Environmental Safety Management Corporation

Air Quality, Mold Testing, Ergonomics, OSHA

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December 23, 2019

Mr. Jason Schimpf
Business Administrator/Board Secretary
Kingsway Regional &
South Harrison Twp. Elem. School Districts
213 Kings Highway
Woolwich Twp., NJ 08085

Dear. Mr. Schimpf,

This report summarizes our professional opinions and recommendations associated with the recent discovery that the gymnasium at the South Harrison Elementary School contains a mercury catalyzed rubberized floor. The professional opinions in this report are based upon the following:

- Review of the April 28, 2019 Bulk Sampling Report from Epic Environmental
- Review of the May 12, 2019 Air Sampling report, from Epic Environmental Based upon their May 2, 2019 air sampling with the air handler operating in the normal occupied mode.
- Review of the August 5, 2019 Air Sampling Report from Epic Environmental based upon their July 26, 2019 air sampling with the air handler deactivated.
- ESMCorp's December 10-12 2019 Mercury Air Monitoring in the Gym and Surrounding Areas

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

Our review of the Epic Environmental reports dated April 28, May 12 and August 5, 2019 reveal that the rubberized floor contains approximately 75 to 200 mg of mercury per kilogram. The Epic air monitoring findings during the May 2019 normal operation of the gym's HVAC system revealed an average of approximately 0.4 to 0.6 micrograms per cubic meter over the sampling period which is below the NJ Department of Health's guidance of 0.8 $\mu g/m^3$ for these gyms. The sample collected in late July 2019 with the HVAC system deactivated revealed higher levels at approximately 1-2 $\mu g/m^3$ during the sampling period; above the NJDOH guidelines. Based upon that report the District discontinued use of the gym, and has modified HVAC operation parameters to 24/7 occupied mode and lowered thermostat settings to approximately 68°F to help reduce emissions and accumulations of mercury vapors within the gym.

ESMCorp's findings from our December 10, 2019 inspection and air monitoring revealed that initial spot monitoring of airborne mercury levels within the gym ranged between 0.1 and 0.19 $\mu g/m^3$ with an average of all gym areas of 0.14 $\mu g/m^3$; below the NJ Department of Health guideline of 0.8 ug/m^3. Airborne mercury levels in the surrounding areas were approximately equivalent to outdoor levels averaging 0.02 $\mu g/m^3$. Based upon these initial findings, we deactivated the gym's air handler at approximately 4:00 PM on December 10, 2019 through 4:00 PM on December 11, 2019 to determine the extent to which airborne mercury levels increased over the 24-hour deactivation period. Findings revealed that airborne mercury

level increased to approximately 0.5 µg/m^3 after approximately 3-hours following deactivation, and decreased as temperature decreased to an average 0.39 µg/m^3 over the 24 hour deactivation period; below the NJ Department of Health Guideline of 0.8 µg/m^3. Following reactivation of air handler at approximately 4:00 PM on December 11, airborne mercury levels returned to baseline levels of approximately 0.16 µg/m^3 after 3 hours and remained stable at that level for the next 20 hours when the monitoring period ended at 1:00 PM on December 12, 2019.

Based upon these findings, it is our professional opinion that airborne mercury levels within the South Harrison Elementary School gym gym at the time of our December 10-12, 2019 inspection with air handlers running in the 24/7 occupied mode as well as during a deliberate 24 hour shutdown of the air handling unit were below the NJDOH guidelines and do not present an elevated health risk to students, staff or visitors at this time. Monthly air monitoring should continue over the course of the remainder of the 2019/20 academic year as well as summer 2020 to determine best management practices, HVAC operating parameters and the potential to maintain safe levels under the range of outdoor air temperatures, heating and cooling cycles and soil temperatures.

Recommendations for monthly monitoring of airborne mercury levels beginning January 2019, as well as for sharing this report with stakeholders, and your Board-appointed physician are contained at the end of this report.

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 - µg/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 µg/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 µg/m^3 until levels have returned to below 3 µg/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 (µg/m^3). For longer exposures, MDH recommends that gym teachers should not be exposed to more than 0.750 µg/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 µg/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 µg/m^3 which is based upon protecting pre-school-aged children. At levels exceeding 0.8 µg/m^3 the NJ Department of Health recommends that schools take active steps to manage and reduce airborne mercury levels within school gyms.

