



PO Box 385
Oceanville, NJ 08231-0385
E-Mail ahera@comcast.net

Fax 609.652.1140
Phone 609.652.1833

INDOOR AIR QUALITY EVALUATION REPORT

Mercury Vapor Readings

Joseph J. Catena Elementary School Gymnasium

Freehold Township School District
384 West Main Street
Freehold, NJ 07728

Survey date:
Inspection performed by:

10/15/2018
John Smoyer

Section I**Introduction**

AHERA Consultants Inc. was retained by the Freehold Township School District to conduct Mercury Vapor Readings in the Joseph J. Catena Elementary School, located in Freehold, New Jersey. This sampling was performed at the request of Mr. Paul Rowan as a follow up to previous bulk sampling and air sampling events. Mercury vapor readings were conducted utilizing a Lumex RA-915M Mercury

Section II**Physical Inspection**

Existing Conditions

On October 15, 2018 I, John Smoyer, along with Michael Sorgenti and Domenic D'Errico arrived at the Joseph J. Catena Elementary School and met with several members of the Freehold Township School District as well as representatives of the Districts insurance agency. After introductions, we all proceeded to the Gymnasium so that we could re-assess the area for ambient mercury vapor content.

As history pertaining to this situation: On August 10, 2018, Domenic D'Errico collected bulk samples of the flooring material and submitted them for laboratory analysis whom determined that the polyethylene flooring contained mercury at a concentration of 180-240 mg/kg. Subsequently, the District requested mercury vapor ambient air sampling of the Gym area which I performed on September 12, 2018, at which time levels between 105 and 3287 ng/m³ were detected.

Presently, District staff informed us that the Gym was not currently being used and that the maintenance department had over-ridden the HVAC programing that serves the gymnasium so that the system would hold at the temperature setting of 68°. The gym is currently fit with air conditioning supplied by roof-top units and exhaust fans. We performed the ambient air testing towards the end of the day during a time of low occupancy. Sampling began at approximately 2:15 PM. The outdoor temperature was in the mid 60's and an indoor temperature reading of 68° was noted.

Comparatively, we collected Lumex RA915M readings outside-of and directly adjacent-to the southern hallway entrance to the Gym, and also outside the main entrance to the building.

Section III**Sampling Procedures**

- ◇ The Lumex RA915M utilizes real time direct read results reported in nanograms(ng) per meter cubed(ng/m³). Several readings were conducted in various sections of the gymnasium at both the breathing level and a level of 6', 3', and 1' from the floor. The Lumex RA915M was calibrated on 04/12/2018 and was due for re-calibration on 04/13/2019.

