Environmental Safety Management Corporation
AIR QUALITY, MOLD TESTING, ERGONOMICS, OSHA

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July 9, 2021

Ms. Sarah Bell
Business Administrator/Board Secretary
Kingsway Regional &
South Harrison Twp. Elem. School Districts
213 Kings Highway
Woolwich Twp., NJ 08085

Dear Ms. Bell,

This report summarizes the results of the June 24 – 28, 2021 air monitoring of the South Harrison Elementary School Gym. This assessment was conducted by Dr. Richard M. Lynch, PhD., CIH and Mr. Richard A. Lynch, MBA, CIEC. The objectives of this assessment were the following:

1. Determine if the gym's overhead air handling systems are effective at controlling airborne mercury levels during the summer cooling season at the current temperature and outdoor air damper settings.
2. Determine any change in airborne mercury levels within the gym during the summer cooling season when the HVAC system is deliberately deactivated for approximately 73 hours.
3. Determine the length of time required to return airborne mercury levels to baseline levels after reactivation of the gym's HVAC system during the summer season.

Executive Summary of Findings

Airborne mercury levels within the South Harrison Elementary School gym averaged 0.12 micrograms per cubic meter (µg/m^3) prior to the stress test. This airborne mercury level was similar to airborne mercury levels measured during our previous monitoring conducted May 26-28, 2021 (average 0.14 µg/m^3) and our February 12-15, monitoring (average 0.12 µg/m^3). These airborne mercury levels are significantly lower than the NJ Department of Health Guideline of 0.8 ug/m^3.

During the stress test (HVAC systems deactivated), the airborne concentration rose from 0.15 µg/m^3 to the NJ Department of Health Guideline of 0.8 µg/m^3 in approximately 14 hours. Airborne mercury levels continued to rise to a maximum of 1.6 µg/m^3 after 38 hours following deactivation of the HVAC system (average 1.01 µg/m^3 over the entire 73-hour deactivation period). After the HVAC system was reactivated, airborne mercury levels decreased to below the NJDOH guideline within a few minutes and returned to the baseline level of 0.15 µg/m^3 in approximately two and a half (2.5 hours).

Based upon the above, it is our professional opinion that the gym's HVAC system operating in the current 24/7 at 50% outdoor air introduction, was effective at controlling airborne mercury levels below the NJDOH guideline of 0.8 $\mu g/m^3$ during the June summer season. Airborne mercury levels reached the NJDOH guideline after approximately 14 hours of deactivation of the HVAC system, and returned to baseline conditions within approximately 2.5 hours after reactivation. This stress test should be repeated in July and August to develop Standard Operating Procedures for continued safe operation of the gym's air handling units to control airborne mercury levels within the gym.

I. Methods

Evaluation criteria were previously described and will not be repeated herein. The following methods were observed during our June 24-28, 2021 site inspection.

- Spot Monitoring was conducted for mercury in the gym and in surrounding areas of the gym on June 24, 2021.
- Continuous air monitoring was conducted within the gym over an approximate 4-day (97-hour) period between approximately 10:25AM on June 24, 2021 and 11:20AM on June 28, 2021. During this period the gym's HVAC system was operating in the 24/7 occupied mode at 50% outdoor air introduction and 68°F thermostat set temperature for the 1st twenty hours of the study. The two18-ton HVAC systems were then deactivated at approximately 6:00 AM on June 25th for 72 hours, and then reactivated at 7:00 AM on June 28th through the remainder of the study period.
- All mercury air monitoring was conducted using a calibrated Jerome J505 Mercury Vapor Analyzer with a reported detection limit of 0.05 $\mu g/m^3$ which reads as low as 0.00 $\mu g/m^3$ with a resolution of 0.01.
- Temperature and humidity were monitored over the same period using a TSI Q-Trak 7575 IAQ monitor.

