GEL Engineering LLC
a member of The GEL Group INC

PO Box 30712 Charleston, SC 29417
2040 Savage Road Charleston, SC 29407
P 843.769.7378 F 843.769.7397

www.gel.com

September 4, 2018

Mr. Randy West
Director of Maintenance
Electronic mail: randy.west@sccpss.com
Savannah-Chatham County School District
2900 Bird Street
North Charleston, South Carolina 29405

Re: Report of Mercury Testing – Rubber Flooring in Gymnasiums
Eight Savannah-Chatham County School District Owned Schools
Savannah & Pooler, Georgia

Dear Mr. West:

Ronald S. Sharpe, Certified Industrial Hygienist (C.I.H.) and Registered Sanitarian (R.S.) from GEL Engineering, LLC (GEL) conducted mercury bulk and air testing for mercury at eight Savannah-Chatham County School District (SCCSD) Owned Schools, which are located in Savannah and Pooler, Georgia on August 20 and 21, 2018. The purpose of this testing s to determine the presence or absence of mercury compounds that may be in rubberized floor coting systems installed in certain gymnasiums in the school district and to evaluate potential health risks to building occupants from exposure to airborne mercury vapors in the event that mercury compounds are present in the rubberized floor coating systems. The specific schools where the rubberized floor coting systems were installed in the gymnasium were provided to GEL by Mr. Randy West with the SCCSD.

PROJECT INFORMATION

The gymnasiums in the following schools were included in the mercury testing:

1. Doreen Middle School
2. Myers Middle School
3. Butler Elementary School
4. Garrison Elementary School
5. Garden City Elementary School
6. West Chatham Middle School
7. Godley Station School

8. Southwest Elementary School

MERCURY TESTING PROCEDURES

Bulk samples of the rubberized floor coating system were collected at each of the gymnasiums in the eight schools listed above on August 20, 2018. Bulk samples were mailed to Scientific Analytical Institute, Inc. (SAI) laboratory in Greensboro, North Carolina for analysis for total mercury, which includes both organic and inorganic mercury compounds.

Area air samples were collected inside the gymnasium for the eight schools listed above to determine the airborne concentration of mercury. Typically, bulk sampling of the rubberized floor coating system is performed initially to determine if mercury is present in the system as a phase 1 health risk assessment. If mercury is present in the rubberized floor coating system, then follow-up mercury air sampling is performed as part of the phase 2 health risk assessment under a separate mobilization. In order to save on additional costs associated with multiple mobilizations to the sites, GEL only mobilized onto the site one time to complete both the bulk and air sampling; therefore, assuming mercury was present in the rubberized floor coating systems in the eight schools listed above.

Area mercury air samples were collected breathing zone level (approximately three feet from the floor) to simulate typical occupant airborne exposures. Mercury was collected onto passive sampling monitors onto suitable sorbent media. Air samples were set up in each gymnasium on the afternoon/evening of August 20, 2018 (from approximately 5 PM until 8 PM). Air samples remained in the gymnasiums overnight and were retrieved from approximately 4 AM until 6:30 AM the next morning. Spent air samples were mailed to SGS Galson Laboratories (Galson) in East Syracuse, New York for analysis for mercury. Galson is accredited by the American Industrial Hygiene Association (AIHA) for industrial hygiene analyses and successfully participates in AIHA's Proficiency Analytical testing (PAT) program.

GEL also performed air sampling for chlorine in conjunction with and in the same area where mercury air sampling was conducted. The validated analytical method for mercury air sample analysis lists chlorine as a possible interference with the mercury analysis. Because school districts may use various chlorine compounds (for example, bleach as sodium hypochlorite and/or other chlorine-based chemical compounds used by the custodial and/or food service personnel) in the schools, GEL performed air sampling for chlorine to confirm is possible interference with mercury air sampling may occur.

