Survey Location: Cedar Cliff High School 1301 Carlisle Road Camp Hill, PA 17011

# Indoor Air Quality Survey Report

Survey Dates: March 18-24, 2016

Report Date: April 12, 2016

### **Prepared for:**

West Shore School District 507 Fishing Creek Road Lewisberry, PA 17339

#### Conducted by:

Compliance Management International 1215 Manor Drive, Suite 205 Mechanicsburg, PA 17055



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# **1.0 INTRODUCTION**

The West Shore School District retained Compliance Management International (CMI) to conduct an Indoor Air Quality (IAQ) assessment at the Cedar Cliff High School located at 1301 Carlisle Road, Camp Hill, PA. This survey was performed to address concerns regarding odors in the school planetarium. The survey was performed between March 18 and 24, 2016. The activities performed as part of this project are summarized below:

Date	CMI Personnel On Site	Activity
3/18/16	Greg Matty, CIH	Set up 14 data logging air quality meters to measure Volatile Organic Compounds (VOC), Carbon Monoxide (CO), Hydrogen Sulfide (H <sub>2</sub> S), Oxygen (O <sub>2</sub> ), and Lower Explosive Limit (LEL)
3/21/16	Greg Matty, CIH	Verify operation of 14 data logging units.
3/22/16	Greg Matty, CIH Dan Larson, CIH	Verify operation of 14 data logging units. Investigate strong odor in the planetarium classroom area. Take additional direct reading measurements for VOC, CO, H <sub>2</sub> S, O <sub>2</sub> , LEL. Place four passive organic vapor monitors (POVM) in area.
3/23/16	Greg Matty, CIH	Verify operation of 14 data logging units. Investigate crawlspace under the planetarium and take additional direct reading measurements for VOC, CO, H <sub>2</sub> S, O <sub>2</sub> , and LEL in that crawlspace. Retrieve five POVM samples.
3/24/16	Greg Matty, CIH	Verify operation of 14 data logging units and retrieve all units for data analysis.

# 2.0 METHODOLOGY

Continuous measurements were collected over the sample period for VOC, LEL,  $O_2$ , H2S and CO using a factory calibrated MultiRAE Plus monitoring devices. The MultiRAE Plus measures all five of these key parameters simultaneously using multiple sensors and provides real-time measurements and data logging capabilities. This data is then downloaded into a software program for analysis and report generation. The sensor type, data range and response time for the unit is presented below for each contaminant measured during this survey.

Contaminant	Sensor Type	Range	Response Time
VOC	Photoionization Detector (PID)	0 to 1000 ppm	15 seconds
CO	Electro-chemical	0 to 500 ppm	30 seconds
H <sub>2</sub> S	Electro-chemical	0 to 100 ppm	35 seconds
LEL	Protected catalytic bead	0 to 100%	15 seconds
O <sub>2</sub>	Electro-chemical	0-30%	15 seconds
ppm = parts per million			

Total hydrocarbon air samples were collected using passive organic vapor monitors. The samples were collected for approximately 22 hours from March 22 to 23, 2016. Upon completion of the sampling period, the monitors were submitted to Analytics Corporation in Ashland, VA for analysis. Analytics Corporation is an American Industrial Hygiene Association (AIHA) accredited laboratory.

# 3.0 EXPOSURE GUIDELINES

The following table summarizes guidelines and/or standards referenced in this report.

Parameter	Exposure Limit or Range	References
Total Volatile Organic Compounds	Not Established	
Hydrogen Sulfide	OSHA – 20 ppm ceiling ACGIH – 1 ppm 8 hour TWA	OSHA 29 CFR 1910.1000 ACGIH TLV 2015
Oxygen	19.5-23.0%	OSHA 29 CFR 1910.146
Carbon Monoxide	9 ppm 24 hour TWA 50 ppm 8 hour TWA 25 ppm 8 hour TWA	EPA NAAQS OSHA 29 CFR 1910.1000 ACGIH TLV 2015
Lower Explosive Limit	<10%	OSHA 29 CFR 1910.146
Hydrocarbons	Varies	OSHA & ACGIH

Notes:

1. OSHA = Occupational Safety and Health Administration

2. ACGIH = American Conference of Governmental Industrial Hygienists

3. EPA NAAQS = Environmental Protection Agency National Ambient Air Quality Standard

4. ppm = parts per million

5. TWA = Time weighted average

Exposure limits that are long-term time-weighted averages (8-hour and 24-hour) are established to protect individuals from the chronic adverse health effects of exposure to airborne contaminants. Ceiling limits are exposure levels that should not be exceeded at any time to prevent the acute adverse health effects of exposure to airborne contaminants.

