

**SUMMARY REPORT OF AIR MONITORING FOR LEED CERTIFICATION  
PHASE 2  
SWANSFIELD ELEMENTARY SCHOOL  
5610 CEDAR LANE  
COLUMBIA, MD 21044**

**PREPARED FOR:**

**HOWARD COUNTY PUBLIC SCHOOL SYSTEM  
10910 ROUTE 108  
ELLCOTT CITY, MD 21042**

**PREPARED BY:**

**ARIA ENVIRONMENTAL, INC.  
PO BOX 286  
WOODBINE, MD 21797**

**January 27, 2017**

**Project Number: J16-971**



**SUMMARY REPORT OF AIR MONITORING FOR LEED CERTIFICATION  
AT SWANSFIELD ELEMENTARY SCHOOL (PHASE 2)**

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## SUMMARY REPORT OF AIR MONITORING FOR LEED CERTIFICATION AT SWANSFIELD ELEMENTARY SCHOOL (PHASE 2)

### EXECUTIVE SUMMARY

Aria Environmental, Inc. (AE) performed indoor air quality monitoring at the Swansfield Elementary School (SFES) Phase 2 construction areas on January 15, 2017 as part of the evaluation for US Green Building Leadership in Energy and Environmental Design (LEED) certification. The LEED requirements include one sample per heating, ventilation and air conditioning (HVAC) zone, one per every 25,000 square feet and one per contiguous floor. The new ventilation zone serves less than 25,000 square feet and one floor; therefore, one sample location was selected: Classroom 140 (01). Air sampling was conducted by Tony Schwegmann, Industrial Hygienist of AE.

#### **Total Volatile Organic Compound Monitoring**

There were detectable concentrations of some volatile organic compounds in the sample collected on January 15, 2017, but the total VOC concentration (386  $\mu\text{g}/\text{m}^3$ ) was below the LEED maximum TVOC concentration (500  $\mu\text{g}/\text{m}^3$ ). Sampling results include individually identified compounds from the analytical TO-15 method.

#### **Formaldehyde Monitoring**

The formaldehyde concentration was 25 ppb and below the LEED specification of 27 ppb at the sampling location on January 15, 2017.

#### **4-Phenylcyclohexene (4-PCH) Monitoring**

The 4-phenylcyclohexene (4-PCH) concentration was below the limit of detection for the analytical method (<4.85  $\mu\text{g}/\text{m}^3$ ) and below the LEED specification of 6.5  $\mu\text{g}/\text{m}^3$  at the sampling location on January 15, 2017.

#### **Carbon Monoxide**

The carbon monoxide (CO) concentration was <1.0 ppm at the sampling location and below the LEED maximum allowable concentration (MAC) of 9 ppm and no greater than 2 ppm above the outdoor concentration on January 15, 2016.

#### **Particles**

The PM10 particle concentration was 18  $\mu\text{g}/\text{m}^3$  on January 15, 2017 and below the LEED maximum allowable concentration (50  $\mu\text{g}/\text{m}^3$ ).

#### **Conclusions**

The indoor air sampling conducted at Swansfield Elementary School for LEED certification purposes on January 15, 2017 identified that the parameters tested in the new HVAC zone serving the Phase 2 area of the building were below the maximum allowable concentrations established by the US Green Building Leadership in Energy and Environmental Design (LEED) certification program.

## SUMMARY REPORT OF AIR MONITORING FOR LEED CERTIFICATION AT SWANSFIELD ELEMENTARY SCHOOL (PHASE 2)

### Introduction

Aria Environmental, Inc. (AE) performed indoor air quality monitoring on January 15, 2017 at the Swansfield Elementary School Phase 2 construction areas. This building is being evaluated for US Green Building Leadership in Energy and Environmental Design (LEED) certification. The construction contractor and AE reviewed heating, ventilation and air conditioning (HVAC) drawings and the LEED certification, EQ Credit 3.2: "Construction IAQ Management Plan Before Occupancy" to determine the number of zones that required air sampling. The LEED requirements include one sample per heating, ventilation and air conditioning (HVAC) zone, per every 25,000 square feet and per each contiguous floor. The new HVAC zone serves less than 25,000 square feet and one floor; therefore, one sample locations was selected: Classroom 140 (01). Air sampling was conducted by Tony Schwegmann, Industrial Hygienist of AE.

AE performed the following air monitoring in the representative sample areas:

- 1) Active sampling using a unique summa canister and 4-hour regulator system. The sample canisters were prepared and analyzed by Centek Laboratories, according to analytical method EPA TO-15 for formaldehyde, 4-phenylcyclohexene (4-PCH) and total volatile organic compounds (TVOCs) and EPA Method 3C for carbon monoxide.
  
- 2) Particle monitoring using calibrated air sampling pumps and PM10 cassettes, simultaneously with the canister samples over 4 hours. The cassettes were returned to Centek Laboratories and analyzed using EPA Method IP-10A.

Air sampling equipment was placed at breathing zone height. A building layout with the sampling locations is included as Attachment 1. Centek Laboratories, LLC is an accredited laboratory. Laboratory and AE professional credentials are included as Attachment 2.

Air sampling was conducted with the building ventilation system operating as would be normal when occupied. All surfaces were finished.

### LEED Specifications

According to the LEED requirements, indoor room air concentration levels, emission rates and qualities of contaminants shall not exceed the limits presented in Table 1 at the time of substantial project completion prior to occupancy of the facility and installation of office furniture, occupants and occupant activities. For each sampling point where the maximum concentration is exceeded, additional flush-out and retesting for the specific parameter(s) exceeded is required until all requirements have been met. When retesting, sampling should be done in the same locations as in the first test.

