



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
Benson Polytechnic High School
546 NE 12th Avenue
Portland, Oregon
PBS Project 25000.138

Dear Mr. Crelier:

On May 4, 2021, PBS Engineering and Environmental Inc. (PBS) performed indoor air quality testing in Benson Polytechnic High 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, two 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 indicate 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)	0.9	476	67.2	45.7	0.019	0.010	N/A
Library	0.0	478	70.5	45.8	0.006	0.002	Supply & Return, Operable Windows, Air Purifier
Computer Lab	0.0	484	70.0	45.9	0.003	0.002	Supply & Return
Reconnection Center	0.0	481	72.7	42.7	0.003	0.001	Supply & Return, Air Purifier
Machine Tech C111	0.0	513	72.9	45.2	0.019	0.011	Supply & Return, Operable Windows
SS – 08	0.0	485	71.7	43.7	0.008	0.006	Supply & Return, Operable Windows, Air Purifier, Radiator Unit
SS – 05	0.0	483	71.4	43.7	0.001	0.001	Supply & Return
Counseling Office	0.0	497	71.7	45.0	0.007	0.004	Supply & Return, Air Purifier
Cafeteria	0.0	480	71.1	45.1	0.004	0.001	Supply & Return, Operable Windows, Air Purifier, Radiator Unit
Kitchen	0.0	489	69.8	43.8	0.005	0.002	Supply & Return, Hoods
Faculty Dining	0.0	482	71.1	45.9	0.000	0.000	Supply & Return
Auditorium A100	0.0	475	70.4	43.5	0.010	0.005	Supply & Return, Operable Windows
Classroom 106	0.0	472	70.5	45.6	0.004	0.002	Supply & Return, Operable Windows, Air Purifier
Classroom 113	0.0	474	72.8	43.7	0.001	0.000	Supply & Return, Operable Windows, Air Purifier
Main Office	0.0	502	72.5	44.6	0.024	0.010	Supply & Return, Operable Windows, Air Purifier, Radiator Unit
Classroom 116	0.0	472	71.3	43.5	0.003	0.002	Supply & Return, Operable Windows, Air Purifier

Room	CO	CO ₂	Temp. (°F)	%RH	PM2.5	PM10	HVAC
Administration VP Office	0.0	483	71.2	45.2	0.005	0.003	Supply & Return, Operable Windows, Air Purifier, Radiator Unit
Weight Room G11	0.0	479	69.9	49.0	0.002	0.002	Supply & Return, Air Purifier
Boys Locker Room	0.0	480	69.8	46.8	0.003	0.002	Supply & Return
PE dressing Room	0.0	467	66.6	49.5	0.002	0.001	Supply & Return, Radiator Unit
Team Room C	0.0	467	66.2	49.8	0.010	0.007	Supply & Return
Old Gym G104	0.0	474	67.4	52.6	0.001	0.000	Supply & Return, Operable Windows
Classroom G109	0.0	463	67.0	48.6	0.002	0.002	Supply & Return, Operable Windows, Air Purifier, Radiator Unit
New Gym G100	0.0	469	67.8	49.8	0.001	0.000	Supply & Return
Classroom 118	0.0	470	68.6	48.0	0.005	0.003	Supply & Return, Operable Windows, Air Purifier, Radiator Unit
Classroom 124	0.0	471	69.1	46.6	0.026	0.014	Supply & Return
Classroom 120	0.0	473	69.7	46.6	0.005	0.002	Supply & Return, Operable Windows, Air Purifier, Radiator Unit
Room 121	0.0	477	70.4	45.2	0.033	0.013	Supply & Return
Classroom E- 148	0.0	487	70.6	45.6	0.001	0.000	Supply & Return, Air Purifier
Classroom E- 131	0.0	480	69.7	42.0	0.000	0.000	Supply & Return, Operable Windows, Air Purifier
Finish Carpentry Classroom E- 116	0.0	493	69.5	44.4	0.045	0.031	Supply & Return, Roll Up Door
Art E-103	0.0	482	70.0	43.1	0.002	0.002	Supply & Return, Air Purifier
Building Construction E-110	0.0	480	69.7	44.1	0.024	0.018	Supply & Return

