Global Consulting, Inc.

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March 28, 2016

Department of General Services
Office of Safety and Health, Facilities Division
2000 14th Street NW, 5th Floor
Washington, DC 20009

Attention: Mr. Ricardo Eley, Mr. Brian Killian

RE: Weekly Indoor Air Quality Evaluation at Shepherd Elementary School

Global Project Number: V0225

Dear Mr. Eley and Mr. Killian:

On March 23, 2016, Global Consulting, Inc. (GLOBAL) conducted a weekly indoor air quality (IAQ) evaluation at the Shepherd Elementary school, a property maintained by the Department of General Services (DGS), located at 7800 14th St. NW Washington DC 20012. This report provides a summary of observations and findings.

Methodology

The IAQ evaluation included a visual assessment, IAQ instrumentation screening, as well as sampling for non-viable mold in representative locations within the building. Additionally, one ambient set of samples was taken for comparison.

Non-viable fungal spore samples were collected on *Air-O-Cell* cassettes using a Buck BioAire calibrated pump. The air sample was taken within the breathing zone and no closer than three feet from the ground. In tandem with collecting mold samples, real-time readings for temperature, relative humidity, carbon dioxide, and carbon monoxide were collected using a Fluke 975 Air Meter.

Respirable particulate in air (PM2.5µ and PM10µ size classes) was measured using an Aerocet 531 Particle Mass Counter and calibrated prior to sampling.

Microbial samples were delivered to EMSL Analytical, Inc. of Beltsville, Maryland, for analysis. The sample chain-of-custodies and laboratory reports are attached.

Observations

The table below summarizes the main observations at each space visited on March 23, 2016.

Location	Summary of Observations
Hallway at entrance; 1st Floor; ca. 500 ft²	One occupant at the time of inspection; Tile floors and drop ceiling; No visible water leaks in the room; No visual signs of microbial growth, no odor; No visible dust on floor/ other surfaces.
Room 111; 1st Floor ca. 440 ft²	No occupants at the time of inspection; Drop ceiling and tile floor; No visual signs of microbial growth, No odor; No visible dust on floor/ other surfaces.
Room C105 1st Floor; Ca. 900 ft²	No occupants at the time of inspection; Dropped ceiling and carpeted floor; No visual signs of microbial growth, No odor; No visible dust on floor/ other surfaces.
Room C203; 2nd Floor; ca. 100 ft²	One occupant at the time of inspection; Drop ceiling and carpeted floor; No visual signs of microbial growth, No odor; No visible dust on floor/ other surfaces.
Stair #5; 2nd Floor; ca. 100 ft²	One occupant at the time of inspection; Dropped ceiling and tiled floor; No visible water leaks in the room; No visual signs of microbial growth, No odor; Trace dust near the air diffusers on the ceiling; No visible dust on floor/other surfaces.
Hallway 2nd floor near stair #5; 2nd Floor; ca. 480 ft²	No occupants at the time of inspection; Dropped ceiling and tiled floor; No visible water leaks in the room; No visual signs of microbial growth, No odor; Visible dust on floors and other surfaces; Has small heater near floor.
Auditorium; First Floor; ca. 2000 ft²	No occupants at the time of inspection, in and out of room; Dropped ceiling and tiled floor; Visible water leak on ceiling; No visual signs of microbial growth, No odor; Visible dust near the air diffusers on the ceiling.

Measurements of Indoor Environmental Quality Parameters

A summary of average measurements of comfort parameters and respirable particulates is provided in Table 1.

Temperature

The American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) have published recommendations for year round acceptable temperatures in Standard 55-2010 (*Thermal Environmental Conditions for Human Occupancy*). The winter comfort range is 20 to 24°C (68 to 75°F) and 23 to 26°C (73 to 79°F) is the summer comfort range. All the temperature readings fell within the ASHRAE recommended ranges.

Relative Humidity (RH)

Relative humidity (RH) is a key factor for mold growth. Mold has the potential of growing on suitable surfaces with humidity levels above 60%. ASHRAE standard 62.1-2010 (*Ventilation for Acceptable Indoor Air Quality*) recommends a maximum indoor relative humidity of 65% to preclude the likelihood of condensation on cool surfaces encouraging mold growth. All RH measurements fell within the ASHRAE recommended range.

Carbon Monoxide

Carbon monoxide (CO) is a colorless and odorless gas that is produced by the incomplete combustion of carbon-containing fuels. Oil, gasoline, diesel fuels, wood, coke, and coal are the major sources of CO. All registered CO concentrations were below the EPA National Ambient Air Quality Standard (NAAQS) of 9 ppm.

Carbon Dioxide

Under conditions of maximum occupancy, ASHRAE Standard 62.1-2010, Appendix C, infers that the acceptable carbon dioxide upper limit is the prevailing outdoor carbon dioxide concentration plus 700 parts per million (ppm). On the day of the space evaluation, the outdoor (ambient) carbon dioxide concentration was approximately 550 ppm so indoor concentrations should not exceed approximately 1250 ppm (700 + 550). All indoor carbon dioxide measurements were within the ASHRAE standards.

