

November 4, 2020

Dr. Tracy Handerhan,  
Superintendent  
Wall Township Schools  
1620 18th Ave  
Wall Township, NJ 07719

Dear Dr. Handerhan,

This report summarizes our professional opinions and recommendations associated with the recent discovery that the gymnasium at the Wall Township High School may contain a mercury catalyzed rubberized floor. The professional opinions in this report are based upon the following:

- Review of the July 16, 2020 Initial Bulk and Air Sampling Report by Partner Engineering including associated laboratory results, and air monitoring data.
- Review of the August 4, 2020 Mercury Investigation Report from Partner Engineering.
- Air Sampling results from EMSL Analytical via Environmental Remediation & Management (collected with the air handler deactivated on July 11, 2019).
- Review of the June 24, 2020 Interpretation of Air Sampling Results Memo by the NJ Work Environment Council
- [ESMCorp](#)'s September 18 to 29, 2020 Air monitoring survey and HVAC Stress Test of the Wall Township High School South Gym.

This evaluation and assessment was conducted by Dr. Richard M. Lynch, Ph.D., CIH and Mr. Richard A. Lynch, MBA, CIEC of [ESMCorp](#).

### Executive Summary of Findings

Based upon our review of the Partner Engineering reports and findings from our September 18 through September 29, 2020 inspections and air monitoring it is our professional opinion that **the rubberized floor within the Wall Township South Gym contains some mercury likely used as a catalyst**. Bulk mercury levels were varied ranging from less than 1 to approximately 73 parts per million. Air sampling and monitoring data collected from within the gym using a variety of methods including air sampling and laboratory analysis, as well as several monitoring rounds in June, July and September 2020 all revealed extremely low airborne mercury levels ranging between **none detected to a maximum of 0.1 micrograms per cubic meter**; all well below the NJ Department of Health guideline of 0.8  $\mu\text{g}/\text{m}^3$  for protection of pre-school aged children using school gyms and far below the PEOSHA 8-hour Permissible Exposure Limit 100  $\mu\text{g}/\text{m}^3$  for teachers and staff.

Based upon all of the above, it is our professional opinion that the airborne mercury levels within Wall Township High School South Gym do not present any imminent health risk to students or staff at the levels measured. In accordance with the guidance from the NJ Department of Health, the gym is safe for use by students and staff at the levels measured. Periodic air monitoring should be repeated at a minimum quarterly, beginning in December 2020 when the heating season requires that the gym's overhead air handler modulates into the heating mode.

## I. Evaluation Criteria

Beginning in the 1960's many manufacturers included phenyl mercuric acetate as a catalyst in its poured rubberized gym floor products. Some of these rubberized floors may release elemental mercury vapor from the floors into air of the gym.

Elemental mercury is a metal that exists in liquid and vapor form, commonly used in many consumer products and is typically encountered in homes, schools, offices and industrial workplaces. The Federal OSHA and 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 micrograms per cubic meter -  $\mu\text{g}/\text{m}^3$ ) for a 40-hour work week. The US Environmental Protection has developed an airborne exposure Reference Criteria (RfC) level for mercury vapor of  $0.3 \mu\text{g}/\text{m}^3$  for lifetime (>70 years) exposure that is unlikely to cause measurable risk for adverse, health effects. According to the EPA, this conservative criterion protects all people, including sensitive individuals, such as pregnant women and children. Based upon this the EPA RfC, Agency for Toxic Substance Research (ATSDR) recommends that schools temporarily evacuate areas with mercury exceeding  $10 \mu\text{g}/\text{m}^3$  until levels have returned to below  $3 \mu\text{g}/\text{m}^3$ . 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 ( $\mu\text{g}/\text{m}^3$ ). For longer exposures, MDH recommends that gym teachers should not be exposed to more than  $0.750 \mu\text{g}/\text{m}^3$  mercury vapor during 40-hour work weeks averaged over the school year and that children exercising in the gym 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 Department of Health guideline for mercury vapor exposure from rubberized gym floors is  $0.8 \mu\text{g}/\text{m}^3$  which is based upon protecting pre-school-aged children. At levels exceeding  $0.8 \mu\text{g}/\text{m}^3$  the NJ Department of Health recommends that schools take active steps to manage and reduce airborne mercury levels within school gyms.