**Table 1 – LEED Indoor Air Requirements**

<b>Contaminant</b>	<b>Maximum Concentration*</b>
Formaldehyde	27 parts per billion (ppb)
Particulates (PM10)	50 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ )
Total Volatile Organic Compounds (TVOCs)	500 $\mu\text{g}/\text{m}^3$
4-Phenylcyclohexene (4-PCH)	6.5 $\mu\text{g}/\text{m}^3$
Carbon Monoxide (CO)	9 parts per million (ppm) and no greater than 2 ppm above outdoor levels

\*Sampling time is required to be no less than 4 hours.



**SUMMARY REPORT OF AIR MONITORING FOR LEED CERTIFICATION  
AT SWANSFIELD ELEMENTARY SCHOOL (PHASE 2)**

**Results**

**Total Volatile Organic Compound (TVOC) Monitoring**

Air sampling for total volatile organic compounds (TVOCs) took place for 4 hours on January 15, 2017 in one sampling location. Sampling equipment was placed at breathing zone height. Concentrations of each individually detected volatile organic compound are added by the laboratory to calculate and report the total VOCs in units of ppb and then the results are converted to  $\mu\text{g}/\text{m}^3$  for comparison to LEED TVOC requirements. There were detectable concentrations of volatile organic compounds in the samples, and the TVOC concentrations ( $386 \mu\text{g}/\text{m}^3$ ) were below the maximum allowable TVOC concentration ( $500 \mu\text{g}/\text{m}^3$ ) on January 15, 2017. Results of monitoring are presented in Table 2 with individually detected concentrations in bold-face type. Certificates of analysis are included in Attachment 3.

**Table 2 – Results of TVOC Monitoring at Swansfield Elementary School on January 15, 2017.**

Chemical	CAS	01 Classroom 140 ( $\mu\text{g}/\text{m}^3$ )
1,1,1-Trichloroethane	71-55-6	<27
1,1,2,2-Tetrachloroethane	79-34-5	<34
1,1,2-Trichloroethane	79-00-5	<27
1,1-Dichloroethane	75-34-3	<20
1,1-Dichloroethene	75-35-4	<20
1,2,4-Trichlorobenzene	120-82-1	<37
1,2,4-Trimethylbenzene	95-63-6	<25
1,2-Dibromoethane	106-93-4	<38
1,2-Dichlorobenzene	95-50-1	<30
1,2-Dichloroethane	107-06-2	<20
1,2-Dichloropropane	78-87-5	<23
1,3,5-Trimethylbenzene	108-67-8	<25
1,3-Butadiene	106-99-0	<11
1,3-Dichlorobenzene	541-73-1	<30
1,4-Dichlorobenzene	106-46-7	<30
1,4-Dioxane	123-91-1	<36
2,2,4-trimethylpentane	540-84-1	<23
4-ethyltoluene	622-96-8	<25
Acetone	67-64-1	<b>77</b>
Allyl chloride	107-05-1	<16
Benzene	71-43-2	<16
Benzyl chloride	100-44-7	<29
Bromodichloromethane	75-27-4	<33
Bromoform	75-25-2	<52
Bromomethane	74-83-9	<19
Carbon disulfide	75-15-0	<16
Carbon tetrachloride	56-23-5	<31
Chlorobenzene	108-90-7	<23
Chloroethane	75-00-3	<13
Chloroform	67-66-3	<24
Chloromethane	74-87-3	<10
cis-1,2-Dichloroethene	156-59-2	<20
cis-1,3-Dichloropropene	10061-01-5	<23
Cyclohexane	110-82-7	<17
Dibromochloromethane	124-48-1	<43
Ethyl acetate	141-78-6	<36
Ethylbenzene	100-41-4	<22

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AT SWANSFIELD ELEMENTARY SCHOOL (PHASE 2)**

Chemical	CAS	01 Classroom 140 ( $\mu\text{g}/\text{m}^3$ )
Freon 11	75-69-4	<28
Freon 113	76-13-1	<38
Freon 114	76-14-2	<35
Freon 12	75-71-8	<25
Heptane	142-82-5	<20
Hexachloro-1,3-butadiene	87-68-3	<53
Hexane	110-54-3	<18
Isopropyl alcohol	67-63-0	<b>15</b>
m&p-Xylene	179601-23-1	<43
Methyl Butyl Ketone	591-78-6	<41
Methyl Ethyl Ketone	78-93-3	<b>44</b>
Methyl Isobutyl Ketone	108-10-1	<41
Methyl tert-butyl ether	1634-04-4	<18
Methylene chloride	75-09-2	<b>110</b>
o-Xylene	95-47-6	<22
Propylene	115-07-1	<8.6
Styrene	100-42-5	<21
Tetrachloroethylene	127-18-4	<34
Tetrahydrofuran	109-99-9	<b>30</b>
Toluene	108-88-3	<b>110</b>
trans-1,2-Dichloroethene	156-60-5	<20
trans-1,3-Dichloropropene	10061-02-6	<23
Trichloroethene	79-01-6	<27
Vinyl acetate	108-05-4	<18
Vinyl Bromide	593-60-02	<22
Vinyl chloride	75-01-4	<13
<b>Reported TVOCs</b>		<b>386</b>
Meets LEED Requirements?		Yes

**Formaldehyde Monitoring**

The formaldehyde concentration was 25 ppb and below the LEED specification of 27 ppb at the sampling location on January 15, 2017. Sample results are reported in Table 3, and certificates of analysis are included in Attachment 3.

