



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 (Fernwood Campus)
1915 NE 33rd Avenue
Portland, Oregon
PBS Project 25000.138

Dear Mr. Crelier:

On April 29, 2021, PBS Engineering and Environmental Inc. (PBS) performed indoor air quality testing in Beverly Cleary (Fernwood 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, two rooms tested above the recommended range for indoor temperatures. Additionally, 11 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	479	47.2	34.3	0.039	0.016	N/A
Main Office	0.0	571	75.4	37.1	0.075	0.037	Supply & Return, Operable Windows, Air Purifier
Principal's Office Room 117	0.0	580	74.9	36.3	0.049	0.025	Operable Windows, Air Purifier, Radiator Unit
Media Center Room 110	0.0	508	74.6	38.3	0.040	0.016	Supply & Return, Operable Windows, Air Purifier, Radiator Unit
Auditorium/ Cafeteria	0.0	498	73.3	37.9	0.013	0.004	Supply & Return, Operable Windows
Kitchen	0.0	522	72.8	42.5	0.019	0.005	Operable Windows, Radiator Unit, Hood
West Gymnasium	0.0	505	72.3	37.7	0.008	0.005	Supply & Return
East Gymnasium	0.0	504	72.2	37.4	0.001	0.000	Supply & Return
Ind. ED. Multi-Purpose Room	0.0	5330	73.2	38.3	0.007	0.004	Supply & Return
Ind. ED Room 139C	0.0	544	74.5	37.3	0.012	0.007	Supply & Return, Operable Windows, Air Purifier, AC Window Unit (x2)
Classroom 125	0.0	603	73.7	41.1	0.088	0.038	Supply & Return, Operable Windows
Classroom 134	0.0	545	73.5	41.2	0.060	0.023	Supply & Return, Operable Windows
Classroom 001	0.0	540	73.4	42.5	0.092	0.035	Supply & Return, Operable Windows, Air Purifier, Radiator Unit

Room	CO	CO ₂	Temp. (°F)	%RH	PM2.5	PM10	HVAC
Classroom 008	0.0	667	72.6	44.4	0.048	0.027	Supply & Return, Operable Windows, Air Purifier
Classroom 207	0.0	535	73.2	41.6	0.019	0.006	Supply & Return, Operable Windows, Air Purifier
Home EC Classroom 224	0.0	561	77.4	35.9	0.056	0.030	Supply & Return, Operable Windows, Air Purifier, AC Unit
Classroom 225	0.0	546	77.6	34.8	0.037	0.016	Supply & Return, Operable Windows, Air Purifier
Science Classroom 204	0.0	516	75.8	38.3	0.018	0.007	Supply & Return, Operable Windows, Air Purifier
Multi-Purpose Classroom 220B	0.0	492	75.7	36.9	0.058	0.029	Supply & Return, Operable Windows, Air Purifier
Faculty Dining Room 106A	0.0	491	74.2	38.6	0.046	0.023	Operable Windows, Radiator Unit
Outdoor (Post)	0.0	484	74.5	35.8	0.061	0.025	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 PM2.5 is 0.035 milligrams per cubic meter of air (mg/m^3) 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 $0.150 \text{ mg}/\text{m}^3$ as measured and averaged over a period of 24 hours.

HVAC

The classrooms in main building and the addition are served by their own multi-zone fan unit. The gymnasium, music room, cafeteria, and auditorium are each served by their own multi-zone fan units.

RECOMMENDATIONS

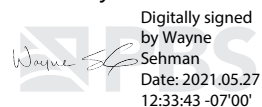
PBS did not observe any rooms that had neither operable windows nor an obvious mechanical or gravity ventilation system. PBS has no recommendations concerning ambient air quality at this time.

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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