

March 29, 2018

Mr. Jeff Klenk
Howard County Public School System (HCPSS)
10910 Route 108
Ellicott City, MD 21043

RE: Indoor Air Quality Assessments during Renovations at Waverly Elementary School
Project #J17-1037 (January 4, 12, 15, 25 and 29, 2018)

Dear Mr. Klenk,

Aria Environmental, Inc. (AE) is pleased to present this report of findings for indoor air quality assessments conducted at Waverly Elementary School (Waverly). Jeff Klenk of HCPSS requested AE make frequent visits to Waverly to monitor indoor air quality that may be affected by the current major renovation of the school. The visits discussed in this report were performed on January 4, 12, 15, 25 and 29, 2018 and included work site observations, and real-time measurements for particles, indoor air quality parameters (temperature, humidity, carbon monoxide (CO) and carbon dioxide (CO₂)) and volatile organic compounds (VOCs). These assessments were performed by Julie Barth, CIH, CSP, LEED Green Associate or Tony Schwegmann, Industrial Hygienist, of AE. Presented below are observations and recommendations made based upon conditions readily observed on the reported dates.

Particles

Particulate matter or PM is the term for a mixture of solid particles and liquid droplets found in the air. It does not distinguish between the types of particles in the air (e.g., pollen, skin cells, soil, etc.). Particulate matter includes "inhalable coarse particles," with diameters larger than 2.5 micrometers and smaller than 10 micrometers (PM₁₀) and "fine particles," with diameters that are 2.5 micrometers and smaller (PM_{2.5}). A micrometer is also called a micron and is one millionth of a meter. To put these particle diameters in perspective, the average human hair is about 70 micrometers in diameter – making it 30 times larger than the largest fine particle. Particle loads expected to be a part of the school environment include carpet and clothing fiber, soil tracked in from outside, paper dust and dust and fibers from building materials.

ANSI/ASHRAE Standard 62.1–2016 suggests target indoor concentrations for PM_{2.5} and PM₁₀ of 15 µg/m³ and 50 µg/m³, respectively. These concentrations are taken from the EPA's National Ambient Air Quality Standards (NAAQS) based on annual arithmetic means deemed acceptable for outdoor air quality. Occupational standards and guidelines for particles are nearly an order of magnitude higher than concentrations typically found in non-occupational settings and are not appropriate for comparison. Particle measurements were taken with an Aerocet 531 particulate monitor. The particle monitor takes a two minute averaged sample of particle concentrations in 5 size fractions (PM₁, PM_{2.5}, PM₇, PM₁₀ and total suspended particles (TSP)). Results of particulate monitoring are presented in Tables 1, 2, 3 and 4.

Discussion of Particle Results for January 4, 2018

Particle measurements were not taken during the survey on January 4, 2018 because the particle monitor was out for calibration.

Discussion of Particle Results for January 12, 2018

The PM2.5 particle concentrations ranged from 0 to 27 µg/m³ and PM10 particle concentrations ranged from 3 to 279 µg/m³ in the hallways outside the construction zones and in non-construction areas. The school was occupied as usual for a normal school day. PM 2.5 concentrations were below the target concentration in all areas monitored outside of the construction area. PM 10 concentrations were above the target concentrations in one non-construction area location, with student activity nearby. It was reported by the construction superintendent that some demolition had been done over the weekend. Results of particulate monitoring are presented in Table 1.

