

October 19, 2018

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

Re: Report of Additional Mercury Testing – Rubber Flooring in Gymnasiums
Eleven 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, surface, and air testing for mercury at eleven Savannah-Chatham County School District (SCCSD) Owned Schools, which are located in Savannah and Pooler, Georgia on September 10 and 11, 2018. The purpose of this testing was to determine the presence or absence of mercury compounds that may be in rubberized floor coating systems installed in certain gymnasiums in the school district and to evaluate potential health risks to building occupants from exposure to airborne mercury vapors and contact with mercury compounds the event that mercury compounds are present in the rubberized floor coating systems. The specific schools where the rubberized floor coating systems were installed in the gymnasium were provided to GEL by Mr. Randy West with the SCCSD.

This report supplements our previous reports to the SCCSD dated September 4 and 13, 2018 in providing additional testing beyond our original testing of eight schools. Supplemental surface testing of the rubberized floor coating systems in the gymnasiums of three elementary schools (Garden City, Garrison, and Butler), which were previously air and bulk tested for mercury on August 20 and 21, 2018 (please see our reports dated September 4 and 13, 2018), was accomplished.

PROJECT INFORMATION

The gymnasiums in the following schools were included in the mercury bulk, surface, and air testing on the following dates (the latter given in parentheses):

1. Marshpoint Elementary School (September 10, 2018)
2. Shuman Elementary School (September 10, 2018)

3. East Broad Elementary School (September 10, 2018)
4. Hubert Elementary School (September 10, 2018)
5. Mercer Middle School (September 10, 2018)
6. West Chatham Middle School (September 10, 2018)
7. White Bluff Temporary School (September 11, 2018)
8. Bartlett Stern Academy (September 11, 2018)
9. Georgetown Elementary School (September 11, 2018)
10. Southwest Middle School (September 11, 2018)
11. Gould Elementary School (September 11, 2018)

As mentioned above, supplement surface mercury testing was performed at three elementary schools (Garden City, Garrison, and Butler). Mercury bulk and air testing was previously performed at the three, aforementioned elementary schools on August 20 and 21, 2018 (please see our reports dated September 4 and 13, 2018). Mercury concentrations in the bulk samples of rubberized floor coating systems ranged from 25 Parts Per Million (ppm) to 39 ppm in the bulk samples of rubberized floor coating system in the gymnasium in these three schools.

No mercury was detected by the laboratory in the bulk samples of rubberized floor coating system in the gymnasiums of the other five schools tested on August 20 and 21, 2018 (please see our report dated September 4, 2018). These five schools included Doreen Middle School, Myers Middle School, West Chatham Middle School, Godley Station School, and Southwest Elementary School.

MERCURY TESTING PROCEDURES

Bulk, surface, and/or air testing for mercury was performed at the schools listed above. Details of the testing procedures for each of the three types of tests are presented below.

Bulk Samples for Mercury Testing

Bulk samples of the rubberized floor coating system were collected at each of the gymnasiums in the eleven 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.

Surface Swab Samples for Mercury Testing

Wipe samples were collected from an approximate 1 Square Foot (SF) area of the surface of the rubberized floor coating system in each gymnasium. Wipe samples were collected onto sterile cotton gauze pads, which were pre-moistened with de-ionized water. Rubber gloves were worn during the collection of each wipe sample. The one SF area was vigorously wiped (loading of dust was minimal on the floors during GEL's surface testing) in its entire area in three dimensions [on the x-axis (back and forth), the y-axis (up and down), and diagonally]. The pre-moistened pad was carefully folded once after each of the three dimensions was wiped. Spent pads for each sample were placed into glass jars with Teflon-lined screw caps and expressed mailed to SAI for total mercury (both inorganic and organic mercury compounds) analysis.

Air Samples for Mercury Testing

Area air samples were collected inside the gymnasium for the eleven 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 and surface 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 eleven 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 each day of testing from approximately 5 PM until 7 PM. Air samples remained in the gymnasiums overnight and were retrieved from approximately 4 AM until 6 AM the next morning following each day of testing. 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.

PROJECT INFORMATION

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 schools tested. Since GEL’s previous mercury testing, SCCSD is now operating the Heating, Ventilation, and Air-Conditioning (HVAC) systems serving the gymnasiums in continuous mode with maximum feasible fresh air intake and at the lowest temperature setting. The aforementioned HVAC operational settings will reduce the potential for emissions of mercury into the air and/or migration and condensation of mercury compounds (from off-gassing) onto the exposed surfaces of the rubberized floor coating systems.

MERCURY SAMPLE TESTING RESULTS

No mercury was detected by the laboratory in the bulk samples of rubberized floor coating system in the gymnasiums of three of the eleven schools tested on September 10 and 11, 2018. These schools included Shuman Elementary school, and Mercer and West Chatham Middle schools. Likewise, no mercury was detected by the laboratory in the surface wipe and the air samples collected in the three, aforementioned schools.

As mentioned above, no mercury was detected by the laboratory in the bulk samples of rubberized floor coating system in the gymnasiums of Doreen Middle School, Myers Middle School, West Chatham Middle School, Godley Station School, and Southwest Elementary School as tested on August 20 and 21, 2018.

