

Environmental Design Inc.

Professional Environmental Consultants



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INTERIM REPORT

PERIODIC MERCURY VAPOR SAMPLING PROGRAM JULY 2020

CONDUCTED AT:

GOVERNOR CHARLES C. STRATTON SCHOOL

WALTER HILL SCHOOL

CONDUCTED FOR:

SWEDESBORO-WOOLWICH SCHOOL DISTRICT

15 FREDRICK BOULEVARD
WOOLWICH TOWNSHIP, NJ 08085



Service Disabled Veteran Owned Small Business



EXECUTIVE SUMMARY

Environmental Design Inc. prepared this Interim Report on behalf of the Swedesboro-Woolwich School District, hereafter referred to as the Client, to document the latest results of the Periodic Mercury Vapor Sampling Program conducted at the Governor Charles C. Stratton School and the Walter Hill School on July 24 & 28, 2020, respectively. The sampling event was conducted to document the level of mercury vapor associated with the mercury-containing, rubberized, synthetic floor in each school's Multi-Purpose Room. The report reflects the second of four planned periodic sampling events.

In April 2019, the Client tasked *EDI* with the collection of bulk samples of the rubberized, synthetic floor material in each Multi-Purpose Room (MPR) to determine if the floors contained mercury. The analytical results indicated the flooring material at both schools contained greater than one part per million (1 ppm) mercury, and thus were considered to be mercury-containing as per the New Jersey Department of Health (NJ DOH). In accordance with the NJ DOH guidelines in effect at the time, *EDI* recommended to the Client that follow-up air samples be collected to document the level of mercury vapor in each MPR, if any. The results of the subsequent air sampling conducted in May 2019 indicated levels of mercury vapor well below the NJ DOH threshold value of 0.80 micrograms of mercury per cubic meter of air (0.80 $\mu\text{g}/\text{m}^3$). Therefore, in accordance with the NJ DOH guidelines each Multi-Purpose Room was deemed acceptable for continued use without the need to remove the mercury-containing floor material.

The NJ DOH published updated guidelines related to mercury-containing floors in February 2020 in a document entitled "*Evaluation and Management of Mercury-Containing Floors in New Jersey Schools*" (dated February 6, 2020), however, the threshold level of 0.80 $\mu\text{g}/\text{m}^3$ for mercury vapor exposure remained the same. The NJ DOH considers exposure to this level of mercury vapor for 8-hours per day for 180 days per year to be protective student health; note that the level is not zero. The updated guidelines outlined that at least two air samples should be collected in the room/area with the mercury-containing floor and that one air sample should be collected outdoors. In addition, the updated guidelines recommended that school districts consider implementation of a periodic sampling program to record mercury vapor levels at quarterly intervals throughout the calendar year to assess the seasonal climatic effects on mercury vapor concentrations inside the school.

Consequently, the Client initiated a Periodic Mercury Vapor Sampling Program to record mercury vapor levels at each school four times over the course of a year. The first round of periodic sampling was conducted in April 2020. This report reflects the second round of periodic sampling conducted in July 2020. Additional rounds of sampling are planned for October 2020 and January 2021.

The second round of periodic sampling took place on July 24 & 28, 2020 at the Governor Charles C. Stratton School and Walter Hill School, respectively. The results for all samples from all locations at both schools were below the NJ DOH threshold value of 0.80 $\mu\text{g}/\text{m}^3$. All of the samples were analyzed for mercury vapor concentration per the NIOSH 6009 Method by an independent, third-party laboratory. Because the analytical results continue to be below the NJ DOH threshold value, it remains the professional opinion of *EDI* that the Multi-Purpose Room at each school can continue to be utilized as per NJ DOH guidelines. The Client is encouraged to follow the recommendations contained in this report regarding the on-going use of the Multi-Purpose Room at each school.