PROJECT INFORMATION & OTHER TESTING

The school district did not have Safety Data Sheets (SDSs), manufacturer's technical specifications, and/or contractor installation information for the rubberized floor coating system installed in the gymnasiums in the eight schools listed above. No technical and operational information on the Heating, Ventilation, and Air-Conditioning (HVAC) systems serving the gymnasiums was obtained by GEL during the testing. Information includes but is not limited to, computerized thermostat settings, energy conservation thermostat settings, fresh air intake, preventive maintenance procedures, etc.

Instantaneous dry bulb temperature and Relative Humidity (RH) readings were measured inside the gymnasiums and outdoors at the beginning and end of the air sampling event using a TSI, Inc. IAQ Trak. Dry bulb temperatures inside the gymnasiums ranged from 73.9 degrees Fahrenheit (°F) to 82.1°F. Dry bulb temperature readings inside five of eight gymnasiums were outside the upper (high) acceptable range of 72.5°F and 80.0°F for summer temperatures as recommended by the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) standards. These temperatures may likely indicate thermostats set to conserve energy (although not confirmed with the school district) during periods of non-occupancy. Dry bulb temperatures outdoors ranged from 90.0 °F (3:40 PM on August 20, 2018) to 76.4°F (4 AM on August 21, 2018).

The RH inside the gymnasiums ranged from 37.6% to 61.4%, which is outside the upper (high) acceptable range between 30% and 60% (just for one of eight schools) as recommended by the ASHRAE standards.

MERCURY BULK SAMPLE RESULTS

No mercury was detected by the laboratory in the bulk samples of rubberized floor coating system in the gymnasiums of five of the eight schools tested. Low concentrations of mercury were detected in the rubberized floor coating system in the gymnasiums of the three schools listed below:

SCHOOL	MEASURED CONCENTRATION OF MERCURY (Parts Per Million, ppm)
Butler Elementary School	25 ppm
Garrison Elementary School	39 ppm
Garden City Elementary School	36 ppm

No mercury was detected by the laboratory in the air samples collected in the gymnasiums of the seven schools tested. No mercury and chlorine air results are available for the gymnasium at Myers Elementary school as further detailed below.

The mercury and chlorine air sampling media, pumps, and telescoping aluminum stand in the gymnasium at Myers Middle school was missing when GEL arrived at the site on August 21, 2018 at approximately 4:30 AM to retrieve the devices. Please note that no mercury was detected in the bulk sample of the rubberized floor coating system in the gymnasium of Myers Middle school; therefore, mercury or chlorine air monitoring is not required.

As mentioned above, mercury was only detected in the rubberized floor coating system in the three elementary schools listed above. Similarly, no chlorine was detected by the laboratory in the air sample collected in the gymnasiums of the seven schools tested and analyzed. The average dry bulb temperatures measured in the gymnasiums in the three elementary schools listed above are presented below:

SCHOOL	**AVERAGE DRY BULB TEMPERATURE** (°F)
Butler Elementary School	82.1°F
Garrison Elementary School	73.9°F
Garden City Elementary School	81.5°F

CONCLUSIONS & RECOMMENDATIONS

No further action pertaining to mercury vapor control is required for the following schools due to the absence of mercury in the rubberized floor coting systems in the gymnasium:

1. Doreen Middle School
2. Myers Middle School
3. West Chatham Middle School
4. Godley Station School
5. Southwest Elementary School

Although mercury was detected in low concentrations in the bulk samples of rubberized floor coating system in Butler, Garrison, and Garden City Elementary schools, the air quality inside the gymnasiums in the above three schools were not negatively impacted by mercury vapors.

Based on the average dry bulb temperature readings collected in the gymnasiums of the three elementary schools listed above, Butler and Garden City Elementary schools possibly appear to be operating on an energy conservation mode as compared to the gymnasium in Garrison Elementary school, which had the highest concentration of mercury in the bulk sample of the rubberized floor coating system.

