Environmental Safety Management Corporation

AIR QUALITY, MOLD TESTING, ERGONOMICS, OSHA

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August 6, 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 July 27-August 2, 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 changes in airborne mercury levels within the gym during the summer cooling season when the HVAC system is deliberately activated and deactivated for 4 cycles over the course of a seven-day summertime monitoring period.
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 during each of the 4 activation/deactivation cycles.

Executive Summary of Findings

Airborne mercury levels within the South Harrison Elementary School gym during while the HVAC was activated all averaged approximately 0.2 to 0.3 $\mu g/m^3$; well below the NJ Department of Health Guideline of 0.8 ug/m^3. During each stress tests, the average airborne mercury concentration increased to approximate the NJ Department of Health Guideline of 0.8 $\mu g/m^3$ within approximately 8 to 12 hours. Upon reactivation of the HVAC systems, approximately 1 hour or less was required for the airborne concentration to return to baseline conditions. Based upon these findings, it is our professional opinion that the gym's HVAC systems are effective at controlling airborne mercury concentrations during the cooling months. Recommendations for optimizing HVAC schedule and operating parameters are contained at the end of this report, leading to school reopening in September.

I. Methods

Evaluation criteria were previously described and will not be repeated herein. The following methods were observed during our July 27 to August 2, 2021 monitoring period.

- Continuous air monitoring was conducted within the gym over an approximate 7-day period between approximately 10:25AM on July 27, 2021 and 12:45PM on August 2, 2021. During this period the gym's HVAC system was operating in the 24/7 occupied mode at 50% outdoor air introduction and 66^{o}F thermostat set temperature for the 1st twenty hours of the study. The two18-ton HVAC systems were sequentially deactivated and re-activated in accordance with the following schedule:
    - Activated – between 10:25AM and 12:00PM, July 27, 2021
    - Deactivated – between 12:00PM July 27 and 12:00PM July 28, 2021
    - Activated – between 12:00PM and 4:00PM, July 28, 2021
    - Deactivated – between 4:00PM, July 28 and 7:00AM July 29, 2021
    - Activated – between 7:00AM and 12:00PM, July 29, 2021
    - Deactivated – between 12:00PM, July 29 and 7:30AM July 30, 2021
    - Activated – between 7:30AM and 4:00PM, July 30, 2021
    - Deactivated – between 4:00PM, July 30 and 7:00AM August 2, 2021
    - Activated – between 7:00AM and 12:45PM, August 2, 2021
- All mercury air monitoring was conducted using a calibrated Jerome J505 Mercury Vapor Analyzer with a reported detection limit of 0.05 μg/m^3 which reads as low as 0.00 μg/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

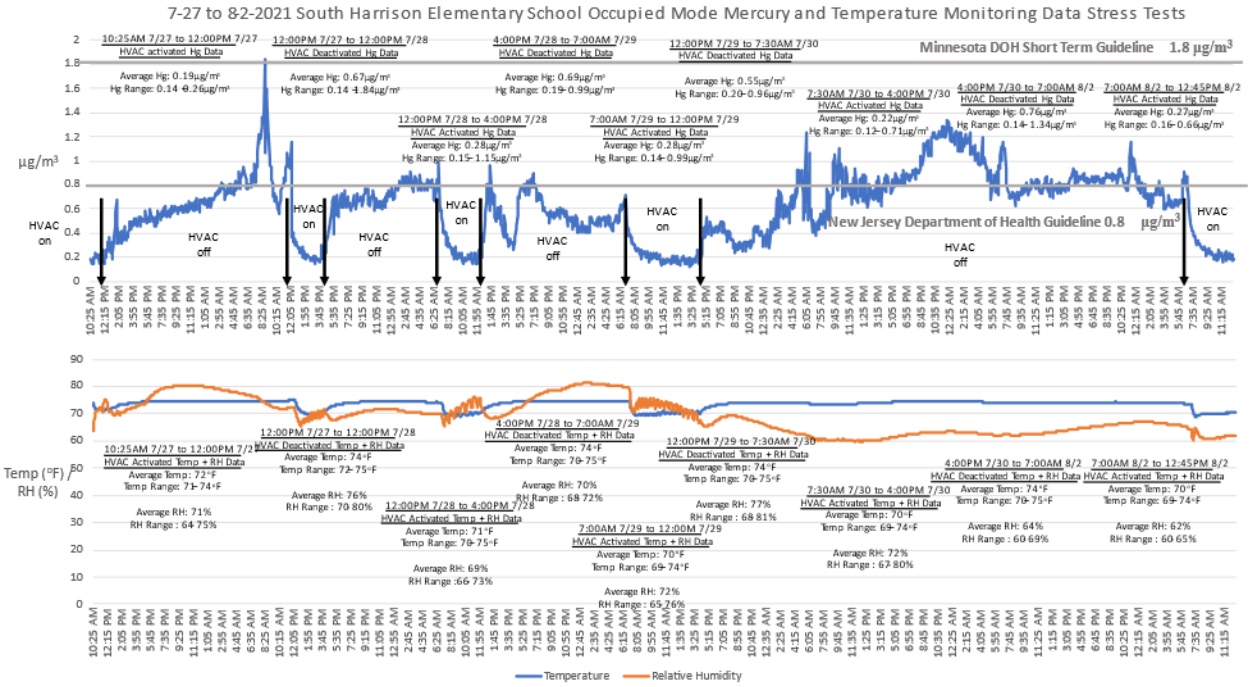
Findings revealed the following:

- Outdoor airborne mercury was at approximately 0.03 micrograms per cubic meter (μg/m^3). Outdoor temperature ranged from 61 to 93 ^{o}F during the duration of the monitoring period.
- Airborne mercury levels measured at the gym center during the initial baseline HVAC activated test period (10:25AM and 12:00PM, July 27, 2021) **averaged, 0.19 μg/m^3 (range 0.14 - 0.26 μg/m^3)**; below the NJDOH Guideline of 0.8 μg/m^3. Gym temperature averaged 72^{o}F during this monitoring period at an average relative humidity of 71%.
- Airborne mercury levels measured at the gym center during the first HVAC Deactivated test period (12:00PM July 27 and 12:00PM July 28, 2021) **averaged, 0.67 μg/m^3 (range 0.14 - 1.84 μg/m^3)**. Gym temperature averaged 74^{o}F during this monitoring period at an average relative humidity of 76%.
- Airborne mercury levels measured at the gym center during the first HVAC Reactivated test period (12:00PM and 4:00PM, July 28, 2021) **averaged, 0.28 μg/m^3 (range 0.15 - 1.15 μg/m^3)**; below the NJDOH Guideline of 0.8 μg/m^3. **Upon reactivation of the**

HVAC system, approximately 40 minutes were required to return airborne mercury levels from 1.15 to 0.30 µg/m^3. Gym temperature averaged 71^{o}F during this monitoring period at an average relative humidity of 69%.

- Airborne mercury levels measured at the gym center during the second HVAC Deactivated test period (between 4:00PM, July 28 and 7:00AM July 29, 2021) **averaged, 0.69 µg/m^3 (range 0.19 - 0.99 µg/m^3)**. Gym temperature averaged 74^{o}F during this monitoring period at an average relative humidity of 70%.
- Airborne mercury levels measured at the gym center during the second HVAC Reactivated test period (7:00AM and 12:00PM, July 29, 2021) **averaged, 0.28 µg/m^3**; below the NJDOH Guideline of 0.8 µg/m^3. **Upon reactivation of the HVAC system, approximately 60 minutes were required** for airborne mercury levels to return from 0.99 to 0.30 µg/m^3. Gym temperature averaged 70^{o}F during this monitoring period at an average relative humidity of 72%.
- Airborne mercury levels measured at the gym center during the third HVAC Deactivated test period (12:00PM, July 29 and 7:30AM July 30, 2021) **averaged, 0.55 µg/m^3.** Gym temperature averaged 74^{o}F during this monitoring period at an average relative humidity of 77%.
- Airborne mercury levels measured at the gym center during the third HVAC Reactivated test period (7:30AM and 4:00PM, July 30, 2021) **averaged, 0.22 µg/m^3**; below the NJDOH Guideline of 0.8 µg/m^3. **Upon reactivation of the HVAC system, approximately 60 minutes were required** to return mercury levels from 0.71 to 0.30 µg/m^3. Gym temperature averaged 74^{o}F during this monitoring period at an average relative humidity of 77%.
- Airborne mercury levels measured at the gym center during the fourth HVAC Deactivated test period (4:00PM, July 30 and 7:00AM August 2, 2021) **averaged, 0.76 µg/m^3 (range 0.14 - 1.34 µg/m^3).** Gym temperature averaged 74^{o}F during this monitoring period at an average relative humidity of 64%.
- Airborne mercury levels measured at the gym center during the fourth HVAC Reactivated test period (7:00AM and 12:45PM, August 2, 2021) **averaged, 0.27 µg/m^3**; below the NJDOH Guideline of 0.8 µg/m^3. **Upon reactivation of the HVAC system, approximately 60 minutes were required** to return airborne mercury levels from 0.66 to 0.30 µg/m^3. Gym temperature averaged 74^{o}F during this monitoring period at an average relative humidity of 64%.

Continuous air monitoring findings over the July 27 to August 2, 2021 7-day monitoring period are shown in the Figure below:



IV. Conclusions and Recommendations

Airborne mercury levels within the South Harrison Elementary School gym while the HVAC system was activated all averaged approximately 0.2 to 0.3 µg/m^3; well below the NJ Department of Health Guideline of 0.8 ug/m^3. During each stress tests, the average airborne mercury concentration increased to approximate or exceed the NJ Department of Health Guideline of 0.8 µg/m^3 within approximately 8 to 12 hours. Upon reactivation of the HVAC systems, approximately 1 hour or less was required for the airborne concentration to return to baseline levels. Based upon these findings, it is our professional opinion that the gym's HVAC systems are effective at controlling airborne mercury concentrations during the cooling months.

<u>Recommendations</u>

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

1. Maintain gym air temperature at a set point of 69°F at 50% outdoor air introduction
2. Consider arranging for professional cleaning of the gym prior to September reopening. Be prepared to establish routine non-abrasive cleaning of gym floors and other surfaces to reduce dust accumulation.
3. The District consider authorizing us to work with the HVAC/Facilities Department to determine a more optimized and energy efficient HVAC operation schedule in preparation for September school reopening.
4. Based upon these data, we recommend a schedule of routine (monthly to bi-monthly) air

monitoring for mercury be established for the 2021-2022 school year beginning in September. We are prepared to assist you with this.

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 August 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:
Richard M. Lynch
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Certification of Instrument Calibration

RMA # 2796776

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

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