II. Review of Initial EPIC Environmental Reports

Our review of the Epic Environmental reports dated April 28, May 12 and August 5, 2019 reveal that the rubberized floor contains approximately 75 to 200 mg of mercury per kilogram. The EPIC air monitoring findings during normal operation of the gym's HVAC system revealed an average of approximately 0.4 to 0.6 micrograms per cubic meter over the sampling period which is below the NJ Department of Health's guidance of 0.8 $\mu g/m^3$ for these gyms. The sample collected in late July 2019 with the HVAC system deactivated revealed higher levels at approximately 1-2 $\mu g/m^3$ during the sampling period; slightly above the NJDOH guidelines. Since receiving those reports the gym at the South Harrison Elementary School has been taken out of service and HVAC operation parameters have been modified to 24/7 occupied mode to 24/7 occupied mode at approximately 68^oF to help reduce emissions and accumulations of mercury vapors within the gym.

III. Methods

The following methods were observed during our December 5, 2019 site inspections

- An initial walkthrough inspection of the South Harrison Elementary School Gym was conducted to observe the configuration, layout, heating and ventilating equipment and proximity to classrooms and offices.
- 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 $\mu g/m^3$ however the meter actually reads as low as 0.00 $\mu g/m^3$with a resolution of 0.01. ESMCorp reports all measurement data down to 0.00 $\mu g/m^3$ 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^oF thermostat setting.
- Spot air monitoring was conducted in areas surrounding the gym including the stage, hallways, and classrooms, as well as outdoors for comparison.
- At approximately 4:00 PM the HVAC systems for the gym and stage areas was deactivated for a period of 24 hours, and continuous air monitoring of airborne mercury levels and temperature within the center of the gym was conducted using the Jerome J505.
- At 4:00 PM on December 11, 2019, the air handlers were reactivated and continuous air monitoring was conducted in the center of the gym through 1:00 PM on December 12, 2019.

IV. ESMCorp's December 10-12, 2019 Observations, Findings and Results

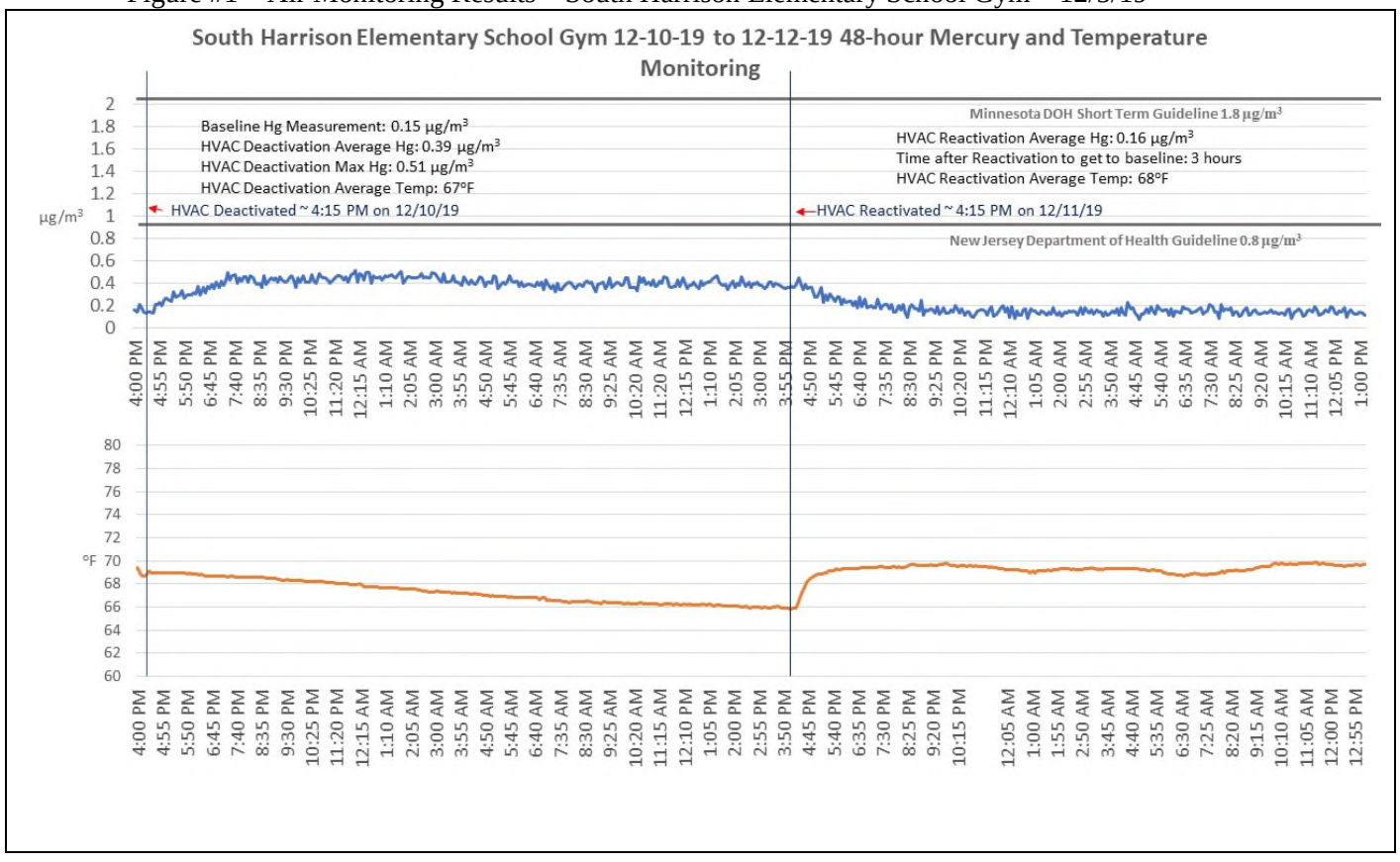
Inspection findings revealed the following:

