



April 13, 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
Scott Elementary School
6700 NE Prescott Street
Portland, Oregon
PBS Project 25000.138

Dear Mr. Crelier:

On April 8, 2021, PBS Engineering and Environmental Inc. (PBS) performed indoor air quality testing in Scott Elementary School 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 (PM_{2.5} and PM₁₀). Additionally, PBS reviewed and inventoried accessible components of the test rooms' heating, ventilation, and air conditioning (HVAC) systems.

Based on PBS' findings, 16 rooms tested below the recommended range for indoor temperatures. PBS observed rooms with open windows throughout the school, which likely led to the decreased temperature readings. Additionally, four 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 Air (Pre)	0.0	484	60.3	29.6	0.022	0.004	N/A
Main Office	0.0	638	67.6	33.8	0.032	0.020	Supply Air, Operable Windows, Air Purifier, Radiant Heat
Gymnasium	0.0	520	65.7	32.0	0.009	0.002	Supply and Return Air, Air Purifier
Cafeteria	0.0	519	65.9	32.5	0.011	0.005	Supply and Return Air, Air Purifier
SUN Office	0.0	516	65.1	32.5	0.013	0.005	Supply Air
Classroom 302	0.0	550	66.4	32.4	0.020	0.011	Supply and Return Air, Operable Windows, Exterior Door, Air Purifier, Radiant Heat
Classroom 305	0.0	611	68.5	32.8	0.021	0.011	Supply and Return Air, Operable Windows, Exterior Door, Air Purifier, Radiant Heat
Room 300A	0.0	583	69.4	34.1	0.003	0.000	Supply and Return Air, Operable Windows, Air Purifier, Radiant Heat, Fan
Library	0.0	509	69.8	29.6	0.003	0.000	Supply and Return Air, Operable Windows, Exterior Door, Air Purifier, Radiant Heat
Classroom 406A	0.0	570	68.3	29.2	0.017	0.009	Supply and Return Air, Operable Windows, Air Purifier, Radiant Heat
Classroom 405	0.0	520	68.0	30.4	0.018	0.005	Supply and Return Air, Operable Windows, Exterior Door, Air Purifier, Radiant Heat, Fan

Room	CO	CO ₂	Temp. (°F)	%RH	PM2.5	PM10	HVAC
Classroom 208	0.0	520	69.3	30.4	0.012	0.005	Supply and Return Air, Operable Windows, Exterior Door, Air Purifier, Radiant Heat
Classroom 203	0.0	488	68.9	26.9	0.024	0.011	Supply and Return Air, Operable Windows, Exterior Door, Air Purifier, Radiant Heat, Fan
Outdoor Air (Intermediate)	0.0	478	56.0	35.2	0.031	0.011	N/A
Classroom 105	0.0	519	57.6	43.0	0.030	0.006	Supply and Return Air, Operable Windows, Air Purifier, Radiant Heat, Fan
Classroom 106	0.0	513	62.8	37.1	0.027	0.005	Supply and Return Air, Operable Windows, Exterior Door, Air Purifier, Radiant Heat
Classroom 104	0.0	493	62.9	31.8	0.021	0.003	Supply and Return Air, Operable Windows, Exterior Door, Air Purifier, Radiant Heat
Classroom 103	0.0	515	65.0	33.0	0.049	0.024	Supply and Return Air, Operable Windows, Air Purifier, Radiant Heat
Classroom 102	0.0	486	63.2	29.0	0.046	0.018	Supply and Return Air, Operable Windows, Exterior Door, Air Purifier, Radiant Heat
Classroom 101	0.0	526	65.5	33.4	0.021	0.008	Supply and Return Air, Operable Windows, Air Purifier, Radiant Heat
Bldg. 282B Copy Room	0.0	517	67.1	31.0	0.044	0.018	Door to Hallway
Outdoor Air (Intermediate)	0.1	472	51.1	34.7	0.053	0.023	N/A

Room	CO	CO ₂	Temp. (°F)	%RH	PM2.5	PM10	HVAC
Industrial Arts 506 (501)	0.0	486	61.3	40.5	0.004	0.002	Supply and Return Air, Operable Windows, Exterior Door, Air Purifier, Fan
Industrial Arts Music (501)	0.0	486	66.6	33.2	0.011	0.001	Supply and Return Air, Operable Windows, Exterior Door, Air Purifier, Fan
Outdoor Air (Intermediate)	0.0	468	53.2	40.8	0.029	0.006	N/A
Portable A	0.0	485	59.5	46.4	0.007	0.003	Supply and Return Air, Operable Windows, Exterior Door, Fan
Portable B	0.0	484	63.9	43.1	0.003	0.002	Supply and Return Air, Operable Windows, Exterior Door, Fan
Outdoor Air (Post)	0.0	466	52.2	41.9	0.027	0.008	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

Classrooms have fan units with radiant heat. The gym and cafeteria have dedicated fan units. The Annex has radiant heat and its own mini boilers and fan units for mixed air units. The Arts Building has steam heat with dedicated fan unit.

RECOMMENDATIONS

PBS observed one room that had neither operable windows nor an obvious mechanical or gravity ventilation system. If these rooms do not have adequate ventilation (active or passive), PBS recommends that they not be used for staff or student activities. These rooms included the following:

- Building 282B, Copy Room

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 503.417.7724 or marli.heininger@pbsusa.com with any questions or comments.

Sincerely,



Marli Heininger
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Marli Heininger
Industrial Hygienist

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