PARTNER
Engineering and Science, Inc.

INDUSTRIAL HYGIENE ASSESSMENT

Wall Township Board of Education
1620 18th Avenue
Wall Township, New Jersey 07719

June 18, 2020
Partner Project Number: 20-283593.1

Prepared for:

Wall Township Board of Education
Wall, New Jersey

Engineers who understand your business

PARTNER
Engineering and Science, Inc.

June 18, 2020

Mr. Nicholas Moretta
Facilities Manager
Wall Township Board of Education
1620 18th Avenue
Wall Township, NJ 07719

Sent Via Email: nmoretta@wall.k12.nj.us

Subject: Mercury Investigation Services
Wall Township Board of Education
1620 18th Avenue
Wall, NJ 07719
Partner Project No. 20-283593.1

Dear Mr. Moretta:

Partner Engineering and Science, Inc. (Partner) is pleased to provide the findings of the Industrial Hygiene Assessment conducted at the above-referenced facility.

This survey included a site reconnaissance, sampling, and laboratory analysis. This assessment was performed utilizing methods and procedures consistent with good commercial or customary practices designed to conform to acceptable industry standards. The independent conclusions presented herein are based upon existing conditions and the information and data available to us during this assignment.

We appreciate the opportunity to provide these services to Wall Township Board of Education. If you have any questions concerning this report, or if we can assist you in any other matter, please contact me at 908-497-0894

Sincerely,

Partner Engineering and Science, Inc.

Dan Bracey, GSP, CHMM
Project Manager – Industrial Hygiene Services, Health & Safety Services

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APPENDICES

EXECUTIVE SUMMARY

Partner Engineering and Science, Incorporated (Partner) was retained by Wall Board of Education to perform an Industrial Hygiene Assessment (IHA) at Wall High School located at 1620 18th Avenue in Wall Township, NJ on June 3, 2020 and June 5, 2020. The IHA was performed in general conformance with the scope of work outlined in Partner's proposal dated May 29, 2020. The objective of the study was to investigate the presence of mercury vapor in the South Gym following an investigation of floors by Partner on May 18, 2020, which revealed the presence of mercury in the rubber-like gym floor. Additionally, bulk samples were collected forty-eight (48) hours after the air samples at the request of Wall Township Board of Education.

Area air samples were collected to evaluate the presence of mercury vapors in the South Gym and adjacent areas. During the air sampling event, direct-read measurements for mercury vapor were collected from the gym and adjacent areas. Additionally, bulk samples of the rubber-like gym floor were collected for mercury analysis. After collection, the samples were sealed and sent to an American Industrial Hygiene Association (AIHA) laboratory for analysis.

Results were evaluated against the relevant Occupational Safety and Health Administration (OSHA) Permissible Exposure Limit (PEL) and the most recent guidance maximum contaminant level from the New Jersey Department of Health (NJDOH) guidance document titled "*Evaluation and Management of Mercury-Containing Floors in New Jersey Schools: Guidance for School Districts and their Environmental Consultants*". PELs represent airborne concentrations of chemicals under which as per industry standard, most healthy workers can be repeatedly exposed to for eight-hours a day, forty hours a week for a working lifetime without adverse health effects.

All analytical results for area air samples collected during this assessment measured below the applicable analytical detection limits and consequently below the relevant OSHA PEL and NJDOH guidance maximum contaminant level for mercury. Direct-read mercury vapor measured during this assessment also revealed results below both the OSHA PEL and NNJDOH guidance maximum contaminant level. Based on the exposure data collected during this assessment, overexposure to mercury vapors is not occurring in the areas sampled.

1.0 INTRODUCTION

1.1 PURPOSE AND SCOPE

Partner Engineering and Science, Inc. (Partner) performed an Industrial Hygiene Assessment (IHA) for Wall Board of Education (BOE) in general conformance with the scope of work outlined in Partner's proposal dated May 29, 2020. The IHA was completed at Wall High School on June 3, 2020 and June 5, 2020. The IHA was conducted to evaluate the presence of mercury vapors in the gym and collect additional bulk samples of the rubber-polyurethane floor for analysis of mercury.

Dan Bracey, Project Manager, and Joseph Rizzo, Project Manager, with Partner completed the IHA. Nicholas Moretta of Wall BOE was Partner's primary contact at the facility during the assessment.

1.2 BACKGROUND

Partner conducted an initial Mercury investigation on May 18, 2020, which included bulk sampling of the rubber-polyurethane floor in the South Gym. The results of the bulk sampling are found below. Mercury was detected at all sampling locations. Based upon these results, Partner recommended collecting a representative number of full-day, breathing zone air samples in the South Gym for analysis by an accredited laboratory using NIOSH Method 6009. Refer to Appendix G for a copy of the May 18, 2020 Mercury Investigation Report.

On May 18, 2020 Partner collected three (3) bulk samples of the rubber-like polyurethane floors at Wall High School.

Facility	Location	Sample ID	Result (mg/kg)
Wall High School	South Gym – West	HS518-1	3.03
	South Gym – North	HS518-2	6.63
	South Gym – East	HS518-3	0.91

mg/kg = milligrams per kilogram

1.3 LIMITING CONDITIONS

This study utilized the sample collection procedure identified within the NJDOH guidance document, which recommends the ventilation within the room operate at the usual capacity. The exhaust fans and air handling units, which are combination heating and fresh air intakes, within the south gym were operating at normal capacity on arrival to the site and throughout the study. No dedicated air conditioning units are located within the gym. Temperatures within the gym at

the time of the study ranged from 70°F to 79°F. The outside temperature was approximately 85°F and relative humidity was approximately 74%. No obvious limiting conditions were identified during the mercury vapor study.

2.0 METHODOLOGY

2.1 AIR SAMPLES

Mercury Vapor Sampling

Area air monitoring was conducted to evaluate the presence of mercury vapors in the South Gym. The air samples were collected using Gillian GilAir-5 personal air sampling pumps. During sampling, plastic tubing was run from the sampling pump to the sampling media. The sampling media was clipped to a camera stand set between approximately 4 and 4.5 feet, i.e. the typical "breathing zone." Air was then drawn through the sampling media at a known flow rate. Samples collected in this manner are industry standard to represent possible exposure.

The specific sampling protocol, media used, and air flow through the media is identified in the table below.

Chemical Agent	Sampling and Analytical Method	Sampling Media*	Air Flow
Metal Fumes	NIOSH 6009	7 cm long solid charcoal sorbent tube	0.20 liters per minute (lpm)

The air flow rate through the sampling media was field calibrated prior to and after the sampling period using a BIOS Defender 510-L. The air flow meter was factory calibrated against a National Institute of Standards and Technology (NIST) standard. A copy of the calibration certificate is contained in Appendix D.

Direct-Read Measurements

A Jerome J505 Mercury Vapor Analyzer was utilized to measure mercury vapors in the South Gym and surrounding areas during the mercury vapor sampling event. The mercury vapor analyzer was factory-calibrated in accordance with manufacturer requirements prior to the assessment (refer to Appendix D).

2.2 BULK SAMPLING

At the request of Wall BOE and based upon current guidance from the New Jersey NJDOH, additional bulk samples of the rubber-like floors were collected for analysis of mercury levels by an accredited laboratory using EPA Method 7471B to determine potential mercury content. Samples were collected using hand tools and Each sample measured approximately 6-inch by 6-inch square. The bulk samples were then cut into approximately 1-inch by 6-inch strips for analysis.

3.0 STANDARDS & GUIDELINES

3.1 AIR SAMPLES

Federal

OSHA has established federal regulations for employee exposures to air contaminants that are published in Title 29, Code of Federal Regulations (CFR), Part 1910.1000. These standards set permissible exposure limits (PELs), most often as 8-hour time-weighted averages (TWAs), for a variety of chemical hazards. OSHA has also adopted action levels for some regulated chemical and physical hazards. If the action levels are exceeded, the employer must institute specific programs to control exposures and to protect workers.

For a limited number of chemicals, OSHA has promulgated standards, called short-term exposure limits (STELs) that allow employee exposures above the TWA for a defined period of time, usually 15 minutes. OSHA has also promulgated standards for some substances, called ceiling limits. The maximum peak exposures that OSHA has established for these chemicals, designated by a "C" preceding the concentration, must not be exceeded at any time during the work shift.

It is the goal of the sampling plan to collect an 8-hour sample. In this sampling event an 8-hour sample was not possible. As such, Partner assumed uniform exposure as a worst-case scenario for the un-sampled time period when calculating the 8-hour TWA. Samples were collected for over 7 hours.

When attempting to establish compliance with a promulgated standard such as a PEL, the air samples are traditionally collected on workers to collect personal air samples. In this case as there is no practical way to collect personal air samples without a significant disruption to the school's operation, Partner opted to collect area air samples within the normal breathing range.

The OSHA PEL for mercury is a ceiling limit of 0.1 milligrams per cubic meter of air (mg/m^3), which is currently enforced as an 8-hour time-weighted average. Other organizations suggest lower exposure levels. The National Institute for Occupational Safety and Health (NIOSH) recommends that exposures to mercury metal be limited to an average of 0.05 mg/m^3 over a 10-hour workday, in addition to a ceiling limit of 0.1 mg/m^3. The American Conference of Governmental Industrial Hygienists (ACGIH) recommends that metallic mercury exposures be limited to an average of 0.025 mg/m^3 over an 8-hour workday. Whereas as the OSHA standard is enforceable, the NIOSH and ACGIH values are recommendations.

New Jersey

As per the NJDOH guidance document titled "*Evaluation and Management of Mercury-Containing Floors in New Jersey Schools: Guidance for School Districts and their Environmental Consultants*", exposure limits such as those by OSHA should not apply to school exposures as they apply to workers and more protective limits are necessary because children are being exposed. The guidance suggests using a guidance maximum contaminant level of 0.8 µg/m^3 for long term repeated 8-hour exposures for up to 180-days. Any detectable concentration of mercury vapor in the gym below this level would also require additional quarterly air sampling to determine if seasonal changes effect the mercury vapor concentration in the gym.

The guidance document "*Evaluation and Management of Mercury-Containing Floors in New Jersey Schools: Guidance for School Districts and their Environmental Consultants* can be found in the Appendix E of this report.

3.2 BULK SAMPLING

Results of the bulk sampling of the rubber-like floors were compared to the NJDOH guidance document referenced above. Based upon the NJDOH guidance document, any detectable concentration of mercury within the rubber-polyurethane gym floor requires additional investigation of mercury vapor to determine potential airborne concentrations of mercury.

4.0 RESULTS

4.1 AIR SAMPLES

Five area samples for mercury vapor were collected, three samples located within the south gym, one sample located in the storage closet, and one sample located within the locker room hallway.

The air samples collected are compared to the applicable PELs and the NJDOH guidance maximum contaminant level in the Tables of Appendix A. Area air samples are not representative of personal exposures. Furthermore, PELs are not intended to be used to evaluate area sample results. Area air comparisons to the PELs are only used for general comparison purposes. At the time of the study, the gym was vacant, and the area samples represented the worst possible condition for exposure (i.e., exposure over a full day).