Room	CO	CO ₂	Temp. (°F)	%RH	PM2.5	PM10	HVAC
Music Classroom 125 Symptom Space	0.0	494	69.8	44.0	0.013	0.005	Supply & Return, Air Purifier
Reconnection Services Room 127	0.0	503	71.1	45.8	0.029	0.015	Supply & Return, Air Purifier
Classroom 236	0.0	487	71.8	43.9	0.004	0.002	Supply & Return, Air Purifier, Radiator Unit
Classroom 237	0.0	484	71.9	43.2	0.004	0.002	Supply & Return, Operable Windows, Air Purifier, Radiator Unit
Classroom 232	0.0	476	70.5	41.0	0.004	0.002	Supply & Return, Operable Windows, Air Purifier, Radiator Unit
Classroom 224	0.0	496	70.6	42.6	0.004	0.001	Supply & Return, Operable Windows, Air Purifier, Radiator Unit
Classroom 229	0.0	471	72.2	41.6	0.003	0.001	Supply & Return, Operable Windows, Air Purifier, Radiator Unit
Classroom 228	0.0	472	71.5	41.2	0.003	0.001	Supply & Return, Operable Windows, Air Purifier, Radiator Unit
Classroom G201	0.0	470	69.0	42.6	0.000	0.000	Supply & Return, Air Purifier
Classroom 210	0.0	467	68.9	45.1	0.006	0.002	Supply & Return, Operable Windows, Air Purifier
Classroom 205	0.0	478	69.9	44.5	0.002	0.001	Supply & Return, Operable Windows, Air Purifier
Classroom 215	0.0	469	71.4	42.4	0.002	0.000	Supply & Return, Operable Windows, Air Purifier
Classroom 218	0.0	464	71.7	42.4	0.005	0.001	Supply & Return, Operable Windows, Air Purifier

Room	CO	CO ₂	Temp. (°F)	%RH	PM2.5	PM10	HVAC
Outdoor (Post/Pre)	0.0	469	64.0	45.9	0.015	0.006	N/A
Foundry F116	0.0	495	66.0	50.8	0.010	0.006	Supply & Return, Operable Windows
Pat 'N Shop F102	0.0	495	66.4	49.0	0.059	0.023	Supply & Return, Operable Windows, Air Purifier
Office F202	0.0	504	68.7	47.8	0.024	0.014	Supply & Return, Operable Windows, Air Purifier, Radiator Unit
Classroom F211	0.0	506	68.9	43.9	0.019	0.008	Supply & Return, Operable Windows, Air Purifier, Radiator Unit
Room F207	0.0	492	69.0	44.5	0.004	0.002	Supply & Return, Operable Windows, Air Purifier, Radiator Unit
Outdoor (Post/Pre)	0.0	464	65.2	46.6	0.013	0.005	N/A
Automotive D130	0.0	467	66.0	47.0	0.015	0.008	Supply & Return, Roll Up Door
Classroom D230	0.0	479	68.0	43.4	0.006	0.004	Supply & Return
Classroom D206	0.0	468	68.8	43.5	0.005	0.002	Supply & Return
Small Eng. Classroom D112	0.0	483	70.0	43.3	0.031	0.012	Supply & Return, Roll Up Door
Deasil Classroom D101	0.0	480	69.0	46.1	0.023	0.011	Supply & Return, Roll Up Door
Classroom D201	0.0	644	71.2	43.6	0.012	0.007	Supply & Return, Air Purifier
Outdoor (Post/Pre)	0.0	478	66.9	41.4	0.019	0.011	N/A
KBPS Room 25	0.0	553	70.6	42.9	0.002	0.002	Supply & Return, Air Purifier
Lunchroom 2A	0.0	558	71.0	41.2	0.034	0.016	Supply & Return
Multi-Purpose Classroom 3A	0.0	567	71.6	40.4	0.014	0.008	Supply & Return, Air Purifier

Room	CO	CO ₂	Temp. (°F)	%RH	PM2.5	PM10	HVAC
Studio Room 11	0.0	554	71.2	41.6	0.011	0.008	Supply & Return
Studio Room 14	0.0	564	71.3	42.4	0.032	0.015	Supply & Return
Outdoor (Post)	0.6	468	64.5	45.2	0.017	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/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 original main building is served by radiators and fan units.

RECOMMENDATIONS

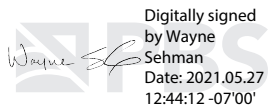
PBS did not observe any rooms that had neither operable windows nor an obvious mechanical or gravity ventilation system. PBS has no recommendations concerning ambient air quality at this time.

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,

 Digitally signed
by Wayne
Sehman
Date: 2021.05.27
12:44:12 -07'00'

Wayne Sehman
Project Manager

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