II. Observations and Mercury Air Monitoring Findings

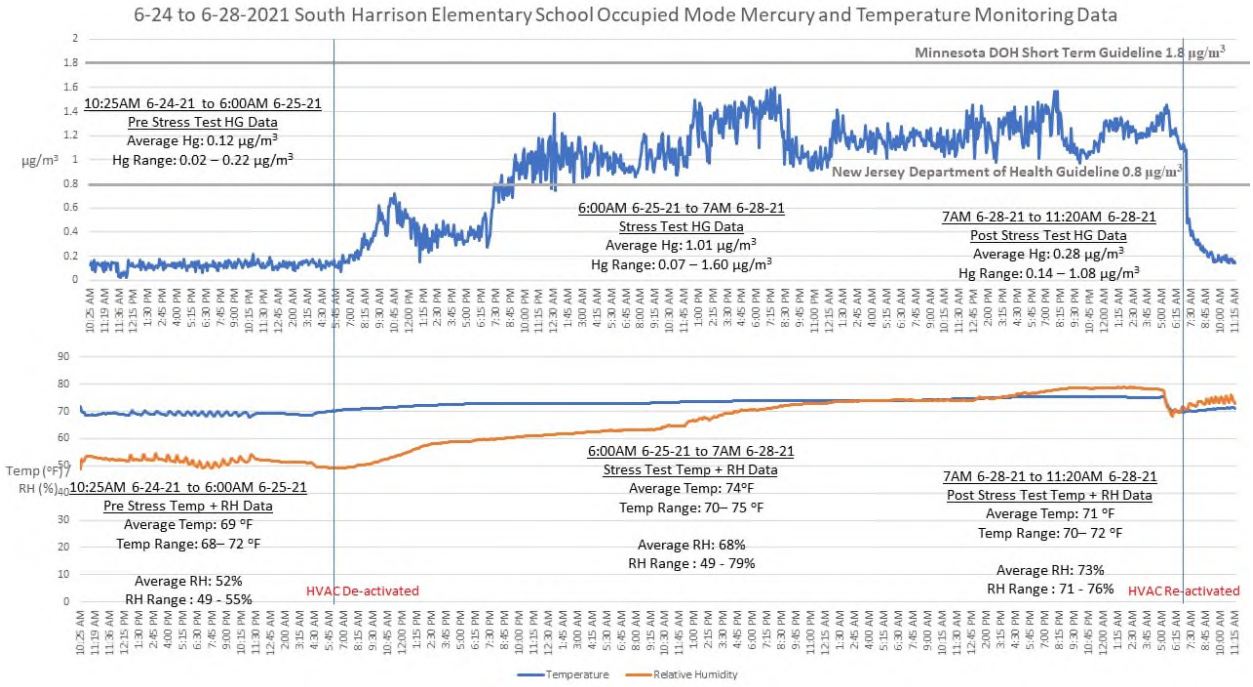
Findings revealed the following:

- The gym was not in use during the monitoring period, as school had been dismissed for the year. As the gym was used for furniture storage during the 2020-21 school year, high levels of accumulated dust was observed on the floor, supplies and on wall and HVAC surfaces.
- During this period the gym's HVAC system was initially operating in the 24/7 occupied mode at 50% outdoor air introduction and 68°F thermostat set temperature, until deactivated.
- Outdoor airborne mercury was at approximately 0.04 micrograms per cubic meter ($\mu g/m^3$). Outdoor temperature ranged from 57 to 93 °F during the duration of the monitoring period.
- Spot airborne mercury measurements within the gym ranged between 0.07 and 0.15

µg/m^3 and averaged 0.12 µg/m^3. Spot airborne mercury measurements in surrounding areas ranged between 0.02 and 0.07 µg/m^3 and averaged 0.04 µg/m^3.