- The South Harrison Elementary School Gym is equipped with two (2) approximate 20-ton overhead air handlers located within the closets of the gym. The air handlers had been operating in the 24/7 occupied mode at the time of sampling, introducing a minimum of 20% outdoor air.
- The approximate area of the gym and stage is an estimated 6,000 square feet with 20-foot ceiling.
- Outdoor mercury levels measured at the time of sampling was 0.02 $\mu g/m^3$.
- Initial spot monitoring of airborne mercury levels within the gym ranged between 0.10 and 0.19 $\mu g/m^3$ with an average of all gym areas of 0.14 $\mu g/m^3$; below the NJ Department of Health

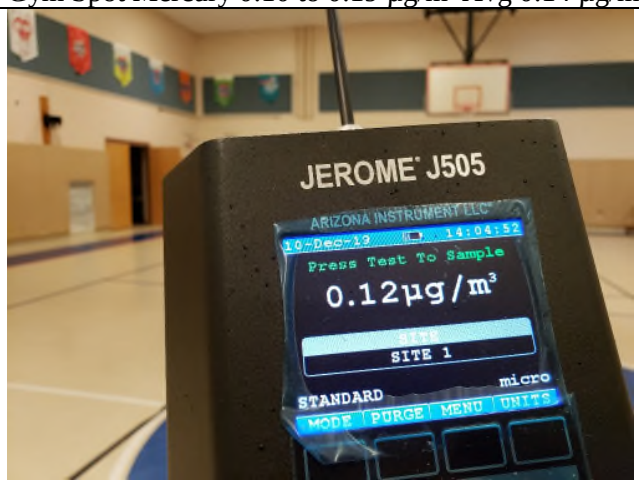
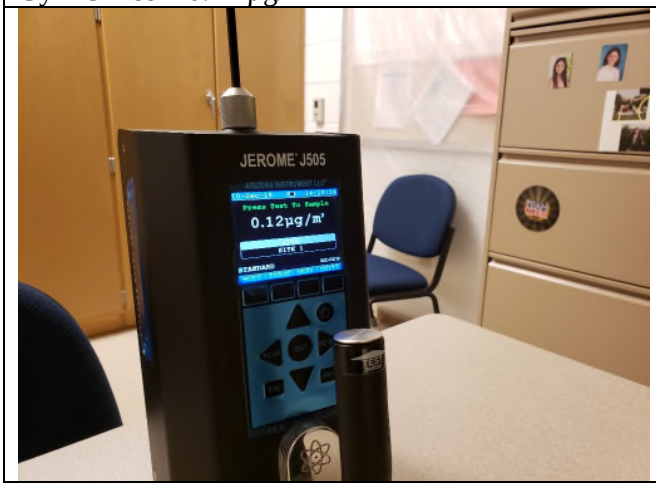
guideline of 0.8 ug/m^3.