All the samples collected indicate that the mercury vapors monitored were below the applicable PELs, NIOSH and ACGIH recommended limits, and the NJDOH guidance maximum contaminant level. None of the air samples exceeded the laboratories applicable analytical detection limit. Refer to Appendix A for the laboratory results, Appendix B for a sample location map, and Appendix C for photographs of sampling locations.

Direct-Read Measurements

Direct-read measurements from six locations in the gym and surrounding areas were screened for mercury vapors utilizing a Jerome J505 Mercury Vapor Analyzer. Measurements were repeated three times throughout the day to account for temperature variations. The measurements yielded the following information:

Measurement Location	Time	Result (µg/m^3)
South Gym – East	0908	0.03
South Gym – West	0909	0
Supply Closet	0911	0.05
Locker Room Hallway	0915	0
Adjacent Hallway - South	0917	0
Cafeteria	0918	0
South Gym – East	1241	0.06
South Gym – West	1243	0.01
Supply Closet	1244	0.05
Locker Room Hallway	1246	0
Adjacent Hallway - South	1248	0
Cafeteria	1250	0
South Gym – East	1519	0.03
South Gym – West	1520	0.04
Supply Closet	1521	0.02
Locker Room Hallway	1523	0
Adjacent Hallway - South	1524	0
Cafeteria	1526	0

µg/m^3 = micrograms per cubic meter

The direct-read measurements collected are compared to the applicable NJDOH guidance maximum contaminant level. All the measurements collected indicate that the mercury vapors monitored were below the NJDOH guidance maximum contaminant level.

4.2 BULK SAMPLING

Three bulk samples for mercury analysis were collected from the south gym, one sample located in the southeastern corner, one sample in the southwestern corner, and one sample from the northeastern corner. The analytical results of the bulk samples are provided below.

Facility	Location	Sample ID	Result (mg/kg)
Wall High School	Southeast	WHS65-1	43.6
Wall High School	Southwest	WHS65-2	78.4
Wall High School	Northeast	WHS65-3	3.61

mg/kg = milligrams per kilogram

The results of the bulk samples collected from Wall High School revealed all three samples of the rubber floor contained elevated concentrations of mercury ranging from 3.61 mg/kg to 78.4 mg/kg. Refer to Appendix A for the laboratory results, Appendix B for a sample location map, and Appendix C for site photographs of sampling locations.

5.0 RECOMMENDATIONS

Mercury vapor levels can be managed by ventilation and temperature control. The gym is equipped with six (6) air handling units, as well as two (2) exhaust fans. Based upon the air sampling results, the ventilation within the gym is adequate for controlling the potential mercury vapors that may be emitted from the floor. In accordance with the NJDOH guidance document "*Evaluation and Management of Mercury-Containing Floors in New Jersey Schools: Guidance for School Districts and their Environmental Consultants*". Partner recommends the following to ensure mercury vapors are properly controlled:

- Continue to use the gym under similar ventilation system conditions that the samples were collected.
- Perform quarterly, seasonal air sampling for mercury vapors throughout the year to ensure seasonal variability has been assessed. Elevated mercury vapors concentrations are related to temperature. Partner recommends collecting another set of air samples in late July/August of 2020 for mercury vapor.
- Maintain the room temperature and ventilation system to remain consistent with the HVAC operations at the time of sampling.
- If conditions of the flooring change (i.e., cracks, signs of deterioration or damage), additional air sampling for mercury vapors is recommended.

In addition, the gym floor should be cleaned using non-abrasive methods. If desired by Wall Township Board of education, the floors can be removed and replaced with a non-mercury containing floor.

It is Partner's understanding that the air handling units in the south gym are combination heating and fresh air intake units. To assist in controlling any mercury vapors it may be prudent for Wall Township Board of Education to install air conditioning/cooling units in the south gym to control temperatures, although this is not required.

6.0 CLOSING

Results of this study are based on the conditions and activities which occurred during the site investigation. Substantial changes in the materials, conditions, or methods could affect future results.

Please contact us if you have any questions regarding this report. We thank you for this opportunity to be of service and hope you will consider us for any future occupational health and safety needs.

This report has been peer reviewed as a part of our internal quality process.

This report was prepared by:

Dan Bracey, GSP, CHMM
Project Manager
Industrial Hygiene & Health and Safety Services
PARTNER Engineering and Science, Inc.

This report was reviewed by:

Corey Myers, CIE
Senior Project Manager,
Industrial Hygiene & Health and Safety Services
PARTNER Engineering and Science, Inc.

APPENDIX A

AIR SAMPLE RESULTS TABLES

PARTNER

Location:
Wall High School
1630 18th Avenue
Wall, NJ 07719

Table 1

Mercury Air Monitoring Results

June 3, 2020

PARTNER Engineering and Science, Inc.

Sample Type	Sample Number	Location	Contaminant	Measured Concentration	OSHA PEL	NJDOH Maximum Contaminant Level	Units	Duration Minutes	Flow (Lpm)
Area	WHS65-1	Locker Room Hallway	Mercury	<0.70	100 (C)	0.8	ug/m^3	427	0.2 / 0.2
Area	WHS65-2	South Gym - Northwest	Mercury	<0.72	100 (C)	0.8	ug/m^3	417	0.2 / 0.2
Area	WHS65-3	South Gym - Southeast	Mercury	<0.71	100 (C)	0.8	ug/m^3	422	0.2 / 0.2
Area	WHS65-4	Supply Closet	Mercury	<0.73	100 (C)	0.8	ug/m^3	413	0.2 / 0.2
Area	WHS65-5	South Gym - Southwest	Mercury	<0.71	100 (C)	0.8	ug/m^3	420	0.2 / 0.2

Notes:
C = Ceiling Limit

KEY:

ACGIH® - American Conference of Governmental Industrial Hygienists
C - Ceiling limit: A concentration that is not to be exceeded at any part of the workday
i – As the inhalable fraction
lpm – Liters per minute
mg/m3 – Milligrams per cubic meter
NE – Not established
NA – Not applicable
< - Denotes less than

PEL – Permissible Exposure Limit
ppm – Parts Per Million
R – As the respirable fraction
STEL – Short Term Exposure Limit
TLV® - The ACGIH® Threshold Limit Value
TWA – Time-Weighted Average (8-hour basis)
µg – Micrograms
µg/m³ – Micrograms per cubic meter
***** - Internal pump timer used for run time

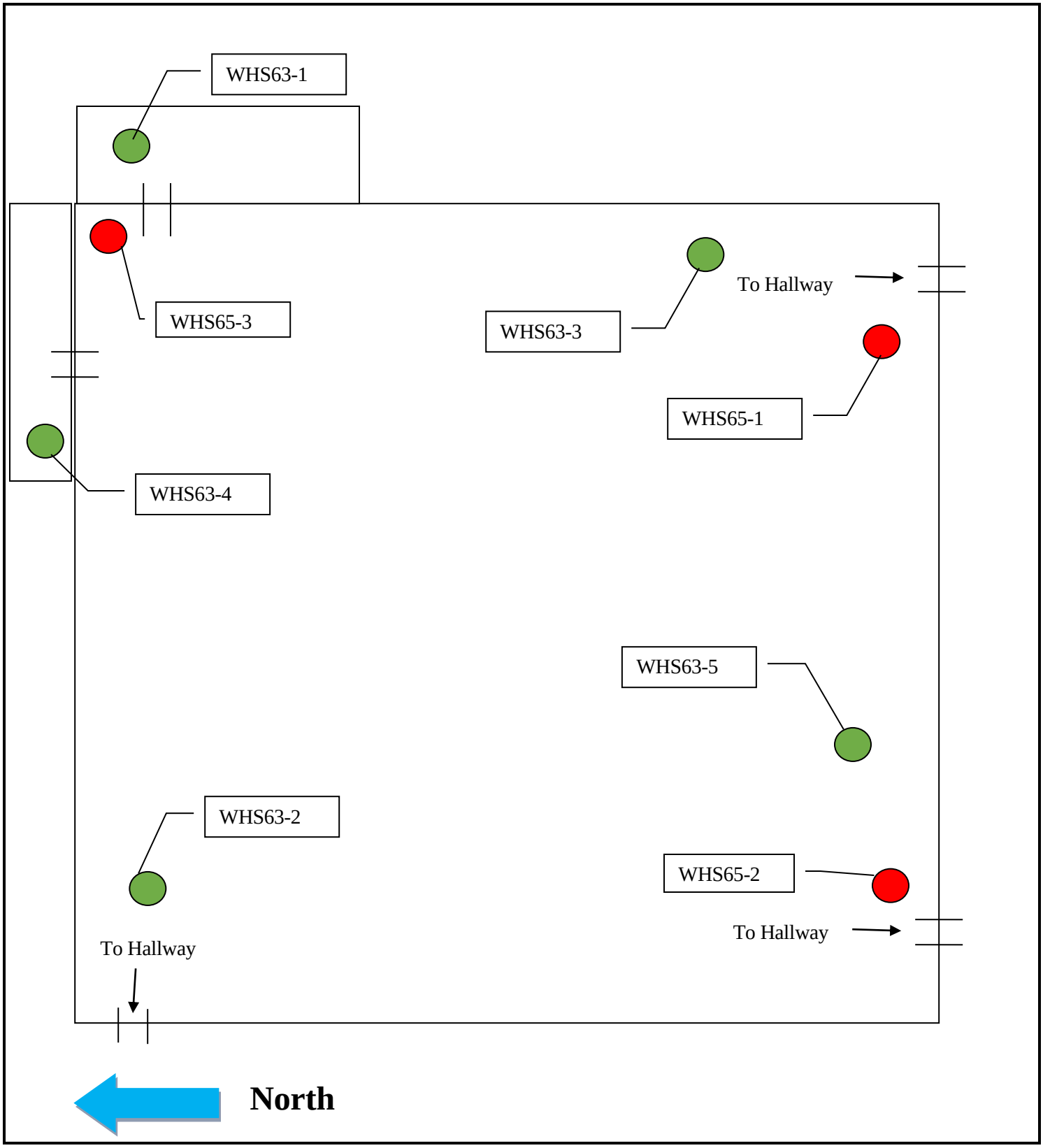
Calibrator Used:
BIOS Defender 510-L

Collected By:
Dan Brace (Partner) Joseph Rizzo (Partner)

APPENDIX B

SAMPLE LOCATION DIAGRAM

PARTNER



Approximate Sample Location

Wall High School

Air Sample Location

Bulk Sample Location

APPENDIX C

PHOTOGRAPHS

PARTNER

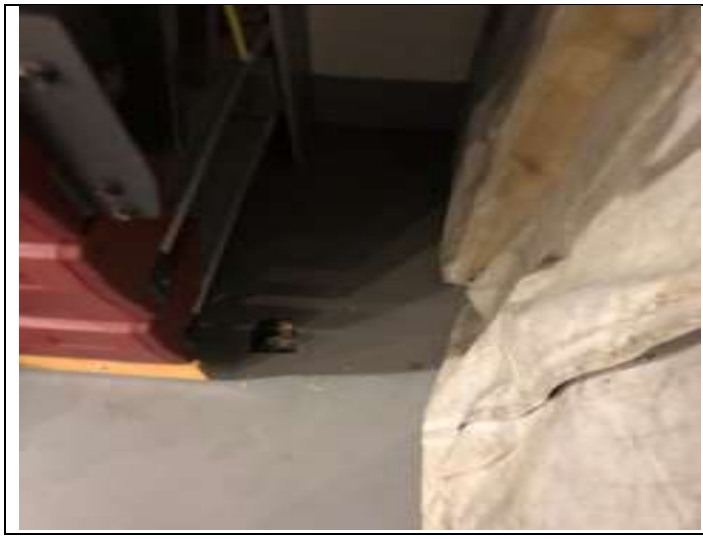
1. View of South Gym.