## II. Summary of Partner Engineering Inspections, Sampling and Monitoring

Our review of the May 18 and June 5, 2020 bulk sampling results of the South gym floor revealed varied mercury levels ranging from < 1 part per million (ppm) to approximately 78 parts per million. Based upon these results it is our professional opinion that mercury was likely used as a catalyst in the floor. Air sampling conducted by Partner on or around June 3, 2020 revealed no airborne mercury detected (detection limit of 0.7 micrograms per cubic meter) within the gym, gym supply closet and locker room hallway outside of the gym. Air monitoring conducted throughout the gym on June 3, 2020 revealed no elevations in airborne mercury (<  $0.05 \mu\text{g}/\text{m}^3$ ). Mercury was detected in concrete and soil in subsequent samples collected on or around June 30, 2020.

Follow-up air sampling was conducted again by Partner Engineering on or around July 21, 2020 throughout the gym. Outdoor temperature was approximately 97°F. Interior temperature within the non-air-conditioned gym ranged between 82-91°F during the sampling period. Overhead air handlers were operating in normal occupied mode at the time of sampling. Air sampling results revealed that average airborne mercury levels were non-detectable at less than 0.12 micrograms per cubic meter in the gym, and <  $0.24 \mu\text{g}/\text{m}^3$  in the locker room hallway. Air monitoring using a Lumex 915+ Mercury Vapor Analyzer revealed airborne mercury levels ranging between approximately 5 to 32 nanograms per cubic meter

(approximately 0.005 to 0.032 micrograms per cubic meter within the South Gym, comparable to levels measured in surrounding classrooms, hallways, cafeterias and other areas not connected to the gym or gym ventilation system. **All airborne sampling and monitoring results were substantially lower than the NJ Department of Health guideline for mercury in gym of 0.8 micrograms per cubic meter.**

Based upon these findings, Partner Engineering recommended that the Wall Township School District; 1) continue to use the gym under similar ventilation system conditions, 2) perform quarterly, seasonal air sampling for mercury, 3) maintain room temperature and ventilation consistent with the conditions of sampling, and 4) arrange additional sampling if conditions change.

### III. ESMCorp September 19-29, 2020 Inspection Methods and Findings

The following methods were observed during our September 18 through September 29 site inspections

- An initial walkthrough inspection of the Wall township High School South School Gym was conducted to observe the configuration, layout, heating and ventilating equipment and proximity to classrooms and offices.
- A visual inspection of overhead heating and ventilating ductwork for the gym was conducted
- Spot air monitoring was conducted within the gym and surrounding hallways using a calibrated Jerome J505 Mercury Vapor Analyzer. The J505 detection limit is reported at 0.05  $\mu\text{g}/\text{m}^3$  with readings as low as 0.00  $\mu\text{g}/\text{m}^3$  with a resolution of 0.01. [ESMCorp](#) reports all measurement data down to 0.00  $\mu\text{g}/\text{m}^3$  to provide maximum information to readers.
- This monitoring was conducted during normal occupancy mode and use of the gym during school hours with the gym's air handler operating in the 24/7 occupied mode at 68°F thermostat setting.
- Continuous air monitoring was conducted (1 measurement every 5 minutes) in the center of the gym between September 18, 2020 and September 22, 2020 and September 24 through 29, 2020. This included an HVAC Stress test where the South Gym's air handler was intentionally deactivated between 3:00 PM on September 25, 2020 through 6:45 AM on September 28, 2020. The purpose of this stress test was to determine the extent to which airborne mercury levels increased within the gym when the air handler was deactivated, and the approximate time required upon reactivation for airborne mercury levels to return to baseline conditions.
- Air monitoring for temperature and humidity within the gym was conducted during this period using a TSI 7575 Q-Trak IAQ monitor.
- Air monitoring was completed on September 29, 2020.



