleaner and heavy foot traffic indoors.

*Other Concerns*

The former RMV RACE office located on the lower level of the building continues to have several conditions that should be addressed and were noted in the 2012 BEH/IAQ report.

- The license plate room does not appear to have exhaust ventilation to remove odors from stored materials.
- Water damage to the AHU cabinets indicates that standing water likely exists in the cabinets when the system is in its cooling mode, which can ultimately lead to microbial growth as well as undermine the structural integrity of the units.

## Conclusions/Recommendations

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

1. The exterior window system should be examined for water leakage and damage. A building engineer should be consulted regarding the integrity of the window system and to provide guidance regarding the reparability of the existing windows systems, including the plywood replacement panels.
2. Consult with a building engineer concerning reparability of the roof. If not feasible, roof replacement would be necessary.
3. Once repairs are made, replace water-damaged ceiling tiles. Remove and discard any other porous water-damaged materials inside the building.
4. Continue to operate the ventilation system during business hours on the upper and lower levels of the building. Repair all supply and exhaust equipment as needed to improve ventilation and reduce noise.

5. Repair the AHUs in the license plate storeroom to provide adequate drainage and to prevent air from being drawn from the room into the supply air. If not repairable, consideration should be given to replacing the damaged AHU that services the lower level.
6. Based on the age, physical deterioration and availability of parts, the BEH recommends that an HVAC engineering firm evaluate the system for repair vs. replacement.
7. Examine methods to provide exhaust ventilation for the license plate storeroom.
8. Consideration should be given to reconfigure the traffic pattern around the RMV to minimize vehicle exhaust entrainment by the lower level AHUs. If not feasible, consideration should be given to relocating the fresh air intakes for this system.
9. Consider posting signs regarding vehicle idling near the building. *M.G.L.* c. 90, § 16A prohibits the idling of vehicles in excess of 5 minutes.
10. 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. Drinking water during the day can help ease some symptoms associated with a dry environment (throat and sinus irritations).
11. Refer to Appendix A for additional information regarding the recommendations from the 2012 report.

12. Refer to resource manuals and other related indoor air quality documents for further building-wide evaluations and advice on maintaining public buildings. Copies of these materials are located on the MDPH's website: 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.

ASHRAE. 1989. ASHRAE Standard: Ventilation for Acceptable Indoor Air Quality. Sections 5.11, 5.12. American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. Atlanta, GA.

ASHRAE. 1991. ASHRAE Applications Handbook, Chapter 33 "Owning and Operating Costs". American Society of Heating, Refrigeration and Air Conditioning Engineers, Atlanta, GA.

BOCA. 1993. The BOCA National Mechanical Code/1993. 8th ed. Building Officials and Code Administrators International, Inc., Country Club Hill, IL. Section M-308.1.1.

MDPH. 1997. Requirements to Maintain Air Quality in Indoor Skating Rinks (State Sanitary Code, Chapter XI). 105 CMR 675.000. Massachusetts Department of Public Health, Boston, MA.

MDPH. 2012. Indoor Air Quality Assessment, Massachusetts Registry of Motor Vehicles, 165 Liberty Street, Springfield, Massachusetts. Massachusetts Department of Public Health, Boston, MA. August 2012.

OSHA. 1997. Limits for Air Contaminants. Occupational Safety and Health Administration. Code of Federal Regulations. 29 C.F.R 1910.1000 Table Z-1-A.

SBBRS. 2011. Mechanical Ventilation. State Board of Building Regulations and Standards. Code of Massachusetts Regulations, 8th edition. 780 CMR 1209.0.

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

Sundell. 2011. Sundell, J., H. Levin, W. W. Nazaroff, W. S. Cain, W. J. Fisk, D. T. Grimsrud, F. Gyntelberg, Y. Li, A. K. Persily, A. C. Pickering, J. M. Samet, J. D. Spengler, S. T. Taylor, and C. J. Weschler. Ventilation rates and health: multidisciplinary review of the scientific literature. *Indoor Air*, Volume 21: pp 191–204.

