



August 4, 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
Franklin High School
5405 SE Woodward Street
Portland, Oregon
PBS Project 25000.138

Dear Mr. Crelier:

On May 5, 2021, PBS Engineering and Environmental Inc. (PBS) performed indoor air quality testing in Franklin 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, six 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	418	75.9	29.5	0.047	0.015	N/A
SS-009	0.0	430	72.5	34.7	0.011	0.008	Supply and Return, Operable Windows, Air Purifier
SS-013	0.0	441	72.9	35.2	0.041	0.020	Supply and Return, Operable Windows
SS-024	0.0	450	72.1	34.2	0.006	0.003	Supply and Return, Operable Windows, Air Purifier
Custodial SS-001	0.0	460	72.2	35.6	0.029	0.020	Supply and Return
Science S-016	0.0	438	72.9	34.5	0.029	0.018	Supply and Return, Operable Windows, Air Purifier
Math S-028	0.0	431	73.2	33.3	0.003	0.002	Supply and Return, Operable Windows, Air Purifier
Seed S-151	0.0	476	73.4	37.2	0.019	0.011	Supply and Return, Operable Windows, Air Purifier
Math S-159	0.0	435	74.6	33.1	0.002	0.002	Supply and Return, Operable Windows, Air Purifier
Office S-153	0.0	427	76.0	31.5	0.010	0.005	Supply and Return, Operable Windows
Science S-151	0.0	440	75.8	31.1	0.004	0.002	Supply and Return, Operable Windows, Air Purifier
Maker Space S-142	0.0	436	71.9	36.6	0.012	0.009	Supply and Return, Air Purifier
Metal Shop S-138	0.0	430	74.1	32.2	0.002	0.000	Supply and Return, Air Purifier
Dance S-132	0.0	438	72.9	35.0	0.002	0.001	Supply and Return, Air Purifier
Band S-131	0.0	436	71.9	36.6	0.012	0.009	Supply and Return, Air Purifier

Room	CO	CO ₂	Temp. (°F)	%RH	PM2.5	PM10	HVAC
Black Box S-103	0.0	439	72.1	33.0	0.007	0.005	Supply and Return, Air Purifier
Auditorium	0.0	435	71.0	32.7	0.020	0.014	Supply and Return
World Languages M-116	0.0	433	72.3	34.9	0.004	0.002	Supply and Return, Operable Windows, Air Purifier
World Languages M-101	0.0	432	72.7	33.1	0.006	0.005	Supply and Return, Operable Windows, Air Purifier
Main Office M-124	0.0	486	72.7	39.3	0.025	0.016	Supply and Return, Operable Windows, Air Purifier
Business Manager Office M-124H	0.0	471	71.9	37.6	0.027	0.015	Supply and Return, Operable Windows
Faculty Lounge M-126	0.0	455	73.1	36.3	0.006	0.003	Supply and Return, Operable Windows
Nurse Office M-133	0.0	440	72.5	35.5	0.008	0.005	Supply and Return, Air Purifier
Health Clinic M-138	0.0	461	73.6	36.9	0.009	0.005	Supply and Return, Operable Windows, Air Purifier
Health Clinic M-138E	0.0	465	74.4	34.9	0.009	0.005	Supply and Return
M-137	0.0	445	74.4	33.1	0.010	0.007	Supply and Return, Operable Windows, Air Purifier
Media Center SS-117	0.0	438	73.7	33.0	0.017	0.010	Supply and Return, Operable Windows, Air Purifier
Mock Trial/Gov't SS-118	0.0	444	74.7	30.7	0.003	0.001	Supply and Return, Operable Windows, Air Purifier
Commons S-104	0.0	448	74.5	31.4	0.011	0.006	Supply and Return, Operable Windows, Roll-up Door
Kitchen S-101	0.0	457	74.6	33.9	0.010	0.004	Supply and Return, Operable Windows, Air Purifier

Room	CO	CO ₂	Temp. (°F)	%RH	PM2.5	PM10	HVAC
Counseling	0.0	461	74.1	32.5	0.042	0.025	Supply and Return, Air Purifier
SS-204	0.0	442	75.2	31.8	0.035	0.018	Supply and Return, Operable Windows
SS-208	0.0	454	73.9	32.4	0.022	0.012	Supply and Return, Operable Windows
SS-216	0.0	443	73.7	32.9	0.011	0.005	Supply and Return, Operable Windows
SS-227	0.0	433	75.1	30.3	0.024	0.014	Supply and Return, Operable Windows, Air Purifier
SS-221	0.0	439	74.8	32.1	0.042	0.016	Supply and Return, Operable Windows, Air Purifier
M-233	0.0	424	75.2	31.3	0.011	0.005	Supply and Return, Operable Windows, Air Purifier
M-239	0.0	443	74.2	32.6	0.069	0.039	Supply and Return, Operable Windows, Air Purifier
M-222	0.0	433	75.3	32.8	0.021	0.008	Supply and Return, Operable Windows, Air Purifier
M-209	0.0	438	75.1	31.2	0.002	0.002	Supply and Return, Operable Windows, Air Purifier
M-202	0.0	426	74.7	32.1	0.004	0.002	Supply and Return, Operable Windows, Air Purifier
S-237	0.0	425	75.0	31.4	0.004	0.002	Supply and Return, Operable Windows, Air Purifier
S-240	0.0	428	75.9	31.7	0.032	0.041	Supply and Return, Operable Windows
S-244	0.0	432	75.1	29.2	0.007	0.005	Supply and Return, Operable Windows, Air Purifier
S-230	0.0	426	75.9	32.1	0.004	0.001	Supply and Return, Operable Windows, Air Purifier
S-221	0.0	429	75.3	32.4	0.004	0.002	Supply and Return, Operable Windows, Air Purifier

Room	CO	CO ₂	Temp. (°F)	%RH	PM2.5	PM10	HVAC
S-215	0.0	441	73.7	36.2	0.006	0.002	Supply and Return, Operable Windows, Air Purifier
Outdoor Air (Post/Pre)	0.0	428	81.0	27.0	0.077	0.033	N/A
Gymnasium	0.3	431	76.0	27.8	0.010	0.005	Supply and Return
G-113	0.0	456	73.8	30.4	0.004	0.002	Supply and Return, Operable Windows, Air Purifier
G-203	0.0	438	74.2	31.6	0.010	0.005	Supply and Return
G-010	0.0	434	74.7	34.5	0.004	0.002	Supply and Return
G-015	0.0	438	69.7	35.0	0.003	0.001	Supply and Return
G-018	0.0	432	69.9	36.4	0.001	0.001	Supply and Return, Operable Windows, Air Purifier
G-019	0.0	440	69.8	35.3	0.007	0.005	Supply and Return
Outdoor Air (Post/Pre)	0.0	440	80.9	26.8	0.067	0.030	N/A
Concessions	1.2	458	79.1	30.1	0.040	0.014	Wall Heater
Outdoor Air (Post)	0.1	432	79.3	26.0	0.069	0.028	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 mg/m^3 as measured and averaged over a period of 24 hours.

HVAC

Fan units located in the main building and on the rooftop serve the entire building.

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: 2021.08.04
11:45:01 -07'00'

Wayne Sehman
Project Manager

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