2. View of air sample setup.

3. View of sample WHS63-3

4. View of ventilation fan.

5. View of air handling unit in gym.



6. View of bulk sample location.

APPENDIX D

CALIBRATION DOCUMENTS

PARTNER

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC
92 North Main St, Building 20
Windsor, NJ 08561
Toll-free: (800) 301-9663

Pine Environmental Services, Inc.

Instrument ID 45259
Description BIOS Defender 510 L
Calibrated 6/2/2020 1:00:54PM

Manufacturer Bios
Model Number Defender 510-L
Serial Number/ Lot Number 170410
Location New Jersey
Department

State Certified
Status Pass
Temp °C 23
Humidity % 28

Calibration Specifications

Group # 1
Group Name Functional Test
Test Performed: Yes **As Found Result: Pass** **As Left Result: Pass**

Test Instruments Used During the Calibration

Test Standard ID	Description	Manufacturer	Model Number	Serial Number / Lot Number	(As Of Cal Entry Date) Last Cal Date/ Opened Date	Next Cal Date / Expiration Date

Notes about this calibration

Calibration Result *Calibration Successful*
Who Calibrated *Kemar Rumble*

All instruments are calibrated by Pine Environmental Services LLC according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

Notify Pine Environmental Services LLC of any defect within 24 hours of receipt of equipment
Please call 800-301-9663 for Technical Assistance

INSTRUMENT CALIBRATION REPORT

Advanced Labs, Inc.

Pine Environmental Services, Inc

Instrument ID 45259
Description Bios Defender 510-L
Calibrated 5/28/2020

Manufacturer Bios
Model Number 510-L
Serial Number 170410
Location New Jersey
Temp 76

Classification
Status *pass*
Frequency *Yearly EOM*
Department *Lab*
Humidity *37*

Calibration Specifications

Group # *1*
Group Name *Calibration*
Stated Accy *Pct of Reading*

Range Acc % 0.0000
Reading Acc % 1.0000
Plus/Minus 0.00

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
30.00 / 29.90	ccm	29.90	ccm	29.98	29.98	0.27%	Pass
100.00 / 101.20	ccm	101.20	ccm	100.40	100.40	-0.79%	Pass
500.00 / 500.09	ccm	500.09	ccm	497.28	497.28	-0.56%	Pass

Test Instruments Used During the Calibration

Test Instrument ID	Description	Manufacturer	Serial Number	(As Of Cal Entry Date) Last Cal Date	Next Cal Date
ML-500-10	Met Lab ML-500-10	Bios International	119826	3/26/2020	3/26/2021
ML-500-24	Met Lab ML-500-24	Bios International	116617	3/26/2020	3/26/2021
ML-500-44	Met Lab ML-500-44	Bios International	120274	3/26/2020	3/26/2021
ML-500-B	Met Lab ML-500-B	Bios International	120696	3/26/2020	3/26/2021

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated David Galego

Advanced Labs, Inc. hereby certifies that this instrument is calibrated and functions to meet the manufacture's specifications using NIST traceable standards, or is derived from accepted values of physical constants.

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC
92 North Main St, Building 20
Windsor, NJ 08561
Toll-free: (800) 301-9663

Pine Environmental Services, Inc.

Instrument ID 35435
Description Jerome J505 Mercury Vapor Analyzer
Calibrated 6/2/2020 1:19:43PM

Manufacturer Arizona
Model Number *J505-0005*
Serial Number/ Lot Number *50500201*
Location New Jersey
Department

State Certified
Status Pass
Temp °C 24.4
Humidity % 29

Calibration Specifications

Group # 1
Group Name Warmup, Purge, Sample, and data logg

Test Performed: Yes **As Found Result: Pass** **As Left Result: Pass**

est Instruments Used During the Calibration

(As Of Cal Entry Date)

st Standard ID	Description	Manufacturer	Model Number	Serial Number / Lot Number	Last Cal Date/ Expiration Da / Opened Date	Next Cal Date

es about this calibration

Calibration Result *Calibration Successful*
Who Calibrated *Carlos Gavilanes*

All instruments are calibrated by Pine Environmental Services LLC according to the manufacturer's fications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with manufacturer's specifications and/or the customer's own specific needs.

Notify Pine Environmental Services LLC of any defect within 24 hours of receipt of equipment

Please call 800-301-9663 for Technical Assistance

APPENDIX E

LABORATORY ANALYTICAL RESULTS

PARTNER

ANALYTICAL REPORT

Lab Number:	L2023579
Client:	Partner Engineering & Science, Inc. 611 Industrial Way W. Eatontown, NJ 07724
ATTN:	Dan Bracey
Phone:	(732) 380-1700
Project Name:	WALL BOE
Project Number:	20-28593.1
Report Date:	06/15/20

Certifications & Approvals: MA (M-MA086), NH NELAP (2064), CT (PH-0574), IL (200077), ME (MA00086), MD (348), NJ (MA935), NY (11148), NC (25700/666), PA (68-03671), RI (LAO00065), TX (T104704476), VT (VT-0935), VA (460195), USDA (Permit #P330-17-00196).

Eight Walkup Drive, Westborough, MA 01581-1019
508-898-9220 (Fax) 508-898-9193 800-624-9220 - www.alphalab.com

Project Name: WALL BOE
Project Number: 20-28593.1

Lab Number: L2023579
Report Date: 06/15/20

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L2023579-01	WHS65-1	SOLID	WALL HIGH SCHOOL	06/05/20 09:04	06/08/20
L2023579-02	WHS65-2	SOLID	WALL HIGH SCHOOL	06/05/20 09:18	06/08/20
L2023579-03	WHS65-3	SOLID	WALL HIGH SCHOOL	06/05/20 09:33	06/08/20

Project Name: WALL BOE
Project Number: 20-28593.1

Lab Number: L2023579
Report Date: 06/15/20

NJ DEP Data of Known Quality Protocols
Conformance/Non-Conformance
Summary Questionnaire

1	For each analytical method referenced in this laboratory report package, were all specified QA/QC performance criteria followed, including the requirement to explain any criteria falling outside of acceptable guidelines, as specified in the NJDEP Data of Known Quality performance standards?	YES
1a	Were the method specified handling, preservation, and holding time requirements met?	YES
1b	EPH Method: Was the EPH Method conducted without significant modifications (see Section 11.3 of respective DKQ methods)?	N/A
2	Were all samples received by the laboratory in a condition consistent with that described on the associated chain-of-custody document(s)?	YES
3	Were all samples received at an appropriate temperature (4 ± 2° C)?	YES
4	Were all QA/QC performance criteria specified in the NJDEP DKQP standards achieved?	YES
5a	Were reporting limits specified or referenced on the chain-of-custody or communicated to the laboratory prior to sample receipt?	YES
5b	Were these reporting limits met?	YES
6	For each analytical method referenced in this laboratory report package, were results reported for all constituents identified in the method-specific analyte lists presented in the DKQP documents and/or site-specific QAPP?	YES
7	Are project-specific matrix spikes and/or laboratory duplicates included in this data set?	NO

Note: For all questions to which the response was "No" (with the exception of question #7), additional information must be provided in an attached narrative. If the answer to question #1, #1a or #1b is "No", the data package does not meet the requirements for "Data of Known Quality".

Project Name:	WALL BOE	**Lab Number:**	L2023579
Project Number:	20-28593.1	**Report Date:**	06/15/20

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively.

When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances, the specific failure is not narrated but noted in the associated QC Outlier Summary Report, located directly after the Case Narrative. QC information is also incorporated in the Data Usability Assessment table (Format 11) of our Data Merger tool, where it can be reviewed in conjunction with the sample result, associated regulatory criteria and any associated data usability implications.

Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

HOLD POLICY - For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Alpha Project Manager and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Project Management at 800-624-9220 with any questions.

Project Name: WALL BOE
Project Number: 20-28593.1

Lab Number: L2023579
Report Date: 06/15/20

Case Narrative (continued)

Report Submission

All non-detect (ND) or estimated concentrations (J-qualified) have been quantitated to the limit noted in the MDL column.

DKQP Related Narratives

Report Submission

All DKQP required questions were answered with affirmative responses; therefore, there are no relevant data issues to discuss.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature: Tiffani Morrissey - Tiffani Morrissey

Title: Technical Director/Representative Date: 06/15/20

METALS

Project Name: WALL BOE
Project Number: 20-28593.1
Lab Number: L2023579
Report Date: 06/15/20

SAMPLE RESULTS

Lab ID: L2023579-01
Client ID: WHS65-1
Sample Location: WALL HIGH SCHOOL
Date Collected: 06/05/20 09:04
Date Received: 06/08/20
Field Prep: Not Specified

Sample Depth:
Matrix: Solid
Percent Solids: Results are reported on an 'AS RECEIVED' basis.

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Total Metals - Mansfield Lab											
Mercury, Total	43.6		mg/kg	3.42	2.23	50	06/10/20 19:36	06/12/20 15:29	EPA 7471B	1,7471B	GD

Project Name: WALL BOE
Project Number: 20-28593.1
Lab Number: L2023579
Report Date: 06/15/20

SAMPLE RESULTS

Lab ID: L2023579-02
Client ID: WHS65-2
Sample Location: WALL HIGH SCHOOL
Date Collected: 06/05/20 09:18
Date Received: 06/08/20
Field Prep: Not Specified

Sample Depth:
Matrix: Solid
Percent Solids: Results are reported on an 'AS RECEIVED' basis.

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Total Metals - Mansfield Lab											
Mercury, Total	78.4		mg/kg	3.21	2.10	50	06/10/20 19:36	06/12/20 15:32	EPA 7471B	1,7471B	GD

Project Name: WALL BOE
Project Number: 20-28593.1
Lab Number: L2023579
Report Date: 06/15/20

SAMPLE RESULTS

Lab ID: L2023579-03
Client ID: WHS65-3
Sample Location: WALL HIGH SCHOOL
Date Collected: 06/05/20 09:33
Date Received: 06/08/20
Field Prep: Not Specified

Sample Depth:
Matrix: Solid
Percent Solids: Results are reported on an 'AS RECEIVED' basis.