- Airborne mercury levels in the surrounding classrooms and hallways were approximately equivalent to outdoor levels averaging 0.02 µg/m^3.
- After deactivation of the gym's air handlers at approximately 4:00 PM on December 10, 2019 through 4:00 PM on December 11, 2019 airborne mercury levels increased over the 24-hour deactivation period to approximately 0.5 µg/m^3 after approximately 3-hours following deactivation, and decreased as temperature decreased to an average 0.39 µg/m^3 over the 24 hour deactivation period; below the NJ Department of Health Guideline of 0.8 µg/m^3.
- Gym Temperatures averaged 67 to 68°F during this monitoring period.
- Following reactivation of air handler at approximately 4:00 PM on December 11, airborne mercury levels returned to baseline levels of approximately 0.16 µg/m^3 after 3 hours and remained stable at that level for the next 20 hours when the monitoring period ended at 1:00 PM on December 12, 2019; well below the NJ Department of Health guideline of 0.8 µg/m^3 (see Figure #1 below)

Figure #1 – Air Monitoring Results – South Harrison Elementary School Gym – 12/5/19



Air monitoring findings are shown on Table #1 attached at the end of this report.

Outdoor Mercury = 0.02 µg/m^3	Gym Spot Mercury 0.10 to 0.19 µg/m^3 Avg 0.14 µg/m^3
	
Gym Office = 0.12 µg/m^3	Gym Spot Mercury 0.10 to 0.19 µg/m^3 Avg 0.14 µg/m^3
	

VI. Conclusions and Recommendations

Findings from our review of the Epic Environmental reports of April through August 2019 revealed that the rubberized floor contains mercury, and that airborne mercury sampling with the air handlers deactivated exceed the NJ Department of Health guidelines of 0.8 µg/m^3 with the air handlers deactivated during late July when outdoor temperatures were high. When air handlers were activated, air sampling revealed airborne levels below the NJDOH guidelines.

Findings from ESMCorp ‘s December 10-12 air monitoring revealed that initial spot monitoring of airborne mercury levels within the gym ranged between 0.1 and 0.19 µg/m^3 with an average of all gym areas of 0.14 µg/m^3; below the NJ Department of Health guideline of 0.8 µg/m^3. Airborne mercury levels in the surrounding areas were approximately equivalent to outdoor levels averaging 0.02 µg/m^3. After deactivation of the air handler, average airborne mercury levels increased to 0.39 µg/m^3 over the 24 hour

deactivation period; below the NJ Department of Health Guideline of 0.8 µg/m^3. Airborne mercury levels returned to baseline levels within 3 hours of HVAC system reactivation.

Based upon these findings, it is our professional opinion that airborne mercury levels within the South Harrison Elementary School gym at the time of our December 10-12, 2019 inspection with air handlers running in the 24/7 occupied mode as well as during a deliberate 24 hour shutdown of the air handling unit were below the NJDOH guidelines and do not present an elevated health risk to students, staff or visitors at this time.

Based upon these findings, the following recommendations should be considered:

1. Monthly air monitoring should continue over the course of the remainder of the 2019/20 academic year as well as summer 2020 to determine best management practices, HVAC operating parameters and the potential to maintain safe levels under the range of outdoor air temperatures, heating and cooling cycles and soil temperatures. We recommend that the next round of air monitoring be scheduled for January 2019 to compare to the results contained herein.
2. This report should be shared with the District's Board appointed Physician to address any potential health concerns raised by teachers, parents or community members.
3. ESMCorp will review custodial cleaning procedures to ensure regular safe non-abrasive cleaning as well as update custodial hazard communication training to address mercury.

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
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School Name: Kingsway Elementary School

Date of Inspection: 12/10/2019

Outdoor Mercury Concentration: 0.02

Outdoor Tempurature / Relative Humidity: 61°F / 100% (raining)

Average Indoor Tempurature / Relative Humidity: 67°F / 53%

Inspected, Reviewed and Finalized by: **Dr. Richard M. Lynch, Ph.D., CIH, CMC, CMRS, CHFM - President**
Richard A. Lynch, MBA, Certified Indoor Environmental Consulant

Gym Areas	Spot Monitoring Data		Adjacent Areas	Spot Monitoring Data	
Monitoring ID	**Monitoring Location**	**Mercury (µg/m^3)**	**Monitoring ID**	**Monitoring Location**	**Mercury (µg/m^3)**
Gym	center	0.12	Adjacent Room	main office	0
Gym	North Side	0.1	Adjacent Room	B104	0.02
Gym	North East Corner	0.15	Adjacent Room	B107	0.03
Gym	East Side	0.14	Adjacent Room	B112	0.01
Gym	South East Corner	0.14	Adjacent Hall	B	0.01
Gym	South Side	0.19	Adjacent Room	A189	0.01
Gym	South West Corner	0.16	Adjacent Room	A191	0.03
Gym	West Side	0.11	Adjacent Room	A111	0.04
Gym	North West Corner	0.16		Average Adjacent rooms Spot Readings	0.02
Stage	West	0.2			
Stage	Center	0.18			
Stage	East	0.16			
Gym Storage	NE corner	0.13			
Gym Storage	SE Corner	0.11			
Gym Storage	S Side	0.12			
Gym Office	S Side	0.12			
	Average Gym Spot Readings	0.14			