**Table 3 – Results of Formaldehyde Monitoring at Swansfield Elementary School**

Sample Location	Sample Date	Formaldehyde (ppb)
Classroom 140 (01)	January 15, 2017	25

ND is None Detected.

**4-Phenylcyclohexene (4-PCH) Monitoring**

The 4-PCH concentrations were below the limit of detection for the analytical method ( $<4.85 \mu\text{g}/\text{m}^3$ ) and below the LEED specification of  $6.5 \mu\text{g}/\text{m}^3$  in the sampling location on January 15, 2017. Certificates of analysis are included in Attachment 3.

**Carbon Monoxide (CO) Monitoring**

The carbon monoxide (CO) concentration was below the limit of detection for the analytical method ( $<1 \text{ ppm}$ ) and below the LEED specification of 9 ppm and no greater than 2 ppm above the outdoor concentration at the sampling location on January 15, 2017. Certificates of analysis are included in Attachment 3.

**SUMMARY REPORT OF AIR MONITORING FOR LEED CERTIFICATION  
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**Particles**

The PM10 particle measurement was collected using a particle monitor, consisting of a calibrated air sampling pump and PM10 cassette. The cassette was returned to Centek Labs and analyzed using EPA Method IP-10A. The PM10 particle concentration ranged was 18 µg/m<sup>3</sup>, and was below the LEED maximum allowable concentration (50 µg/m<sup>3</sup>) on January 15, 2017. Results are given in Table 4, and certificates of analysis are included in Attachment 3.

**Table 4 – Results of Particulate Monitoring at Swansfield Elementary School**

<b>Sample Location</b>	<b>PM 10 (µg/m<sup>3</sup>)</b>	<b>Date</b>	<b>Total Time Sampled (HRs:MINs)</b>
Classroom 140 (01)	32	January 15, 2017	4:01

Bold type indicates results over the allowable concentration.

**Conclusions**

The indoor air sampling conducted at Swansfield Elementary School on January 15, 2017 for LEED certification purposes identified that the parameters tested in the new HVAC zone serving the Phase 2 areas of the building were below the maximum allowable concentrations established by the US Green Building Leadership in Energy and Environmental Design (LEED) certification program.

**Attachment 1**

**Building Layout with Highlighted Sample Locations**



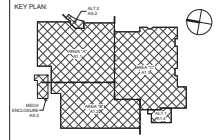


CANOPY ADDITION  
(ADD ALTERNATE 2)

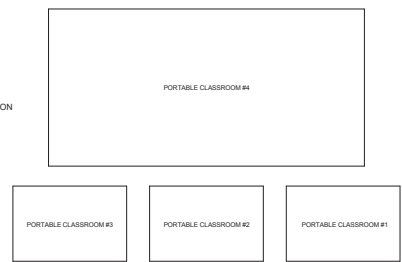
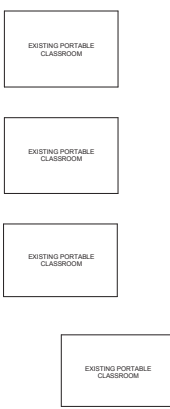
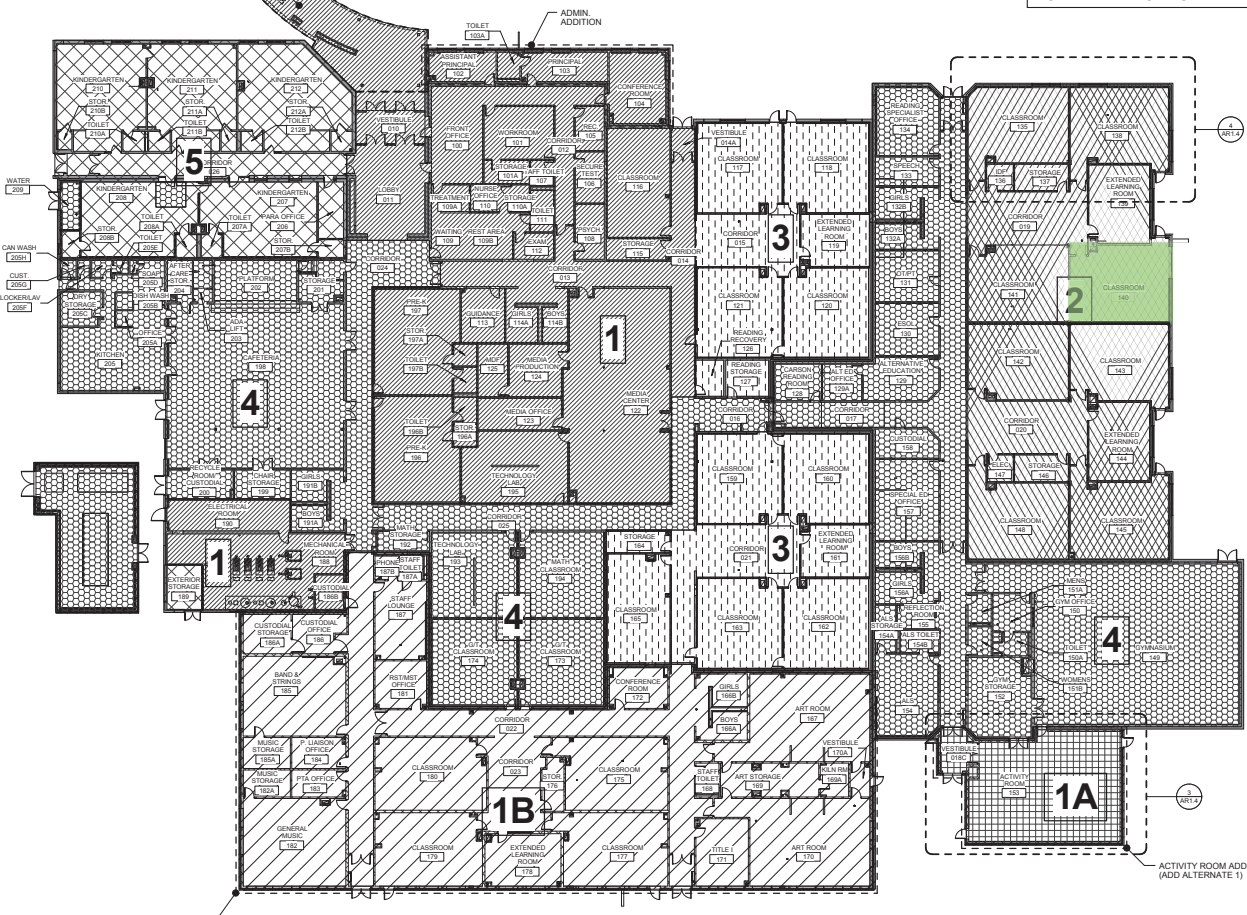
1. CONTRACTOR SHALL PROVIDE TEMPORARY WALLS WITH LOCKABLE DOORS TO SEPARATE CONSTRUCTION FROM OCCUPIED AREAS AS NEEDED DURING EVERY PHASE OF CONSTRUCTION.  
2. REFER TO CONSTRUCTION SCHEDULE IN SECTION 013000.