BACKGROUND & FINDINGS

The New Jersey Department of Health (NJ DOH) issued guidance documents which detail how some rubberized, synthetic floors manufactured and installed up until early 2000's may contain organic mercury compounds. The mercury compounds were added either during the manufacturing process at the factory or during the installation process in the field. The primary health concern associated with mercury-containing floors is that the mercury compounds may volatilize (i.e. off-gas) under certain conditions, releasing mercury vapor into the air. Inhalation of mercury vapor can adversely affect health depending on various individual factors, such as the length of exposure, the concentration of exposure, and personal susceptibility. NJ DOH established the Maximum Contaminant Level (MCL) for mercury vapor applicable to school environments at $0.80 \mu\text{g}/\text{m}^3$. NJ DOH considers exposures at or below this level to be protective for children as young as three years old, even if they are exposed to this level of mercury vapor at a frequency of 8-hours per day for 180 days per year.

In April 2019, *EDI* collected bulk samples of the rubberized synthetic flooring material in the Multi-Purpose Room at the Governor Charles C. Stratton School and the Walter Hill School. The physical samples were analyzed for mercury content by a certified, third-party laboratory per EPA Method 7471B. The analytical lab report indicated there was mercury present in each of the MPR floors above one part per million (1 ppm).

Table 1. Results Summary - Mercury Bulk Sampling (April 2019)

School	Sample	Result	Average
Governor Charles C. Stratton School	#1	210 ppm	260 ppm
	#2	310 ppm	
Walter Hill School	#1	160 ppm	160 ppm

In accordance with NJ DOH guidelines in effect at the time, *EDI* recommended that air samples be collected in each MPR given that the floor was found to contain more than 1 ppm mercury. The results of the subsequent air sampling conducted in May 2019 indicated levels of mercury vapor in the MPR and adjacent spaces well below the NJ DOH threshold value of $0.80 \mu\text{g}/\text{m}^3$. In consideration of the analytical results and the NJ DOH guidance in effect at the time, no action was taken by the Client with respect to removing the mercury-containing floor.

In February 2020, the NJ DOH published updated guidelines related to mercury-containing floors in a document entitled "*Evaluation and Management of Mercury-Containing Floors in New Jersey Schools*" (dated February 6, 2020), however, the Maximum Contaminant Level of $0.80 \mu\text{g}/\text{m}^3$ for mercury vapor exposure remained the same. To comply with the updated guidelines, atmospheric measurements of temperature, relative humidity, and barometric pressure were recorded during the July 2020 periodic sampling event in addition to the collection of indoor and outdoor samples at each school.

A total of five (5) air samples were collected at each school during the July 2020 round of testing: two in the MPR, one in the kitchen, one in the hallway outside the MPR, and one outdoors. The samples were collected in accordance with the NIOSH 6009 Method, which employs a glass sorbent tube attached to a portable sampling pump calibrated to run at 0.2 liters per minute. Each sample was



allowed to run for at least 8 hours. The sorbent tubes were then delivered to a certified, third-party laboratory for mercury analysis per the NIOSH 6009 Method.

The analytical data for the July 2020 periodic sampling event is summarized in the table below and is presented in comparison to the results from the initial May 2019 sampling event and the previous periodic sampling event.

Table 2A. Results Summary - Mercury Vapor Air Sampling - Stratton

Sample Location	May 2019	April 2020	July 2020
MPR (3' above floor)	0.16	0.29	0.29
MPR (5' above floor)	None Detected	0.20	0.24
Hallway	0.25	0.17	0.21
Kitchen	-	None Detected	0.30
Outdoors	-	None Detected	None Detected

Results expressed in $\mu\text{g}/\text{m}^3$; reporting limit is $0.10 \mu\text{g}/\text{m}^3$

Table 2B. Results Summary - Mercury Vapor Air Sampling - Hill

Sample Location	May 2019	April 2020	July 2020
MPR (3' above floor)	0.50	0.22	0.39
MPR (5' above floor)	0.18	0.26	0.34
Hallway	None Detected	0.16	0.29
Kitchen	-	0.16	0.33
Outdoors	-	None Detected	None Detected

Results expressed in $\mu\text{g}/\text{m}^3$; reporting limit is $0.10 \mu\text{g}/\text{m}^3$

Note that the results for all samples collected at both schools during the July 2020 sampling event continue to be lower than the NJ DOH recommended MCL value of $0.80 \mu\text{g}/\text{m}^3$.