### IV. ESMCorp's September 18-22, 2020 Observations, Findings and Results

Initial September 18, 2020 Inspection findings revealed the following:

- The Wall Township High School South Gym was not in use during this study, as the district has removed it from service.
- The approximate floor area of the gym is 9000 square feet with an approximate 25-foot ceiling.
- The Gym's overhead Heating and Ventilation system was operating at the time of the inspection. The system is comprised of 6 overhead heating and ventilating systems; each rated at approximately 2,500 cubic feet per minute. Each overhead air handler is equipped with heating coils and outdoor air dampers with pneumatic controls to modulate outdoor air introduction based upon outdoor temperature and thermostat settings (up to 50% outdoor air introduction). Total estimated airflow from overhead units is approximately 15,000 cubic feet per minute with up to

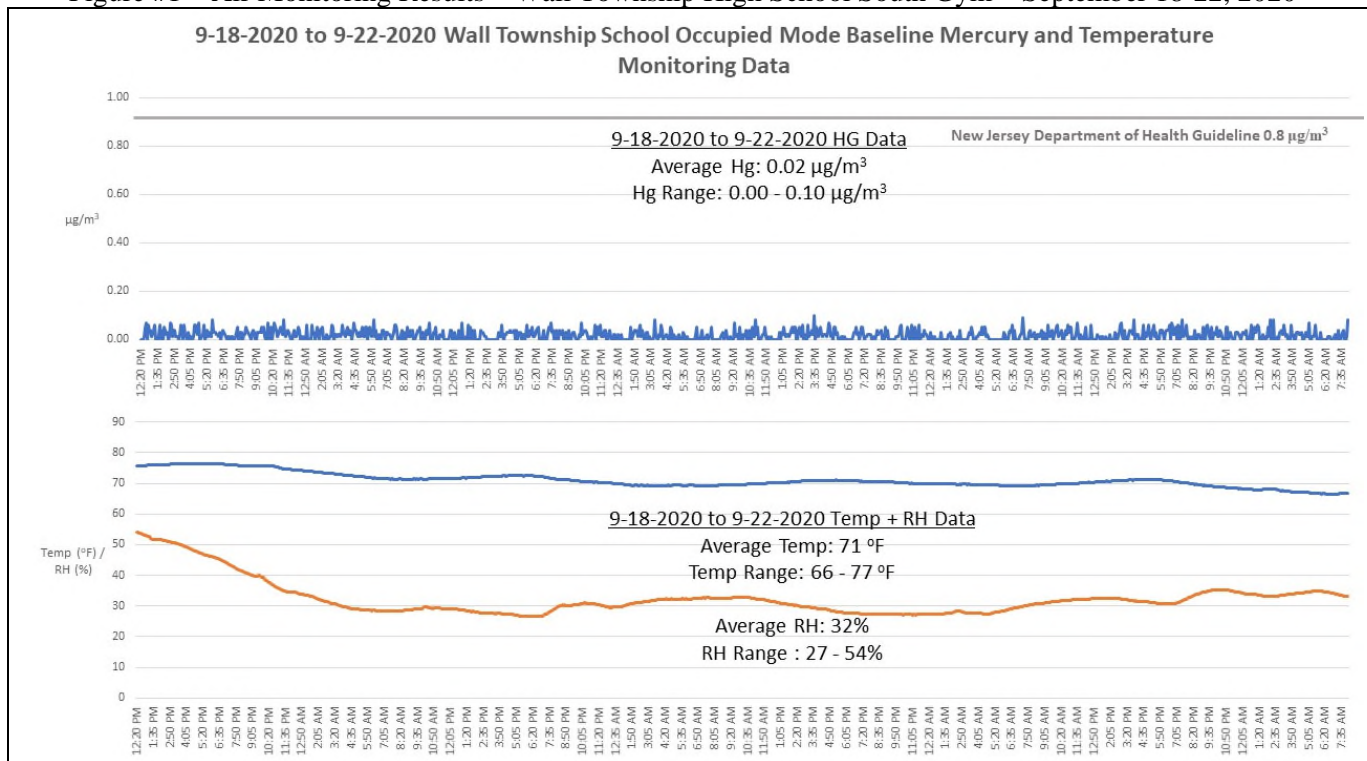
7500 cfm outdoor air introduction.