- Airborne mercury levels measured at the gym center during the initial baseline monitoring (6-24-2021 at 10:25AM to 6-25-2021 at 6:00AM) **averaged, 0.12 µg/m^3 (range 0.02 - 0.22 µg/m^3)**; below the NJDOH Guideline of 0.8 µg/m^3. Gym temperature averaged 69ºF during this monitoring period at an average relative humidity of 52%.
- Airborne mercury levels measured at the gym center during the 73-hour HVAC deactivation "Stress Test" period (6-25-2021 at 6:00AM to 6-28-2021 at 7:00AM) **averaged, 1.01 µg/m^3 (range 0.07 – 1.60 µg/m^3)**; slightly above the NJDOH Guideline of 0.8 µg/m^3. Gym temperature averaged 74ºF and ranged from 70 - 75 ºF during this monitoring period and relative humidity averaged 68% (range 49-79%)
- Following reactivation of the HVAC system the airborne mercury concentration decreased from **1.08 µg/m^3** to below the NJDOH guideline within a few minutes, and returned to the baseline level of **0.15 µg/m^3** by 9:30AM (approximately 2.5 hours).

Continuous air monitoring findings from the May 26-28, 2021 monitoring period are shown on the Figure below:



III. Conclusions and Recommendations

Based upon these findings, it is our professional opinion that the baseline airborne mercury levels within the South Harrison Elementary School gym averaged 0.12 µg/m^3 prior to the stress test. This is significantly lower than the NJ Department of Health Guideline of 0.8 ug/m^3. During the stress test (HVAC systems deactivated), the airborne concentration rose from 0.15 ug/m^3 at 6:00AM to the NJ Department of Health Guideline of 0.8 µg/m^3 in approximately 14

hours. The maximum airborne mercury level of 1.6 µg/m^3 was reached after approximately 38 hours following HVAC deactivation *(this result is similar to the 1-2 ug/m^3 reported by EPIC environmental on July 26, 2019 approximately 8-14 hours following deactivation of the gym's HVAC system to simulate "Worst Case" conditions…see August 5, 2019 EPIC Environmental Report)*. Airborne mercury levels decreased to 0.8 µg/m^3 within a few minutes of reactivation of the HVAC system and to the baseline level of 0.15 µg/m^3 within approximately 2.5 hours.

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

1. Continue to maintain gym air temperature at approximately 68°F at 50% outdoor air introduction as is current practice.
2. Consider arranging for professional HVAC cleaning of the gym's HVAC systems prior to September reopening. We can assist with this. Be prepared to establish routine non-abrasive cleaning of gym floors and other surfaces to reduce dust accumulation.

ESMCorp is prepared to assist you with all of the above, and to meet with BOE members, stakeholders and others to communicate risk and management priorities. Our next monitoring will be scheduled for July 2021.

Thank you for the opportunity to assist you with the evaluation. Please contact me with any questions.

Sincerely,
Richard A. Lynch
Richard A. Lynch, MBA, CIEC
Industrial Hygienist
NJ Licensed Indoor Environmental Consultant
www.esmcorp.com

Reviewed and Authorized:
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Certification of Instrument Calibration

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

RMA # 2796776

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: **Out of Calibration**

	Actual	Calibration Gas	Allowable Range
Incoming:	28.21 µg/m3 Hg 0.74 % RSD	25.00 µg/m3 Hg	22.50 - 27.50 µg/m3 Hg <5%
Outgoing:	24.77 µg/m3 Hg 0.65 % RSD	25.00 µg/m3 Hg	23.75 - 26.25 µg/m3 Hg <3%
Calibration Verification:	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: 22-Jan-2021 Recalibration Date: 21-Jan-2022

Temperature °F: 71.10 % Relative Humidity: 42.00

Approved By: Cheryl Hradek Date Approved: 10-Feb-2021
Title: Cheryl Hradek - Quality Control

Equipment Used:

Permeation Tube: S89-56804 **NIST#:** ISO13265: 072958
Calibration Date: 21-May-2020 **Calibration Date Due:** 21-May-2021

DynaCalibrator: M-1878 **NIST#:** 19-2985
Calibration Date: 30-Sep-2020 **Calibration Date Due:** 30-Sep-2021

Digital Multimeter: 66961028 **NIST#:** 7003135
Calibration Date: 24-Feb-2020 **Calibration Date Due:** 24-Feb-2021

Mass Flow Controller: 63665 **NIST#:**227080
Calibration Date:27-Mar-20 **Calibration Date Due:** 27-Mar-21

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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