Respirable Particulates

Respirable particulate concentrations under PM2.5 & PM10 size classes were below their respective National Ambient Air Quality Standard (NAAQS) levels. The highest average PM2.5 concentration during the monitoring period was 0.002mg/m^3 (2 µg/m^3). This is compared to the NAAQS primary standard for PM2.5 of 12 µg/m^3 annual mean. The highest average PM10 concentration during the same period was 0.033mg/m^3 (33 µg/m^3), in the 2nd floor hallway near Stair #5. This is compared to NAAQS standard for PM10 of 150µg/m^3 24 hr. average. http://www.epa.gov/air/criteria.html

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Table 1: Shepherd Elementary School, Measurements of Indoor Environmental Quality Parameters; March 23, 2016. (10:30 AM- 12:30 PM)

Sample Location	Temp ^{0}F	RH%	CO ppm	CO2 ppm	PM 2.5 mg/m^3	PM 10 mg/m^3
Standards	**ASHRAE 68 to 75˚F**	**ASHRAE <65%**	**NAAQS 9**	**ASHRAE 1230**	**NAAQS 0.012**	**NAAQS 0.150**
Ambient	70.7	27.7	0	550	0.001	0.012
Hallway at entrance	72.5	27.8	0	675	0.000	0.016
Room 111	71.6	26	0	607	0.000	0.001
Room C105	71.6	28	0	663	0.000	0.011
Room C203	71.6	29.9	0	762	0.000	0.002
Stair #5	71.6	29.9	0	759	0.001	0.006
Hallway 2nd floor near Stair #5	71.6	30.9	0	808	0.002	0.033
Auditorium	70.7	29.1	0	713	0.000	0.007

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Mold-in-Air Samples

There are no definitive regulations or standardized guidelines for addressing airborne mold in an indoor setting. If building systems (ventilation, envelope) are functioning properly, the indoor population profile should mimic what is encountered outdoors and the concentrations should be below the ambient levels.

Table 2 summarizes airborne mold spore (non-viable) sampling results and locations. On the day of sampling, the mold population profiles and concentrations (spore count/m^3 of air) in all the areas were lower than the outdoor concentrations. Laboratory analysis follows this report (see attachment).

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Table 2: Shepherd Elementary School, Measurements of Mold-in-Air samples; March 23, 2016. (10:30 AM- 12:30 PM)

Sample Location	Ambient	Hallway at entrance	RM C111	RM C105	RM C203	Stair #5	Hallway 2nd floor	Auditorium
Alternaria	-	-	-	-	-	-	10	-
Ascospores	100	-	-	-	-	40	10	-
Aspergillus/Penicillium	570	200	-	-	-	40	-	200
Basidiospores	40	-	-	-	-	-	-	-
Bipolaris++	10	-	-	-	-	-	-	-
Chaetomium	40	-	-	-	-	-	-	-
Cladosporium	10	-	-	-	10	40	-	-
Curvularia	-	10	-	-	-	-	-	-
Epicoccum	-	-	-	-	-	-	-	-
Fusarium	-	-	-	-	-	-	-	-
Gonoderma	-	-	-	-	-	-	-	-
Myxomycetes++	-	10	-	-	10	-	-	-
Pithomyces	-	-	-	-	-	-	-	-
Rust	-	-	-	-	-	-	-	-
Unidentifiable Spores	-	-	-	-	-	-	10	-
Oidium	40	-	-	-	-	-	-	-
Pestalotia	40	-	-	-	-	-	-	-
Spegazzinia	10	-	-	-	-	-	-	-
Zygomycetes	-	-	-	-	-	-	-	-
Hyphal Fragment	30	-	40	40	-	40	-	-
Insect Fragment	80	-	-	-	-	-	-	-
Pollen	100	-	-	-	10	10	-	40
Total Molds	**860**	**220**	**None Detected**	**None Detected**	**20**	**120**	**30**	**200**

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Conclusions

The comfort parameters (i.e., temperature, relative humidity, carbon dioxide, and carbon monoxide levels) and respirable particulates in the areas of concern conform to ASHRAE and/or NAAQS guidelines. The indoor mold spore concentrations do not indicate any mold growth related air quality concerns. Based on the observations and results of the IAQ inspection at Shepherd Elementary School building, we have no further recommendations at this time.

Thank you for the opportunity to provide industrial hygiene services for the Department of General Services. If you have any questions, please contact me at 202.832.1433 (office).

Sincerely,

Channa Bambaradeniya, Ph.D., CIH, CHMM, PMP
Global Consulting, Inc.

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Attachment

Mold Spore Sample Analytical Results and Chain-of-Custody Forms