

November 10, 2017

Ms. Robin Tedesco
Business Administrator
Parsippany Troy Hills School District
PO Box 52
Parsippany, NJ 07054

Dear Ms. Tedesco,

As requested at Littleton School, a mercury vapor air quality screening assessment was conducted of the gym. The mercury vapor air screening occurred on Friday November 3, and Saturday November 4, 2017. In addition representative air sampling was also conducted in the adjacent hallway and several nearby rooms for comparison.

The purposes of this sampling were the following;

Determine average airborne mercury vapor levels in the gym and adjacent hallways and classrooms under two (2) environmental conditions.

1. Ventilation system on, simulating normal occupancy mercury vapor level exposure to students and staff in occupied mode.
2. Ventilation system off (deactivated), simulating unoccupied mercury vapor levels that exist during night time un-occupied mode.

All sampling was conducted when the gym was not in use and the building unoccupied to reduce any potential safety concerns for staff or students or equipment damage during sampling.

Evaluation Criteria

In the 1960s, a number of companies began manufacturing and installing a thin layer of synthetic, polyurethane flooring on top of concrete sub-floors, to provide a resilient and rubber-like surface. Typically, proprietary liquid polyurethane was poured on top of the sub-floor and organo-mercuric salts were incorporated to catalyze the polymerization/curing process to produce a solid, rubber-like floor. These polyurethane floors are reported to contain between 0.1 and 0.2 percent total mercury (ATSDR 2006a). Mercury-containing polyurethane floors were widely installed in school gymnasiums across the US, until being discontinued mostly in the mid-1980s amid concerns over their emissions of elemental mercury vapor (NEWMOA 2010). However, many of these floors remain in place today, and recent reports have demonstrated that some emit notable amounts of elemental mercury vapor (ATSDR 2003; 2004; 2006a; 2006b), which has raised questions about inhalation health risks, particularly for children in schools.

The U.S. Environmental Protection Agency (EPA) has developed an airborne exposure Reference Concentration (RfC) level for mercury vapor of an average of 0.3 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) for lifetime exposure (average over 70 years) that is unlikely to cause measurable risk for adverse, health effects to the most sensitive members of the population including pregnant women and children.

The U.S. Centers for Disease Control (CDC) Agency for Toxic Substances Disease Registry (ATSDR) recommends that areas of schools where mercury levels exceed $10 \mu\text{g}/\text{m}^3$ be restricted until airborne levels return to less than $3 \mu\text{g}/\text{m}^3$.

The Minnesota Department of Health (MDH) recommends that the general public should not be exposed to short-term (acute or one hour) mercury air concentrations above 1.8 micrograms mercury per cubic meter of air ($\mu\text{g}/\text{m}^3$) in schools. They believe that this conservative criterion protects all people, including sensitive individuals, such as pregnant women and children. For longer term exposures, MDH recommends that school gym teachers should not be exposed to more than an average of $0.750 \mu\text{g}/\text{m}^3$ mercury vapor during 40 hour work weeks averaged over the school year, and children exercising in the gym should also be limited to an average of $0.750 \mu\text{g}/\text{m}^3$ during 16 hours or less per week averaged over the school year.

The New Jersey Public Employees Occupational Safety and Health (PEOSH) Act Permissible Exposure Limit (PEL) for airborne mercury exposure to workers (including teachers) is an 8 hour time weighted average of 0.1 milligrams per cubic meter (equivalent to $100 \mu\text{g}/\text{m}^3$) for a 40 hour work week (approximately 133 times higher than the Minnesota Guideline for teachers and students). New Jersey has published no specific recommended exposure limits for members of the general public or children in schools for exposure to mercury (in air or on surfaces).

Methods

Based upon the above, the following methods were observed:

1. Air monitoring for mercury was conducted within the gym and surrounding hallway & classrooms during ventilation system off (deactivated) and ventilation system on normal occupancy modes, using a Jerome J505 Atomic Fluorescence Spectroscopy Mercury Vapor Analyzer.
2. Ventilation system on (simulated normal occupancy) continuous air monitoring began around 6:00 pm on Friday November 3, 2017 and continued until 3:30 am, November 4, 2017. The ventilation system was on and in occupancy mode during this approximate 9 hour testing period. Samples were collected every 10 minutes.

3. Ventilation system off (deactivated) continuous air monitoring began around 3:30 am on Saturday November 4, 2017 and continued until 12:30 pm Saturday November 4, 2017. The ventilation system (deactivated) was off and in occupied mode during this approximate 9 hour testing period. Samples were collected every 10 minutes.
4. Ventilation system on and deactivated mercury vapor level spot monitoring was performed before and after of hallway and adjacent classrooms to document levels.