# 4.0 FINDINGS AND CONCLUSIONS

The air monitoring results for the thirteen (13) classrooms in the planetarium and the office were all below regulatory limits and/or recommended guidelines and did not indicate any air quality conditions of concern. The odors in the planetarium were likely the result of the natural gas leaks in the planetarium.

The following findings and conclusions are based on conditions and sampling results as they existed at the time of this survey.

- 1. The following notes and observations were made by or reported to CMI personnel at the time of the surveys:
  - a. On March 21, 2016 it was reported that the multiRAE unit in room 123 was showing a reading of over 300 ppm of CO. This peak was not found in the downloaded data from the time that the unit was in room 123. It was most likely a peak on the instrument from a previous datalogging session. CMI personnel responded to this concern by bringing another calibrated instrument (TSI Q-Trak Model 7575 Serial Number 7575X1201002) to the site to take additional measurements of CO. CO levels were 0 ppm in the room with the TSI Q-Trak.
  - b. On March 21 and 22, 2016 there was a noticeable natural gas-like odor in the rear stairwell of the planetarium.
  - c. On March 22, 2016 the crawlspace under room 125 was inspected and tested for LEL,  $O_2$ ,  $H_2S$ , CO and VOC. There were no  $H_2S$ , CO or VOC detected in the crawlspace and  $O_2$  levels were 20.9%; which is within the normal range. One LEL reading was measured at 3% near the hot water line that goes through the crawlspace wall under the slab, which may indicate that a natural gas leak was occurring near this pipe.
  - d. There were no noticeable odors on March 23 or 24, 2016.
  - e. It was reported to CMI on March 31, 2016 that pressure testing of the natural gas lines in the building because of the reoccurring odor had revealed several leaks which would have caused the odors that were noticed in the building. Repairs to the natural gas lines were under way on March 31, 2016.
- 2. Total VOC levels in the rooms tested were within the acceptable range at all locations tested. Refer to Appendix A, Table 1 and Appendix B for detailed results.
- 3. O<sub>2</sub> levels were within the acceptable range at all locations, with the exception of rooms 123 and 125. On one occasion in each of these rooms the oxygen levels rose above 23% for a short duration (less than 10 minutes) and then returned to the acceptable range. This was most likely a sampling/equipment anomaly. Refer to Appendix A, Table 1 and Appendix B for detailed results.
- 4. CO levels were below the EPA National Ambient Air Quality Standard (NAAQS) in all of the rooms tested. It should be noted that on five (5) occasions in room 123, the CO level rose to approximately 13-20 ppm for less than 10 minutes each time. This was most likely a sampling/equipment anomaly. The recorded data indicated that the events occurred at 7:03 am on March 20, 10:43 pm on March 21, 10:31 am on March 22, 1:01 am on March 23, and at 2:09 am on March 24. Refer to Appendix A, Table 1 and Appendix B for detailed results.

5. H<sub>2</sub>S and LEL were found to be below the established exposure limits in all of the rooms tested. Refer to Appendix A, Table 1 and Appendix B for detailed results.

The results for the air samples collected for total hydrocarbon analysis were below the analytical limit of detection. Refer to Appendix A, Table 2 for detailed results and Appendix C for a copy of the laboratory report.

# 5.0 **RECOMMENDATIONS**

The following recommendations are based on the findings and conclusions of this survey:

- 1. All leaks in the natural gas lines should be repaired.
- 2. Pressure testing of the gas lines should be performed once all repairs have been made and prior to turning the gas back on to the building.