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Total Metals - Mansfield Lab											
Mercury, Total	3.61		mg/kg	0.133	0.087	2	06/10/20 19:36	06/12/20 15:36	EPA 7471B	1,7471B	GD

Project Name: WALL BOE
Project Number: 20-28593.1
Lab Number: L2023579
Report Date: 06/15/20

Method Blank Analysis
Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Metals - Mansfield Lab for sample(s): 01-03 Batch: WG1379989-1										
Mercury, Total	ND		mg/kg	0.083	0.054	1	06/10/20 19:36	06/12/20 12:24	1,7471B	GD

Prep Information

Digestion Method: EPA 7471B

Lab Control Sample Analysis

Batch Quality Control

Project Name: WALL BOE

Project Number: 20-28593.1

Lab Number: L2023579

Report Date: 06/15/20

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01-03 Batch: WG1379989-2 SRM Lot Number: D109-540								
Mercury, Total	104		-		60-140	-		

Project Name: WALL BOE
Project Number: 20-28593.1

Lab Number: L2023579
Report Date: 06/15/20

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information

Cooler	*Custody Seal*
A	Absent

Container Information

Container ID	*Container Type*	*Cooler*	*Initial pH*	*Final pH*	*Temp deg C*	*Pres*	*Seal*	*Frozen Date/Time*	*Analysis(*)*
L2023579-01A	Glass 500ml/16oz unpreserved	A	NA		4.7	Y	Absent		HG-T(28)
L2023579-02A	Glass 500ml/16oz unpreserved	A	NA		4.7	Y	Absent		HG-T(28)
L2023579-03A	Glass 500ml/16oz unpreserved	A	NA		4.7	Y	Absent		HG-T(28)

*Values in parentheses indicate holding time in days

Project Name:	WALL BOE	**Lab Number:**	L2023579
Project Number:	20-28593.1	**Report Date:**	06/15/20

GLOSSARY

Acronyms

DL	- Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the limit of quantitation (LOQ). The DL includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
EDL	- Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).
EMPC	- Estimated Maximum Possible Concentration: The concentration that results from the signal present at the retention time of an analyte when the ions meet all of the identification criteria except the ion abundance ratio criteria. An EMPC is a worst-case estimate of the concentration.
EPA	- Environmental Protection Agency.
LCS	- Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LCSD	- Laboratory Control Sample Duplicate: Refer to LCS.
LFB	- Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LOD	- Limit of Detection: This value represents the level to which a target analyte can reliably be detected for a specific analyte in a specific matrix by a specific method. The LOD includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
LOQ	- Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.) Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
MDL	- Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
MS	- Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. For Method 332.0, the spike recovery is calculated using the native concentration, including estimated values.
MSD	- Matrix Spike Sample Duplicate: Refer to MS.
NA	- Not Applicable.
NC	- Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.
NDPA/DPA	- N-Nitrosodiphenylamine/Diphenylamine.
NI	- Not Ignitable.
NP	- Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.
RL	- Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
RPD	- Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.
SRM	- Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.
STLP	- Semi-dynamic Tank Leaching Procedure per EPA Method 1315.
TEF	- Toxic Equivalency Factors: The values assigned to each dioxin and furan to evaluate their toxicity relative to 2,3,7,8-TCDD.
TEQ	- Toxic Equivalent: The measure of a sample's toxicity derived by multiplying each dioxin and furan by its corresponding TEF and then summing the resulting values.
TIC	- Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Footnotes

Report Format: DU Report with 'J' Qualifiers

Project Name:	WALL BOE	**Lab Number:**	L2023579
Project Number:	20-28593.1	**Report Date:**	06/15/20

1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Difference: With respect to Total Oxidizable Precursor (TOP) Assay analysis, the difference is defined as the Post-Treatment value minus the Pre-Treatment value.

Final pH: As it pertains to Sample Receipt & Container Information section of the report, Final pH reflects pH of container determined after adjustment at the laboratory, if applicable. If no adjustment required, value reflects Initial pH.

Frozen Date/Time: With respect to Volatile Organics in soil, Frozen Date/Time reflects the date/time at which associated Reagent Water-preserved vials were initially frozen. Note: If frozen date/time is beyond 48 hours from sample collection, value will be reflected in 'bold'.

Initial pH: As it pertains to Sample Receipt & Container Information section of the report, Initial pH reflects pH of container determined upon receipt, if applicable.

PAH Total: With respect to Alkylated PAH analyses, the 'PAHs, Total' result is defined as the summation of results for all or a subset of the following compounds: Naphthalene, C1-C4 Naphthalenes, 2-Methylnaphthalene, 1-Methylnaphthalene, Biphenyl, Acenaphthylene, Acenaphthene, Fluorene, C1-C3 Fluorenes, Phenanthrene, C1-C4 Phenanthrenes/Anthracenes, Anthracene, Fluoranthene, Pyrene, C1-C4 Fluoranthenes/Pyrenes, Benz(a)anthracene, Chrysene, C1-C4 Chrysenes, Benzo(b)fluoranthene, Benzo(j)+(k)fluoranthene, Benzo(e)pyrene, Benzo(a)pyrene, Perylene, Indeno(1,2,3-cd)pyrene, Dibenz(ah)+(ac)anthracene, Benzo(g,h,i)perylene. If a 'Total' result is requested, the results of its individual components will also be reported.

PFAS Total: With respect to PFAS analyses, the 'PFAS, Total (5)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA and PFOS. If a 'Total' result is requested, the results of its individual components will also be reported.

The target compound Chlordane (CAS No. 57-74-9) is reported for GC ECD analyses. Per EPA,this compound "refers to a mixture of chlordane isomers, other chlorinated hydrocarbons and numerous other components." (Reference: USEPA Toxicological Review of Chlordane, In Support of Summary Information on the Integrated Risk Information System (IRIS), December 1997.)

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Data Qualifiers

A - Spectra identified as "Aldol Condensates" are byproducts of the extraction/concentration procedures when acetone is introduced in the process.

B - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

C - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

D - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

E - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

G - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

H - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

I - The lower value for the two columns has been reported due to obvious interference.

J - Estimated value. The Target analyte concentration is below the quantitation limit (RL), but above the Method Detection Limit (MDL) or Estimated Detection Limit (EDL) for SPME-related analyses. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

M - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

ND - Not detected at the method detection limit (MDL) for the sample, or estimated detection limit (EDL) for SPME-related analyses.

NJ - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

Q - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration

Report Format: DU Report with 'J' Qualifiers

Project Name:	WALL BOE	**Lab Number:**	L2023579
Project Number:	20-28593.1	**Report Date:**	06/15/20

Data Qualifiers

Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

R - Analytical results are from sample re-analysis.

RE - Analytical results are from sample re-extraction.

S - Analytical results are from modified screening analysis.

Report Format: DU Report with 'J' Qualifiers

Project Name:	WALL BOE	**Lab Number:**	L2023579
Project Number:	20-28593.1	**Report Date:**	06/15/20

REFERENCES

1 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. Third Edition. Updates I - IV, 2007.

LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.

Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

Westborough Facility
EPA 624/624.1: m/p-xylene, o-xylene, Naphthalene
EPA 8260C: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
EPA 8270D: NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.
SM4500: NPW: Amenable Cyanide; SCM: Total Phosphorus, TKN, NO2, NO3.

Mansfield Facility
SM 2540D: TSS
EPA 8082A: NPW: PCB: 1, 5, 31, 87,101, 110, 141, 151, 153, 180, 183, 187.
EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.
EPA TO-12 Non-methane organics
EPA 3C Fixed gases
Biological Tissue Matrix: EPA 3050B

The following analytes are included in our Massachusetts DEP Scope of Accreditation

Westborough Facility:

Drinking Water
EPA 300.0: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500Cl-D, SM2320B, SM2540C, SM4500H-B, SM4500NO2-B**
EPA 332: Perchlorate; **EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.
Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT,SM9222D**.

Non-Potable Water
SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH: Ammonia-N and Kjeldahl-N, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2**: Nitrate-N**, SM4500P-E, SM4500P-B, E, SM4500SO4-E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D, EPA 300: Chloride, Sulfate, Nitrate.**
EPA 624.1: Volatile Halocarbons & Aromatics,
EPA 608.3: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
EPA 625.1: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9221E, EPA 1600, EPA 1603.**

Mansfield Facility:

Drinking Water
EPA 200.7: Al, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Na, Ag, Ca, Zn. **EPA 200.8:** Al, Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn. **EPA 245.1** Hg.
EPA 522.

Non-Potable Water
EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.
EPA 200.8: Al, Sb**,** As, Be, Cd, Cr, Cu, Fe, Pb, Mn, Ni, K, Se, Ag, Na, TL, Zn.
EPA 245.1 Hg.
SM2340B

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

NEW JERSEY CHAIN OF CUSTODY

ALPHA ANALYTICAL

Westborough, MA 01581
8 Walkup Dr.
TEL: 508-898-9220
FAX: 508-898-9193

Mansfield, MA 02048
320 Forbes Blvd
TEL: 508-822-9300
FAX: 508-822-9288

Service Centers
Mahwah, NJ 07430: 35 Whitney Rd, Suite 5
Albany, NY 12205: 14 Walker Way
Tonawanda, NY 14150: 275 Cooper Ave, Suite 105

Page of

Date Rec'd in Lab: 06/08/20

ALPHA Job #: L2023579

Client Information

Client: Hartner Engineering
Address: 611 Industrial Dr
Eatontown, NJ 07724
Phone: (908) 497-9104
Fax:
Email: dbracco@hartnereng.com

Project Information

Project Name: Wall BOE
Project Location: Wall High School
Project #: 20-28593.1
(Use Project name as Project #) ☐
Project Manager: DEB
ALPHAQuote #:

Turn-Around Time

Standard ☒ Due Date:
Rush (only if pre approved) ☐ # of Days:

Deliverables

☒ NJ Full / Reduced
☐ EQuIS (1 File) ☐ EQuIS (4 File)
☐ Other

Regulatory Requirement

☐ SRS Residential/Non Residential
☐ SRS Impact to Groundwater
☐ NJ Ground Water Quality Standards
☐ NJ IGW SPLP Leachate Criteria
☐ Other

Billing Information

☒ Same as Client Info
PO #

Site Information

Is this site impacted by Petroleum? Yes ☐
Petroleum Product:

These samples have been previously analyzed by Alpha ☐

For EPH, selection is REQUIRED:
☐ Category 1
☐ Category 2

For VOC, selection is REQUIRED:
☐ 1,4-Dioxane
☐ 8011

Other project specific requirements/comments:

Please specify Metals or TAL.

ANALYSIS

Mercury x 7471B

Sample Filtration
☐ Done
☐ Lab to do
Preservation
☐ Lab to do
(Please Specify below)

Sample Specific Comments

Total Bottle

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	Mercury x 7471B	Total Bottle
23579 -01	WHS65-1	6/5/20	0804	NJ-Prot	DRB	X	
-02	WHS65-2		0918			X	
-03	WHS65-3		0933			X	

Preservative Code:
A = None
B = HCl
C = HNO_3
D = H_2SO_4
E = NaOH
F = MeOH
G = $NaHSO_4$
H = $Na_2S_2O_3$
K/E = Zn Ac/NaOH
O = Other

Container Code
P = Plastic
A = Amber Glass
V = Vial
G = Glass
B = Bacteria Cup
C = Cube
O = Other
E = Encore
D = BOD Bottle

Westboro: Certification No: MA935
Mansfield: Certification No: MA015

Container Type	A
Preservative	A

Relinquished By:	Date/Time	Received By:	Date/Time
Dan Bracco	6/8/20 1054	[illegible]	6-8-20 09:00
[illegible]	6-8-20 13:00	Paul Magella	6/8/20 1642
Paul Magella	6/8/20 2000	[illegible]	6/8/20 22:00

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. BY EXECUTING THIS COC, THE CLIENT HAS READ AND AGREES TO BE BOUND BY ALPHA'S TERMS & CONSTITUTIONS. (See reverse side.)