◇ **Table 1: OHIO Lumex RE-915M Readings**

October 15, 2018

SAMPLE ID #	SAMPLE LOCATION	Range	Height	Floor Temperature
1	Outside (Background) (Rear Egress)	8 ng/m ³	6'	58°F
		15 ng/m ³	3'	
2	Gym-SE	99-105 ng/m ³	6'	68°F
		104-120 ng/m ³	3'	
3	Gym-E	99-111 ng/m ³	1'	68°F
		112-133 ng/m ³	6'	
4	Gym-NW	126-145 ng/m ³	3'	68°F
		189-230 ng/m ³	1'	
5	Gym-N	82-86 ng/m ³	6'	68°F
		81-86 ng/m ³	3'	
6	Gym-NE	79-86 ng/m ³	1'	68°F
		77-80 ng/m ³	3'	
7	Gym-W	82-90 ng/m ³	1'	68°F
		97-115 ng/m ³	6'	
8	Gym-S	121-133 ng/m ³	3'	68°F
		190-205 ng/m ³	1'	
9	Gym-N Corner	60-66 ng/m ³	6'	68°F
		80-99 ng/m ³	3'	
10	Gym-NE Corner	150-187 ng/m ³	1'	68°F
		150-179 ng/m ³	6'	
11	Gym Office	203-217 ng/m ³	3'	68°F
		187-222 ng/m ³	1'	
12	Hallway adjacent Gym	122-135 ng/m ³	6'	68°F
		120-138 ng/m ³	3'	
13	Side Entrance Floor Mats	160-190 ng/m ³	1'	68°F
		150 ng/m ³	6'	
14	Gym Office	171 ng/m ³	3'	68°F
		180 ng/m ³	1'	
15	Hallway adjacent Gym	95-101 ng/m ³	6'	68°F
		110-112 ng/m ³	3'	
16	Side Entrance Floor Mats	107-115 ng/m ³	1'	68°F
		8-11 ng/m ³	6'	
17	Side Entrance Floor Mats	50 ng/m ³	3'	68°F
		38-42 ng/m ³	1'	
18	Adjacent 116 Receiving Room	12-14 ng/m ³	6'	68°F
		11-14 ng/m ³	3'	
19	Adjacent 116 Receiving Room	12-15 ng/m ³	1'	68°F
20	Room 104 Carpet (Squares) Carpet (Circles)	4 ng/m ³	1'	N/A
		7 ng/m ³	1'	
21	Room 105 Carpet (Squares)	7 ng/m ³	1'	N/A
22	Room 113 Carpet (Circle) Carpet (Crab)	3 ng/m ³	1'	N/A
		4 ng/m ³	1'	
23	Room 206 Carpet (Squares) Carpet (World) Carpet Streets)	7 ng/m ³	1'	N/A
		7 ng/m ³	1'	
24	Room 206 Carpet (Squares) Carpet (World) Carpet Streets)	6 ng/m ³	1'	N/A
25	Room 222 Carpet (Circles) Carpet (Mod. Gray) Carpet (Gray stripe 1) Carpet (Gray stripe 2)	3 ng/m ³	1'	N/A
		3 ng/m ³	1'	
26	Room 222 Carpet (Circles) Carpet (Mod. Gray) Carpet (Gray stripe 1) Carpet (Gray stripe 2)	3 ng/m ³	1'	N/A
		3 ng/m ³	1'	
27	Room 223 Carpet (Circles) Carpet (Taupe Pile-1) Carpet (Taupe Pile-2)	4 ng/m ³	1'	N/A
		7 ng/m ³	1'	
28	Room 223 Carpet (Circles) Carpet (Taupe Pile-1) Carpet (Taupe Pile-2)	3 ng/m ³	1'	N/A
29	Outside (Background) (Run outside of Room 201)	11 ng/m ³	3'	64°F

(Results reported in ng/m³)

Results: Samples indicate a range between 60 ng/m³ and 179 ng/m³ in the breathing zone of 5' – 6' at the time of testing.

From the 1960's through the mid 1990's schools, colleges, and other facilities throughout the country installed synthetic "rubber-like" flooring in gymnasiums and similar rooms. Phenyl Mercuric acetate ($C_8H_8HgO_2$) was utilized in these floors as a catalyst to level and spread the floor. These floors have a potential to off gas especially in places where seams, tears and cracks exist. Mercury (Hg) is known to volatilize at room temperatures above 77° Fahrenheit and therefore exposure may fluctuate based on temperatures within the space. Ventilation is an important key in maintaining a low level of vapor exposure. Changes in room temperature, HVAC limitations or problems, or other climate changes should be monitored, and re-testing conducted to routinely check conditions.

Currently the Agency for Toxic Substances Disease Registry (ASTDR) has a residential occupancy level for Mercury (Hg) at *1 microgram(ug) per cubic meter* (1 ug/m^3) or *1,000 nanograms(ng) per cubic meter* ($1,000 \text{ ng/m}^3$). The Minnesota Department of Health is one of the few agencies in the country that sets vapor exposure guidance for Mercury Catalyzed Polyurethane Flooring at the present time. It sets a chronic level at 750 ng/m^3 and an acute level of 1800 ng/m^3 . These guidance values, set by the Minnesota Department of Health, were based on the USEPA Integrated Risk Information System (IRIS) Reference Concentration (RfC) for chronic mercury exposure of 300 ng/m^3 (USEPA 2004), which is a lifetime exposure concentration not expected to result in adverse health effects to most people, including sensitive subpopulations.

