

September 16, 2020  
**NV5 Project No.: 20-30766**

Middlesex Community College  
 Ms. Christina Kelley, Director of Procurement  
 591 Springs Road  
 Bedford, Massachusetts 01730

RE: **Summary of Results of the Limited Indoor Air Quality Evaluations**  
Middlesex Community College – Lowell & Bedford Campuses

Dear Ms. Kelley,

NV5, Inc. (NV5) offers the following summary of the results described in our two reports to you dated September 9 & 11, 2020. The evaluations included indoor air quality comfort parameter measurements of temperature, relative humidity, carbon dioxide, carbon monoxide, airborne particulate, and total volatile organic compounds, collected during three separate time periods from various locations within each building. Additionally, visual and moisture surveys were performed within each of the surveyed buildings, along with bioaerosol sampling.

The purpose of this evaluation was to document environmental conditions within the buildings located at the Middlesex Community College, Lowell and Bedford Campuses located in Lowell and Bedford, Massachusetts, respectively.

The following summarizes the contents of the reports. For a complete listing of laboratory results and indoor air quality measurements and findings in each sampled location, please refer to the full reports forwarded to Middlesex Community College on September 9 & 11, 2020.

## **VISUAL OBSERVATIONS AND MOISTURE SURVEY**

Results of the visual and moisture survey measurements documented the following:

- No visible fungal colonization was observed in any sampled area.
- Minor water staining and/or damage was observed in several locations on both campuses (primarily ceiling tiles), and are generally considered maintenance-type issues that should be addressed, but are unlikely to have significant negative impact on indoor air quality.
- Evaluation of the Heating, Ventilation, and Air Conditioning (HVAC) systems documented generally clean air handlers, and duct systems. Minor mildew growth was observed near the fresh air intake at the ground level of Building 1A of the Bedford campus. Mildew near fresh air intakes can result in entrainment of airborne spores and should be repaired.

## OCCUPANT COMFORT PARAMETERS

Measurements of carbon dioxide, carbon monoxide, total airborne particulate, and total volatile organic compounds (TVOCs) indicated average levels within recommended comfort guidelines, as defined by the American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE), the United States Environmental Protection Agency (USEPA), the Occupational Safety and Health Administration (OSHA), and the American Conference of Governmental Industrial Hygienists (ACGIH) in occupied, air conditioned areas.

Temperature and relative humidity measurements outside recommended ASHRAE standards were documented in multiple locations throughout both campuses. These findings were determined to largely be associated with attempts to conserve energy during periods of building vacancy. Resetting of thermostat controls prior to building occupancy is likely to address these issues, however; NV5 recommends ensuring that indoor relative humidity is maintained below sixty percent whenever possible.

Carbon dioxide measurements are specifically utilized to indicate fresh air ventilation based upon human occupancy. As the buildings were unoccupied at the time of the surveys, the measured carbon dioxide levels may not be reflective of fresh air ventilation at times of occupancy.

## BIOAEROSOL SAMPLING

Sampling for airborne fungal spores was performed using standard procedures outlined by the American Industrial Hygiene Association, and in general accordance with accepted practices in the field of industrial hygiene. Collected samples were forwarded to an independent third-party, AIHA accredited laboratory for the analysis of airborne mold concentrations.

Due to regional and climate variance, and a wide span of diversity in human exposure response, there is no standard for interpretation of mold in air sample results. In general, NV5 uses the following guidance for interpretation of this data:

- Total indoor measured concentrations should be statistically similar to or below outdoor measured concentrations.
- No significant presence of certain hydrophilic (water-loving) fungi including: Stachybotrys, Alternaria, Chaetomium, et. al. should be present in indoor samples.
- No findings of a significant concentration of any genus in indoor concentrations more than an order of magnitude higher than found in the outdoor environment.
- Basidiospores (mushrooms, et al) do not readily propagate in the indoor environment and are generally ignored in indoor measured concentrations. Elevated indoor concentrations of Basidiospores are considered indicative of outdoor air infiltration.
- Spores of the genera Cladosporium and Aspergillus/Penicillium are generally associated with humid conditions when found in elevated concentrations in the indoor environment.

These compose the two most commonly found life forms on earth, and can be readily found in both indoor and outdoor environments worldwide. They propagate in soils and on decaying organic matter (plants, foodstuffs) and are therefore ubiquitous in all environments. They are primary colonizers, requiring comparatively little water to grow.

Results of the analysis of collected samples can be found in the full reports, but may be summarized as follows:

The vast majority of collected samples indicated favorable conditions, with indoor measured spore concentrations similar to or less than outdoor measured concentrations and of generally similar genus makeup.

One sample, collected from the ground floor hallway in Building #6 within the Bedford campus was found to yield elevated levels of *Aspergillus/*Penicillium. This area has undergone past water intrusion, and was recommended for additional evaluation and cleaning, followed by re-testing.

**Based upon the above information and those results established in the full project reports, NV5 concludes that overall indoor air quality in the buildings evaluated was good, with little suggestion for modification or further action beyond that noted in this summary report.**

If you should have any additional questions regarding this information, or if we can be of help to you in any other capacity, please do not hesitate to contact us. It is a pleasure to have been of service to you on this project, and we look forward to continuing work in the future.

Sincerely,



Steven A. Lipson, CIH, CSP, CIAQP  
 Certified Industrial Hygienist #7658 CP  
 Certified Safety Professional #14191  
 Vice President – OHS&E Services