Form No: 01-14 HC (rev. 30-Sept-2013)

APPENDIX F

NJDOH GUIDANCE DOCUMENT

PARTNER

Evaluation and Management of Mercury-Containing Floors in New Jersey Schools:

Guidance for School Districts and their Environmental Consultants

February 6, 2020

Health Consultation
prepared by:

New Jersey Department of Health
Environmental and Occupational Health Surveillance Program

Table of Contents

Purpose

This guidance document provides a systematic approach for school districts and their environmental consultants to evaluate whether installed mercury-containing flooring systems emit mercury vapors in excess of New Jersey Department of Health's (NJDOH) recommended maximum contaminant level of 0.8 micrograms per cubic meter ($\mu g/m^3$) of air.

Introduction

In the 1960s, a number of companies began manufacturing and installing a thin layer of synthetic, polyurethane flooring on top of concrete sub-floors, to provide a resilient and rubberlike surface (ATSDR 2010; ATSDR 2006a; ATSDR 2006b). Typically, liquid polyurethane was poured directly over concrete sub-floors, and in some cases over a rubberized shock-absorbing cushion material. Certain formulations of polyurethane incorporated mercury catalysts, such as phenylmercuric acetate (PMA), to produce a solid, seamless rubber-like floor. Depending on the required thickness of the floor, multiple pours of polyurethane were often employed. The concentration of mercury in such polyurethane flooring systems are reported to contain between 0.1 and 0.2 percent total mercury (Bush 2011; ATSDR 2006a; Reiner 2005).

Mercury-containing polyurethane floors were widely installed in school gymnasiums across the United States until being reportedly discontinued amid concerns over their emissions of elemental mercury vapor (NEWMOA 2010). It is to be noted that depending on the type and brand of polyurethane flooring, these floors may have been installed even as late as in 2005 or 2006 (Washington Township, New Jersey 2019; Bush 2011).

The following list of manufacturers are consistently referenced as having produced polyurethane products known to contain PMA in their formulation (Garrison, 2019). It is important to recognize this list is not an all-inclusive list. It is believed other manufacturers may also have included mercury catalysts in their polyurethane flooring systems.

- 3M under the name of Tartan® floors and Tartan® track
- American Biltrite Rubber Co. Inc.
- Amtico Rubber Flooring
- Athletic Polymer Systems (APS)
- Chemothane
- Crossfields Products (DexOTex)
- Mondo Rubber
- Pitzer Inc.
- Pulastic Systems
- Robbins Sport Surfaces - Chemturf
- Selby Battersby & Company Surfacing Systems

- Sportan Surfaces, Inc.
- Whittaker Synthetic Surfaces

Studies have shown that some of these flooring systems emit mercury vapor into the indoor air, leading to a concern about mercury exposures in schools. It is not known how many of these floors currently exist, whether they are still being installed, or what schools have them (ATSDR 2004; ATSDR 2006a; ATSDR 2006b; ATSDR 2010; Bush 2011; Garrison 2019).

This document provides guidance to school districts investigating the potential mercury vapors being emitted from these floors.

Steps for Assessment of Flooring

1. School districts should conduct a visual inspection to determine if poured-polyurethane floors (soft material in one contiguous piece that is clearly not wood or tile) have been installed in the school. If this type of flooring is identified in the school, a licensed indoor environmental consultant should be hired. A list of these consultants can be found on the Department's website at: https://www.nj.gov/health/ceohs/documents/childcare/conslt.pdf

2. Check if the manufacturer is noted in the list above and/or review the floor's Safety Data Sheet (SDS) for PMA. If the presence of PMA is confirmed, then skip step 3 below (as bulk sampling is not necessary to confirm the presence of mercury). It is not possible to rule out the potential presence of mercury based on the list above as other flooring system manufacturers and installers may have incorporated PMA in their polyurethane formulations. Further, the SDS may not be conclusive as the company might list the PMA ingredient as proprietary information.

3. If the record review was inconclusive, the district and its consultant may choose to collect a bulk sample of the flooring material to test for the presence of mercury. A bulk sampling plan overview is outlined below for the consultant to follow. The consultant will determine the timing between the bulk sampling and any indoor air sampling as these should not occur concurrently. The bulk sampling test may be informative in confirming there is no mercury present. The bulk sample must be analyzed by an American Industrial Hygiene Association (AIHA) accredited laboratory available at: https://www.aihaaccreditedlabs.org/

4. If the record review or bulk sampling confirmed the presence of mercury in the flooring, an appropriate air testing and monitoring program is warranted. A sampling plan overview is outlined below for your consultant to follow.

Sampling Plan Overview

A sampling plan that includes specific sampling and analytical methods is critical for evaluating mercury levels contained in synthetic flooring and the mercury levels in the indoor air. The district should hire and work with a licensed environmental consultant to understand the sampling plan before the plan is implemented. The consultant must provide sampling protocols, procedures, and an understanding of how to interpret the results to the district. The details for these procedures are provided in the sections below.

Bulk Sampling

The purpose of the bulk sampling is to determine if mercury is present in the flooring material and if indoor air monitoring is necessary. A sampling plan must be developed to ensure that the bulk samples are representative of the floor area(s) being evaluated. As noted above, the consultant will determine the timing between the bulk sampling and any indoor air sampling as these should not occur concurrently. The plan must include a diagram of the floor(s) showing the sampling locations and the laboratory results of the bulk samples. The environmental consultant should identify the rooms that contain the suspect flooring, coordinate the collection of bulk samples with school facilities staff, and execute the bulk sampling plan. The environmental consultant must ensure that all floor sampling locations are sealed and repaired after the bulk samples are collected.

Sampling Methods and Procedures

1. An appropriate size sample of the flooring material needs to be collected for analysis. The thickness of most poured polyurethane floors typically ranges from ¼-inch to 1-inch. Bulk samples of rubberized floor must represent the entire thickness/depth of the floor material. Sampling of only the surface or partial thickness of the floor must be avoided. Coring tools are commonly used to collect the bulk sample of the floor material. The environmental consultant must provide information on the bulk sample collection tools as well as the procedure to collect the sample from the entire thickness of the floor.

2. The recommended number of samples is: one floor sample from rooms that are less than 1,000 square feet, two samples from rooms 1,000 to 5,000 square feet, and three samples from rooms greater than 5,000 square feet. The sample locations should be selected, to the extent possible, in areas where the sample extraction is less likely to present a visual blemish (such as in room corners, in closets, behind doors, etc.)

Bulk samples of floor material must be analyzed using USEPA Method 7471B to determine the mercury content. An accredited laboratory should be contacted to ensure the proper amount of floor material is being collected. Typically, laboratories require 10 grams of floor material to analyze for mercury content.

If the floor contains mercury at any concentration, the NJDOH recommends sampling of the indoor air to evaluate the mercury vapor levels.

Indoor Air Sampling

The primary route of exposure to mercury vapor is through inhalation. Therefore, it is important to conduct air sampling to provide data which characterizes the mercury vapor levels in the indoor air.

General Requirements

- An indoor air sampling plan must be developed before any samples are collected. The sampling plan should ensure that air samples are taken from several locations to be representative of the floor area or room being evaluated. Samples should be collected at the breathing zone level, which is typically between three to five feet above the floor. Your consultant should include procedures for using a direct read instrument, the NIOSH 6009 method or both in the plan. See below for general sampling requirements using these methods. For all sampling plans, a diagram of the floor area or room showing the locations of the air samples must be developed. Sampling adjacent hallways and rooms should be included in the sampling plan. Ambient readings should be collected outside the facility to establish background levels.

Airborne mercury levels are affected by the operation of the Heating, Ventilation and Air Conditioning (HVAC) system. Given this relationship, the indoor air samples should be collected under typical HVAC operational conditions. Sampling under these conditions will represent the typical ventilation and temperature conditions under which the building is being maintained and occupied. The room temperature and typical operational settings of the HVAC system should be documented prior to collecting any air samples.

Field notes should include a visual inspection of the condition of the floor at locations where samples are collected, specifically noting if the floor surface is compromised in any manner.

Sampling Methods and Procedures

The following two widely used sampling and analytical methods are available for quantifying mercury levels in the indoor air.

1. Direct Reading Instruments:

- The Lumex RA-915M Mercury Vapor Analyzer (OhioLumex Co., Inc.,) or the Jerome J505 (AMETEK Arizona Instrument) can be used to measure mercury vapor concentrations in air. These direct read instruments are portable mercury

vapor analyzers that have very little cross-sensitivity to chemicals other than elemental mercury. These instruments have low detection limits (ranging from 0.002 micrograms per cubic meter ($\mu g/m^3$) to 0.05 $\mu g/m^3$) and can measure mercury vapor levels under a variety of sample collection protocols.

Sample Collection Procedures

- Ensure that the instrument has been properly calibrated according to the manufacture's recommended procedures. Calibration records must be retained to document that the instrument is functioning correctly.
- Temperature, humidity, and air pressure measurements must be collected during the sampling events.
- Direct read measurements should be taken in a predetermined pattern throughout the gym/room where the flooring material is located.
- Direct reading measurements should be taken at various heights above the floor.
- Readings collected at locations where the floor surface is compromised should be noted.

2. Industrial Hygiene Sampling:

- NIOSH Method 6009 - Analysis of Mercury in Air, is a common method for collecting airborne mercury vapors for laboratory analysis. Using this method, samples may be collected over customized periods of time to represent typical occupied conditions. The sample collection method includes a solid sorbent tube (Hopcalite sample collection media) which is connected to a properly calibrated sampling pump. Sampling pumps must be calibrated using a recognized primary standard to document the sampling flowrate. The NIOSH 6009 method should be consulted for the sample collection flowrates and detection limits.

Sample Collection Procedure

- To be representative of the gym/room, three to five samples should be collected. The number of samples within the gym/room may vary depending on the size of the room being evaluated. When determining the number of samples to be collected, the consultant should ensure that there are a sufficient number of samples to represent the gym/room and adjacent areas being evaluated.
- Temperature, humidity, and air pressure measurements must be collected during the sampling events.
- Samples should be collected at a height between three and five feet above the floor.
- The sampling time should be between six to eight hours to represent a typical day within the gym/room.
- Samples should be collected at a flowrate between 0.20 – 0.25 liters per minute (LPM)
- Collect between 90 and 100 liters of air to ensure that the lowest limit of detection (LOD) for the method is reached.

- Record the sampling information on a chain of custody form for submission to the accredited laboratory.
- Follow the quality control procedures outlined in the method for the submission of blank samples to the laboratory.
- Submit the samples to an accredited laboratory for analysis.

