



May 25, 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
Ockley Green Middle School
6031 N Montana Avenue
Portland, Oregon
PBS Project 25000.138

Dear Mr. Crelier:

On May 20, 2021, PBS Engineering and Environmental Inc. (PBS) performed indoor air quality testing in Ockley Green Middle 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 (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, all 18 rooms tested below the recommended range for indoor temperatures. At the time of the investigation, school was not in session and the portable buildings were not occupied and it is believed that the HVAC systems were not in operation. The results of the testing and assessment indicates that indoor air quality in the buildings is good and that the buildings are 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	466	65.6	37.0	0.030	0.010	N/A
Main Office	0.0	469	63.7	42.8	0.018	0.008	Supply and Return Air, Air Purifier, Radiant Heat
Auditorium	0.0	466	64.5	41.7	0.014	0.007	Supply and Return Air, Exterior Doors, Radiant Heat
Library	0.0	467	65.2	39.8	0.018	0.005	Supply and Return Air, Exterior Doors, Operable Windows, Air Purifier, Radiant Heat,
Room 105 Student Commons	0.0	481	65.1	43.6	0.006	0.002	Operable Window Air Purifier, Radiant Heat, Unit Ventilator
Room 103 Symptom Space	0.0	475	63.8	44.4	0.006	0.003	Operable Windows, Air Purifier, Radiant Heat, Unit Ventilator
Home Economics	0.0	451	61.1	45.6	0.020	0.004	Supply and Return Air, Operable Windows, Air Purifier, Radiant Heat, Unit Ventilator
Cafeteria	0.0	486	63.6	45.2	0.013	0.008	Supply and Return Air, Exterior Doors, Operable Windows, Air Purifier, Radiant Heat, Unit Ventilator
Classroom 203	0.0	458	64.1	40.6	0.005	0.003	Operable Windows, Air Purifier, Radiant Heat, Unit Ventilator
Classroom 216	0.0	454	64.6	40.2	0.011	0.005	Operable Windows, Air Purifier, Radiant Heat, Unit Ventilator
Office 218	0.0	459	63.8	41.5	0.014	0.005	Supply and Return Air, Operable Windows, Air Purifier
Classroom 217	0.0	456	63.0	43.9	0.001	0.000	Operable Windows, Air Purifier, Radiant Heat, Unit Ventilator

Room	CO	CO ₂	Temp. (°F)	%RH	PM2.5	PM10	HVAC
Classroom 225	0.0	456	63.6	41.7	0.010	0.006	Operable Windows, Air Purifier, Radiant Heat, Unit Ventilator
Room 140D	0.0	460	63.4	42.7	0.015	0.004	Supply and Return Air, Operable Windows, Air Purifier, Radiant Heat
Classroom 115	0.0	453	62.9	45.0	0.012	0.003	Operable Windows, Air Purifier, Radiant Heat, Unit Ventilator
Industrial Arts 304	0.0	552	63.5	44.1	0.003	0.002	Supply and Return Air, Exterior Doors, Air Purifier
Gymnasium	0.0	674	63.5	44.6	0.006	0.002	Supply and Return Air, Exterior Doors, Air Purifier
Outdoor Air (Intermediate)	0.0	470	56.5	53.6	0.046	0.016	N/A
Portable 153	0.0	438	58.0	62.1	0.014	0.009	Supply and Return Air, Operable Windows, Air Purifier
Outdoor Air (Post)	0.0	449	53.1	62.6	0.027	0.004	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 which 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 which is $0.150 \text{ mg}/\text{m}^3$ as measured and averaged over a period of 24 hours.

For more detailed information regarding the laboratory results of these analyses, please refer to the attached laboratory reports.

HVAC

Rooftop units serve the library, teachers' lounge, and main office. Fan units in boiler room serve the auditorium. Most classrooms are served by Univents. The building addition with the gym and dance studio is served by fans in a penthouse room. The cafeteria has a dedicated fan unit.

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 503.417.7724 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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