Very low concentrations (less than 0.2 ppm) of mercury were detected in the bulk samples of rubberized floor coating system collected in the gymnasiums of the four of the eleven schools tested on September 10 and 11, 2018 as listed below:

| BULK SAMPLE MERCURY TESTING RESULTS | |
|--|---|
| SCHOOL | MEASURED CONCENTRATION OF MERCURY (Parts Per Million, ppm) |
| Marshpoint Elementary School | 0.017 |
| Hubert Middle School | 0.019 |
| Bartlett Stern Academy | 0.022 |
| Southwest Middle School | 0.17 |

No mercury was detected by the laboratory in the surface wipe and the air samples collected in the four schools listed above.

Low concentrations (ranging from 32 ppm to 75 ppm) of mercury were detected in the bulk samples of rubberized floor coating system collected in the gymnasiums of the four of the eleven schools tested on September 10 and 11, 2018 listed below:

| BULK SAMPLE MERCURY TESTING RESULTS | |
|--|--|
| SCHOOL | MEASURED CONCENTRATION OF MERCURY (ppm) |
| East Broad Elementary School | 75 |
| White Bluff Temporary School | 65 |
| Georgetown Elementary School | 64 |
| Gould Elementary School | 32 |

Likewise, low concentrations of mercury (ranging from 25 ppm to 39 ppm) were detected in the bulk samples of rubberized flooring collected in the gymnasiums of the following elementary schools from our previous testing on August 20 and 21, 2018 (our reports dated September 4 and 13, 2018):

| BULK SAMPLE MERCURY TESTING RESULTS | |
|--|--|
| SCHOOL | MEASURED CONCENTRATION OF MERCURY (ppm) |
| Butler Elementary School | 25 |
| Garrison Elementary School | 39 |
| Garden City Elementary School | 36 |

Very low concentrations (ranging from 0.59 micrograms per SF, ug/SF, to 2.8 ug/SF) of mercury were detected on the surface wipe samples of the rubberized floor coating system in the gymnasiums of the seven schools listed above (and having low concentrations of mercury in the bulk samples of rubberized floor coating system) as presented below:

| SURFACE WIPE SAMPLE MERCURY TESTING RESULTS | |
|--|--|
| SCHOOL | MEASURED CONCENTRATION OF MERCURY (ug/SF) |
| East Broad Elementary School | 1.5 |
| White Bluff Temporary School | 2.8 |
| Georgetown Elementary School | 1.0 |
| Gould Elementary School | 0.67 |
| Butler Elementary School | 0.59 |
| Garrison Elementary School | 2.2 |
| Garden City Elementary School | 1.3 |

Of the seven schools listed above (having low concentrations of mercury in the bulk samples of rubberized floor coating system and very low concentrations of mercury in the surface wipe samples), two of the seven schools had very low airborne concentrations (given in micrograms per cubic meter, ug/m³) of mercury as listed below:

| AIR SAMPLE MERCURY TESTING RESULTS | |
|---|---|
| SCHOOL | MEASURED CONCENTRATION OF MERCURY (ug/m³) |
| Georgetown Elementary School | 0.63 |
| Gould Elementary School | 1.3 |

No mercury was detected by the laboratory in the air samples collected in the gymnasiums of the other five of seven schools tested and listed above.

As stated in our previous report to you dated September 4, 2018, no mercury was detected in the bulk sample of the rubberized floor coating system collected in the gymnasium of Myers Middle school; therefore, mercury air and/or surface wipe testing is not required.

CONCLUSIONS & RECOMMENDATIONS

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

1. Shuman Elementary School
2. Mercer Middle School
3. West Chatham Middle School
4. Doreen Middle School
5. Myers Middle School
6. West Chatham Middle School
7. Godley Station School
8. Southwest Elementary School

Although mercury was detected in very low to low concentrations in the bulk samples of rubberized floor coating system in eleven of nineteen schools tested and listed above, the air quality inside the gymnasiums in the eleven schools was not negatively impacted by mercury vapors. The highest airborne concentration of mercury measured (1.3 ug/m³ at Gould Elementary school) was well below the action level of 3.0 ug/m³ for mercury as established by the Agency for Toxic Substances Disease Registry (ATSDR). This action level is recommended for the re-occupancy of personnel into a commercial (e.g., school) setting after clean-up/remediation of a mercury spill, where mercury is not usually handled.

No current post clean-up/remediation guidelines have currently been established for mercury surface contamination. Mercury clearance guidelines have relied solely on the concentration of mercury in air. The United States Environmental Protection Agency (EPA) and the Housing and Urban Development (HUD) have established post clean-up/remediation guidelines for paint containing lead, a metal with similar toxicological properties (affecting the same target organs of the body) and exposure levels. The EPA and HUD post remediation clearance criteria for lead on the floor surfaces is 40 ug/SF, as compared to a highest mercury concentration of 2.8 ug/SF measured on the floor from the surface wipe sample collected at White Bluff Temporary school.

GEL understands that the SCCSD plans to abate the rubberized floor coating system in the eleven schools listed above. GEL will prepare a draft, written, performance-based mercury abatement design specification for the eleven schools under a separate cover. Both removal and encapsulation abatement options will be addressed in the draft specification.

Until mercury abatement actions are taken for the eleven schools and 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 the eleven schools:

1. If not already in place, periodic, Preventive Maintenance (PM) of the HVAC systems serving the gymnasiums in the above eleven schools should be performed.
2. 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.
3. 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.
4. The HVAC system serving the gymnasiums of the eleven schools should continue to 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.
5. 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.
6. Maintain dry bulb temperatures to the lowest setting of the acceptable range recommended by ASHRAE standards in the gymnasiums of the eleven schools to reduce the potential for release of mercury vapors into the air from the rubberized floor coating systems.
7. 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.

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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