- Outdoor mercury levels measured at the front entrance, was measured at 0.00 to 0.01  $\mu\text{g}/\text{m}^3$ .
- Initial spot check for mercury within the gym ranged between approximately 0.00 to 0.08  $\mu\text{g}/\text{m}^3$ ; well below the NJ Department of Health Guideline of 0.8  $\mu\text{g}/\text{m}^3$ . Gym temperature was approximately 74-76°F.
- Airborne mercury levels in surrounding hallway areas averaged 0.00  $\mu\text{g}/\text{m}^3$ , comparable to outdoor levels.
- Spot monitoring results from our September 18, 2020 inspection are shown in Table #1 at the end of this report.

Outdoor Mercury = 0.00 to 0.01 $\mu\text{g}/\text{m}^3$	Gym Mercury 0.00 to 0.08 $\mu\text{g}/\text{m}^3$
	

Continuous monitoring within the gym center collected between approximately 2:00 PM on September 18 and 7:30 AM on September 22, 2020 revealed average airborne mercury levels at 0.02  $\mu\text{g}/\text{m}^3$  with a maximum of 0.10  $\mu\text{g}/\text{m}^3$  ; well below the NJ Department of Health guideline of 0.8  $\mu\text{g}/\text{m}^3$ . Gym temperature during the monitoring period averaged 71°F (see Figure #1 below).

Figure #1 – Air Monitoring Results – Wall Township High School South Gym – September 18-22, 2020