GENERAL NOTES

- PHASE 1: 6/16- 8/16
- PHASE 1A: 6/16- 12/16  
SEE DETAIL 4(A)1.4 FOR TEMPORARY PARTITION LOCATIONS
- PHASE 1B: 6/16- 8/17
- PHASE 2: 9/16- 12/16  
SEE DETAIL 3(A)1.4 FOR TEMPORARY PARTITION LOCATIONS
- PHASE 3: 1/17- 5/17
- PHASE 4: 6/17- 8/17
- PHASE 5: 9/17- 12/17



KEYNOTES LISTED ON THIS SHEET ARE FOR CONVENIENCE ONLY. REFER TO SHEET 03.1 FOR COMPLETE LIST



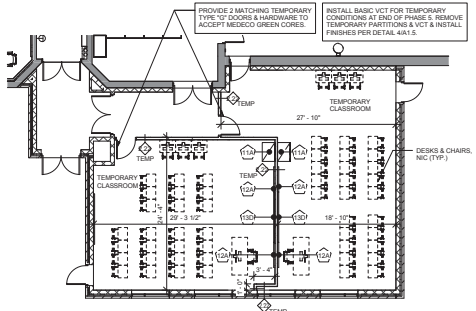
BID DOCUMENTS

Scale:	
Scale:	
<b>G   W</b> <b>W   O</b>	
2015 GWWO INC.	

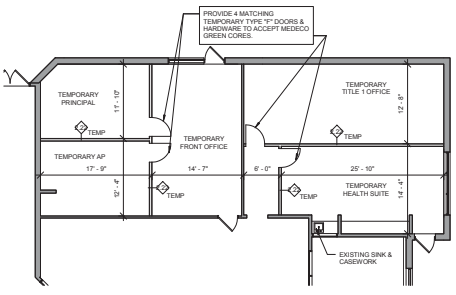
Revisions	No.	Date	Description

<b>SWANSFIELD ELEMENTARY SCHOOL</b>			
HOWARD COUNTY PUBLIC SCHOOL SYSTEM			
Job No.	1448	GEW	Drawn
Scale	As Indicated	GEW	Checked
Date	01/13/2016	PLH	Approved
Drawing Title	REFERENCE PHASING PLAN		Drawing Number
			<b>AR1.4</b>

PHASING PLAN  
1/17 - 5/17



PHASE 1 TEMPORARY PARTITIONS 8/16-10/16



C:\Users\p\Documents\1448\_CD\_2015-11\_DL\_P.dwg 1/13/2016 1:48:42 PM

## **Attachment 2**

### **Laboratory and Professional Credentials**





## AIHA Laboratory Accreditation Programs, LLC

*acknowledges that*

### **Centek Laboratories, LLC**

143 Midler Park Drive, Syracuse, NY 13206

Laboratory ID: 182993

along with all premises from which key activities are performed, as listed above, has fulfilled the requirements of the AIHA Laboratory Accreditation Programs (AIHA-LAP), LLC accreditation to the ISO/IEC 17025:2005 international standard, *General Requirements for the Competence of Testing and Calibration Laboratories* in the following:

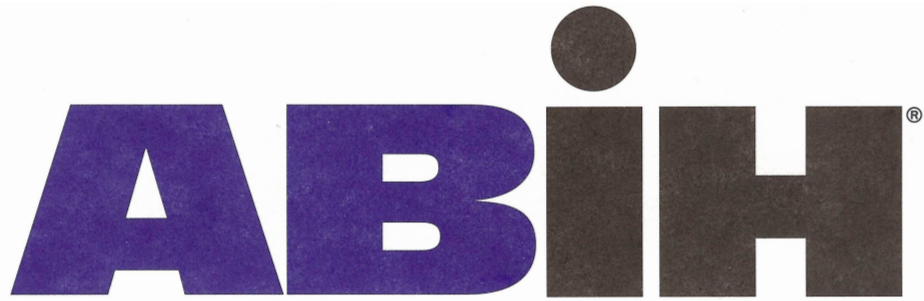
#### **LABORATORY ACCREDITATION PROGRAMS**