The temperature, relative humidity, barometric pressure, and carbon dioxide levels in each Multi-Purpose Room were measured with a TSI IAQ Q-Trak 7575 monitor with data logging set at one minute intervals over the length of the sampling period. The average value of each parameter is listed in the table below.

Table 3. - Atmospheric Parameters - July 2020

School	Temp (°F)	Humidity (%RH)	Barometric Pressure (inHg)	CO ₂ (ppm)
Stratton School	70.0	80.7	29.97	364
Hill School	68.6	76.2	29.77	350

Average values; see data sheets for details



Results Interpretation

It is important to understand that the NJ DOH Maximum Contaminant Level (MCL) for mercury vapor is based on a risk assessment health model. Understanding how the MCL value of $0.80 \mu\text{g}/\text{m}^3$ is derived helps to put the level of mercury vapor detected at the school into perspective, and it also serves to explain why the MPR can be considered acceptable for occupancy without the need for additional remedial actions, such as removal of the flooring material.

The MCL is derived from a calculation which uses conservative variables to evaluate health risks for young children. The NJ DOH considers a child's health to be protected even if they are exposed to $0.80 \mu\text{g}/\text{m}^3$ of mercury vapor at a frequency of 8-hours per day for 180 days per year. Note that the exposure frequency used in the MCL calculation is longer than the typical school day and that 180 days denotes every day of the typical school year. Thus, the MCL essentially represents an unlikely worst-case scenario as students are realistically not going to spend 8-hours a day in the Multi-Purpose Room every single day of the school year. Consequently, the health risks at each school can be considered substantially reduced because the mercury vapor levels are lower than the MCL and the exposure frequency is much less than 8-hours per day or 180 days per year.

Occupational exposures for teachers and other district employees are governed by the NJ Public Employees Occupational Safety & Health regulations (NJ PEOSH), which establish a statutory Permissible Exposure Limit (PEL) for occupational exposure to mercury vapor at $100 \mu\text{g}/\text{m}^3$. Similar to the MCL value, the PEL is a risk-based calculated value that represents a level of exposure at which worker health is considered not to be compromised. The PEL is based on a daily 8-hour time-weighted average factored over a 40-hour work week for a working life-time. A time-weighted average allows for short-term exposures in excess of the PEL provided the overall daily exposure does not exceed the PEL (i.e. average exposure over 8 hours). Because the level of mercury detected at each school was several orders of magnitude lower than the PEL, and because staff are unlikely to be in the MPR for a full 8 hours every day every day of the school year, the potential health risks associated with the conditions at each school can be considered significantly reduced as compared to exposures at the PEL.



CONCLUSIONS/RECOMMENDATIONS

The level of mercury vapor detected in the Multi-Purpose Room and adjacent areas at the Governor Charles C. Stratton School and the Walter Hill School during the July 2020 periodic sampling event were below the Maximum Contaminant Level set by the NJ Department of Health. In consideration of the NJ DOH recommendations for the protection of student health and the NJ PEOSH Permissible Exposure Limit for the protection of staff, and based on the NIOSH 6009 analytical laboratory results, it is the professional opinion of *Environmental Design Inc.* that the Multi-Purpose Room at the Stratton School and the Hill School can continue to be utilized in their current condition.

EDI encourages the Client to consider the following suggestions regarding the use of the MPR at both schools:

- Maintain the physical condition of the MPR floor. Non-abrasive cleaning methods are recommended by NJ DOH. However, the Client should not encapsulate or cover the floor; this is specifically addressed in the NJ DOH guidelines dated February 6, 2020.
- The HVAC system should to be operated in "occupied" mode with respect to heating, cooling, and ventilation even when the MPR is vacant, including nights, weekends, and holidays. It is important to supply fresh make-up air and to provide sufficient air exchanges to prevent mercury vapor from accumulating, even if temperatures are maintained within ideal parameters. A mechanical contractor can confirm the system is operating properly, if needed.
- Industry guidelines suggest the temperature in the MRP should be kept in the range of 68°F to 70°F throughout the year, including during the summer recess, to minimize the rate of mercury volatilization. The NJ DOH guidelines issued in February 2020 explain that managing temperature and ventilation is an acceptable long-term mitigation strategy for controlling mercury vapor concentrations. However, the most recent NJ DOH do not recommend stress-testing the MPR by heating the space to above 90°F.
- Teachers, staff, custodial, and maintenance personnel should be informed of the nature of the mercury hazards associated with the MPR floor.
- Continue with an annual periodic sampling program to document that mercury vapor levels in the MPR are below the NJ DOH threshold level throughout the year.

EDI is neither recommending nor discouraging the removal of the mercury-containing floor at either school. If the Client decides to remove the floor, then the Client should be prepared to conduct core sampling of the concrete slab and the underlying soil as part of a preliminary investigation to determine the extent of mercury contamination, if any, below the poured floor. It is possible that portions of the concrete slab and even some sub-soil may need to be excavated as part of a floor replacement project. If there are cracks in the slab, then the potential for deeper contamination is increased, dictating a more complicated, time-consuming, and costly project. In addition to the direct costs for removal and disposal of a mercury-containing floor (potentially as a classified hazardous waste), the Client will need to factor the cost of a replacement floor and the ancillary engineering, architectural, and environmental services required for such a project.

EDI

LAB REPORTS & DATA TABLES

**EMSL Analytical, Inc.**

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<http://www.EMSL.com> EnvChemistry2@emsl.com

EMSL Order: 012007751
 CustomerID: EDI50
 CustomerPO:
 ProjectID:

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 Received: 07/27/20 9:00 AM

Project: SWBOE - **Stratton School** PR-200310-1508

Analytical Results

Client Sample Description 13-0724-01
MPR **Collected:** 7/24/2020 **Lab ID:** 012007751-0001

Method	Parameter	Result	RL Units	Prep Date & Analyst	Analysis Date & Analyst
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METALS

6009	Mercury	0.29	0.10 µg/m³	7/31/2020 SW	07/31/20 17:40 SW
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Client Sample Description 13-0724-02
MPR **Collected:** 7/24/2020 **Lab ID:** 012007751-0002

Method	Parameter	Result	RL Units	Prep Date & Analyst	Analysis Date & Analyst
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METALS

6009	Mercury	0.24	0.10 µg/m³	7/31/2020 SW	07/31/20 17:42 SW
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Client Sample Description 13-0724-03
Kitchen **Collected:** 7/24/2020 **Lab ID:** 012007751-0003

Method	Parameter	Result	RL Units	Prep Date & Analyst	Analysis Date & Analyst
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METALS

6009	Mercury	0.30	0.10 µg/m³	7/31/2020 SW	07/31/20 17:44 SW
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Client Sample Description 13-0724-04
Hallway **Collected:** 7/24/2020 **Lab ID:** 012007751-0004

Method	Parameter	Result	RL Units	Prep Date & Analyst	Analysis Date & Analyst
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METALS

6009	Mercury	0.21	0.10 µg/m³	7/31/2020 SW	07/31/20 17:46 SW
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Client Sample Description 13-0724-05
Outdoors **Collected:** 7/24/2020 **Lab ID:** 012007751-0005

Method	Parameter	Result	RL Units	Prep Date & Analyst	Analysis Date & Analyst
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METALS

6009	Mercury	ND	0.10 µg/m³	7/31/2020 SW	07/31/20 17:48 SW
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 Received: 07/27/20 9:00 AM

Project: SWBOE - **Stratton School** PR-200310-1508**Analytical Results**

Client Sample Description 13-0724-06 **Collected:** 7/24/2020 **Lab ID:** 012007751-0006
 Blank

Method	Parameter	Result	RL Units	Prep Date & Analyst	Analysis Date & Analyst
METALS					
6009	Mercury	ND	0.010 µg/tube	7/31/2020 SW	07/31/20 17:50 SW