Findings and Results

Littleton Gym

The rubberized floor appears to have had sections repaired in the past, at the time of sampling the floor was in good condition with small cuts and gouges spread throughout the floor.

Average airborne mercury levels in the gym with the ventilation system on simulating normal occupancy mode (6:00 pm-3:30 am) averaged **0.08 $\mu\text{g}/\text{m}^3$** ; which is below the guidelines.

Average airborne mercury levels in the gym with the ventilation off (deactivated) simulating overnight unoccupied mode averaged **0.12 $\mu\text{g}/\text{m}^3$** , which is below guidelines.

Conclusions and Recommendations

Based upon the findings of this investigation, it is my professional opinion that the airborne levels of mercury vapor measured at Littleton School gym during occupied mode (ventilation system on) are below the lifetime reference concentration of 0.3 $\mu\text{g}/\text{m}^3$ published by the US EPA, the 2012 Centers for Disease Control ATSDR guidelines for schools and members of the general public as well as the Minnesota Department of Health for 16 to 40 hours per week for students & teachers; respectively.

The airborne mercury levels in the unoccupied mode (ventilation off/deactivated) are below the lifetime reference concentration of 0.3 $\mu\text{g}/\text{m}^3$ published by the US EPA, the 2012 Centers for Disease Control ATSDR guidelines for schools and members of the general public as well as the Minnesota Department of Health for 16 to 40 hours per week for students & teachers; respectively.

Airborne levels of mercury vapor in the surrounding hallway and comparison classrooms were comparable during periods with ventilation on or off modes. No significant mercury vapor hazards are expected in the hallways or classrooms.

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The following recommendations should continue to be followed in the gym.

1. Continue to operate the gym's ventilation system in the occupied mode when students or staff are present
2. Seasonal periodic monitoring should be performed to demonstrate acceptable mercury levels as outside temperatures rise or fall.

If you or anyone has questions regarding sampling, please contact me right away.

Sincerely,



Michael S. Berta, CSP, CPEA, CMC

Manager EHS

ASSE Certified Safety Professional

Certified Professional Environmental Auditor

Certified Microbial Consultant

Attachment: Mercury Vapor Data, Jerome J505

Jerome J505 Mercury Air Vapor Sampling Results

Client
Building Location

Parsippany Troy Hills School
Littleton School

Mercury Guidelines
MDH School Acute
MDH School Chronic
OSHA 8 Hour PEL
US EPA (RfC)

0.750 ug/m3
1.80 ug/m3
100.00 ug/m3
0.3 ug/m3

Ventilation On

Location	Ventilation On/Off	Date	Time	Airborne Mercury ug/m3	Comment
Room 11	On	3-Nov-17	18:04:12	<0.05	Comparison Area
Room 10	On	3-Nov-17	18:05:04	<0.05	Comparison Area
Hallway By Bathroom & Drinking Fountain	On	3-Nov-17	18:05:54	<0.05	Comparison Area
Room 25	On	3-Nov-17	18:07:06	<0.05	Comparison Area
Room 26	On	3-Nov-17	18:07:57	<0.05	Comparison Area
Hallway by Room 26	On	3-Nov-17	18:14:38	<0.05	Comparison Area
Room 24	On	3-Nov-17	18:15:46	<0.05	Comparison Area
Room 18	On	3-Nov-17	18:17:47	<0.05	Comparison Area
Room 19	On	3-Nov-17	18:20:42	<0.05	Comparison Area
Room 23	On	3-Nov-17	18:21:49	<0.05	Comparison Area
Gym- Center	On	3-Nov-17	18:23:52	<0.05	Gym
Gym- Center	On	3-Nov-17	18:31:09	<0.05	Gym
Gym- Center	On	3-Nov-17	18:36:25	<0.05	Gym
Gym- Center	On	3-Nov-17	18:40:43	0.06	Gym
Gym- Center	On	3-Nov-17	18:44:09	0.08	Gym
Gym- Center	On	3-Nov-17	18:46:03	<0.05	Gym
Gym- Center	On	3-Nov-17	18:47:04	<0.05	Gym
Gym- Center	On	3-Nov-17	18:49:06	<0.05	Gym
Gym- Center	On	3-Nov-17	18:49:30	<0.05	Gym