- |   |                                   |
|---|-----------------------------------|
| <input type="checkbox"/> INDUSTRIAL HYGIENE         | Accreditation Expires:            |
| <input type="checkbox"/> ENVIRONMENTAL LEAD         | Accreditation Expires:            |
| <input type="checkbox"/> ENVIRONMENTAL MICROBIOLOGY | Accreditation Expires:            |
| <input type="checkbox"/> FOOD                       | Accreditation Expires:            |
| <input checked="" type="checkbox"/> UNIQUE SCOPES   | Accreditation Expires: 09/01/2017 |

Specific Field(s) of Testing (FoT)/Method(s) within each Accreditation Program for which the above named laboratory maintains accreditation is outlined on the attached **Scope of Accreditation**. Continued accreditation is contingent upon successful on-going compliance with ISO/IEC 17025:2005 and AIHA-LAP, LLC requirements. This certificate is not valid without the attached **Scope of Accreditation**. Please review the AIHA-LAP, LLC website ([www.aihaaccreditedlabs.org](http://www.aihaaccreditedlabs.org)) for the most current Scope.

*Gerald Schultz, CIH*  
Chairperson, Analytical Accreditation Board

*Cheryl O. Morton*  
Managing Director, AIHA Laboratory Accreditation Programs, LLC



**american board of industrial hygiene®**

organized to improve the practice of industrial hygiene  
proclaims that

*Julie M. Barth*

having met all requirements of  
education, experience and examination, and  
ongoing maintenance,  
is hereby certified in the

**COMPREHENSIVE PRACTICE  
of  
INDUSTRIAL HYGIENE**

and has the right to use the designations

**CERTIFIED INDUSTRIAL HYGIENIST**

**CIH**

Certificate Number	<b>8386 CP</b>
Awarded:	<b>November 1, 2002</b>
Expiration Date:	<b>June 1, 2018</b>



  
Chair ABIH

  
Executive Director ABIH



GREEN BUILDING CERTIFICATION INSTITUTE CERTIFIES THAT

**Julie Barth**

HAS ATTAINED THE DESIGNATION OF

**LEED GREEN ASSOCIATE**

by demonstrating the knowledge and understanding of green building practices and principles needed to support the use of the LEED® Green Building Rating System™.

10604951-GREEN-ASSOCIATE

CREDENTIAL ID

19 APR 2016

ISSUED

19 APR 2018

VALID THROUGH

A handwritten signature in black ink, appearing to read "Gail Vittori".

GAIL VITTORI, GBCI CHAIRPERSON

A handwritten signature in black ink, appearing to read "Mahesh Ramanujam".

MAHESH RAMANUJAM, GBCI PRESIDENT

**Attachment 3**

**Certificates of Analyses for TVOCs, Formaldehyde, 4-PCH, CO and PM10  
from Centek Laboratories in units of ppb and  $\mu\text{g}/\text{m}^3$**



**Centek Laboratories, LLC**

Date: 25-Jan-17

**CLIENT:** Aria Environmental  
**Lab Order:** C1701032  
**Project:** Swansfield Elementary School  
**Lab ID:** C1701032-001A