Table 1 – Results of Particulate Monitoring Waverly Elementary School on January 12, 2018

Location	Time	PM1 (µg/m ³)	PM2.5 (µg/m ³)	PM7 (µg/m ³)	PM10 (µg/m ³)	TSP (µg/m ³)
Lobby	1:58 PM	0	1	4	8	17
Rm 115 (Band)	2:02 PM	0	6	39	54	71
Closet in Rm 115	2:13 PM	0	3	12	15	22
Hall at Containment near Rm 115	2:23 PM	0	3	17	28	55
Front Office	2:29 PM	0	1	8	21	40
Hall near Front Office	2:31 PM	0	1	3	4	5
Hall near A123	2:33 PM	0	2	6	17	33
Hall near Media Center	2:37 PM	0	1	8	12	18
Media Center	2:43 PM	0	1	6	10	16
Back Hall near B136	2:46 PM	0	1	4	6	8
Door at Containment	2:48 PM	0	0	3	11	26
Inside Construction Area	2:52 PM	3	27	187	279	369
Hall near Rm 115	3:05 PM	0	0	3	3	18
Rm 115	3:07 PM	0	3	20	32	54
Outside	3:10 PM	0	5	13	14	16

Bold-faced results indicate results above target concentrations.

Discussion of Particle Results for January 15, 2018

The PM2.5 particle concentrations ranged from 1 to 36 µg/m³ and PM10 particle concentrations ranged from 9 to 1,042 µg/m³. PM2.5 particle concentrations were below the target concentration in all locations measured outside the construction area. PM10 particle concentrations were above the target concentrations in three areas outside of the construction zone. The building was occupied as usual for a normal school day. Construction workers had opened a ceiling tile and were running wires above the ceiling tiles in the Media Center during the measurements inside the Media Center. Active excavation was taking place inside the containment. Results of particulate monitoring are presented in Table 2.

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Table 2 – Results of Particulate Monitoring Waverly Elementary School on January 15, 2018

Location	Time	PM1 ($\mu\text{g}/\text{m}^3$)	PM2.5 ($\mu\text{g}/\text{m}^3$)	PM7 ($\mu\text{g}/\text{m}^3$)	PM10 ($\mu\text{g}/\text{m}^3$)	TSP ($\mu\text{g}/\text{m}^3$)
Rm 115 (Band)	12:35 PM	0	2	13	17	23
Hall near Containment and RM 115	12:38 PM	0	1	7	9	13
Front Office	12:40 PM	0	2	15	18	20
Hall near Front Office and Containment	12:42 PM	0	4	32	41	52
Hall near Rm A123 and Containment	12:44 PM	0	5	27	33	37
Hall at Media Center	12:48 PM	0	1	6	9	9
Media Center	12:52 PM	1	11	70	116	146
Back Hall near B136	12:55 PM	1	5	35	53	71
Hall at door to Containment	12:58 PM	1	7	46	94	162
Inside Construction Area on Music Room Side	1:02 PM	0	20	101	343	783
Inside Construction Area near Active Excavation	1:05 PM	2	36	672	1,042	1,599
Outside	1:09 PM	3	5	15	18	21

Bold-faced results indicate results above target concentrations

Discussion of Particle Results for January 25, 2018

The PM2.5 particle concentrations ranged from 1 to 8 $\mu\text{g}/\text{m}^3$ and PM10 particle concentrations ranged from 13 to 78 $\mu\text{g}/\text{m}^3$. PM2.5 particle concentrations were below the target concentration in all locations measured outside the construction area. PM10 particle concentrations were below the target concentrations in all areas with the exception of the measurement taken in the hallway outside the main office and near the back containment door. The building was occupied as usual for a normal school day. Inside the construction containment, plastic sheeting was in place and well-sealed and two large air filters were operating to control dust. On the day of monitoring, construction workers were compacting soil and drilling concrete in certain areas. Results of particulate monitoring are presented in Table 3.