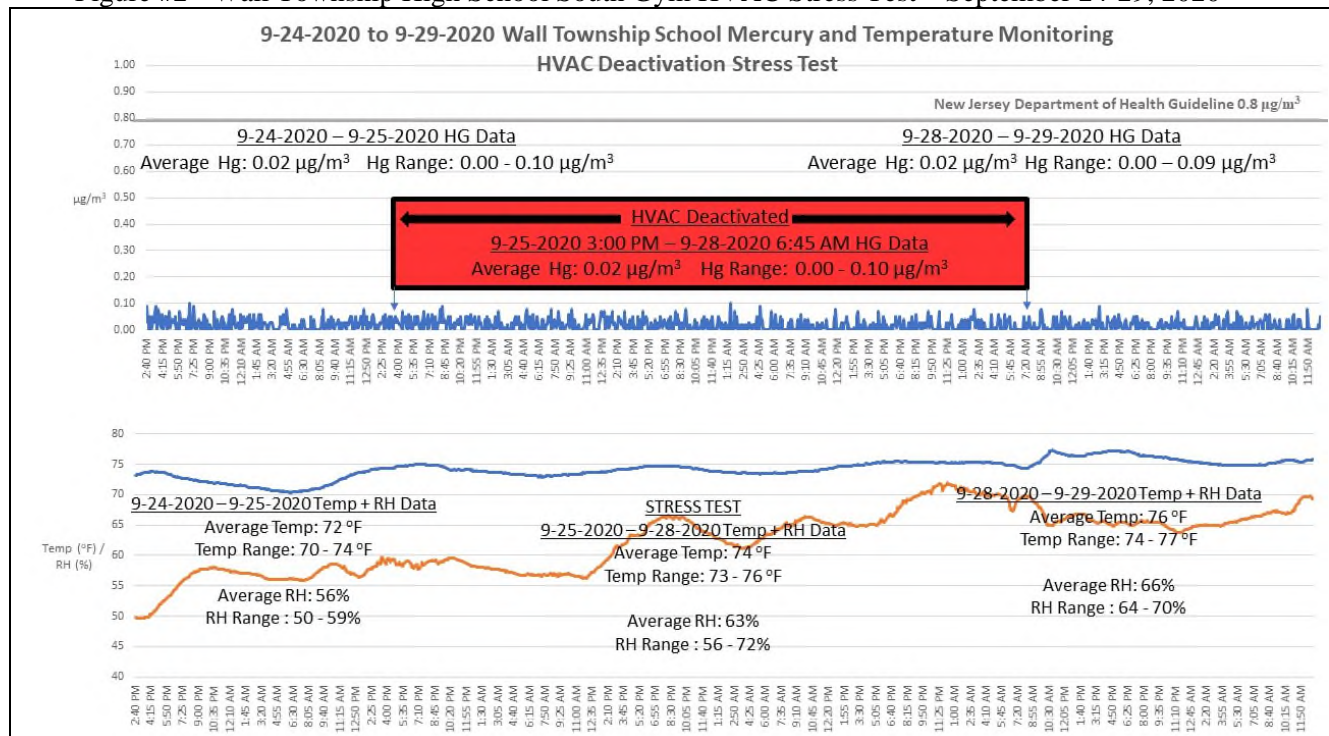
**V. HVAC Stress Test Findings**

Based upon the above, An HVAC Stress test was conducted between September 24-29, 2020 to determine the extent to which airborne mercury levels would increase after deactivation of the overhead heating and ventilation units for the gym.

Findings revealed that airborne mercury levels between September 24 and up to 3:00 PM on September 25, averaged 0.02 µg/m<sup>3</sup>. During the approximate 60 hours of no ventilation within the South Gym on September 25-28, 2020 airborne mercury levels remained unchanged at an average 0.02 µg/m<sup>3</sup> (range 0.00 to 0.10 µg/m<sup>3</sup>); well below the NJ Department of Health guideline of 0.8 µg/m<sup>3</sup>.

Findings from the Stress Test are shown in Figure #2 below.

Figure #2 - Wall Township High School South Gym HVAC Stress Test – September 24-29, 2020



## VI. Conclusions and Recommendations

Based upon our review of the Partner Engineering reports and findings from our September 18 through September 29, 2020 inspections and air monitoring it is our professional opinion that **the rubberized floor within the Wall Township South Gym contains some mercury likely used as a catalyst**. Bulk mercury levels were varied ranging from less than 1 to approximately 73 parts per million. Air sampling and monitoring data collected from within the gym using a variety of methods including air sampling and laboratory analysis, as well as several monitoring rounds in June, July and September 2020 all revealed extremely low airborne mercury levels ranging between **none detected to a maximum of 0.1 micrograms per cubic meter**; all well below the NJ Department of Health guideline of  $0.8 \mu\text{g}/\text{m}^3$  for protection of pre-school aged children using school gyms and far below the PEOSHA 8-hour Permissible Exposure Limit  $100 \mu\text{g}/\text{m}^3$  for teachers and staff.

Based upon all of the above, it is our professional opinion that the airborne mercury levels within Wall Township High School South Gym do not present any imminent health risk to students or staff at the levels measured. In accordance with the guidance from the NJ Department of Health, the gym is safe for use by students and staff at the levels measured.

Periodic air monitoring should be repeated at a minimum quarterly, beginning in December 2020 when the heating season requires that the gym's overhead air handler modulates into the heating mode.

[ESMCorp](#) is prepared to assist you with all of the above including risk communication efforts. Please contact us to coordinate next steps. Thank you for the opportunity to assist you with the evaluation. Please contact me with any questions at (856)764-3557.

Sincerely,

*Richard M. Lynch*

Richard M. Lynch, Ph.D., CIH, FAIHA, CMC, CMRS, CHFM

*Certified Industrial Hygienist*

*Certified Microbial Consultant*

*Certified Microbial Remediation Supervisor*

*Certified Healthcare Facility Manager*

President

Environmental Safety Management Corporation

School Name **Wall Township South Gym**

Inspection Type **Mercury Monitoring**

Dates of inspection **9/18/2020**

Inspected, **Dr. Richard M. Lynch, Ph.D., CIH, CMC, CMRS, CHFM - President**

Reviewed and

Finalized by **Richard A. Lynch, MBA, Certified Indoor Environmental Consultant**



