



May 27, 2021

Joe Crelier, Director–Risk Management
Portland Public Schools
501 N Dixon Street
Portland, Oregon

Via email: jcrelier@pps.net

Regarding: COVID Response Indoor Air Quality Testing Report
Beverly Cleary (Hollyrood Campus)
3560 NE Hollyrood Court
Portland, Oregon
PBS Project 25000.138

Dear Mr. Crelier:

On April 30, 2021, PBS Engineering and Environmental Inc. (PBS) performed indoor air quality testing in Beverly Cleary (Hollyrood Campus) located at the address above. These services were provided to Portland Public Schools (District) to measure air quality parameters before schools and district-owned buildings are opened again for reoccupancy.

As part of these indoor air quality testing services, PBS measured carbon monoxide (CO), carbon dioxide (CO₂), temperature in degrees Fahrenheit (°F), relative humidity (%RH), and airborne particulate (PM2.5 and PM10). Additionally, PBS reviewed and inventoried accessible components of the test rooms' heating, ventilation, and air conditioning (HVAC) systems

Based on PBS' findings, three rooms in the investigation tested above the recommended ambient airborne particulate concentrations; however, when compared to the ambient outdoor concentrations these results do not present an actionable condition. The results of the testing and assessment indicates that indoor air quality in the building is good and that the building is acceptable for occupancy.

While PBS observed no measurable indoor air quality concerns in any of the rooms that were tested, PBS did not test every occupiable room in each building. This investigation has been performed in concert with a concerted effort on the part of the District to perform regular inspections and repair of all HVAC mechanical systems throughout the District. Additionally, it is the District's policy that rooms without adequate ventilation will not be utilized moving forward.

VENTILATION PARAMETERS AND AIRBORNE PARTICULATE MONITORING

PBS took spot measurements of ventilation parameters in approximately 20% of the classrooms, offices, and common areas in the building (or each building). The readings were compared to recommendations in the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Standard 62.1-2016, Ventilation for Acceptable Indoor Air Quality.

PBS used a TSI VelociCalc 9565 ventilation meter to measure temperature, %RH, CO, and CO₂. A TSI Aerotrak 9306-V2 optical particle counter was used to measure airborne particulate. The table below summarizes the results of the testing. Readings above or below the ASHRAE recommendations are shown in bold.

IAQ Testing Results

Room	CO	CO ₂	Temp. (°F)	%RH	PM2.5	PM10	HVAC
Outdoor (Pre)	0.0	466	73.0	43.7	0.037	0.013	N/A
Main Office	0.0	564	74.0	44.5	0.028	0.018	Supply & Return, Operable Windows, Air Purifier
Nurse's Office	0.0	572	74.4	43.4	0.013	0.010	Supply & Return, Operable Windows, Air Purifier, Radiator Unit
Classroom 19	0.0	561	74.9	38.3	0.003	0.002	Supply & Return, Operable Windows, Air Purifier, Unit Ventilator
Classroom 18	0.0	559	75.1	43.8	0.050	0.024	Supply & Return, Operable Windows, Air Purifier, Unit Ventilator
Classroom 17	0.0	535	74.8	44.6	0.041	0.020	Supply & Return, Operable Windows, Air Purifier, Unit Ventilator
Library Room 10	0.0	520	74.9	39.7	0.008	0.003	Supply & Return, Operable Windows, Air Purifier, Unit Ventilator
Classroom 9	0.0	500	74.2	41.5	0.030	0.015	Supply & Return, Operable Windows, Air Purifier, Unit Ventilator
Classroom 8	0.0	567	73.8	45.1	0.040	0.020	Supply & Return, Operable Windows, Air Purifier, Unit Ventilator
Classroom 7	0.0	544	74.0	45.0	0.025	0.009	Supply & Return, Operable Windows, Air Purifier, Unit Ventilator

Room	CO	CO ₂	Temp. (°F)	%RH	PM2.5	PM10	HVAC
Faculty Room 4	0.0	506	75.3	42.8	0.013	0.006	Supply & Return, Operable Windows, Air Purifier, Radiator Unit
Cafeteria Room 3	0.0	488	74.9	43.4	0.011	0.005	Supply & Return, Operable Windows, Air Purifier, Unit Ventilator
Classroom 2	0.0	527	74.4	40.5	0.015	0.005	Supply & Return, Operable Windows, Air Purifier, Unit Ventilator
Outdoor (Post)	0.0	470	71.6	47.1	0.030	0.016	N/A

CO and CO₂ are presented in parts per million (ppm)

°F: degrees Fahrenheit

%RH: relative humidity

PM: particulate matter

HVAC: visible heating, ventilation, and air conditioning components

CARBON MONOXIDE

CO is produced from the incomplete combustion of carbon-containing fuels, including gasoline, heating oil, and natural gas. CO encountered in a classroom or office environment would likely be the result of proximity to motor vehicles or a malfunctioning heating system exhaust. While ASHRAE recommends that CO levels indoors should not exceed 9 parts per million (ppm), any sustained measurable amount of CO should be investigated.

CARBON DIOXIDE

CO₂ is a normal constituent of exhaled breath and indoor concentrations depend on the number of occupants, duration of occupancy, and air exchanges in a given space. ASHRAE recommends maintaining indoor CO₂ concentrations at less than approximately 1,200 ppm. Given that the building had only limited occupancy during the testing, the reported concentrations are not reflective of conditions during full occupancy.

TEMPERATURE

ASHRAE recommends maintaining indoor temperatures between 68 and 76°F.

RELATIVE HUMIDITY

ASHRAE recommends maintaining relative humidity indoors below 60%. Relative humidity indoors is difficult to regulate and is largely reflective of outdoor conditions.

AIRBORNE PARTICULATE

PM2.5

Airborne particulate matter was measured to assess the effectiveness of the buildings ventilation filtration system. ASHRAE recommends that ambient airborne particulate matter concentrations, measured as PM2.5, should meet

National Ambient Air Quality Standards (NAAQS) which for PM_{2.5} is 0.035 milligrams per cubic meter of air (mg/m³) as measured and averaged over a period of 24 hours.

PM₁₀

Airborne particulate matter was measured to assess the effectiveness of the buildings ventilation filtration system. ASHRAE recommends that airborne particulate matter concentrations, measured as PM₁₀, should meet NAAQS which for PM₁₀ is 0.150 mg/m³ as measured and averaged over a period of 24 hours.

HVAC

The classrooms are served by unit ventilators.

RECOMMENDATIONS

PBS observed three rooms with open windows throughout the school which likely led to the increased temperature readings. Monitor these rooms for temperature complaints as the seasons change, and adjust thermostats accordingly.

LIMITATIONS OF SCOPE

This study was limited to the tests and locations as indicated above. The site as a whole may have other environmental concerns that will not be characterized by this study. The findings and conclusions of this work are not scientific certainties but probabilities based on professional judgment concerning the significance of the data gathered during the course of this investigation. PBS is not able to represent conditions on the site or adjoining sites beyond those detected or observed by PBS.

PBS respectfully submits these results of our indoor air quality investigation. Please feel free to contact me at 503.313.9061 or wayne.sehman@pbsusa.com with any questions or comments.

Sincerely,


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by Wayne
Sehman
Date: 2021.05.27
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Wayne Sehman
Project Manager

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