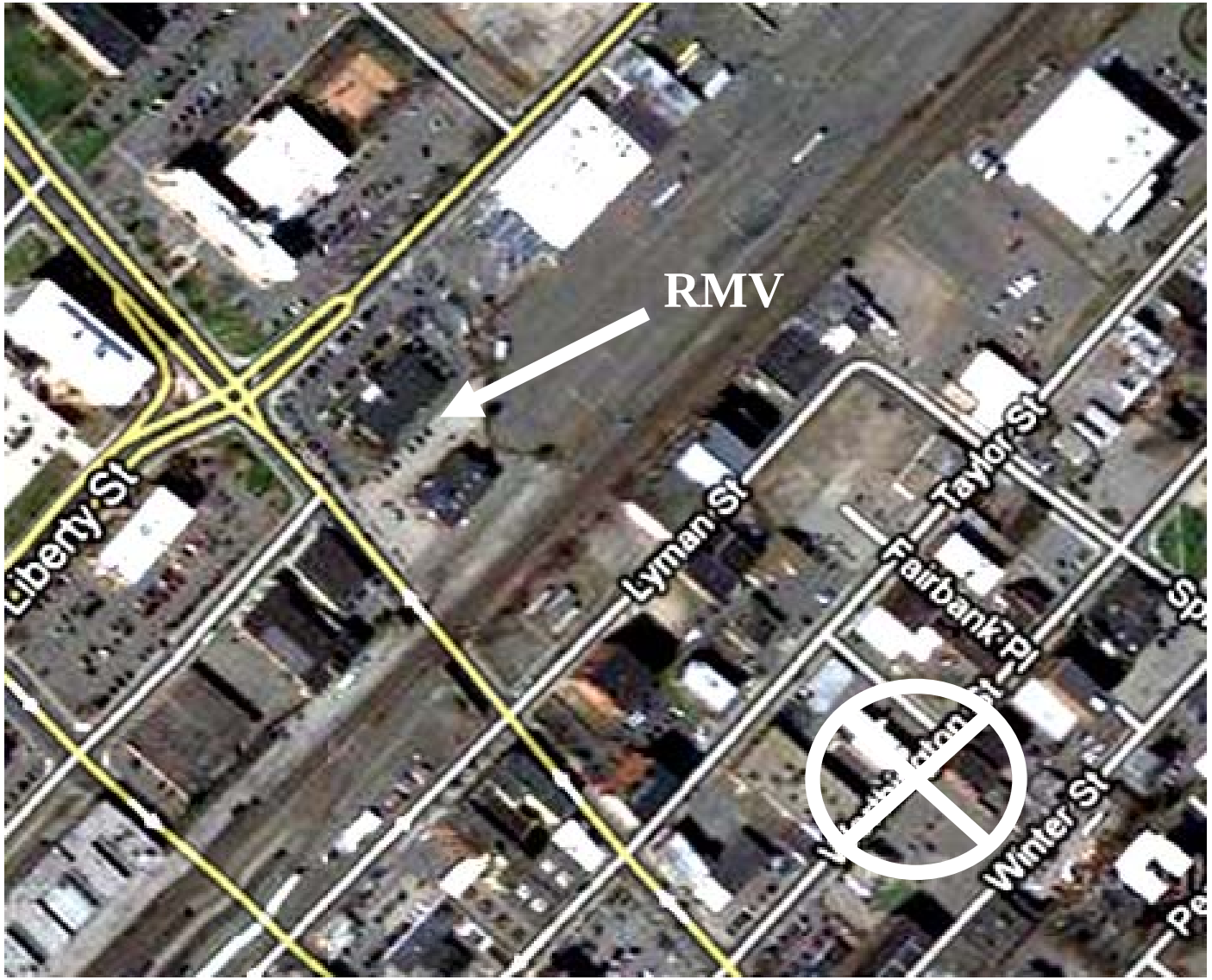
US EPA. 2001. Mold Remediation in Schools and Commercial Buildings. US Environmental Protection Agency, Office of Air and Radiation, Indoor Environments Division, Washington, DC. EPA 402-K-01-001. March 2001.

US EPA. 2006. National Ambient Air Quality Standards (NAAQS). US Environmental Protection Agency, Office of Air Quality Planning and Standards, Washington, DC. http://www.epa.gov/air/criteria.html.

Walsh. 2012. Walsh, R., Fay, A., Kriger, B., Cho, Y. and Halligan, S. *Several hurt, none killed in massive downtown gas explosion*. 22 News WWLP, Chicopee, MA. November 26, 2012. http://www.wwlp.com/dpp/news/local/hampden/downtown-intersection-blocked-off-due-to-apparent-gas-leak.

