

School/Facility: Long Reach High
Location: Rooms 241, 313, 318, 324, 326, 328, 330, 334, 335, 341, 343, & 344
Date of IEQ Report Form: September 29, 2016
Date(s) Investigated: October 14, 26, 28, November 7, December 6, 2016, and
January 26, 2017 (Working with Building Services HVAC Shop
and making visits after their modifications)
Date of Report: March 8, 2017

IEQ Concern:

Many rooms in the English department have a musty smell. As a result, a general concern was raised regarding a couple of employees' health concerns.

IEQ Investigation Process:

Identify deficiencies that may impact IEQ and/or sources of odor concerns. Typically includes the following depending on the nature of concern, but not limited to:

- interview/questionnaire of concern individual(s)
- inspection above drop ceiling (condition of roof deck, pipe insulation, return air plenum)
- inspection of ventilation system (operation of variable air volume box and outdoor air dampers, check controls, measurements of carbon dioxide, temperature and relative humidity, sources near outdoor air intake, measure return and supply air volume, cleanliness of coils, liner and condensate pan)
- inspection of exterior
- inspection below drop ceiling (housekeeping, sink and floor drain traps, signs of past and present moisture concern via visual and/or moisture meter, mold growth, ensure connection of current and capping of abandoned sanitary vents, odorizers, excessive plants and fabric items, identify potential pathways, and measure volatile organic compounds, carbon monoxide, and lighting)

Findings:

- A musty, mildew, or wet dog aroma was not detected. A dry, stale carpet aroma generally noted in our buildings was detected at times in various rooms prior to occupancy. Changes in environmental conditions, such as temperature and relative humidity may influence the aroma of building materials and supplies within the classroom. The below condition noted on some HVAC coils may create an odor during the cooling season.
- The unit ventilator coils had some particulate buildup in rooms 318, 324, 328, 330, 334, 335, and 341.

- Room 344 had minor mold growth (~6 square inches) on the paint of the exterior CMU wall located behind two posters. The wall is experiencing moisture issues around the window.
- Mineral efflorescence was observed on exterior CMU walls around the windows in rooms 318, 334, and 344.
- A printer was located beneath the thermostat in room 343. This can give a false air temperature reading to the thermostat and cause discomfort and/or over cool during the summer which can lead to dew point and/or relative humidity issues.
- A brown stained ceiling tile was observed in the book storage room of the teacher planning room 335. The stain was created from roof leak or a collar on the chilled water line.
- Housekeeping of settled dust could be improved in room 313.
- Artificial plants were observed in room 313. One was a large tree having adhered dust.
- The carbon dioxide measurements in rooms 334 and 344 were elevated (+487 ppm & +249 ppm) above guidelines of outdoor air concentration plus 700 parts per million (ppm). The measurement assists with indicating if adequate outdoor air is being introduced to dilute body odors. The outdoor air dampers of the ventilation units did appear to be functioning. The classrooms did not have body odor aroma and did not feel stagnant or stuffy when entering.

Corrective Actions:

- Unit ventilators in rooms 318, 324, 328, 330, 334, 335, and 341 were disassembled and all accessible surfaces (heating & cooling coils, blower assembly & condensate pan) were cleaned. Any other mechanical deficiencies unrelated to the IEQ investigation were also addressed when identified.
- The mold in room 344 was cleaned off the wall and poster at the time of finding with custodial disinfectant / cleaner Q128 (EPA registered). The teacher was informed at the time of the finding.
- The windows of rooms 318, 334, and 344 have been checked out. A scope of work has been completed and turned over to the Construction Office for repairs to be made. A feasibility report has been completed with possible work scheduled during the summer of 2017. The painting department will scrape and prime walls to clean up areas until repairs can be made.

- School administration is to inform staff not to attach posters on the exterior walls of rooms 318, 334, and 344 until moisture around the windows and CMU walls have been resolved.
- School administration is to inform staff in room 343 to move the printer away from the thermostat and not to place anything near the thermostat that will give it a false sense of the room air temperature.
- School administration is to inform custodial staff to clean horizontal surfaces in room 318 and inform teaching staff to remove items from surfaces so custodial staff can easily clean without disturbing or breaking personal items and/or work.
- The artificial tree is to be removed from room 313.
- Building Services replaced the stained ceiling tile in the teacher planning storage and determined it to be from a previous leak.
- The elevated CO2 measurements were and are being addressed as follows by Building Services HVAC shop:
 - Room 344. The operation of transfer fan for the room was properly operating. However, the damper in the transfer branch was 90% closed. The damper was open to proper position. The damper operation and operating parameters of room's unit ventilator were properly operating and set. The minimum outdoor air intake was increased. The heating and cooling set points were adjusted to compensate for room sensor reading high by 1.5 degrees Fahrenheit.
 - Room 334. The operation of transfer fan for the room was properly operating. The vanes to the transfer air grille were opened more to increase air changes in the room. The damper operation and operating parameters of room's unit ventilator were properly operating and set. The minimum outdoor air intake was increased.
 - A perforated grate was added to the drop ceiling to allow additional air to exhaust from the classrooms.
 - After earlier in-house attempts to review and improve the volume of the ventilation units' introduction of outdoor air, additional carbon dioxide measurements continued to be above guidelines of outdoor concentration plus 700 (ppm).

As a result, Building Services' mechanical engineer and the HVAC shop are working with a control specialist (manufacturer of the unit ventilator) and HVAC testing and balancing company to review the operation sequence of the outdoor air damper and ensure it is operating as designed. Manipulation of the outdoor air damper just to introduce more outdoor air is not encouraged because it could hinder the performance

of the ventilation unit, thus causing possible issues like increased humidity (cooling season) or pipe freezing (heating season). The school will be updated with end result of the ventilation review process.

- Carbon dioxide measurements is a way to assess ventilation (introduction of outdoor air). Outdoor air is introduced to commercial buildings (i.e. schools) ventilation systems to assist with comfort. In this case, comfort is diluting human bioeffluents (a.k.a body odor). During the numerous investigation visits, the classrooms felt comfortable from a thermal standpoint, not stuffy, and an outstanding body odor was not detected when walking into occupied (after 2-3 periods) classrooms.