**Client Sample ID:** SF-01  
**Tag Number:** 582.1077.1034  
**Collection Date:** 1/15/2017  
**Matrix:** AIR

Analyses	Result	**Limit	Qual	Units	DF	Date Analyzed
<b>FIELD PARAMETERS</b>						
			<b>FLD</b>			Analyst:
Lab Vacuum In	-8			"Hg		1/18/2017
Lab Vacuum Out	-30			"Hg		1/18/2017
Sample Time	240			minutes		1/18/2017
<b>LEED FORMALDEHYDE BY TO-15</b>						
			<b>TO-15</b>			Analyst: LL
Formaldehyde	31	31		ug/m3	1	1/19/2017
<b>LEED VOC'S BY EPA IP-1A</b>						
			<b>TO-15</b>			Analyst: LL
1,1,1-Trichloroethane	< 27	27		ug/m3	1	1/19/2017 4:56:00 PM
1,1,2,2-Tetrachloroethane	< 34	34		ug/m3	1	1/19/2017 4:56:00 PM
1,1,2-Trichloroethane	< 27	27		ug/m3	1	1/19/2017 4:56:00 PM
1,1-Dichloroethane	< 20	20		ug/m3	1	1/19/2017 4:56:00 PM
1,1-Dichloroethene	< 20	20		ug/m3	1	1/19/2017 4:56:00 PM
1,2,4-Trichlorobenzene	< 37	37		ug/m3	1	1/19/2017 4:56:00 PM
1,2,4-Trimethylbenzene	< 25	25		ug/m3	1	1/19/2017 4:56:00 PM
1,2-Dibromoethane	< 38	38		ug/m3	1	1/19/2017 4:56:00 PM
1,2-Dichlorobenzene	< 30	30		ug/m3	1	1/19/2017 4:56:00 PM
1,2-Dichloroethane	< 20	20		ug/m3	1	1/19/2017 4:56:00 PM
1,2-Dichloropropane	< 23	23		ug/m3	1	1/19/2017 4:56:00 PM
1,3,5-Trimethylbenzene	< 25	25		ug/m3	1	1/19/2017 4:56:00 PM
1,3-butadiene	< 11	11		ug/m3	1	1/19/2017 4:56:00 PM
1,3-Dichlorobenzene	< 30	30		ug/m3	1	1/19/2017 4:56:00 PM
1,4-Dichlorobenzene	< 30	30		ug/m3	1	1/19/2017 4:56:00 PM
1,4-Dioxane	< 36	36		ug/m3	1	1/19/2017 4:56:00 PM
2,2,4-trimethylpentane	< 23	23		ug/m3	1	1/19/2017 4:56:00 PM
4-ethyltoluene	< 25	25		ug/m3	1	1/19/2017 4:56:00 PM
Acetone	77	24		ug/m3	1	1/19/2017 4:56:00 PM
Allyl chloride	< 16	16		ug/m3	1	1/19/2017 4:56:00 PM
Benzene	< 16	16		ug/m3	1	1/19/2017 4:56:00 PM
Benzyl chloride	< 29	29		ug/m3	1	1/19/2017 4:56:00 PM
Bromodichloromethane	< 33	33		ug/m3	1	1/19/2017 4:56:00 PM
Bromoform	< 52	52		ug/m3	1	1/19/2017 4:56:00 PM
Bromomethane	< 19	19		ug/m3	1	1/19/2017 4:56:00 PM
Carbon disulfide	< 16	16		ug/m3	1	1/19/2017 4:56:00 PM
Carbon tetrachloride	< 31	31		ug/m3	1	1/19/2017 4:56:00 PM
Chlorobenzene	< 23	23		ug/m3	1	1/19/2017 4:56:00 PM
Chloroethane	< 13	13		ug/m3	1	1/19/2017 4:56:00 PM
Chloroform	< 24	24		ug/m3	1	1/19/2017 4:56:00 PM
Chloromethane	< 10	10		ug/m3	1	1/19/2017 4:56:00 PM
cis-1,2-Dichloroethene	< 20	20		ug/m3	1	1/19/2017 4:56:00 PM
cis-1,3-Dichloropropene	< 23	23		ug/m3	1	1/19/2017 4:56:00 PM

**Qualifiers:** \*\* Quantitation Limit . Results reported are not blank corrected  
 B Analyte detected in the associated Method Blank E Estimated Value above quantitation range  
 H Holding times for preparation or analysis exceeded J Analyte detected below quantitation limit  
 JN Non-routine analyte. Quantitation estimated. ND Not Detected at the Limit of Detection  
 S Spike Recovery outside accepted recovery limits

# Centek Laboratories, LLC

Date: 25-Jan-17

**CLIENT:** Aria Environmental  
**Lab Order:** C1701032  
**Project:** Swansfield Elementary School  
**Lab ID:** C1701032-001A

**Client Sample ID:** SF-01  
**Tag Number:** 582.1077.1034  
**Collection Date:** 1/15/2017  
**Matrix:** AIR

Analyses	Result	**Limit	Qual	Units	DF	Date Analyzed
<b>LEED VOC'S BY EPA IP-1A</b>		<b>TO-15</b>		Analyst: LL		
Cyclohexane	< 17	17		ug/m3	1	1/19/2017 4:56:00 PM
Dibromochloromethane	< 43	43		ug/m3	1	1/19/2017 4:56:00 PM
Ethyl acetate	< 36	36		ug/m3	1	1/19/2017 4:56:00 PM
Ethylbenzene	< 22	22		ug/m3	1	1/19/2017 4:56:00 PM
Freon 11	< 28	28		ug/m3	1	1/19/2017 4:56:00 PM
Freon 113	< 38	38		ug/m3	1	1/19/2017 4:56:00 PM
Freon 114	< 35	35		ug/m3	1	1/19/2017 4:56:00 PM
Freon 12	< 25	25		ug/m3	1	1/19/2017 4:56:00 PM
Heptane	< 20	20		ug/m3	1	1/19/2017 4:56:00 PM
Hexachloro-1,3-butadiene	< 53	53		ug/m3	1	1/19/2017 4:56:00 PM
Hexane	< 18	18		ug/m3	1	1/19/2017 4:56:00 PM
Isopropyl alcohol	15	12		ug/m3	1	1/19/2017 4:56:00 PM
m&p-Xylene	< 43	43		ug/m3	1	1/19/2017 4:56:00 PM
Methyl Butyl Ketone	< 41	41		ug/m3	1	1/19/2017 4:56:00 PM
Methyl Ethyl Ketone	44	29		ug/m3	1	1/19/2017 4:56:00 PM
Methyl Isobutyl Ketone	< 41	41		ug/m3	1	1/19/2017 4:56:00 PM
Methyl tert-butyl ether	< 18	18		ug/m3	1	1/19/2017 4:56:00 PM
Methylene chloride	110	17		ug/m3	1	1/19/2017 4:56:00 PM
o-Xylene	< 22	22		ug/m3	1	1/19/2017 4:56:00 PM
Propylene	< 8.6	8.6		ug/m3	1	1/19/2017 4:56:00 PM
Styrene	< 21	21		ug/m3	1	1/19/2017 4:56:00 PM
Tetrachloroethylene	< 34	34		ug/m3	1	1/19/2017 4:56:00 PM
Tetrahydrofuran	30	15		ug/m3	1	1/19/2017 4:56:00 PM
Toluene	110	19		ug/m3	1	1/19/2017 4:56:00 PM
trans-1,2-Dichloroethene	< 20	20		ug/m3	1	1/19/2017 4:56:00 PM
trans-1,3-Dichloropropene	< 23	23		ug/m3	1	1/19/2017 4:56:00 PM
Trichloroethene	< 27	27		ug/m3	1	1/19/2017 4:56:00 PM
Vinyl acetate	< 18	18		ug/m3	1	1/19/2017 4:56:00 PM
Vinyl Bromide	< 22	22		ug/m3	1	1/19/2017 4:56:00 PM
Vinyl chloride	< 13	13		ug/m3	1	1/19/2017 4:56:00 PM
<b>LEED 4-PCH BY TO-15</b>		<b>TO-15</b>		Analyst: LL		
4-phenylcyclohexene	< 4.85	4.85		ug/m3	1	1/19/2017