## Figure 1

**General Location of Gas Explosion (X) Relative to the RMV Building**
**(Scale: 1 ½ in. = 500ft.)**



**Picture 1**

**Open seam of the window system in the RACE office (arrow indicates opening)**

**Picture 2**

**Plywood replacement panel**

**Picture 3**

**Detached gasket on window**

**Picture 4**

**Sliding window panel**

**Picture 5**

**Detached roof membrane**

**Location: Registry of Motor Vehicles**

**Address: 165 Liberty St., Springfield, MA**

# Table 1

**Indoor Air Results**

**Date: 4/12/2013**

| Location | Carbon Dioxide (*ppm) | Carbon Monoxide (*ppm) | Temp (°F) | Relative Humidity (%) | PM2.5 (ug/m$^3$) | Occupants in Room | Windows Openable | Ventilation | | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Intake | Exhaust | |
| Background (Outdoors) | 366 | ND | 46 | 50 | 8 | | | | | rain |
| Former RACE office (lower level) | 540 | ND | 65 | 38 | 1 | 2 | N | Y | Y | |
| License plate storage (lower level) | 551 | ND | 67 | 35 | 1 | 0 | N | Y | Y | 10+ water-damaged ceiling tile<br>10+ missing ceiling tiles |
| 2 | 1069 | ND | 72 | 36 | 3 | 0 | N | Y | N | 4 water-damaged ceiling tiles |
| 3 | 1160 | ND | 70 | 37 | 3 | 1 | N | Y | N | 1 water-damaged ceiling tile |
| Break room | 1126 | ND | 73 | 38 | 3 | 0 | N | Y | Y | Water-damaged wall paper, 2 water-damaged ceiling tiles |
| File cabinet room | 1146 | ND | 73 | 37 | 3 | 0 | N | N | N | Door open |
| Inspection | 1024 | ND | 69 | 39 | 2 | 2 | N | Y | Y | 1 water-damaged ceiling tile |
| Main room east side | 1286 | ND | 72 | 41 | 3 | 100+ | N | Y | Y | |

ppm = parts per million  µg/m$^3$ = micrograms per cubic meter  ND = non-detect

**Comfort Guidelines**

Carbon Dioxide: < 600 ppm = preferred
600 - 800 ppm = acceptable
> 800 ppm = indicative of ventilation problems

Temperature: 70 - 78 °F
Relative Humidity: 40 - 60%

**Location: Registry of Motor Vehicles**

**Address: 165 Liberty St., Springfield, MA**

**Indoor Air Results**

**Date: 4/12/2013**

## Table 1 (continued)

| Location | Carbon Dioxide (*ppm) | Carbon Monoxide (*ppm) | Temp (°F) | Relative Humidity (%) | PM2.5 (ug/m$^3$) | Occupants in Room | Windows Openable | Ventilation | | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Intake | Exhaust | |
| Main room front counter | 1205 | ND | 71 | 40 | 3 | 100+ | N | Y | Y | 1 water-damaged ceiling tile, missing ceiling tile with water collector outside breakroom |
| Main room licensing area | 1867 | ND | 74 | 41 | 4 | 100+ | N | Y | Y | 1 water-damaged ceiling tile |
| Manager office | 1172 | ND | 73 | 37 | 3 | 1 | N | Y | Y | 1 water-damaged ceiling tile |
| RACE office | 964 | ND | 72 | 34 | 3 | 1 | N | Y | Y | 4 water-damaged ceiling tiles |
| Road test | 1169 | ND | 73 | 37 | 3 | 0 | N | N | N | Grills in ceiling |
| Upstairs license plate storage | 1122 | ND | 73 | 36 | 3 | 0 | N | N | N | Door open |

ppm = parts per million  µg/m$^3$ = micrograms per cubic meter  ND = non-detect

**Comfort Guidelines**

Carbon Dioxide: < 600 ppm = preferred
600 - 800 ppm = acceptable
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Temperature: 70 - 78 °F
Relative Humidity: 40 - 60%

# Appendix A

## Actions on MDPH Recommendations, Registry of Motor Vehicles, Springfield, MA

The following is a status report of action(s) taken on MDPH recommendations made in the 2012 MDPH report (**in bold**) based on reports from maintenance staff, documents, photographs and MDPH staff observations.

- **Operate the ventilation system during business hours on the upper and lower levels of the building. Repair all supply and exhaust equipment as needed to improve ventilation and reduce noise.**
- **Action:** RMV reports that repairs were done to the ventilation system, which was operational during the 2013 visit.
- **Repair the AHUs in the license plate storeroom to provide adequate drainage and to prevent air from being drawn from the room. If not repairable, consideration should be given to replacing the damaged AHU that services the lower level.**

**Action:** This recommendation was not implemented.

- **Examine methods to provide exhaust ventilation for the license plate storeroom.**
- **Action:** No exhaust ventilation was available in the license plate storeroom.
- **Render the rear exterior door weather-tight. Ensure tightness of doors by monitoring for light penetration and drafts around doorframes**.
- **Action:** Light around the exterior door was reduced.
- **Consideration should be given to reconfigure the traffic pattern around the RMV to minimize vehicle exhaust entrainment by lower level AHUs. If not feasible, consideration should be given to relocating the fresh air intakes for this system.**

# Appendix A

- **Action:** This recommendation was not implemented.
- **Consider posting signs regarding vehicle idling near the building. *M.G.L.* c. 90, § 16A prohibits the idling of vehicles in excess of 5 minutes**.
- **Action:** This recommendation was not implemented.
- **Ensure leaks are repaired and replace water-damaged ceiling tiles.**
- **Action:** Patches were reportedly done, however water-damaged ceiling tiles continue to occur.