**APPENDIX A** 

SAMPLING RESULTS



TABLE 1 SUMMARY OF DATA LOG RESULTS											
Location	CO (ppm)	VOC (ppm)	H₂S (ppm)	LEL (%)	O <sub>2</sub> (%)						
Office	0.0	0.0-0.1	0.0	0.0	20.9						
MMR	0.9-7.1	0.0-0.2	0.3-0.6	0.0	20.4-20.9						
Room 122	0.0-1.5	0.0-4.4	0.0-2.3	0.0	20.9-21.3						
Room 123	0.0-20.1	0.0	0.0-0.6	0.0	20.6-32.9						
Room 123 Workroom	0.0-0.1	0.0-2.9	0.0-0.1	0.0	20.9						
Room 124	0.0	0.0-0.2	0.0-0.1	0.0	20.9						
Room 124 Workroom	0.0	0.0-1.3	0.0	0.0	20.6-20.9						
Room 125	0.0	0.0-0.3	0.0	0.0	20.9-32.7						
Room 126	0.0	0.0	0.0	0.0	20.8-20.9						
Room 127	0.0-0.1	0.0	0.0-0.4	0.0	20.9-21.2						
Room 127 Workroom	0.0-1.0	0.0	0.0	0.0	20.9-21.3						
Room 128	0.0-0.2	0.0	0.0	0.0	21.3-21.6						
Room 128 Workroom	0.0-0.6	0.0	0.0-0.5	0.0	20.9						
Room 218	0.0-0.3	0.0-0.6	0.0	0.0-4.7	20.9						



TABLE 2 TOTAL HYDROCARBON SAMPLE RESULTS										
Sampling Location	Sample Number	Sample Time (min)	Analyte	Airborne Concentration (mg/m <sup>3</sup> )						
MMR	1	1333	Total Hydrocarbon	<0.703						
Room 123	2	1327	Total Hydrocarbon	<0.71						
Room 122	3	1332	Total Hydrocarbon	<0.704						
Back Stairwell	4	1343	Total Hydrocarbon	<0.698						
Crawlspace	5	1274	Total Hydrocarbon	<0.74						



# **APPENDIX B**

MultiRAE RESULTS



25 20 15 Concentration CO(ppm) -VOC(ppm) H2S(ppm) -LEL(%) OXY(%) 10 \_ 5 0 -3/18/2016 3/19/2016 3/20/2016 3/21/2016 3/22/2016 3/23/2016 3/24/2016 Date

MMR









## Room 123 Workroom







## Room 124 Workroom















## Room 127 Workroom







#### Room 128 Workroom











**APPENDIX C** 

LABORATORY REPORTS





March 29, 2016

GREG MATTY COMPLIANCE MANAGEMENT INT'L INC SUITE 205 1215 MANOR DRIVE MECHANICSBURG, PA 17055

#### Laboratory Workorder ID: U084011

Client Project ID:	CEDAR CLIFF HS
Received:	March 24, 2016
Reported:	March 29, 2016

Attached are the results we obtained on the analysis of your samples submitted to Analytics. Any Chains-of-Custody associated by this sample group are enclosed. Air concentrations are calculated as a convenience to the client and the overall accuracy of this result depends on both the accuracy of the air volume and the amount found by analysis. Theoretical air volumes for passive monitors are calculated using the sampling time submitted and the manufacture's listed sampling rate for each compound. Results provided in this report relate only to the items tested.

For blanks and non-detects the results indicated with a '<' value represents the reporting limit for the analysis. Unless otherwise noted results are not corrected for blank values.

Unless the signature of the appropriate manager(s) appears on this report, this report should be considered PRELIMINARY and is subject to change.

We appreciate your confidence in allowing Analytics to be your testing laboratory. Any questions regarding this report can be addressed by calling our customer services department at (800) 888-8061.

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Andrew L. Teague, CIH Technical Director

Enclosures



#### Final Report —

Work Order U084011

COMPLIANCE MANAGEMENT INT'L INC			Customer:	37091000			Date Received:	03/24/16	
SUITE 205 1215 MANOR DRIVE			Attention:	GREG MATTY					
MECHANICSBURG, PA 17055			PO Number	NA			Client Project II	D CEDAR CLIFF HS	
Lab ID: U084011001 Sample ID:	1-MMR			Media: <mark>3</mark>	M 3520 ORGAN	IC POVM WI	Sample Date:	3/23/2016 Sampling T	ime 1333
Analyte	Method	Analysis Date	Volume	Reporting Limit	Front	Rear	Total	Concentration	
Total Hydrocarbons as Hexane	NIOSH Method 1550	03/28/16	42.66	30 ug	< 30 ug	ND	< 30 ug	< 0.703 mg/M3 < 0	.2 ppm

The Total Hydrocarbons estimate was reported as < LOQ; loading on the sample was insufficient for useful follow-up qualitative analysis by GC-MS.