**Qualifiers:** \*\* Quantitation Limit . Results reported are not blank corrected  
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 JN Non-routine analyte. Quantitation estimated. ND Not Detected at the Limit of Detection  
 S Spike Recovery outside accepted recovery limits



**Centek Laboratories, LLC**

Date: 25-Jan-17

**CLIENT:** Aria Environmental  
**Lab Order:** C1701032  
**Project:** Swansfield Elementary School  
**Lab ID:** C1701032-001A

**Client Sample ID:** SF-01  
**Tag Number:** 582.1077.1034  
**Collection Date:** 1/15/2017  
**Matrix:** AIR

Analyses	Result	**Limit	Qual	Units	DF	Date Analyzed
<b>FIELD PARAMETERS</b>		<b>FLD</b>		Analyst:		
Lab Vacuum In	-8			"Hg		1/18/2017
Lab Vacuum Out	-30			"Hg		1/18/2017
Sample Time	240			minutes		1/18/2017
<b>LEED CARBON MONOXIDE IP-3C</b>		<b>EPA IP-3C</b>		Analyst: LL		
Carbon Monoxide	ND	1.5		ppm	1.5	1/25/2017
<b>LEED FORMALDEHYDE BY TO-15</b>		<b>TO-15</b>		Analyst: LL		
Formaldehyde	25	25		ppbV	1	1/19/2017
Surr: Bromofluorobenzene	102	71.9-133		%REC	1	1/19/2017
<b>LEED VOC'S BY EPA IP-1A</b>		<b>TO-15</b>		Analyst: LL		
1,1,1-Trichloroethane	< 5.0	5.0		ppbV	1	1/19/2017 4:56:00 PM
1,1,2,2-Tetrachloroethane	< 5.0	5.0		ppbV	1	1/19/2017 4:56:00 PM
1,1,2-Trichloroethane	< 5.0	5.0		ppbV	1	1/19/2017 4:56:00 PM
1,1-Dichloroethane	< 5.0	5.0		ppbV	1	1/19/2017 4:56:00 PM
1,1-Dichloroethene	< 5.0	5.0		ppbV	1	1/19/2017 4:56:00 PM
1,2,4-Trichlorobenzene	< 5.0	5.0		ppbV	1	1/19/2017 4:56:00 PM
1,2,4-Trimethylbenzene	< 5.0	5.0		ppbV	1	1/19/2017 4:56:00 PM
1,2-Dibromoethane	< 5.0	5.0		ppbV	1	1/19/2017 4:56:00 PM
1,2-Dichlorobenzene	< 5.0	5.0		ppbV	1	1/19/2017 4:56:00 PM
1,2-Dichloroethane	< 5.0	5.0		ppbV	1	1/19/2017 4:56:00 PM
1,2-Dichloropropane	< 5.0	5.0		ppbV	1	1/19/2017 4:56:00 PM
1,3,5-Trimethylbenzene	< 5.0	5.0		ppbV	1	1/19/2017 4:56:00 PM
1,3-butadiene	< 5.0	5.0		ppbV	1	1/19/2017 4:56:00 PM
1,3-Dichlorobenzene	< 5.0	5.0		ppbV	1	1/19/2017 4:56:00 PM
1,4-Dichlorobenzene	< 5.0	5.0		ppbV	1	1/19/2017 4:56:00 PM
1,4-Dioxane	< 10	10		ppbV	1	1/19/2017 4:56:00 PM
2,2,4-trimethylpentane	< 5.0	5.0		ppbV	1	1/19/2017 4:56:00 PM
4-ethyltoluene	< 5.0	5.0		ppbV	1	1/19/2017 4:56:00 PM
Acetone	32	10		ppbV	1	1/19/2017 4:56:00 PM
Allyl chloride	< 5.0	5.0		ppbV	1	1/19/2017 4:56:00 PM
Benzene	< 5.0	5.0		ppbV	1	1/19/2017 4:56:00 PM
Benzyl chloride	< 5.0	5.0		ppbV	1	1/19/2017 4:56:00 PM
Bromodichloromethane	< 5.0	5.0		ppbV	1	1/19/2017 4:56:00 PM
Bromoform	< 5.0	5.0		ppbV	1	1/19/2017 4:56:00 PM
Bromomethane	< 5.0	5.0		ppbV	1	1/19/2017 4:56:00 PM
Carbon disulfide	< 5.0	5.0		ppbV	1	1/19/2017 4:56:00 PM
Carbon tetrachloride	< 5.0	5.0		ppbV	1	1/19/2017 4:56:00 PM
Chlorobenzene	< 5.0	5.0		ppbV	1	1/19/2017 4:56:00 PM
Chloroethane	< 5.0	5.0		ppbV	1	1/19/2017 4:56:00 PM

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 S Spike Recovery outside accepted recovery limits