Table 3 – Results of Particulate Monitoring Waverly Elementary School on January 25, 2018

Location	Time	PM1 ($\mu\text{g}/\text{m}^3$)	PM2.5 ($\mu\text{g}/\text{m}^3$)	PM7 ($\mu\text{g}/\text{m}^3$)	PM10 ($\mu\text{g}/\text{m}^3$)	TSP ($\mu\text{g}/\text{m}^3$)
Outside Main Office	11:00	0	5	38	53	82
Hall Near Room A123	11:03	0	6	37	49	67
Health Room – Back work bench	11:06	1	8	28	34	41
Health Room – Nurses Desk	11:09	0	7	29	36	43
Lobby	11:16	0	3	17	23	35
Room 115	11:18	0	2	10	15	21
Pod Center – B158	11:22	0	1	8	13	23
Hall Outside Media Center	11:24	0	2	18	27	49

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Location	Time	PM1 ($\mu\text{g}/\text{m}^3$)	PM2.5 ($\mu\text{g}/\text{m}^3$)	PM7 ($\mu\text{g}/\text{m}^3$)	PM10 ($\mu\text{g}/\text{m}^3$)	TSP ($\mu\text{g}/\text{m}^3$)
Media Center	11:36	0	3	14	20	30
Hallway Near A130	11:42	0	5	22	32	47
Back Containment	11:44	0	4	35	78	134
Outside	11:52	0	6	37	39	40

Bold-faced results indicate results above target concentrations

Discussion of Particle Results for January 29, 2018

The PM2.5 particle concentrations ranged from 0 to 2 $\mu\text{g}/\text{m}^3$ and PM10 particle concentrations ranged from 1 to 21 $\mu\text{g}/\text{m}^3$. PM2.5 and PM10 particle concentrations were below the target concentration in all locations measured outside the construction area. The building was occupied as usual for a normal school day. Results of particulate monitoring are presented in Table 4.

Table 4 – Results of Particulate Monitoring Waverly Elementary School on January 29, 2018

Location	Time	PM1 ($\mu\text{g}/\text{m}^3$)	PM2.5 ($\mu\text{g}/\text{m}^3$)	PM7 ($\mu\text{g}/\text{m}^3$)	PM10 ($\mu\text{g}/\text{m}^3$)	TSP ($\mu\text{g}/\text{m}^3$)
Outside Main Office	14:38	0	1	11	21	44
Hall Near Room A123	14:40	0	0	5	16	41
Health Room	14:42	0	0	9	13	24
Lobby	14:45	0	1	7	12	22
Room 115	14:47	0	1	6	11	16
Pod Center – 155	14:51	0	0	0	1	1
Hall Outside Media Center	14:53	0	0	7	12	24
Media Center	14:55	0	2	8	12	17
Hallway Near C106	14:59	0	0	6	9	18
Back Containment	15:02	0	1	9	18	30
Outside	15:09	0	1	5	5	7

Bold-faced results indicate results above target concentrations

Indoor Air Quality Measurements

Industry guidelines or standards for seasonal temperature and humidity ranges for thermal comfort are established by the American National Standards Institute (ANSI) and the American Society for Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) standard 55-2013. These ranges are presented in Table 5. The U.S. Environmental Protection Agency (EPA) recommends maintaining indoor relative humidity below 60% and ideally between 30 and 50%. Low humidity is expected in buildings that do not add humidity during the heating season. The comfort ranges are only set for the Summer and Winter seasons when temperatures are usually consistent. There are no Fall or Spring ranges because these seasons can include both heating and cooling modes of HVAC operation. Carbon dioxide and carbon monoxide measurements are used to assess ventilation system performance. The exhaled breath of building occupants is the main indoor source of carbon dioxide; therefore, the build-up of carbon dioxide indicates inadequate ventilation. Results of temperature, relative humidity, carbon dioxide and carbon monoxide monitoring are presented in Tables 6-10 below.

