



April 22, 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
Boise-Eliot/Humboldt Elementary School
620 N Fremont Street
Portland, Oregon
PBS Project 25000.138

Dear Mr. Crelier:

On April 14, 2021, PBS Engineering and Environmental Inc. (PBS) performed indoor air quality testing in Boise-Eliot/Humboldt 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, there is no indication that a significant or measurable indoor air quality concern exists in the building. 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)	0.2	458	68.8	15.2	0.034	0.021	N/A
Main Office	0.0	494	73.6	20.1	0.014	0.007	Supply and Return, Operable Windows, Unit Ventilator
Media Center	0.0	470	71.1	21.9	0.014	0.005	Supply and Return, Operable Windows, Unit Ventilator
Multipurpose Room	0.0	459	70.4	18.9	0.006	0.001	Supply and Return
Commons Area 123	0.0	483	70.1	22.0	0.011	0.005	Supply and Return
Classroom 122	0.0	452	70.3	19.7	0.013	0.009	Supply and Return, Operable Windows, Unit Ventilator
Classroom 124	0.0	458	70.8	19.6	0.006	0.003	Supply and Return, Operable Windows, Unit Ventilator
Classroom 139	0.0	474	71.0	22.3	0.021	0.010	Supply and Return, Operable Windows, Unit Ventilator
Classroom 132	0.0	471	70.2	27.1	0.029	0.015	Supply and Return, Operable Windows, Unit Ventilator, Air Purifier
Room 113 (Special Ed)	0.0	469	70.1	21.3	0.016	0.008	Supply and Return
Staff Lounge	0.0	459	70.7	20.0	0.003	0.002	Supply and Return, Operable Windows, Unit Ventilator, Air Purifier
Classroom 101	0.0	462	71.5	18.4	0.014	0.005	Supply and Return, Operable Windows, Unit Ventilator, Air Purifier
Classroom 202	0.0	472	71.3	18.1	0.003	0.001	Supply and Return, Operable Windows, Unit Ventilator

Room	CO	CO ₂	Temp. (°F)	%RH	PM2.5	PM10	HVAC
Commons 205	0.0	467	71.0	21.6	0.007	0.002	Supply and Return
Classroom 210	0.0	470	72.5	18.6	0.009	0.005	Supply and Return, Operable Windows, Unit Ventilator
Classroom 211	0.0	474	73.5	22.2	0.001	0.000	Supply and Return, Operable Windows, Unit Ventilator
Classroom 220	0.0	454	71.5	23.8	0.002	0.001	Supply and Return, Operable Windows, Unit Ventilator, Air Purifier
Classroom 226	0.0	459	71.1	18.2	0.004	0.000	Supply and Return, Operable Windows, Unit Ventilator, Air Purifier
Classroom 229	0.0	460	73.5	21.6	0.001	0.000	Supply and Return, Operable Windows, Unit Ventilator, Air Purifier
Day Care	0.0	531	73.9	18.6	0.029	0.018	Operable Windows, Unit Ventilator, Air Purifier
Outdoor Air (Post)	0.1	446	68.6	14.7	0.026	0.010	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

Classrooms are served by unit ventilators. The cafeteria and gymnasium are served by a fan unit. Study spaces are served by an overhead fan unit in the attic.

RECOMMENDATIONS

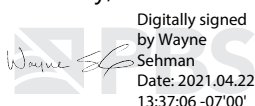
PBS did not observe any rooms that had neither operable windows nor an obvious mechanical or gravity ventilation system. PBS has no recommendations concerning ambient air quality at this time.

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,

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by Wayne
Sehman
Date: 2021.04.22
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Wayne Sehman
Project Manager

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