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**Table 1**

**ESMCorp 9-18-2020 Spot Monitoring Data**

Monitoring Location	9-18-2020 10am Mercury ( $\mu\text{g}/\text{m}^3$ )	9-18-2020 10am Temp ( $^{\circ}\text{F}$ )	9-18-2020 10am RH (%)	9-18-2020 1145am Mercury ( $\mu\text{g}/\text{m}^3$ )	9-18-2020 1145am Temp ( $^{\circ}\text{F}$ )	9-18-2020 1145am RH (%)	Partner Engineering 8-4-2020 Mercury Monitoring ( $\mu\text{g}/\text{m}^3$ )
outside	0.00	70	50	0.00	71	52	-
South gym - South	0.04	75	58	0.01	76	53	0.005
South gym - Center	0.08	75	58	0.05	76	54	0.023
Auxiliary Gym	0.00	75	56	0.00	75	51	0.034
Locker Room Hallway	0.00	75	57	0.00	76	54	0.045
South Gym - Northwest	0.00	75	59	0.02	76	54	0.032
South Hallway	0.00	74	59	0.00	75	56	0.022
Cafeteria	0.00	74	60	0.02	74	56	0.016
<b>Average</b>	<b>0.02</b>	<b>75</b>	<b>58</b>	<b>0.01</b>	<b>75</b>	<b>54</b>	<b>0.03</b>

**State and Federal Mercury Exposure Guidelines ( $\mu\text{g}/\text{m}^3$ )**

PEOSHA 8 Hour PEL	ATSDR Temporary Evacuation Ceiling	Minnesota DOH Short Term Guideline	Minnesota DOH School Guideline	New Jersey Department of Health
100	10	1.8	0.75	0.8





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**Certification of Instrument Calibration**

Environmental Safety Management Corp  
 21 E. Scott Street  
 Riverside, NJ 08075

RMA # 2721737

This is to certify that the Jerome **J505-0005** Atomic Fluorescence Mercury Analyzer, Serial Number **50500325**, was calibrated with standard units traceable to NIST.

Calibration Status as Received:	<u>In Calibration</u>		
	Actual	Calibration Gas	Allowable Range
<b>Incoming:</b>	26.76 µg/m3 Hg 0.22 % RSD	25.00 µg/m3 Hg	22.50 - 27.50 µg/m3 Hg <5%
<b>Outgoing:</b>	24.88 µg/m3 Hg 0.32 % RSD	25.00 µg/m3 Hg	23.75 - 26.25 µg/m3 Hg <3%
<b>Calibration Verification:</b>	µg/m3 Hg % RSD	0.300 µg/m3 Hg	0.255 - 0.345 µg/m3 Hg <15%

Calibration Status as Left: In Calibration

Estimated Uncertainty of Calibration System: 3.5%

Calibration Date: 09-Jan-2020      Recalibration Date: 08-Jan-2021

Temperature °F: 68.80      % Relative Humidity: 25.50

Approved By: Jackie Kreitlow  
 Title: Jackie Kreitlow - Quality Control

Date Approved: 09-Jan-2020

Equipment Used:

- Permeation Tube:** S89-6 NIST#: ISO13265; 072958  
**Calibration Date:** 17-Jan-2019 **Calibration Date Due:** 17-Jan-2020
- DynaCalibrator:** M-1998 NIST#: 19-2952  
**Calibration Date:** 26-Apr-2019 **Calibration Date Due:** 25-Apr-2020
- Digital Multimeter:** 64070755 NIST#: 7003135  
**Calibration Date:** 11-Apr-2019 **Calibration Date Due:** 11-Apr-2020
- Mass Flow Controller:** 54807 NIST#: 236847  
**Calibration Date:** 6-Jul-19 **Calibration Date Due:** 6-Jul-20

Calibration Procedure Used: 730-0165

AMETEK Brookfield certifies that the above listed instrument meets or exceeds all published specifications and has been calibrated using standards whose accuracy is traceable to the NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY within the limitations of the Institute's calibration services, or have been derived from accepted values of natural physical constants, or have been derived by the ratio type of self-calibration techniques.  
 Disclaimer: Any unauthorized adjustments, removal or breaking of QC seals, or other customer modifications on your Jerome Analyzer WILL VOID this factory calibration, because any of the above acts could affect the calibration and readings of the instrument. Further, AMETEK Brookfield WILL NOT be responsible for any liabilities created as a result of using the instrument after such adjustments, seal removal, or modifications.

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