Gym- Center	On	3-Nov-17	18:50:29	<0.05	Gym
Gym- Center	On	3-Nov-17	19:00:43	<0.05	Gym
Gym- Center	On	3-Nov-17	19:10:43	0.11	Gym
Gym- Center	On	3-Nov-17	19:20:43	0.15	Gym
Gym- Center	On	3-Nov-17	19:30:43	0.25	Gym
Gym- Center	On	3-Nov-17	19:40:43	0.03	Gym
Gym- Center	On	3-Nov-17	19:50:43	0.15	Gym
Gym- Center	On	3-Nov-17	20:00:43	0.13	Gym
Gym- Center	On	3-Nov-17	20:10:43	0.07	Gym
Gym- Center	On	3-Nov-17	20:20:43	0.13	Gym
Gym- Center	On	3-Nov-17	20:30:43	0.09	Gym
Gym- Center	On	3-Nov-17	20:40:43	<0.05	Gym
Gym- Center	On	3-Nov-17	20:50:43	0.1	Gym
Gym- Center	On	3-Nov-17	21:00:43	0.17	Gym
Gym- Center	On	3-Nov-17	21:10:43	0.06	Gym
Gym- Center	On	3-Nov-17	21:20:43	0.06	Gym
Gym- Center	On	3-Nov-17	21:30:43	0.08	Gym
Gym- Center	On	3-Nov-17	21:40:43	<0.05	Gym
Gym- Center	On	3-Nov-17	21:50:43	<0.05	Gym
Gym- Center	On	3-Nov-17	22:00:43	0.08	Gym
Gym- Center	On	3-Nov-17	22:10:43	0.12	Gym
Gym- Center	On	3-Nov-17	22:20:43	0.08	Gym
Gym- Center	On	3-Nov-17	22:30:43	0.13	Gym
Gym- Center	On	3-Nov-17	22:40:43	<0.05	Gym
Gym- Center	On	3-Nov-17	22:50:43	<0.05	Gym

Gym- Center	On	3-Nov-17	23:00:43	<0.05	Gym
Gym- Center	On	3-Nov-17	23:10:43	0.14	Gym
Gym- Center	On	3-Nov-17	23:20:43	0.07	Gym
Gym- Center	On	3-Nov-17	23:30:43	0.06	Gym
Gym- Center	On	3-Nov-17	23:40:43	0.06	Gym
Gym- Center	On	3-Nov-17	23:50:43	0.07	Gym
Gym- Center	On	4-Nov-17	0:00:43	<0.05	Gym
Gym- Center	On	4-Nov-17	0:10:43	0.1	Gym
Gym- Center	On	4-Nov-17	0:20:43	0.11	Gym
Gym- Center	On	4-Nov-17	0:30:43	0.06	Gym
Gym- Center	On	4-Nov-17	0:40:43	0.13	Gym
Gym- Center	On	4-Nov-17	0:50:43	0.11	Gym
Gym- Center	On	4-Nov-17	1:00:43	0.08	Gym
Gym- Center	On	4-Nov-17	1:10:43	<0.05	Gym
Gym- Center	On	4-Nov-17	1:20:43	0.06	Gym
Gym- Center	On	4-Nov-17	1:30:43	0.09	Gym
Gym- Center	On	4-Nov-17	1:40:43	0.09	Gym
Gym- Center	On	4-Nov-17	1:50:43	0.1	Gym
Gym- Center	On	4-Nov-17	2:00:43	0.08	Gym
Gym- Center	On	4-Nov-17	2:10:43	0.09	Gym
Gym- Center	On	4-Nov-17	2:20:43	<0.05	Gym
Gym- Center	On	4-Nov-17	2:30:43	<0.05	Gym
Gym- Center	On	4-Nov-17	2:40:43	0.09	Gym
Gym- Center	On	4-Nov-17	2:50:43	0.09	Gym
Gym- Center	On	4-Nov-17	3:00:43	0.09	Gym

Gym- Center	On	4-Nov-17	3:10:43	<0.05	Gym
Gym- Center	On	4-Nov-17	3:20:43	0.06	Gym
Gym- Center	On	4-Nov-17	3:30:43	<0.05	Gym
Average Gym Ventilation On				0.08	Ventilation On Mode

Jerome J505 Mercury Air Vapor Sampling Results

Client
Building Location

Parsippany Troy Hills School
Littleton School

Mercury Guidelines
MDH School Acute 0.750 ug/m3
MDH School Chronic 1.80 ug/m3
OSHA 8 Hour PEL 100.00 ug/m3
US EPA (RfC) 0.3 ug/m3