Client Sample Description 13-0724-07 **Collected:** 7/24/2020 **Lab ID:** 012007751-0007
 Blank

Method	Parameter	Result	RL Units	Prep Date & Analyst	Analysis Date & Analyst
METALS					
6009	Mercury	ND	0.010 µg/tube	7/31/2020 SW	07/31/20 18:01 SW

Definitions:

- MDL - method detection limit
- J - Result was below the reporting limit, but at or above the MDL
- ND - indicates that the analyte was not detected at the reporting limit
- RL - Reporting Limit (Analytical)
- D - Dilution Sample required a dilution which was used to calculate final results

Swedesboro-Woolwich School District
 Periodic Mercury Vapor Sampling Program - July 2020
 Governor Charles C. Stratton School

TrakPro Version 4.70 ASCII Data File

Model: VelociCalc/Q-Trak 7575
 Model Number: 7575-X
 Serial Number: 7575X1844002
 Probe Model Number: 982
 Probe Serial Number: P18440066
 Test ID: 3
 Test Abbreviation: Test 003
 Start Date: 7/24/2020
 Start Time: 8:11:59
 Duration (dd:hh:mm:ss): 0:07:16:02
 Log Interval (mm:ss): 1:00
 Number of points: 436
 Notes: **Stratton School**

Data	Temperature	Relative Humidity	Barometric Pressure	Carbon dioxide	Carbon monoxide
Units:	deg F	%rh	inHg	ppm	ppm
Average:	70	80.7	29.97	364	0
Minimum:	69.2	64.5	25.48	347	0
Time of Minimum:	8:13:59	15:08:59	15:28:01	14:46:59	8:12:59
Date of Minimum:	7/24/2020	7/24/2020	7/24/2020	7/24/2020	7/24/2020
Maximum:	77.7	90.7	29.99	388	0
Time of Maximum:	15:07:59	15:06:59	9:58:59	8:13:59	8:12:59
Date of Maximum:	7/24/2020	7/24/2020	7/24/2020	7/24/2020	7/24/2020

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Project: SWE-WW: **Hill School** Mercury Vapor**Analytical Results**

Client Sample Description 58-0728-01
Gym (5 ft) **Collected:** 7/28/2020 **Lab ID:** 012007822-0001

Method	Parameter	Result	RL Units	Prep Date & Analyst	Analysis Date & Analyst
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METALS

6009	Mercury	0.34	0.10 µg/m³	7/31/2020 SW	07/31/20 15:28 SW
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Client Sample Description 58-0728-02
Gym (3 ft) **Collected:** 7/28/2020 **Lab ID:** 012007822-0002

Method	Parameter	Result	RL Units	Prep Date & Analyst	Analysis Date & Analyst
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METALS

6009	Mercury	0.39	0.10 µg/m³	7/31/2020 SW	07/31/20 15:30 SW
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Client Sample Description 58-0728-03
Kitchen **Collected:** 7/28/2020 **Lab ID:** 012007822-0003

Method	Parameter	Result	RL Units	Prep Date & Analyst	Analysis Date & Analyst
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METALS

6009	Mercury	0.33	0.10 µg/m³	7/31/2020 SW	07/31/20 15:32 SW
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Client Sample Description 58-0728-04
Hallway **Collected:** 7/28/2020 **Lab ID:** 012007822-0004

Method	Parameter	Result	RL Units	Prep Date & Analyst	Analysis Date & Analyst
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METALS

6009	Mercury	0.29	0.10 µg/m³	7/31/2020 SW	07/31/20 15:34 SW
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Client Sample Description 58-0728-05
Outdoor **Collected:** 7/28/2020 **Lab ID:** 012007822-0005

Method	Parameter	Result	RL Units	Prep Date & Analyst	Analysis Date & Analyst
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METALS

6009	Mercury	ND	0.10 µg/m³	7/31/2020 SW	07/31/20 15:36 SW
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Phone: (856) 616-9516
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 Received: 07/28/20 5:50 PM