Risk Assessment

The primary exposure to mercury vapor is by inhalation. The NJDOH has adopted Standards for Indoor Environment Certification and for Licensure of Indoor Environmental Consultants (N.J.A.C. 8:50[1]). These regulations provide a risk assessment model that can be used to evaluate indoor air contaminants for school children and staff. This model is very conservative and adjusts for body weight, inhalation rate, and the amount of time spent in school for both children and staff. Based on the toxicological information and this regulated risk assessment model, the NJDOH has issued a guidance maximum contaminant level of 0.8 µg/m^3 for evaluating mercury in flooring. **This level is protective for children as young as three years old and is based on an exposure frequency of 8-hours per day for 180 days (NJDOH 2017).** The NJDOH acknowledges that there are other guidance levels for mercury vapors established by ATSDR, USEPA and other states, but there is no national standard (ATSDR 2004; 2006a; 2006b; 2010; Bush 2011; OEHHA; USEPA). The NJDOH guidance value is based on the exposure scenario in the risk model that is protective of preschool-aged children and a level at which adverse health effects are not likely to occur.

Evaluate and Mitigate Exposures

Based on the air sampling results, school districts may encounter the following scenarios:

Airborne mercury levels lower or equal to 0.8 µg/m^3

- Continue to use the gym/room under the occupied conditions that the samples were collected.
- Quarterly, seasonal sampling is recommended to ensure that the seasonal variability's impact on mercury concentrations is captured. Assessing the seasonal mercury level variation will ensure that the mercury indoor air level is always lower than 0.8 µg/m^3. Mercury vapor levels are related to temperature, so it is important to test during all seasons, especially during the heat of the summer.
- Maintain the room temperature and ventilation system to remain consistent with the operations at the time of sampling.

[1] https://www.nj.gov/health/ceohs/documents/eohap/njac_850_adoption.pdf

- If conditions of the flooring change, i.e., if there are cracks or other signs of deterioration or damage, resampling of mercury vapors in indoor air is necessary.
- Mercury vapor levels can be managed by active ventilation and temperature control of the room.

Airborne mercury levels above 0.8 µg/m^3

- Work with the environmental consultant to develop a feasible plan to reduce the mercury vapor levels below 0.8 µg/m^3. Mercury vapor levels can be reduced by active ventilation and temperature control of the room.
- Make adjustments to the HVAC system including increasing the ventilation/fresh air intake and/or lowering the temperature in the room. Verify (by retesting) that these adjustments have reduced mercury vapor levels to equal to or less than 0.8 µg/m^3.
- If these adjustments are inadequate to maintain the levels to 0.8 µg/m^3 or below, reduce the amount of time spent in the room to less than 8 hours per day or do not allow use of the room.
- If ventilation adjustments sufficiently reduce the levels to less than or equal to 0.8 µg/m^3, monitor the indoor air at least quarterly to evaluate the mercury levels during other seasons.
- If ventilation adjustments do not sufficiently reduce the levels to less than or equal to 0.8 µg/m^3, additional actions including removal of the flooring should be considered. Discussions with the environmental consultant will be needed to determine the appropriate course of action.

In addition, the gym floor should be cleaned using non-abrasive cleaning methods to avoid damaging the floor which could result in an increase in mercury emissions into the air.

Disposal of Floor Materials

If the flooring contains mercury and a decision is made to remove it, a determination needs to be made whether the material would be regulated as a hazardous waste for disposal. Contact the NJDEP's Bureau of Solid and Hazardous Waste[2] for information on the proper disposal of the flooring material. The Bureau of Solid and Hazardous Waste can be reached at (609) 633-1418 or (609) 984-0565.

For general questions, please contact the NJDOH - Consumer, Environmental, & Occupational Health Services at 609-826-4920.

[2] https://www.nj.gov/dep/enforcement/hw.html; https://www.nj.gov/dep/easyaccess/compenf.htm#hazwastecompenf

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OEHHA 2014. California Environmental Protection Agency's Office of Environmental Health Hazard Assessment. Appendix D. Individual Acute, 8-Hour, and Chronic Reference Exposure Level Summaries pages 476-501. Available at: https://oehha.ca.gov/media/downloads/crnr/appendixd1final.pdf

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Washington Township Public Schools, Gloucester County, New Jersey March 2019. Rubberized Flooring Mercury Investigation – Occupied Air Sampling Report. March 26, 2019.

Technical Resources

Analytical Methods for Mercury

- EPA 7471B Mercury in solid or semisolid waste (manual cold-vapor technique) https://www.epa.gov/sites/production/files/2015-07/documents/epa-7471b.pdf
- EPA TCLP Method 1311 SW-846 Test Method 1311: Toxicity Characteristic Leaching Procedure https://www.epa.gov/sites/production/files/2015-12/documents/1311.pdf
- NIOSH Method 6009 https://www.cdc.gov/niosh/docs/2003-154/pdfs/6009.pdf
- TCLP test https://www.epa.gov/sites/production/files/2015-12/documents/1311.pdf

Sources for Direct Reading Instruments for Mercury

- Lumex of Ohio, https://www.ohiolumex.com/mercury-analyzer-915m
- Arizona Instruments/Jerome, https://www.azic.com/jerome/j505/

REPORT PREPARATION

This health consultation providing guidance for evaluation of mercury in flooring was prepared by the New Jersey Department of Health.

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Consumer, Environmental and Occupational Health Service
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Trenton, New Jersey 08625-0369

Non-Certified

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APPENDIX G

PARTNER MAY 28, 2020 MERCURY INVESTIGATION REPORT

PARTNER

PARTNER

INDUSTRIAL HYGIENE SERVICES

Wall Township Board of Education
1620 18th Avenue
Wall, New Jersey 07719

Date: May 28, 2020
Partner Project No. 20-277423.1

Prepared for:
Wall Township Board of Education
1620 18th Avenue
Wall, NJ 07719

PARTNER
Engineering and Science, Inc.

March 23, 2020

Wall Township Board of Education
1620 18th Avenue
Wall, NJ 07719

Attn: Nicholas Moretta
Facilities Manager

Re: Mercury Investigation Services
Wall Township Board of Education
Wall Township, New Jersey 07719

Dear Mr. Moretta:

Attached is the report of Partner Engineering and Science, Inc.'s (Partner's) Mercury Investigation Services performed at Wall High School, Allenwood Elementary School, and West Belmar Elementary School.

Please feel free to contact me directly with any questions or comments regarding the scope, sequence, or fees as indicated at (732) 380-1700 ext. 1361.

Very truly yours,

Dan Bracey, GSP, CHMM
Project Manager
Industrial Hygiene and Health & Safety Services

TABLE OF CONTENTS

I. INTRODUCTION

At the request of Wall Board of Education (the "Client"), Partner Engineering and Science, Inc. (Partner) conducted a mercury investigation to assess potential mercury content in the rubber-like polyurethane floors in Wall High School, Allenwood Elementary School, and West Belmar Elementary School, Dan Bracey of Partner performed the investigation activities on May 18, 2020.

II. BACKGROUND

Partner conducted an initial walkthrough of the subject building on February 13, 2020, to determine potential sampling locations in the three target areas containing rubber-like polyethylene floors, specifically the gymnasiums at all schools. No safety data sheets (SDSs) for the floors were available at the time of the investigation and the installation date of the floors is unknown. Based upon this information and current guidance from the New Jersey Department of Health (NJDOH), bulk samples of the rubber-like floors were to be collected for analysis of mercury levels by an accredited laboratory using EPA Method 7471B to determine potential mercury content.

III. SAMPLING RESULTS

On March 10, 2020 Partner collected three (3) bulk samples of the rubber floor from the gymnasium at Wall High School, two (2) bulk samples of the rubber floor from the gymnasium at Allenwood Elementary School, and two (2) bulk samples of the rubber floor from the gymnasium at West Belmar Elementary School. Each sample measured approximately 6-inch by 6-inch square. The bulk samples were then cut into approximately 1-inch by 6-inch strips for analysis.

The results of the bulk sampling showed mercury was not detected above the reporting limit of the laboratory for the samples collected from Allenwood Elementary School and West Belmar Elementary School. The results of the bulk samples collected from Wall High School revealed all three samples of the rubber floor contained elevated concentrations of mercury ranging from 0.9 mg/kg to 6.63 mg/kg. Refer to Appendix A for the laboratory results, Appendix B for site photographs of sampling locations, and Appendix C for a sample location map.

Facility	Location	Sample ID	Result (mg/kg)
Wall High School	South Gym – West	HS518-1	3.03
Wall High School	South Gym – North	HS518-2	6.63
Wall High School	South Gym – East	HS518-3	0.91
Allenwood School	Gym – Northeast (Office)	AE518-1	ND
Allenwood School	Gym – Southwest	AE518-2	ND
West Belmar School	Gym – Southwest	WB518-1	ND
West Belmar School	Gym – Northwest	WB518-2	ND

NOTES:
mg/kg = milligrams per kilograms
ND-indicates that the analyte was not detected at the reporting limit of 0.058 mg/kg

IV. CONCLUSIONS AND RECOMMENDATIONS

Laboratory analysis of the bulk samples revealed results below the laboratories minimum detection limits (MDL) at both West Belmar Elementary School and Allenwood Elementary Schools indicating no detectable mercury concentrations were identified in the samples. Based upon these results, no air sampling or additional bulk sampling of the floors is required at this time for these two facilities.

Laboratory analysis of the bulk samples collected from Wall High School revealed elevated mercury concentration ranging from 0.91 mg/kg to 6.63 mg/kg; therefore, as per the NJDOH guidance document titled "*Evaluation and Management of Mercury-Containing Floors in New Jersey Schools: Guidance for School Districts and their Environmental Consultants*" air sampling for mercury is recommended to determine the airborne concentration of mercury vapors in the gym and surrounding areas (Appendix D). Partner can provide a separate proposal for the follow-up air sampling at the request of Wall Board of Education.

APPENDIX A

ALPHA ANALYTICAL

World Class Chemistry

www.alphalab.com

Lab Number: L2020571

Client: Partner Engineering & Science, I

ATTN: Dan Bracey

Project Name: WALL BOE

Project Number: 20-277423.1

ANALYTICAL DATA PACKAGE FOR THE
NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION
TRENTON NEW JERSEY 08625

Agency/Division:	**Bureau/Office:**
Project No: 20-277423.1	**Contract No:**
Laboratory: Alpha Analytical	**Laboratory Location:** Westborough, Ma.
	Laboratory Phone Number: (508) 898-9220
SDG No: L2020571	**NJDEP Certification #:** MA015/MA935
Date of First Sample Receipt: 05/19/2020	**Date of Last Sample Receipt:** 05/19/2020

Agency Sample Number	Laboratory Sample Number	Sample Location	Date/Time of Collection
HS518-1	L2020571-01	WALL BOE	05/18/2020 09:12
HS518-2	L2020571-02	WALL BOE	05/18/2020 09:25
HS518-3	L2020571-03	WALL BOE	05/18/2020 10:00
WB518-1	L2020571-04	WALL BOE	05/18/2020 10:33
WB518-2	L2020571-05	WALL BOE	05/18/2020 10:45
AE518-1	L2020571-06	WALL BOE	05/18/2020 11:30
AE518-2	L2020571-07	WALL BOE	05/18/2020 11:40

I certify that this data package is in compliance with the terms and conditions of this contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package and in the computer-readable data submitted on disk or electronically has been authorized by the laboratory director or his/her designee, as verified by the following signature.