Ventilation Off

Location	Ventilation On/Off	Date	Time	Airborne Mercury ug/m3	Comment
Gym- Center	Off	4-Nov-17	3:30:43	<0.05	Gym
Gym- Center	Off	4-Nov-17	3:40:43	0.06	Gym
Gym- Center	Off	4-Nov-17	3:50:43	<0.05	Gym
Gym- Center	Off	4-Nov-17	4:00:43	0.12	Gym
Gym- Center	Off	4-Nov-17	4:10:43	0.12	Gym
Gym- Center	Off	4-Nov-17	4:20:43	0.1	Gym
Gym- Center	Off	4-Nov-17	4:30:43	0.14	Gym
Gym- Center	Off	4-Nov-17	4:40:43	0.14	Gym
Gym- Center	Off	4-Nov-17	4:50:43	0.08	Gym
Gym- Center	Off	4-Nov-17	5:00:43	0.13	Gym
Gym- Center	Off	4-Nov-17	5:10:43	0.13	Gym
Gym- Center	Off	4-Nov-17	5:20:43	0.1	Gym
Gym- Center	Off	4-Nov-17	5:30:43	0.14	Gym
Gym- Center	Off	4-Nov-17	5:40:43	0.17	Gym
Gym- Center	Off	4-Nov-17	5:50:43	0.16	Gym
Gym- Center	Off	4-Nov-17	6:00:43	0.18	Gym
Gym- Center	Off	4-Nov-17	6:10:43	0.17	Gym
Gym- Center	Off	4-Nov-17	6:20:43	0.16	Gym
Gym- Center	Off	4-Nov-17	6:30:43	0.12	Gym
Gym- Center	Off	4-Nov-17	6:40:43	0.2	Gym
Gym- Center	Off	4-Nov-17	6:50:43	0.16	Gym
Gym- Center	Off	4-Nov-17	7:00:43	0.12	Gym
Gym- Center	Off	4-Nov-17	7:10:43	0.18	Gym
Gym- Center	Off	4-Nov-17	7:20:43	0.1	Gym
Gym- Center	Off	4-Nov-17	7:30:43	0.18	Gym

Gym- Center	Off	4-Nov-17	7:40:43	0.15	Gym
Gym- Center	Off	4-Nov-17	7:50:43	0.11	Gym
Gym- Center	Off	4-Nov-17	8:00:43	0.17	Gym
Gym- Center	Off	4-Nov-17	8:10:43	0.14	Gym
Gym- Center	Off	4-Nov-17	8:20:43	0.08	Gym
Gym- Center	Off	4-Nov-17	8:30:43	0.06	Gym
Gym- Center	Off	4-Nov-17	8:40:43	<0.05	Gym
Gym- Center	Off	4-Nov-17	8:50:43	0.12	Gym
Gym- Center	Off	4-Nov-17	9:00:43	0.11	Gym
Gym- Center	Off	4-Nov-17	9:10:43	0.11	Gym
Gym- Center	Off	4-Nov-17	9:20:43	0.17	Gym
Gym- Center	Off	4-Nov-17	9:30:43	0.13	Gym
Gym- Center	Off	4-Nov-17	9:40:43	0.12	Gym
Gym- Center	Off	4-Nov-17	9:50:43	0.16	Gym
Gym- Center	Off	4-Nov-17	10:00:43	0.09	Gym
Gym- Center	Off	4-Nov-17	10:10:43	0.13	Gym
Gym- Center	Off	4-Nov-17	10:20:43	0.11	Gym
Gym- Center	Off	4-Nov-17	10:30:43	0.11	Gym
Gym- Center	Off	4-Nov-17	10:40:43	<0.05	Gym
Gym- Center	Off	4-Nov-17	10:50:43	0.08	Gym
Gym- Center	Off	4-Nov-17	11:00:43	0.11	Gym
Gym- Center	Off	4-Nov-17	11:10:43	0.09	Gym
Gym- Center	Off	4-Nov-17	11:20:43	0.13	Gym
Gym- Center	Off	4-Nov-17	11:30:43	0.1	Gym
Gym- Center	Off	4-Nov-17	11:40:43	0.1	Gym
Gym- Center	Off	4-Nov-17	11:50:43	0.11	Gym
Gym- Center	Off	4-Nov-17	12:00:43	0.13	Gym
Gym- Center	Off	4-Nov-17	12:10:43	0.15	Gym
Gym- Center	Off	4-Nov-17	12:20:43	0.14	Gym
Gym- Center	Off	4-Nov-17	12:30:43	0.14	Gym
Room 11	Off	3-Nov-17	12:32:36	<0.05	Comparison Area
Room 10	Off	3-Nov-17	12:33:36	<0.05	Comparison Area
Hallway By Bathroom & Drinking Fountain	Off	3-Nov-17	12:34:27	<0.05	Comparison Area

Room 25	Off	3-Nov-17	12:35:39	<0.05	Comparison Area
Room 26	Off	3-Nov-17	12:36:52	<0.05	Comparison Area
Hallway by Room 26	Off	3-Nov-17	12:38:04	<0.05	Comparison Area
Room 24	Off	3-Nov-17	12:39:03	<0.05	Comparison Area
Room 18	Off	3-Nov-17	12:40:17	<0.05	Comparison Area
Room 19	Off	3-Nov-17	12:41:27	<0.05	Comparison Area
Room 23	Off	3-Nov-17	12:42 30	<0.05	Comparison Area
Average Gym Ventilation Off				0.12	Ventilation Off Mode