Project: SWE-WW: **Hill School** Mercury Vapor**Analytical Results**

Client Sample Description 58-0728-06 **Collected:** 7/28/2020 **Lab ID:** 012007822-0006
 Blank

Method	Parameter	Result	RL Units	Prep Date & Analyst	Analysis Date & Analyst
METALS					
6009	Mercury	ND	0.010 µg/tube	7/31/2020 SW	07/31/20 15:38 SW

Client Sample Description 58-0728-07 **Collected:** 7/28/2020 **Lab ID:** 012007822-0007
 Blank

Method	Parameter	Result	RL Units	Prep Date & Analyst	Analysis Date & Analyst
METALS					
6009	Mercury	ND	0.010 µg/tube	7/31/2020 SW	07/31/20 15:40 SW

Definitions:

- MDL - method detection limit
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- ND - indicates that the analyte was not detected at the reporting limit
- RL - Reporting Limit (Analytical)
- D - Dilution Sample required a dilution which was used to calculate final results

Swedesboro-Woolwich School District
Periodic Mercury Vapor Sampling Program - July 2020
Walter Hill School

TrakPro Version 4.70 ASCII Data File

Model: VelociCalc/Q-Trak 7575
 Model Number: 7575-X
 Serial Number: 7575X1844002
 Probe Model Number: 982
 Probe Serial Number: P18440066
 Test ID: 5
 Test Abbreviation: Test 005
 Start Date: 7/28/2020
 Start Time: 7:48:36
 Duration (dd:hh:mm:ss): 0:07:52:00
 Log Interval (mm:ss): 1:00
 Number of points: 472
 Notes: **Walter Hill School**

Data	Temperature	Relative Humidity	Barometric Pressure	Carbon dioxide	Carbon monoxide
Units:	deg F	%rh	inHg	ppm	ppm
Average:	68.6	76.2	29.77	350	0
Minimum:	67.9	73.1	29.75	337	0
Time of Minimum:	10:42:36	7:50:37	14:49:36	14:47:36	7:50:37
Date of Minimum:	7/28/2020	7/28/2020	7/28/2020	7/28/2020	7/28/2020
Maximum:	71.7	77.4	29.78	1110	0
Time of Maximum:	7:49:36	11:10:36	9:23:36	7:49:36	7:49:36
Date of Maximum:	7/28/2020	7/28/2020	7/28/2020	7/28/2020	7/28/2020



LIMITATIONS AND SERVICE CONSTRAINTS

Environmental Design Inc. (EDI) has presented professional opinions in this report based on information provided to us by the Client and gathered by *EDI* personnel on site. Conditions described in this report are as found at the time of the investigation, unless stated otherwise. The Client selected the date and time of our evaluation.

Sample results represent a snapshot of environmental conditions at a specific time. Indoor and outdoor environmental conditions can change daily, weekly, monthly, and even throughout the day. *EDI* has done nothing to create or contribute to the presence of any hazardous waste, pollutants, chemicals, or other hazardous materials at the Client's property. A full and complete determination as to whether a certain property is or is not free from environmental hazards cannot be made with 100% certainty.

The Client retained *EDI* for the sole purpose of assisting them in evaluating mercury levels at select indoor and outdoor locations. *EDI* is only responsible for the limited evaluation of specific areas of the school that the Client requested *EDI* to assess and only for the specific samples collected.

EDI did not evaluate nor are we qualified to assess the operational effectiveness of the mechanical systems providing heating and air conditioning. Mechanical systems that are not operating properly or that do not adequately provide sufficient fresh air or air exchanges can be a significant contributing factor in any indoor quality problem.

The tests *EDI* conducted were based on the problem described by the Client and site conditions at the time of our evaluation. These tests may not be the only testing methodologies available for this type of evaluation. Further, the test results represent a "snapshot in time" of the conditions at the site and are reflective of the conditions at the time of the evaluation only. *EDI* receives no remuneration for any products suggested.

EDI will not be held liable for any disclosures, notifications, or reports that may be required to be made to third parties, including the governmental agencies.

EDI

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