Technical Director/Representative (Typed)	Melissa Sturgis	05/27/20
Technical Director/Representative (Signature)	Melissa Sturgis	

Table of Contents

Chain of Custody

NEW JERSEY CHAIN OF CUSTODY

ALPHA ANALYTICAL

Westborough, MA 01581
8 Walkup Dr.
TEL: 508-898-9220
FAX: 508-898-9193

Mansfield, MA 02048
320 Forbes Blvd
TEL: 508-822-9300
FAX: 508-822-3288

Service Centers
Mahwah, NJ 07430: 35 Whitney Rd, Suite 5
Albany, NY 12205: 14 Walker Way
Tonawanda, NY 14150: 275 Cooper Ave, Suite 105

Page 1 of 1

Date Rec'd in Lab: 5/19/20

ALPHA Job #: L2020571

Client Information

Client: Partner Engineering
Address: 611 Industrial Way W, Suite A
Phone: 732-380-1700
Fax: 732-380-1701
Email: dbracey@partnersei.com

Project Information

Project Name: Wall BOE
Project Location: Wall, NJ
Project #: 20-277423.2
(Use Project name as Project #) ☐
Project Manager: DRB
ALPHAQuote #:

Turn-Around Time

Standard ☑ Due Date:
Rush (only if pre approved) ☐ # of Days:

Deliverables

☑ NJ Full / Reduced
☐ EQuIS (1 File) ☐ EQuIS (4 File)
☐ Other

Regulatory Requirement

☐ SRS Residential/Non Residential
☐ SRS Impact to Groundwater
☐ NJ Ground Water Quality Standards
☐ NJ IGW SPLP Leachate Criteria
☐ Other

Billing Information

☑ Same as Client Info
PO #

Site Information

Is this site impacted by Petroleum? Yes ☐
Petroleum Product:

These samples have been previously analyzed by Alpha ☐

For EPH, selection is REQUIRED:
☐ Category 1
☐ Category 2

For VOC, selection is REQUIRED:
☐ 1,4-Dioxane
☐ 8011

Other project specific requirements/comments:

Please specify Metals or TAL.

ANALYSIS

Mercury 7471B

Sample Filtration
☐ Done
☐ Lab to do
Preservation
☐ Lab to do
(Please Specify below)

Sample Specific Comments

Total Bottle

ALPHA Lab ID (Lab Use Only)		Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	Mercury 7471B	Total Bottle
20571	1	HS518-1	5/18/20	0912	X1-Floor	DRB	X	
	2	HS518-2	"	0925	"	DRB	"	
	3	HS518-3	"	1000	"	DRB	"	
	4	WB518-1	"	1033	"	DRB	"	
	5	WB518-2	"	1045	"	DRB	"	
	6	AE518-1	"	1130	"	DRB	"	
	7	AE518-2	"	1140	"	DRB	"	

Preservative Code:
A = None
B = HCl
C = HNO_3
D = H_2SO_4
E = NaOH
F = MeOH
G = $NaHSO_4$
H = $Na_2S_2O_3$
K/E = Zn Ac/NaOH
O = Other

Container Code
P = Plastic
A = Amber Glass
V = Vial
G = Glass
B = Bacteria Cup
C = Cube
O = Other
E = Encore
D = BOD Bottle

Westboro: Certification No: MA935
Mansfield: Certification No: MA015

Container Type	A
Preservative	A

Relinquished By:	Date/Time	Received By:	Date/Time
[signature]	5/19/20 1000	[signature]	5/19/20 12:00
[signature]	5/19/20 17:00	[signature]	5/19/20 1110
[signature]	5/19/20 2000	[signature]	5/19/20 2000
[signature]	5/19/20 2200	[signature]	5/19/20 2200

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. BY EXECUTING THIS COC, THE CLIENT HAS READ AND AGREES TO BE BOUND BY ALPHA'S TERMS & CONDITIONS. (See reverse side.)

Form No: 01-14 HC (rev. 30-Sept-2013)

ALPHA ANALYTICAL LABORATORIES, INC.
LOGIN CHAIN OF CUSTODY REPORT
May 27 2020, 11:18 am

Login Number: L2020571
Account: PARTNER Partner Engineering & Science, Inc.Project: 20-277423.1
Received: 19MAY20 Due Date: 27MAY20

Sample #	Client ID	Mat	PR	Collected
L2020571-01	HS518-1	4	S0	18MAY20 09:12
| NJ-RED Package Due Date: 05/27/20				
HG-T,NJ-RED,NJDEP,PREPT,TS100				
L2020571-02	HS518-2	4	S0	18MAY20 09:25
| Package Due Date: 05/27/20				
HG-T,PREPT,TS100				
L2020571-03	HS518-3	4	S0	18MAY20 10:00
| Package Due Date: 05/27/20				
HG-T,PREPT,TS100				
L2020571-04	WB518-1	4	S0	18MAY20 10:33
| Package Due Date: 05/27/20				
HG-T,PREPT,TS100				
L2020571-05	WB518-2	4	S0	18MAY20 10:45
| Package Due Date: 05/27/20				
HG-T,PREPT,TS100				
L2020571-06	AE518-1	4	S0	18MAY20 11:30
| Package Due Date: 05/27/20				
HG-T,PREPT,TS100				
L2020571-07	AE518-2	4	S0	18MAY20 11:40
| Package Due Date: 05/27/20				

ALPHA ANALYTICAL LABORATORIES, INC.
LOGIN CHAIN OF CUSTODY REPORT
May 27 2020, 11:18 am

Login Number: L2020571

Account: PARTNER Partner Engineering & Science, Inc.Project: 20-277423.1

Received: 19MAY20 Due Date: 27MAY20

Sample #	Client ID	Mat	PR Collected

HG-T,PREPT,TS100

Logged By: Kyle Provencher

ALPHA ANALYTICAL LABORATORIES
Container Tracking Report

Container ID	Type	Status	Transaction Date	From Response	From Location	From Operator	To Response	To Location	To Operator
L2020571-01A	Glass-A.5	INTACT	21-MAY-20	A2-CUSTODY-REFRIDGE	A2-METALS PREP	Kherna Yoyo	A2-CUSTODY-MET2-S10	A2-CUSTODY-MET2-S10	Kherna Yoyo
L2020571-01A	Glass-A.5	INTACT	21-MAY-20	A2-CUSTODY-REFRIDGE	A2-CUSTODY-MET3-S6	Kherna Yoyo	A2-METALS PREP	A2-METALS PREP	Kherna Yoyo
L2020571-01A	Glass-A.5	INTACT	20-MAY-20	A2-CUSTODY-REFRIDGE	A2-CUSTODY	Andrew Kussmaul	A2-CUSTODY-MET3-S6	A2-CUSTODY-MET3-S6	Andrew Kussmaul
L2020571-01A	Glass-A.5	INTACT	20-MAY-20	TRANSIT COURIER	COOLER4-TRANSFER_TO_MANSFIELD	Wendy Morency	A2-CUSTODY	A2-CUSTODY	Theodore Huddleson
L2020571-01A	Glass-A.5	INTACT	20-MAY-20	COOLER4-TRANSFER_TO_MANSFIELD	COOLER4-TRANSFER_TO_MANSFIELD	Wendy Morency	TRANSIT COURIER	COOLER4-TRANSFER_TO_MANSFIELD	T
L2020571-01A	Glass-A.5	INTACT	20-MAY-20		CUSTODY	Wendy Morency	COOLER4-TRANSFER_TO_MANSFIELD	COOLER4-TRANSFER_TO_MANSFIELD	Wendy Morency
L2020571-01A	Glass-A.5	INTACT	20-MAY-20	LOGIN	LOGIN	Kyle Provencher	CUSTODY	CUSTODY	Kyle Provencher
L2020571-02A	Glass-A.5	INTACT	21-MAY-20	A2-CUSTODY-REFRIDGE	A2-METALS PREP	Kherna Yoyo	A2-CUSTODY-MET2-S10	A2-CUSTODY-MET2-S10	Kherna Yoyo
L2020571-02A	Glass-A.5	INTACT	21-MAY-20	A2-CUSTODY-REFRIDGE	A2-CUSTODY-MET3-S6	Kherna Yoyo	A2-METALS PREP	A2-METALS PREP	Kherna Yoyo
L2020571-02A	Glass-A.5	INTACT	20-MAY-20	A2-CUSTODY-REFRIDGE	A2-CUSTODY	Andrew Kussmaul	A2-CUSTODY-MET3-S6	A2-CUSTODY-MET3-S6	Andrew Kussmaul
L2020571-02A	Glass-A.5	INTACT	20-MAY-20	TRANSIT COURIER	COOLER4-TRANSFER_TO_MANSFIELD	Wendy Morency	A2-CUSTODY	A2-CUSTODY	Theodore Huddleson
L2020571-02A	Glass-A.5	INTACT	20-MAY-20	COOLER4-TRANSFER_TO_MANSFIELD	COOLER4-TRANSFER_TO_MANSFIELD	Wendy Morency	TRANSIT COURIER	COOLER4-TRANSFER_TO_MANSFIELD	T
L2020571-02A	Glass-A.5	INTACT	20-MAY-20		CUSTODY	Wendy Morency	COOLER4-TRANSFER_TO_MANSFIELD	COOLER4-TRANSFER_TO_MANSFIELD	Wendy Morency
L2020571-02A	Glass-A.5	INTACT	20-MAY-20	LOGIN	LOGIN	Kyle Provencher	CUSTODY	CUSTODY	Kyle Provencher
L2020571-03A	Glass-A.5	INTACT	21-MAY-20	A2-CUSTODY-REFRIDGE	A2-METALS PREP	Kherna Yoyo	A2-CUSTODY-MET2-S10	A2-CUSTODY-MET2-S10	Kherna Yoyo
L2020571-03A	Glass-A.5	INTACT	21-MAY-20	A2-CUSTODY-REFRIDGE	A2-CUSTODY-MET3-S6	Kherna Yoyo	A2-METALS PREP	A2-METALS PREP	Kherna Yoyo
L2020571-03A	Glass-A.5	INTACT	20-MAY-20	A2-CUSTODY-REFRIDGE	A2-CUSTODY	Andrew Kussmaul	A2-CUSTODY-MET3-S6	A2-CUSTODY-MET3-S6	Andrew Kussmaul
L2020571-03A	Glass-A.5	INTACT	20-MAY-20	TRANSIT COURIER	COOLER4-TRANSFER_TO_MANSFIELD	Wendy Morency	A2-CUSTODY	A2-CUSTODY	Theodore Huddleson
L2020571-03A	Glass-A.5	INTACT	20-MAY-20	COOLER4-TRANSFER_TO_MANSFIELD	COOLER4-TRANSFER_TO_MANSFIELD	Wendy Morency	TRANSIT COURIER	COOLER4-TRANSFER_TO_MANSFIELD	T
L2020571-03A	Glass-A.5	INTACT	20-MAY-20		CUSTODY	Wendy Morency	COOLER4-TRANSFER_TO_MANSFIELD	COOLER4-TRANSFER_TO_MANSFIELD	Wendy Morency
L2020571-03A	Glass-A.5	INTACT	20-MAY-20	LOGIN	LOGIN	Kyle Provencher	CUSTODY	CUSTODY	Kyle Provencher
L2020571-04A	Glass-A.5	INTACT	21-MAY-20	A2-CUSTODY-REFRIDGE	A2-METALS PREP	Kherna Yoyo	A2-CUSTODY-MET2-S10	A2-CUSTODY-MET2-S10	Kherna Yoyo
L2020571-04A	Glass-A.5	INTACT	21-MAY-20	A2-CUSTODY-REFRIDGE	A2-CUSTODY-MET3-S6	Kherna Yoyo	A2-METALS PREP	A2-METALS PREP	Kherna Yoyo
L2020571-04A	Glass-A.5	INTACT	20-MAY-20	A2-CUSTODY-REFRIDGE	A2-CUSTODY	Andrew Kussmaul	A2-CUSTODY-MET3-S6	A2-CUSTODY-MET3-S6	Andrew Kussmaul
L2020571-04A	Glass-A.5	INTACT	20-MAY-20	TRANSIT COURIER	COOLER4-TRANSFER_TO_MANSFIELD	Wendy Morency	A2-CUSTODY	A2-CUSTODY	Theodore Huddleson