**Centek Laboratories, LLC**

Date: 25-Jan-17

**CLIENT:** Aria Environmental  
**Lab Order:** C1701032  
**Project:** Swansfield Elementary School  
**Lab ID:** C1701032-001A

**Client Sample ID:** SF-01  
**Tag Number:** 582.1077.1034  
**Collection Date:** 1/15/2017  
**Matrix:** AIR

Analyses	Result	**Limit	Qual	Units	DF	Date Analyzed
<b>LEED VOC'S BY EPA IP-1A</b>		<b>TO-15</b>			Analyst: <b>LL</b>	
Chloroform	< 5.0	5.0		ppbV	1	1/19/2017 4:56:00 PM
Chloromethane	< 5.0	5.0		ppbV	1	1/19/2017 4:56:00 PM
cis-1,2-Dichloroethene	< 5.0	5.0		ppbV	1	1/19/2017 4:56:00 PM
cis-1,3-Dichloropropene	< 5.0	5.0		ppbV	1	1/19/2017 4:56:00 PM
Cyclohexane	< 5.0	5.0		ppbV	1	1/19/2017 4:56:00 PM
Dibromochloromethane	< 5.0	5.0		ppbV	1	1/19/2017 4:56:00 PM
Ethyl acetate	< 10	10		ppbV	1	1/19/2017 4:56:00 PM
Ethylbenzene	< 5.0	5.0		ppbV	1	1/19/2017 4:56:00 PM
Freon 11	< 5.0	5.0		ppbV	1	1/19/2017 4:56:00 PM
Freon 113	< 5.0	5.0		ppbV	1	1/19/2017 4:56:00 PM
Freon 114	< 5.0	5.0		ppbV	1	1/19/2017 4:56:00 PM
Freon 12	< 5.0	5.0		ppbV	1	1/19/2017 4:56:00 PM
Heptane	< 5.0	5.0		ppbV	1	1/19/2017 4:56:00 PM
Hexachloro-1,3-butadiene	< 5.0	5.0		ppbV	1	1/19/2017 4:56:00 PM
Hexane	< 5.0	5.0		ppbV	1	1/19/2017 4:56:00 PM
Isopropyl alcohol	6.1	5.0		ppbV	1	1/19/2017 4:56:00 PM
m&p-Xylene	< 10	10		ppbV	1	1/19/2017 4:56:00 PM
Methyl Butyl Ketone	< 10	10		ppbV	1	1/19/2017 4:56:00 PM
Methyl Ethyl Ketone	15	10		ppbV	1	1/19/2017 4:56:00 PM
Methyl Isobutyl Ketone	< 10	10		ppbV	1	1/19/2017 4:56:00 PM
Methyl tert-butyl ether	< 5.0	5.0		ppbV	1	1/19/2017 4:56:00 PM
Methylene chloride	30	5.0		ppbV	1	1/19/2017 4:56:00 PM
o-Xylene	< 5.0	5.0		ppbV	1	1/19/2017 4:56:00 PM
Propylene	< 5.0	5.0		ppbV	1	1/19/2017 4:56:00 PM
Styrene	< 5.0	5.0		ppbV	1	1/19/2017 4:56:00 PM
Tetrachloroethylene	< 5.0	5.0		ppbV	1	1/19/2017 4:56:00 PM
Tetrahydrofuran	10	5.0		ppbV	1	1/19/2017 4:56:00 PM
Toluene	29	5.0		ppbV	1	1/19/2017 4:56:00 PM
trans-1,2-Dichloroethene	< 5.0	5.0		ppbV	1	1/19/2017 4:56:00 PM
trans-1,3-Dichloropropene	< 5.0	5.0		ppbV	1	1/19/2017 4:56:00 PM
Trichloroethene	< 5.0	5.0		ppbV	1	1/19/2017 4:56:00 PM
Vinyl acetate	< 5.0	5.0		ppbV	1	1/19/2017 4:56:00 PM
Vinyl Bromide	< 5.0	5.0		ppbV	1	1/19/2017 4:56:00 PM
Vinyl chloride	< 5.0	5.0		ppbV	1	1/19/2017 4:56:00 PM
Surr: Bromofluorobenzene	100	79.4-106		%REC	1	1/19/2017 4:56:00 PM
<b>LEED 4-PCH BY TO-15</b>		<b>TO-15</b>			Analyst: <b>LL</b>	
4-phenylcyclohexene	< 0.750	0.750		ppbV	1	1/19/2017
Surr: Bromofluorobenzene	103	83.5-124		%REC	1	1/19/2017
<b>LEED PM10 BY EPA METHOD IP-10A</b>		<b>PM10</b>			Analyst: <b>JS</b>	

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**Centek Laboratories, LLC**

**Date:** 25-Jan-17

**CLIENT:** Aria Environmental  
**Lab Order:** C1701032  
**Project:** Swansfield Elementary School  
**Lab ID:** C1701032-001A

**Client Sample ID:** SF-01  
**Tag Number:** 582.1077.1034  
**Collection Date:** 1/15/2017  
**Matrix:** AIR

<b>Analyses</b>	<b>Result</b>	<b>**Limit</b>	<b>Qual</b>	<b>Units</b>	<b>DF</b>	<b>Date Analyzed</b>
<b>LEED PM10 BY EPA METHOD IP-10A</b>			<b>PM10</b>			Analyst: <b>JS</b>
Total particulate	18	1.0		ug/M3	1	1/25/2017

**Qualifiers:** \*\* Quantitation Limit . Results reported are not blank corrected  
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