



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  
South Powellhurst Campus  
2900 SE 122nd Avenue  
Portland, Oregon  
PBS Project 23179.091, Phase 0001

Dear Ms. Komar:

On January 27, 2021, PBS Engineering and Environmental Inc. (PBS) performed indoor air quality testing and ventilation assessments at the South Powellhurst campus in Portland, Oregon. These services were completed to provide an overall assessment of indoor air quality in the buildings.

The results of the testing and assessment indicates that overall indoor air quality in the buildings is good and that the buildings are acceptable for occupancy.

The campus includes the main building, a food services warehouse, maintenance shops, and the bus garage. The main building includes three classrooms and administrative offices.

### **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 each of the buildings. Measurements included temperature (°F), relative humidity (%RH), carbon monoxide (CO), carbon dioxide (CO<sub>2</sub>), 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 CO<sub>2</sub>. 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)	CO <sub>2</sub> (ppm)	CO (ppm)	PM10 (mg/m <sup>3</sup> )
1	Room 103	73.1	31.2	512	0.2	0.006
2	Room 104	75.7	30.0	574	0.0	0.003
3	Room 106	69.5	32.0	513	0.0	0.006
4	Room 108	69.7	32.3	517	0.0	0.008
5	Room 114	72.6	31.6	609	0.0	0.006
6	Room 214 (basement)	72.3	34.6	1,019	0.0	0.013
7	Office 218 (basement)	73.1	33.6	701	0.0	0.007
8	Room 208 (basement)	70.7	32.0	524	0.0	0.028
9	Maintenance Shop Break Room	<b>63.7</b>	42.7	516	0.0	0.013
10	Maintenance Shop Office	<b>63.9</b>	41.8	531	5.3	0.009
11	Maintenance Shop Work Office	<b>64.1</b>	41.0	478	0.0	0.012
12	Bus Garage Office	<b>63.9</b>	45.3	497	0.0	0.015
13	Warehouse Office	<b>62.1</b>	46.7	514	0.0	0.041

°F: degrees Fahrenheit      %RH: relative humidity      ppm: parts per million      mg/m<sup>3</sup>: 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

CO<sub>2</sub> 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 CO<sub>2</sub> 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/m<sup>3</sup>) 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. Temperature readings in the maintenance shops, bus garage, and

warehouse were below the recommended indoor temperature of 68°F. Given the use of these buildings, these temperatures are normal and expected.

A CO reading of 5.3 ppm was recorded in the Maintenance Shop Office. While below the ASHRAE recommended maximum level of 9 ppm, any sustained levels of CO should be investigated. Subsequent measurements in the space showed CO levels at 0.0 ppm, indicating that initial reading was a transient event and there is not a sustained CO concentration in the space.

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.

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

1. Custodian's office
2. Office 104B
3. Room 109
4. Rooms 106A & 106B
5. Room 108
6. Rooms 113 and 113A
7. Room 114
8. Room 115 (kitchen)

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

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