At this point, Minnesota is the only state to date that has issued recommendations concerning rubber flooring in gym/multipurpose room flooring. The Minnesota Department of Health recommends the general public not be exposed to short-term mercury air concentrations above 0.0018 milligrams(mg) per cubic meter (0.0018 mg/m^3) or 1,800 nanograms per cubic meter ($1,800 \text{ ng/m}^3$) in schools. For longer term exposures, the Minnesota Department of Health recommends that gym teachers should not be exposed to more than an average of 0.00075 mg/m^3 or (750 ng/m^3) during a 40-hour work week and children be limited to an average of 0.00075 mg/m^3 or (750 ng/m^3) during 16 hours or less per week averaged over the school year.

The Occupational Safety & Health Administration (OSHA) and the New Jersey Public Employee Occupational Safety & Health (PEOSH) permissible exposure limit for airborne exposure to workers is an 8-hour time weighted average of 0.0100 mg/m^3 or ($10,000 \text{ ng/m}^3$) for a 40-hour work week. The US Center for Disease Control (CDC) Agency recommends that entry into areas of schools where mercury levels exceed 0.00100 mg/m^3 or ($1,000 \text{ ng/m}^3$) be restricted until airborne levels return to less than 0.00030 mg/m^3 or (300 ng/m^3).

Section V**Observations/Recommended Response Actions**

Based on our latest assessment of the gymnasium area, under the conditions noted at the time of testing (HVAC/Ventilation systems actively engaged) it appears that the levels detected utilizing the LUMEX RA-915M were well below the levels established by USEPA / Minnesota Department of Health. Additionally, the levels were below the adjusted level developed by the Minnesota Department of Health as the adjusted value of 750 ng/m³. As stated in the Interpretation of Results, levels may increase / decrease based on climate factors such as HVAC system limitations / issues, temperature changes, ventilation restrictions, and other climate changes.

It is suggested that the rooftop exhaust units continue to ventilate the areas and should remain on either continuously, or activated at least two hours prior to occupancy, to assist in decreasing vapor concentrations. Follow up ambient sampling during weather changes should be conducted to verify that exhaust fans can provide enough air changes in order to lower vapor concentrations. It appears that the change in weather, lower temperatures, additional ventilation were successful in reducing the vapor concentrations from the original testing. The doorways leading to the hallway should be utilized to increase fresh airflow into the gymnasium. Ventilation should be at the maximum amount feasible.

Ultimately, removal of the flooring is the best solution to decrease the level of mercury exposure from the floor. AHERA recommends keeping heat low, as needed, during winter months. Periodic air testing for mercury vapors should be done in the gymnasium and surrounding areas to ensure maximum ventilation of the space is continuously happening.

Additional bulk sampling/core sampling should be conducted on the flooring and its substrate to determine the extent of cross contamination.

Lastly, ambient sampling of the area carpets dispersed throughout the building showed no signs of mercury vapor present above the background levels of 8-15 ng/m³.

OHIO Lumex Co. Certificate of Calibration

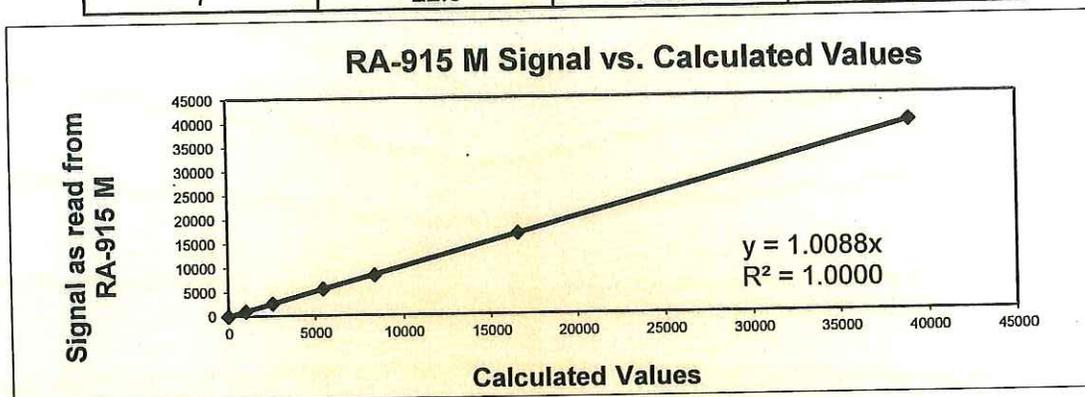
(Lumex Calibration Attached – 2 Pages)