Lab ID: U084011002 Sample II	D: 2-ROOM 123		Media: 3M	/I 3520 ORGAN	IC POVM WI	Sample Date:	3/23/2016 Sampling Time	1327
		Analysis	Reporting					
Analyte	Method	Date Volume	Limit	Front	Rear	Total	Concentration	

The Total Hydrocarbons estimate was reported as < LOQ; loading on the sample was insufficient for useful follow-up qualitative analysis by GC-MS.

Lab ID: U084011003 Samp	e ID: 3-ROOM 122		Media:	3M 3520 ORGAN	IC POVM WI	Sample Date:	3/23/2016 Sampling Time	1332
		Analysis	Reporting					
Analyte	Method	Date Volume	Limit	Front	Rear	Total	Concentration	
Total Hydrocarbons as Hoxano		02/20/10 12 02	20.00	< 20 μα		< 00 · · · ·	< 0.704 mm/M2 < 0.0 mm	~

The Total Hydrocarbons estimate was reported as < LOQ; loading on the sample was insufficient for useful follow-up qualitative analysis by GC-MS.



Final Report -

#### Work Order U084011

Lab ID: U084011004 Sample ID:	4-BACK STAIRWELL			Media: <mark>3M</mark>	3520 ORGA	NIC POVM W	I Sample Date:	3/23/2016 Sampling Time	1343
Analyte	Method	Analysis Date	Volume	Reporting Limit	Front	Rear	Total	Concentration	
Total Hydrocarbons as Hexane	NIOSH Method 1550	03/28/16	42.98	30 ug	< 30 ug	ND	< 30 ug	< 0.698 mg/M3 < 0.2 p	pm
The Total Hydrocarbons estimate was reported as < LOQ; loading on the sample was insufficient for useful follow-up qualitative analysis by GC-MS.									

Lab ID:	U084011005	Sample ID:	5	Media:	3M 3520 ORGANIC POVM WI	Sample Date:	3/23/2016 Sampling Time	1274
			CRAWLSPACE					
			UNDR 123					

Analyte	Method	Analysis Date	Volume	Reporting Limit	Front	Rear	Total	Concentration	
Total Hydrocarbons as Hexane	NIOSH Method 1550	03/28/16	40.77	30 ug	< 30 ug	ND	< 30 ug	< 0.74 mg/M3 < 0.21 ppm	

The Total Hydrocarbons estimate was reported as < LOQ; loading on the sample was insufficient for useful follow-up qualitative analysis by GC-MS.



Analytics Corporation 10329 Stony Run Lane Ashland, Va 23005 Phone: (804) 365-3000 Fax: (804) 365-3002 AIHA Accreditation # 176, ID 100531

Final Report -

Work Order U084011

**General Laboratory Comments** 

Abbreviations:

ug = micrograms; mg=milligrams; g = grams, ppm=parts per million (volume), ppb = parts per billion (volume), mg/M3=milligrams per cubic meter of air, ug/M3=micrograms per cubic meter of air; Min=minutes, Qual=Qualifiers

### LABORATORY TEST REQUEST

ACCOUNT NUMBER. NAME AND ADDRESS

37091000

Compliance Management International

1215 Manor Dr., Suite 205

Mechanicsburg, PA 17055

NALYTICS

U084011

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FOR LABORATORY USE	ONLY SAMPLE # OR	SAMPLE AREA	SAMPL	E DATE	SAMPLE VOLUME/LITE	RS	ANALYSIS	REQUESTED	PLEASE USE S	EPARATE AMPLE TYPE
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	2-Room 12	3	3/22-23/1	6	1327 min	Ну	drocarbons	, Total as n	-Hexane, H	gh Resolutio
	3-Room 12	2	3/22-23/1	6	1332 min	Hy	drocarbons,	Total as n-	Hexane, Hi	gh Resolutio
	4-Back Sta	irwell	3/22-23/1	6	1343 min	Ну	drocarbons	, Total as n	-Hexane, H	gh Resolutio
	5-Crawlspac	e under 125	3/22-23/1	6	1274 min	Hy	drocarbons,	Total as n-	-Hexane, H	gh Resolutic
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