Table 5- Acceptable Ranges of Temperature and Relative Humidity in Summer and Winter^a

Relative Humidity	Winter Temperature	Summer Temperature
30%	68.5°F – 76.0°F	74.0°F – 80.0°F
40%	68.5°F - 75.5°F	73.5°F – 79.5°F
50%	68.5°F - 74.5°F	73.0°F – 79.0°F
60%	68.0°F - 74.0°F	72.5°F – 78.0°F

^aadapted from ASHRAE Standard 55-2013

Real Time Volatile Organic Compounds Measurements

Instantaneous measurements for volatile organic compounds (VOCs) were collected using a ppbRae 3000 monitor calibrated using isobutylene gas. This instrument is used as a screening tool for VOCs in general with a limit of detection of 1 ppb. VOCs include a variety of chemicals, some of which may cause adverse health effects. Concentrations of many VOCs are generally higher indoors than outdoors. VOCs are emitted by many common products including paints, paint strippers, cleaning supplies, building materials, furnishings, fuels, office equipment and supplies, glues, and permanent markers, as well as cosmetics, perfumes and other personal hygiene products. These products can release organic compounds while being used or stored. It is important to note that the measurements taken are instantaneous and are intended to aid the inspector in detecting potential sources of VOC contamination. A VOC source is suspected when the measured concentration is significantly higher than the outdoor concentration or if a spike in concentration is seen in one location compared to others. Results of VOC monitoring are also presented in Tables 6-10 below.

Discussion of IAQ and VOC Measurements for January 4, 2018

The indoor temperatures for January 4, 2018 ranged from 64.1°F to 69.3°F. Temperature measurements in classrooms and occupied areas of the school were within the recommended comfort ranges in all areas with a few exceptions. Indoor relative humidity measurements ranged from 11.9% to 21.0%. All locations were below the recommended range of 30 to 60%. Lower than normal relative humidity is expected in the winter season in buildings that do not add humidity to conditioned air.

Carbon dioxide concentrations ranged from 291 to 478 ppm within indoor occupied areas. The concentration of concern for carbon dioxide is set by ANSI/ASHRAE standard 62.1 as 700 ppm above outdoor air. On the day of monitoring, the outdoor air concentration of carbon dioxide was 311 ppm; therefore, concentrations were below the target concentration in all areas monitored. Measurements were made during a snow day when only construction workers were at the school.

Carbon monoxide is mainly attributed to incomplete combustion. Indoor concentrations of CO were 0.0 ppm in all locations measured with two exceptions where the concentration was 0.2 ppm. The outdoor concentration was 0.0 ppm. All measurements were below the ASHRAE concentration of concern (9 ppm).

Indoor concentrations of VOCs measured ranged from 0 to 19 ppb, and the outdoor measurement was 0 ppb. The measurements are considered low and do not indicate any obvious source of VOCs above a normal building background level. Results of IAQ and VOC monitoring are presented in Table 6.

**Table 6 – Results of Indoor Air Quality (IAQ) Measurements
at Waverly Elementary School on January 4, 2018**

Location	Time	Temperature (°F)	Relative Humidity (Rh%)	Carbon Monoxide (CO)	Carbon Dioxide (CO ₂)	Volatile Organic Compounds (VOCs)
Outside	3:07 PM	26.3	41.1	0	311	0
At New Containment Door in back of school	3:14 PM	64.1	21.0	0	478	0
Center of B140 Classroom Pod	3:17 PM	67.0	11.9	0	316	0
Hall near Media Center	3:18 PM	67.5	14.9	0	384	0
Media Center	3:19 PM	68.3	16.8	0	337	19
Center of B150 Classroom Pod	3:21 PM	68.4	16.1	0	342	0
Art Room	3:22 PM	69.3	15.4	0	331	0
Classroom 129	3:23 PM	69.4	14.8	0	294	0
Hall near A123 at New Containment Wall	3:24 PM	69.1	14.8	0	303	0
Front Lobby	3:25 PM	65.8	13.7	0.2	291	0
Hall near 115 at New Containment Wall	3:26 PM	64.6	14.8	0.2	321	0

Bold-faced indicates results outside of recommended comfort ranges or target concentrations.

Discussion of IAQ and VOC Measurements for January 12, 2018

The indoor temperatures for January 12, 2018 ranged from 68.6°F to 73.9°F. Temperature measurements in classrooms and occupied areas of the school were within the recommended comfort ranges. Indoor relative humidity measurements ranged from 51.1% to 75.5%. Nine of the locations measured were above the recommended range of 30 to 60%.