State and Federal Mercury Exposure Guidelines(µg/m3)					
PEOSHA 8 Hour PEL	**ATSDR Temporary Evacuation Ceiling**	**Minnesota DOH Short Term Guideline**	**Minnosota DOH School Guideline**	**New Jersey Department of Health**	**US EPA 70 year average reference concentration**
100	10	1.8	0.75	0.8	0.3

AMETEK ARIZONA INSTRUMENT
800.528.7411 | (f) 602.281.1745 | www.azic.com
Exclusive Manufacturer of Computrac® Moisture Analyzers and Jerome® Mercury & Hydrogen Sulfide Analyzers

Certification of Instrument Calibration

AMETEK Arizona Instrument - New Unit
3375 N. Delaware Street
Chandler, AZ 85225

RMA # 2632201

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: **New**

	Actual	Calibration Gas	Allowable Range
Incoming:	µg/m3 Hg	µg/m3 Hg	- µg/m3 Hg
	% RSD		<5%
Outgoing:	25.16 µg/m3 Hg	25.00 µg/m3 Hg	23.75 - 26.25 µg/m3 Hg
	0.04 % RSD		<3%
Calibration Verification:	µg/m3 Hg	0.300 µg/m3 Hg	0.255 - 0.345 µg/m3 Hg
	% RSD		<15%

Calibration Status as Left: **New**

Estimated Uncertainty of Calibration System: 3.5%

Calibration Date: 13-Dec-2018 Recalibration Date: 12-Dec-2019

Temperature °F: 71.30 % Relative Humidity: 31.20

Approved By:_____ Date Approved: 13-Dec-2018
Title: Johnny Padilla - Quality Control

Equipment Used:

Permeation Tube: 498-51337 **NIST#:** ISO13265; 072958
Calibration Date: 29-May-2018 **Calibration Date Due:** 29-May-2019

DynaCalibrator: M-812 **NIST#:** 18-2889
Calibration Date: 19-Sep-2018 **Calibration Date Due:** 20-Sep-2019

Digital Multimeter: 74620505 **NIST#:** 7002611
Calibration Date: 07-Apr-2018 **Calibration Date Due:** 07-Apr-2019

Mass Flow Controller: 54809 **NIST#:**210458
Calibration Date:23-Oct-18 **Calibration Date Due:** 23-Oct-19

Calibration Procedure Used: 730-0165

AMETEK Arizona Instrument 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 Arizona Instrument WILL NOT be responsible for any liabilities created as a result of using the instrument after such adjustments, seal removal, or modifications.

Guidance for New Jersey Schools: Evaluating Mercury in Synthetic Flooring

The New Jersey Department of Health is providing this fact sheet to New Jersey school districts concerned about mercury exposure from synthetic flooring.

What types of floors contain mercury?

The types of floors that may contain mercury are solid, rubber-like synthetic flooring manufactured from about 1960 until the 1990s. Not all synthetic flooring contains mercury. Flooring made using a catalyst known as "phenyl mercuric acetate" may release mercury vapors into the air under certain conditions. Not all flooring that contains mercury emit mercury vapors into the air.

What should you do if your school has a synthetic floor?

- Check to see if you can determine if the flooring contains mercury by contacting the manufacturer/installer or reviewing the Safety Data Sheet (SDS).
- If you are able to determine that the flooring contains mercury or you suspect it contains mercury, work with a qualified environmental consultant to evaluate the flooring and determine next steps.
- If indoor air sampling is recommended, it should be done under normal school operating conditions.

What levels of mercury are considered safe for school children and staff?

The New Jersey Department of Health (NJDOH) has adopted Standards for Indoor Environment Certification and for Licensure of Indoor Environmental Consultants (N.J.A.C. 8:50). These regulations provide a risk assessment model that can be used to evaluate indoor air contaminants for school children and staff. Your indoor environmental consultant can use this risk model to determine a Maximum Contaminant Level (MCL) for mercury in your school. Alternatively, your consultant may evaluate the indoor air data to ensure that mercury levels are below 0.8µg/m^3 which is based on the exposure scenario in the risk model that is protective of preschool-aged children.

N.J.A.C. 8:50 is available on the NJDOH website at:
http://www.nj.gov/health/ceohs/documents/eohap/njac_850_adoption.pdf