April 2, 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
James John Elementary School
7439 N Charleston Avenue
Portland, Oregon
PBS Project 25000.138

Dear Mr. Crelier:

On March 29, 2021, PBS Engineering and Environmental Inc. (PBS) performed indoor air quality testing in James John 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 (CO_2), 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, elevated particulate levels were observed in room 42 of the outbuilding. HVAC efficiency should be monitored in this room. The results of all other testing and assessment indicates that indoor air quality in the buildings is good and that the buildings are 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 CO_2. 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)	1.7	431	62.1	33.1	0.034	0.013	N/A
Main Office	0.0	451	68.7	31.4	0.003	0.002	Supply Air, Operable Windows, Radiant Heat
Classroom 29	0.0	437	69.5	33.1	0.003	0.001	Operable Windows, Unit Ventilator
Classroom 31	0.0	426	69.9	33.4	0.001	0.000	Operable Windows, Unit Ventilator
Library	0.0	443	70.3	30.8	0.012	0.005	Operable Windows, Unit Ventilator
Gym	0.0	447	70.7	30.0	0.003	0.001	Supply and Return Air, Operable Windows, Radiant Heat
Cafeteria	0.0	449	70.1	29.7	0.004	0.001	Supply and Return Air, Operable Windows, Radiant Heat
Staff Lounge	0.0	447	70.4	30.4	0.008	0.004	Supply and Return Air, Operable Windows, Radiant Heat
Kitchen	0.0	457	70.4	31.3	0.005	0.002	Supply and Return Air, Operable Windows
Classroom 19	0.0	454	70.6	33.5	0.004	0.002	Operable Windows, Unit Ventilator, Radiant Heat
Classroom 34	0.0	447	71.3	32.3	0.003	0.002	Supply and Return Air, Operable Windows, Unit Ventilator
Classroom 22	0.0	459	72.7	30.1	0.011	0.008	Operable Windows, Unit Ventilator
Room 24	0.0	448	72.8	32.6	0.015	0.008	Operable Windows, Radiant Heat
Auditorium	0.0	442	71.7	28.2	0.003	0.001	Supply and Return Air, Operable Windows
Classroom 1	0.0	438	70.3	33.1	0.002	0.001	Operable Windows, Unit Ventilator
Classroom 4	0.0	443	70.5	30.8	0.003	0.002	Operable Windows, Unit Ventilator

Room	CO	CO_2	Temp. (°F)	%RH	PM2.5	PM10	HVAC
Classroom 7	0.0	451	71.6	33.2	0.003	0.002	Operable Windows, Unit Ventilator
Room 8 - Counselor	0.0	461	71.8	33.2	0.003	0.002	Operable Windows, Unit Ventilator
Classroom 11	0.0	439	72.2	32.0	0.001	0.001	Operable Windows, Unit Ventilator
Classroom 13	0.0	453	71.6	32.6	0.003	0.001	Operable Windows, Unit Ventilator
Outdoor Air (Post/Pre)	1.2	430	59.6	33.3	0.023	0.008	N/A
Outbuilding Room 39	0.0	471	68.1	39.6	0.005	0.002	Operable Windows, Radiant Heat
Outbuilding Room 38	0.0	473	69.4	36.6	0.012	0.007	Operable Windows, Radiant Heat
Outbuilding Room 37	0.0	469	69.5	35.4	0.002	0.000	Operable Windows, Radiant Heat
Outbuilding Room 36	0.0	468	69.9	35.5	0.008	0.003	Operable Windows, Radiant Heat
Outbuilding Room 42	0.0	511	70.4	36.3	**0.203**	0.126	Operable Windows, Radiant Heat
Outdoor Air (Post)	0.9	455	58.9	33.5	0.018	0.009	N/A

CO and CO_2 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

CO_2 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_2 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 which 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 which is 0.150 mg/m^3 as measured and averaged over a period of 24 hours.

For more detailed information regarding the laboratory results of these analyses, please refer to the attached laboratory reports.

HVAC

Classrooms are served by unit ventilators. Gymnasium and the auditorium are served by a fan unit in the boiler room.

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: 2021.04.02 15:07:55 -07'00'

Wayne Sehman
Project Manager

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