Carbon dioxide concentrations ranged from 475 to 1,240 ppm within indoor occupied areas. The concentration of concern for carbon dioxide is set by ANSI/ASHRAE standard 62.1 as 700 ppm above outdoor air. On the day of monitoring, the outdoor air concentration of carbon dioxide was 307 ppm; therefore, concentrations were below the target concentration in all areas monitored with the exception of Room 115 and outside the door to the construction containment in the back hallway. Measurements above the target range indicate inadequate ventilation in those areas. Measurements were made during a normal school day when the building was fully occupied.

Carbon monoxide is mainly attributed to incomplete combustion. Indoor concentrations of CO ranged from 0.0 to 0.9 ppm in all locations measured and the outdoor concentration was 0.3 ppm. All measurements were below the ASHRAE concentration of concern (9 ppm).

Indoor concentrations of VOCs measured on January 12, 2018 ranged from 0 to 567 ppb, and the outdoor measurement was 0 ppb. The librarian was using a large magic marker on drawings in the Media Center at the time of the measurements there. Overall, the measurements are considered low and do not indicate any obvious source of VOCs. Results of IAQ and VOC monitoring are presented in Table 7.

**Table 7 – Results of Indoor Air Quality (IAQ) Measurements
at Waverly Elementary School on January 12, 2018**

Location	Time	Temperature (°F)	Relative Humidity (Rh%)	Carbon Monoxide (CO)	Carbon Dioxide (CO ₂)	Volatile Organic Compounds (VOCs)
Lobby	1:58 PM	70.2	75.3	0.0	479	0-332
Rm 115 (Band)	2:02 PM	71.8	62.9	0.9	1,240	201-567
Closet in Rm 115	2:13 PM	72.7	54.3	0.9	928	88
Hall at Containment near Rm 115	2:23 PM	73.0	65.1	0.0	704	0
Front Office	2:29 PM	73.6	51.1	0.0	534	0
Hall near Front Office	2:31 PM	73.9	63.9	0.0	570	0
Hall near A123	2:33 PM	72.8	62.5	0.0	573	0
Hall near Media Center	2:37 PM	72.7	64.1	0.0	673	114
Media Center	2:43 PM	73.9	56.3	0.0	876	261
Back Hall near B136	2:46 PM	72.8	60.1	0.0	866	0
Door at Containment	2:48 PM	72.0	59.8	0.0	1,038	0
Inside Construction Area	2:52 PM	68.6	75.5	0.9	475	296
Hall near Rm 115	3:05 PM	72.2	69.5	0.0	695	0
Rm 115	3:07 PM	71.9	62.7	0.0	960	139
Outside	3:10 PM	65.8	80.6	0.3	307	0

Bold-faced indicates results outside of recommended comfort ranges or target concentrations.

Discussion of IAQ and VOC Measurements for January 15, 2018

The indoor temperatures for January 15, 2018 ranged from 67.3°F to 70.2°F. Temperature measurements in classrooms and occupied areas of the school were mostly within the recommended comfort ranges with the exception of the hall near Room 115. Indoor relative humidity measurements ranged from 16.7% to 20.1%. All indoor relative humidity measurements were below the recommended range of 30 to 60%. Lower than normal relative humidity is expected in the winter season in buildings that do not add humidity to conditioned air.

Carbon dioxide concentrations ranged from 341 to 550 ppm within indoor occupied areas. The concentration of concern for carbon dioxide is set by ANSI/ASHRAE standard 62.1 as 700 ppm above outdoor air. On the day of monitoring, the outdoor air concentration of carbon dioxide was 301 ppm; therefore, concentrations were below the target concentration in all areas measured. Measurements were made during a normal school day when the building was fully occupied.

Carbon monoxide is mainly attributed to incomplete combustion. Indoor concentrations of CO ranged from 0.0 to 0.3 ppm in all locations measured and the outdoor concentration was 2.1 ppm. All measurements were below the ASHRAE concentration of concern (9 ppm).

