



February 28, 2021

Patt Komar
David Douglas School District
11300 NE Halsey Street
Portland, Oregon 97220

Via email: patt_komar@ddsd40.org

Regarding: Indoor Air Quality and Ventilation Assessment Report
Earl Boyles Elementary School
10822 SE Bush Street
Portland, Oregon
PBS Project 23179.091, Phase 0001

Dear Ms. Komar:

On January 25, 2021, PBS Engineering and Environmental Inc. (PBS) performed indoor air quality testing and ventilation assessments at Earl Boyles Elementary School in Portland, Oregon. These services were completed to provide an overall assessment of indoor air quality in the building.

The results of the testing and assessment indicates that indoor air quality in the building is good and that the school is acceptable for occupancy.

The school includes 27 classrooms, offices, a staff break room, cafeteria, and gymnasium.

VENTILATION PARAMETERS & PM10 MONITORING

As part of indoor air quality testing services PBS took spot measurements of ventilation parameters in approximately 20% of the classrooms, offices, and common areas in the building. Measurements included temperature (°F), relative humidity (%RH), carbon monoxide (CO), carbon dioxide (CO₂), and airborne particulate matter (PM10). 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.

In addition, PBS visually assessed every occupied space in the building to determine if the space was served by a mechanical ventilation system or had an operable window. Spaces without a mechanical ventilation system or operable window were noted and referred to the district for further evaluation. The visual inspection also looked for obvious indications of water intrusion, fungal growth, and other conditions that could lead to poor 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 PM10. The table below summarizes the results of the testing. Readings above or below the ASHRAE recommendations are shown in bold.

Table 1. Ventilation Monitoring Results

	Location	Temp (°F)	Relative Humidity (%RH)	CO₂ (ppm)	CO (ppm)	PM10 (mg/m³)
1	Main Office reception area	68.5	31.8	527	0.0	0.024
2	Cafeteria	66.8	32.8	469	0.0	0.005
3	Room 27	67.7	31.8	455	0.0	0.007
4	Room 20	67.2	31.1	434	0.0	0.000
5	Gym	68.7	32.0	455	0.0	0.005
6	Library	69.0	30.2	439	0.0	0.004
7	Room 12	70.4	28.6	444	0.0	0.000
8	Room 8	69.7	28.3	441	0.0	0.001
9	Room 3	64.0	32.0	415	0.0	0.002
10	Office 53	70.6	32.3	460	0.0	0.005
11	Conference Room 51	70.7	28.9	452	0.0	0.008

°F: degrees Fahrenheit %RH: relative humidity ppm: parts per million mg/m³: milligrams per cubic meter of air

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.

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.

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 be below 0.150 milligrams per cubic meter of air (mg/m³) for indoor spaces.

CONCLUSIONS AND RECOMMENDATIONS

PBS measured ventilation parameters and airborne particulate matter in approximately 20% of classrooms, offices, and common areas throughout the building. Temperatures in the cafeteria, Room 27, Room 20, and Room 3 were below the ASHRAE recommended level of 68°F. Ventilation parameters in all other areas were within ASHRAE recommended levels.

The visual assessment did not find any obvious indications of water intrusion, fungal growth, or other conditions that could lead to poor indoor air quality.

Five areas were referred to the district for further evaluation of their ventilation systems.

1. Kitchen office
2. Offices 42 and 43 on the stage
3. Custodian's office – ceiling vent only
4. Observation room 1 (between rooms 7 & 8)
5. Observation room 2 (between rooms 9 & 10)

After evaluation, the District will post a summary detailing how issues in each area were resolved.

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.

Please feel free to contact me at 503.515.4726 or voeller@pbsusa.com with any questions or comments.

Sincerely,

Dale Voeller, CHMM, CSP
Senior Project Manager

DSV:mo