Based on the above conclusions, GEL offers the following recommendations to minimize the risk of exposure of mercury vapors to building occupants of the gymnasiums in Butler, Garrison, and Garden City Elementary schools:

1. If practical and feasible, a vapor/moisture-proof (not retardant) coating should be considered to install over the existing rubberized floor coat system to encapsulate the existing floor system and to prevent vaporization of mercury into the air. If possible, the manufacturer of the existing rubberized floor coting system should be consulted to determine the compatibility of the existing system with the encapsulating system.
2. If the above recommendation is not feasible, the existing rubberized floor coating system in the gymnasiums of the three elementary schools listed above may be maintained in place with further recommendations presented below.
3. If not already in place, periodic, Preventive Maintenance (PM) of the HVAC systems serving the gymnasiums in the above three schools should be performed.
4. PM schedules for the HVAC systems should include a functional test to confirm that the existing HVAC systems are operating as designed to maximize the efficiency of operation.
5. Periodic cleaning of the Air Handling Unit (AHU) components (i.e., condensate drip pan, cooling coils, interior housing, ventilation ductwork, fresh air dampers, etc.) and replacement of dry filters should be included in the PM schedule.
6. The HVAC system serving the gymnasiums of the three elementary school should operate in continuous occupancy mode (no energy conservation or complete shutdown modes) with maximum fresh air intake (as practically feasible) to reduce/dilute any mercury vapors that may be emitted from the rubberized floor coating systems.
7. The HVAC systems serving the three gymnasiums may be required to operate in thee occupancy mode during the summer season (when students may not be in school) pending contractor or other construction and/or other renovation activities that may be performed inside these gymnasiums.
8. A minimum of fifteen (15) Cubic Feet per Minute (cfm) of fresh air per person (based on maximum occupancy) should be provided in the three gymnasiums.

9. Maintain dry bulb temperatures to the lowest setting of the acceptable range recommended by ASHRAE standards in the three gymnasiums to reduce the potential for release of mercury vapors into the air from the rubberized floor coating systems.
10. Cleaning and/or repair of the existing rubberized floor coating system in the three schools must not include chemical (using chemicals that are incompatible with the rubberized floor coating system), mechanical (sanding, abrading, drilling, cutting, etc.), or thermal (heat, steam cleaning, etc.) methods.
11. Representative, surface wipe sampling and testing for mercury of areas of the rubberized floor coating system in the three elementary schools should be performed to confirm no dermal (skin contact) and/or ingestion (poor personal hygiene) hazards exist for personnel occupying the gymnasium. Additional controls may be required for maintaining the existing rubberized floor coating system in place based on the laboratory analytical results of the surface wipe samples.
12. Periodic air monitoring for mercury vapors should be performed in the three gymnasiums during the winter, spring, and summer (the latter before the school year commences) periods when higher dry bulb temperatures are anticipated.

CLOSING

The sampling, analytical results, findings, and conclusions presented in this report are indicative of the conditions in the referenced schools on the days of the mercury testing and site visits. This mercury testing does not claim to identify all potential hazards in the schools tested and only addresses the conditions observed during the mercury testing.

This report has been prepared for the exclusive use of the Savannah-Chatham County School District solely for their use and reliance and is subject to the terms and conditions agreed upon between GEL and the Savannah-Chatham County School District for this specific project. These services have been provided in accordance with generally accepted environmental practices. No other warranty, expressed or implied, is made. Reliance on this report cannot be transferred without the written permission of the Savannah-Chatham County School District and GEL, and only if the other party agrees to the Standard Terms and Conditions agreed upon for this project.

On behalf of GEL, I want to thank you for the opportunity to assist you with your industrial hygiene needs. If you have any questions or need additional information, please contact Ron Sharpe at (843) 769-7378, extension 4208, on his mobile phone at (864) 616-2848, or via electronic mail at ronald.sharpe@gel.com.

Sincerely,

Sarah Browning, E.I.T., C.I.E.C.
Project Manager

Ronald S. Sharpe, C.I.H., R.S.
Senior Scientist

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