Indoor concentrations of VOCs measured on January 15, 2018 ranged from 0 to 91 ppb, and the outdoor measurement was 0 ppb. The measurements are considered low and do not indicate any obvious source of VOCs. Results of IAQ and VOC monitoring are presented in Table 8.

**Table 8 – Results of Indoor Air Quality (IAQ) Measurements
at Waverly Elementary School on January 15, 2018**

Location	Time	Temperature (°F)	Relative Humidity (Rh%)	Carbon Monoxide (CO)	Carbon Dioxide (CO ₂)	Volatile Organic Compounds (VOCs)
Rm 115 (Band)	12:35 PM	69.0	20.1	0.0	458	0
Hall near Containment and RM 115	12:38 PM	67.3	17.7	0.0	457	0
Front Office	12:40 PM	68.2	16.7	0.0	550	0
Hall near Front Office and Containment	12:42 PM	68.1	17.6	0.0	482	0
Hall near Rm A123 and Containment	12:44 PM	68.6	17.3	0.0	341	0
Hall at Media Center	12:48 PM	68.9	17.1	0.0	443	0
Media Center	12:52 PM	69.8	18.9	0.2	501	60-91
Back Hall near B136	12:55 PM	70.1	16.9	0.2	377	14
Hall at door to Containment	12:58 PM	70.2	17.7	0.3	446	45-82
Inside Construction Area on Music Room Side	1:02 PM	47.0	31.1	0.0	320	0
Inside Construction Area near Active Excavation	1:05 PM	55.4	38.6	1.1	770	300-500
Outside	1:09 PM	37.8	26.2	2.1	301	0

Bold-faced indicates results outside of recommended comfort ranges or target concentrations.

Discussion of IAQ and VOC Measurements for January 25, 2018

The indoor temperatures for January 25, 2018 ranged from 65.3°F to 69.7°F. Temperature measurements in classrooms and occupied areas of the school were below the recommended comfort ranges in five of the locations measured. Indoor relative humidity measurements ranged from 20.2% to 25.8% and were lower than the recommended range of 30 to 60% in all areas measured. Lower than normal relative humidity is expected in the winter season in buildings that do not add humidity to conditioned air.

Carbon dioxide concentrations ranged from 532 to 879 ppm within indoor occupied areas. The concentration of concern for carbon dioxide is set by ANSI/ASHRAE standard 62.1 as 700 ppm above outdoor air. On the day of monitoring, the outdoor air concentration of carbon dioxide was 334 ppm; therefore, concentrations were below the target concentration in all areas measured. Measurements were made during a normal school day when the building was fully occupied.

Carbon monoxide is mainly attributed to incomplete combustion. Indoor concentrations of CO were 0.0 ppm in all locations measured and the outdoor concentration was 2.0 ppm. All measurements were below the ASHRAE concentration of concern (9 ppm).

Indoor concentrations of VOCs measured on January 25, 2018 ranged from 0 to 737 ppb, and the outdoor measurement was 0 ppb. The measurements are considered low and do not indicate any obvious source of VOCs. Results of IAQ and VOC monitoring are presented in Table 9.

**Table 9 – Results of Indoor Air Quality (IAQ) Measurements
at Waverly Elementary School on January 25, 2018**

Location	Time	Temperature (°F)	Relative Humidity (Rh%)	Carbon Monoxide (CO)	Carbon Dioxide (CO ₂)	Volatile Organic Compounds (VOCs)
Outside Main Office	11:00	65.3	25.4	0.0	879	165
Hall Near Room A123	11:03	65.7	24.3	0.0	686	479
Health Room	11:06	66.8	22.7	0.0	532	737
Lobby	11:16	68.3	20.2	0.0	568	0
Room 115	11:18	67.7	23.1	0.0	685	200
Pod Center – B158	11:22	68.4	24.5	0.0	792	17
Hall Outside Media Center	11:24	69.6	21.9	0.0	665	0
Media Center	11:36	66.0	25.8	0.0	698	0
Hallway Near A130	11:42	69.0	22.3	0.0	708	506
Back Containment	11:44	69.7	20.4	0.0	593	0
Outisde	11:52	47.2	26.6	2.0	334	0

Bold-faced indicates results outside of recommended comfort ranges or target concentrations.