Spectrometer Calibration Certificate

RA-915 M #1705

Standard #	Temp °C	Calculated Value	Signal (10m cell)
1	22.5	0	0
2	22.5	999	1002
3	22.5	2557	2539
4	22.5	5486	5553
5	22.5	8415	8333
6	22.5	16610	16798
7	22.5	38976	39334



Calibration Gas certified value: 4.7µg/m³
Calibration Parameter A: 52000

Reading observed: 4.7µg/m³
Calibration Parameter B: 29600

CALIBRATION DATE: 05/03/2018 NEXT CALIBRATION DUE: 05/04/2019

ON THE DATE CALIBRATED, THIS UNIT OPERATED WITHIN SPECIFIED TOLERANCES

Digital Barometer:

Cert. #1081-8782151, Cal. Due.: 09/01/2019

Digital Thermometer:

Cert. #1081-8782151, Cal. Due.: 09/01/2019

Gas NIST Traceable Standard

Themo Hg Calibrator Serial #0712322224

Concentration: 4.7µg/m³, Analytical Accuracy, +/- 10%. Recertification Date: 06/29/2018

Service Technician: V. SIK

QA/QC Manager: _____

Technical Director: _____

RECOMMENDATION NOTE: INSTRUMENT SHOULD BE RECALIBRATED EVERY 12 MONTHS OR SOONER, IF EXPOSED TO EXTREME CONDITIONS OR DAMAGE IS SUSPECTED

©2018 Ohio Lumex Co. Inc. 30350 Bruce Industrial Parkway, Solon, OH. 44139

mail@ohiolumex.com

1.888.876.2611

Thermo Scientific Model 81i Calibrator Certification Report

Certification Date: 6/29/2016

Location:	<u>Candidate</u> Franklin, MA	ID:	<u>Reference</u> NISTA
Device:	<u>81i-Ohio Lmuex</u>	S/N:	<u>0712322224</u>
S/N:	<u>1021143493</u>		
Chiller S/N 548	Chiller Temp 6 DEG C	RA 57492	

As Found Data:

As Left Data:

Candidate User Information		Candidate User Generator Certification					Reference Generator
Setpoint	Value	Setpoint	Certified	1 σ	2 σ	Relative	Expanded
$\mu\text{g}/\text{scm}$	$\mu\text{g}/\text{scm}$	$\mu\text{g}/\text{scm}$	$\mu\text{g}/\text{scm}$	$\mu\text{g}/\text{scm}$	$\mu\text{g}/\text{scm}$	2 σ %	2 σ %
1.2	1.05	1.2	1.18	0.0140	0.0280	2.38%	1.13%
2.7	2.41	2.7	2.72	0.0179	0.0358	1.32%	0.98%
4.7	4.23	4.7	4.73	0.0299	0.0598	1.26%	1.03%

At each concentration level, the results of the bracketing certification procedure are acceptable if the expanded uncertainty of the elemental mercury generator concentration, calculated in accordance with Section 6.3 in the Interim EPA Traceability Protocol for Qualification and Certification of Elemental Mercury Gas Generators, does not exceed 5.0 percent of the certified value, or is not more than 2.0 percent above the Vendor Prime uncertainty at the closest set point, whichever is less restrictive. (Source Interim EPA Traceability Protocol for Qualification and Certification of Elemental Mercury Gas Generators: Section 6.4)

Protocol applies only to Hg monitoring system span values greater than or equal to 5.0 micrograms per cubic meter
 (Source Interim EPA Traceability Protocol for Qualification and Certification of Elemental Mercury Gas Generators: Section 1.0)

This document certifies that the above instrument has been calibrated and tested in accordance with Thermo Fisher Scientific procedure conducted under the conditions noted with standards, which are certified traceable to the National Institute of Standards and Technology (NIST). This Calibration Certificate may not be reproduced except in full, without written permissions from Thermo Fisher Scientific. The results of this report relate only to the instrument tested and calibrated as identified on this certificate.

Calibration

Certification