



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
Sabin Elementary School
4013 NE 18th Avenue
Portland, Oregon
PBS Project 25000.138

Dear Mr. Crelier:

On April 30, 2021, PBS Engineering and Environmental Inc. (PBS) performed indoor air quality testing in Sabin 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 (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, nine rooms in the investigation tested above the recommended ambient airborne particulate concentrations. When compared with outdoor particulate concentrations, the concentrations in these rooms are higher and follow-up testing would be prudent.

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	472	68.4	47.7	0.019	0.007	N/A
Gymnasium 110	0.0	548	72.2	44.3	0.005	0.002	Supply & Return
Kitchen	0.0	496	72.0	44.0	0.007	0.003	Supply 7 Return, Operable Windows, Hood
Library 112	0.0	520	72.9	41.8	0.008	0.003	Supply & Return
Classroom 115	0.0	524	71.8	44.2	0.045	0.018	Supply & Return, Operable Windows, Air Purifier, Radiator Unit
Classroom 105	0.0	545	71.3	46.9	0.038	0.024	Supply & Return, Operable Windows, Air Purifier, Radiator Unit
Main Office	0.0	637	73.0	44.5	0.061	0.026	Operable Windows, Air Purifier, Unit Ventilator
Classroom 200	0.0	527	74.9	40.6	0.024	0.009	Supply & Return, Operable Windows, Air Purifier, Unit Ventilator
Room 208	0.0	517	72.7	41.9	0.030	0.013	Operable Windows, Radiator Unit
Auditorium 210	0.0	528	72.6	43.6	0.017	0.008	Supply & Return, Operable Windows, Air Purifier, Radiator Unit
Classroom 214	0.0	481	72.0	43.1	0.018	0.011	Operable Windows, Air Purifier, Unit Ventilator
Classroom 220B	0.0	553	72.4	44.5	0.198	0.094	Supply & Return, Operable Windows, Air Purifier, Unit Ventilator
Classroom 219	0.0	518	72.5	45.3	0.072	0.036	Operable Windows, Air Purifier, Unit Ventilator
Classroom 307	0.0	534	73.4	43.6	0.082	0.030	Operable Windows, Air Purifier, Unit Ventilator

Room	CO	CO ₂	Temp. (°F)	%RH	PM2.5	PM10	HVAC
Classroom 303	0.0	507	72.3	43.5	0.031	0.015	Operable Windows, Air Purifier, Unit Ventilator
Classroom 313	0.0	577	72.6	45.2	0.181	0.072	Operable Windows, Air Purifier, Unit Ventilator
Outdoor (Post/Pre)	0.0	476	70.9	47.7	0.021	0.009	N/A
Portable 3	0.0	480	68.6	46.6	0.148	0.078	Supply & Return, Operable Windows, Radiator Unit
Portable 4	0.0	522	69.2	49.3	0.016	0.008	Supply & Return, Operable Windows, Unit Ventilator
Portable 5	0.0	486	67.7	46.2	0.021	0.013	Supply & Return, Operable Windows, Air Purifier, Unit Ventilator
Outdoor (Post/Pre)	0.0	467	65.5	52.8	0.027	0.014	N/A
Portable 1 / 2	0.0	724	68.3	52.6	0.313	0.017	Supply & Return, Operable Windows, Hood
Outdoor (Post)	0.0	466	66.5	56.5	0.033	0.017	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

The classrooms are served by unit ventilators. The auditorium, media center, gymnasium, and cafeteria are all served by fan units.

RECOMMENDATIONS

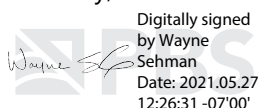
PBS did not observe any rooms that had neither operable windows nor an obvious mechanical or gravity ventilation system.

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
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Wayne Sehman
Project Manager

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