Discussion of IAQ and VOC Measurements for January 29, 2018

The indoor temperatures for January 29, 2018 ranged from 66.8°F to 71.2°F. Temperature measurements in classrooms and occupied areas of the school were mostly within the recommended comfort ranges with the exception of the hallway outside the main office. Indoor relative humidity measurements ranged from 26.0% to 33.4% and were mostly within the recommended range of 30 to 60% with some areas that were lower. Lower than normal relative humidity is expected in the winter season in buildings that do not add humidity to conditioned air.

Carbon dioxide concentrations ranged from 505 to 835 ppm within indoor occupied areas. The concentration of concern for carbon dioxide is set by ANSI/ASHRAE standard 62.1 as 700 ppm above outdoor air. On the day of monitoring, the outdoor air concentration of carbon dioxide was 315 ppm; therefore, concentrations were below the target concentration in all areas measured. Measurements were made during a normal school day when the building was fully occupied.

Carbon monoxide is mainly attributed to incomplete combustion. Indoor concentrations of CO were 0.0 ppm in all locations measured and the outdoor concentration was 1.9 ppm. All measurements were below the ASHRAE concentration of concern (9 ppm).

Indoor concentrations of VOCs measured on January 29, 2018 were 0 ppb in all areas, and the outdoor measurement was 0 ppb. The measurements are considered low and do not indicate any obvious source of VOCs. Results of IAQ and VOC monitoring are presented in Table 10.

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**Table 10 – Results of Indoor Air Quality (IAQ) Measurements
at Waverly Elementary School on January 29, 2018**

Location	Time	Temperature (°F)	Relative Humidity (Rh%)	Carbon Monoxide (CO)	Carbon Dioxide (CO ₂)	Volatile Organic Compounds (VOCs)
Outside Main Office	14:38	66.8	32.8	0.0	785	0
Hall Near Room A123	14:40	68.0	29.6	0.0	505	0
Health Room	14:42	69.4	30.7	0.0	610	0
Lobby	14:45	69.4	29.7	0.0	595	0
Room 115	14:47	69.1	33.4	0.0	835	0
Pod Center – 155	14:51	70.1	32.2	0.0	692	0
Hall Outside Media Center	14:53	70.9	31.5	0.0	735	0
Media Center	14:55	71.2	31.3	0.0	810	0
Hallway Near C106	14:59	70.7	26.2	0.0	725	0
Back Containment	15:02	70.0	26.0	0.0	525	0
Outside	15:09	48.6	35.0	1.9	315	0

Bold-faced indicates results outside of recommended comfort ranges or target concentrations.

Conclusions and Recommendations

Based upon our observations and sampling results on January 4, 12, 15, 25 & 29, 2018 at Waverly Elementary School, measures are being taken to prevent construction dust and odors from entering the occupied areas of the school. Only a few measurements were above the recommended concentrations in a few areas during these five school visits. The school is fully occupied. Elevated concentrations are expected and are not entirely due to construction activities. The tiled floors were being kept clean of visible dust. Fluctuations of dust and VOC concentrations are influenced by the types of construction activities occurring and also by student and staff activities and are expected to vary over time. A floor plan with measurement locations for the school is attached.

AE will continue to make weekly visits to Waverly Elementary School as requested. Thank you for choosing Aria Environmental, Inc. for your industrial hygiene consulting needs. Should you have any questions about the information contained herein, please do not hesitate to contact us at 410-549-5774.

Sincerely,
Aria Environmental, Inc.



Julie Barth, CIH, CSP, LEED Green Associate

