



April 6, 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
Lewis Elementary School
4401 SE Evergreen Street
Portland, Oregon
PBS Project 25000.138

Dear Mr. Crelier:

On March 22, 2021, PBS Engineering and Environmental Inc. (PBS) performed indoor air quality testing in Lewis 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)	1.4	487	61.2	41.0	0.033	0.014	N/A
Classroom 1	0.0	461	68.9	33.4	0.006	0.000	Supply and Return, Operative Windows, Radiant Heat, Air Purifier
Classroom 4	0.0	463	70.3	32.7	0.006	0.002	Supply and Return, Operative Windows, Radiant Heat, Air Purifier
Classroom 3	0.0	479	71.6	33.1	0.002	0.002	Supply and Return, Operative Windows, Radiant Heat, Air Purifier
Classroom 8	0.0	483	70.8	30.9	0.007	0.004	Supply and Return, Operative Windows, Radiant Heat, Air Purifier
Classroom 7	0.0	473	71.4	31.6	0.014	0.004	Supply and Return, Operative Windows, Radiant Heat, Air Purifier
Classroom 12	0.0	468	73.1	30.9	0.005	0.002	Supply and Return, Operative Windows, Radiant Heat, Air Purifier
Classroom 16	0.0	461	72.9	32.1	0.004	0.002	Supply and Return, Operative Windows, Radiant Heat, Air Purifier
Cafeteria	0.0	457	72.0	33.4	0.007	0.002	Supply and Return
Gymnasium	0.0	467	73.1	34.0	0.005	0.002	Supply and Return
Library	0.0	471	72.7	32.7	0.004	0.002	Supply and Return, Operative Windows, Unit Ventilator
Classroom 20	0.0	462	72.8	31.1	0.007	0.002	Supply and Return, Operative Windows, Unit Ventilator, Air Purifier

Room	CO	CO ₂	Temp. (°F)	%RH	PM2.5	PM10	HVAC
Classroom 23	0.0	449	73.6	31.4	0.002	0.002	Operative Windows, Unit Ventilator, Air Purifier
Room 34	0.0	454	74.0	32.0	0.007	0.004	Supply, Operative Windows, Unit Ventilator
Office 4A	0.0	460	73.3	32.2	0.012	0.004	Operative Windows, Radiant Heat, Air Purifier
Office 4B	0.0	459	72.7	33.0	0.004	0.000	Operative Windows, Unit Ventilator, Air Purifier
Outdoor Air (Post)	1.6	478	62.2	39.9	0.040	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 PM_{2.5} which 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 which is 0.150 mg/m³ as measured and averaged over a period of 24 hours.

HVAC

The new addition has unit ventilators in classrooms and the older section classrooms are served by mixed air units. The gymnasium, auditorium, and cafeteria are served by one fan unit. The kindergarten classrooms are served by attic fan units. The kitchen has fan units in the closets.

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: 2021.04.06
16:18:55 -07'00'

Wayne Sehman
Project Manager

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