Container ID	Type	Status	Transaction Date	From Response	From Location	From Operator	To Response	To Location	To Operator
L2020571-04A	Glass-A.5	INTACT	20-MAY-20	COOLER4-TRANSFER_TO_MANSFIELD	COOLER4-TRANSFER_TO_MANSFIELD	Wendy Morency	TRANSIT COURIER	COOLER4-TRANSFER_TO_MANSFIELD	
L2020571-04A	Glass-A.5	INTACT	20-MAY-20		CUSTODY	Wendy Morency	COOLER4-TRANSFER_TO_MANSFIELD	COOLER4-TRANSFER_TO_MANSFIELD	Wendy Morency
L2020571-04A	Glass-A.5	INTACT	20-MAY-20	LOGIN	LOGIN	Kyle Provencher	CUSTODY	CUSTODY	Kyle Provencher
L2020571-05A	Glass-A.5	INTACT	21-MAY-20	A2-CUSTODY-REFRIDGE	A2-METALS PREP	Kherna Yoyo	A2-CUSTODY-MET2-S10	A2-CUSTODY-MET2-S10	Kherna Yoyo
L2020571-05A	Glass-A.5	INTACT	21-MAY-20	A2-CUSTODY-REFRIDGE	A2-CUSTODY-MET3-S6	Kherna Yoyo	A2-METALS PREP	A2-METALS PREP	Kherna Yoyo
L2020571-05A	Glass-A.5	INTACT	20-MAY-20	A2-CUSTODY-REFRIDGE	A2-CUSTODY	Andrew Kussmaul	A2-CUSTODY-MET3-S6	A2-CUSTODY-MET3-S6	Andrew Kussmaul
L2020571-05A	Glass-A.5	INTACT	20-MAY-20	TRANSIT COURIER	COOLER4-TRANSFER_TO_MANSFIELD	Wendy Morency	A2-CUSTODY	A2-CUSTODY	Theodore Huddleson
L2020571-05A	Glass-A.5	INTACT	20-MAY-20	COOLER4-TRANSFER_TO_MANSFIELD	COOLER4-TRANSFER_TO_MANSFIELD	Wendy Morency	TRANSIT COURIER	COOLER4-TRANSFER_TO_MANSFIELD	
L2020571-05A	Glass-A.5	INTACT	20-MAY-20		CUSTODY	Wendy Morency	COOLER4-TRANSFER_TO_MANSFIELD	COOLER4-TRANSFER_TO_MANSFIELD	Wendy Morency
L2020571-05A	Glass-A.5	INTACT	20-MAY-20	LOGIN	LOGIN	Kyle Provencher	CUSTODY	CUSTODY	Kyle Provencher
L2020571-06A	Glass-A.5	INTACT	21-MAY-20	A2-CUSTODY-REFRIDGE	A2-METALS PREP	Kherna Yoyo	A2-CUSTODY-MET2-S10	A2-CUSTODY-MET2-S10	Kherna Yoyo
L2020571-06A	Glass-A.5	INTACT	21-MAY-20	A2-CUSTODY-REFRIDGE	A2-CUSTODY-MET3-S6	Kherna Yoyo	A2-METALS PREP	A2-METALS PREP	Kherna Yoyo
L2020571-06A	Glass-A.5	INTACT	20-MAY-20	A2-CUSTODY-REFRIDGE	A2-CUSTODY	Andrew Kussmaul	A2-CUSTODY-MET3-S6	A2-CUSTODY-MET3-S6	Andrew Kussmaul
L2020571-06A	Glass-A.5	INTACT	20-MAY-20	TRANSIT COURIER	COOLER4-TRANSFER_TO_MANSFIELD	Wendy Morency	A2-CUSTODY	A2-CUSTODY	Theodore Huddleson
L2020571-06A	Glass-A.5	INTACT	20-MAY-20	COOLER4-TRANSFER_TO_MANSFIELD	COOLER4-TRANSFER_TO_MANSFIELD	Wendy Morency	TRANSIT COURIER	COOLER4-TRANSFER_TO_MANSFIELD	
L2020571-06A	Glass-A.5	INTACT	20-MAY-20		CUSTODY	Wendy Morency	COOLER4-TRANSFER_TO_MANSFIELD	COOLER4-TRANSFER_TO_MANSFIELD	Wendy Morency
L2020571-06A	Glass-A.5	INTACT	20-MAY-20	LOGIN	LOGIN	Kyle Provencher	CUSTODY	CUSTODY	Kyle Provencher
L2020571-07A	Glass-A.5	INTACT	21-MAY-20	A2-CUSTODY-REFRIDGE	A2-METALS PREP	Kherna Yoyo	A2-CUSTODY-MET2-S10	A2-CUSTODY-MET2-S10	Kherna Yoyo
L2020571-07A	Glass-A.5	INTACT	21-MAY-20	A2-CUSTODY-REFRIDGE	A2-CUSTODY-MET3-S6	Kherna Yoyo	A2-METALS PREP	A2-METALS PREP	Kherna Yoyo
L2020571-07A	Glass-A.5	INTACT	20-MAY-20	A2-CUSTODY-REFRIDGE	A2-CUSTODY	Andrew Kussmaul	A2-CUSTODY-MET3-S6	A2-CUSTODY-MET3-S6	Andrew Kussmaul
L2020571-07A	Glass-A.5	INTACT	20-MAY-20	TRANSIT COURIER	COOLER4-TRANSFER_TO_MANSFIELD	Wendy Morency	A2-CUSTODY	A2-CUSTODY	Theodore Huddleson
L2020571-07A	Glass-A.5	INTACT	20-MAY-20	COOLER4-TRANSFER_TO_MANSFIELD	COOLER4-TRANSFER_TO_MANSFIELD	Wendy Morency	TRANSIT COURIER	COOLER4-TRANSFER_TO_MANSFIELD	
L2020571-07A	Glass-A.5	INTACT	20-MAY-20		CUSTODY	Wendy Morency	COOLER4-TRANSFER_TO_MANSFIELD	COOLER4-TRANSFER_TO_MANSFIELD	Wendy Morency
L2020571-07A	Glass-A.5	INTACT	20-MAY-20	LOGIN	LOGIN	Kyle Provencher	CUSTODY	CUSTODY	Kyle Provencher

Methodology Review

REFERENCES

1 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. Third Edition. Updates I - IV, 2007.

LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.

Laboratory Chronicle

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information

Cooler	Custody Seal
A	Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L2020571-01A	Glass 500ml/16oz unpreserved	A	NA		4.7	Y	Absent		HG-T(28)
L2020571-02A	Glass 500ml/16oz unpreserved	A	NA		4.7	Y	Absent		HG-T(28)
L2020571-03A	Glass 500ml/16oz unpreserved	A	NA		4.7	Y	Absent		HG-T(28)
L2020571-04A	Glass 500ml/16oz unpreserved	A	NA		4.7	Y	Absent		HG-T(28)
L2020571-05A	Glass 500ml/16oz unpreserved	A	NA		4.7	Y	Absent		HG-T(28)
L2020571-06A	Glass 500ml/16oz unpreserved	A	NA		4.7	Y	Absent		HG-T(28)
L2020571-07A	Glass 500ml/16oz unpreserved	A	NA		4.7	Y	Absent		HG-T(28)

*Values in parentheses indicate holding time in days

NJ DEP
Data of Known Quality Protocols
Conformance/Non-Conformance
Summary Questionnaire

NJ DEP Data of Known Quality Protocols
Conformance/Non-Conformance
Summary Questionnaire

1	For each analytical method referenced in this laboratory report package, were all specified QA/QC performance criteria followed, including the requirement to explain any criteria falling outside of acceptable guidelines, as specified in the NJDEP Data of Known Quality performance standards?	YES
1a	Were the method specified handling, preservation, and holding time requirements met?	YES
1b	EPH Method: Was the EPH Method conducted without significant modifications (see Section 11.3 of respective DKQ methods)?	N/A
2	Were all samples received by the laboratory in a condition consistent with that described on the associated chain-of-custody document(s)?	YES
3	Were all samples received at an appropriate temperature (4 ± 2° C)?	YES
4	Were all QA/QC performance criteria specified in the NJDEP DKQP standards achieved?	YES
5a	Were reporting limits specified or referenced on the chain-of-custody or communicated to the laboratory prior to sample receipt?	YES
5b	Were these reporting limits met?	YES
6	For each analytical method referenced in this laboratory report package, were results reported for all constituents identified in the method-specific analyte lists presented in the DKQP documents and/or site-specific QAPP?	YES
7	Are project-specific matrix spikes and/or laboratory duplicates included in this data set?	NO

Note: For all questions to which the response was "No" (with the exception of question #7), additional information must be provided in an attached narrative. If the answer to question #1, #1a or #1b is "No", the data package does not meet the requirements for "Data of Known Quality".

Conformance/Non-Conformance Summary

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively. When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. All specific QC information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications. Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances the specific failure is not narrated but noted in the associated QC table. The information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications.

Please see the associated ADEx data file for a comparison of laboratory reporting limits that were achieved with the regulatory Numerical Standards requested on the Chain of Custody.

HOLD POLICY
For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Client Service Representative and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Client Services at 800-624-9220 with any questions.

Case Narrative (continued)

Report Submission

All non-detect (ND) or estimated concentrations (J-qualified) have been quantitated to the limit noted in the MDL column.

DKQP Related Narratives

Report Submission

All DKQP required questions were answered with affirmative responses; therefore, there are no relevant data issues to discuss.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature: Melissa Sturgis Report Date: 05/27/20

Title: Technical Director/Representative

Glossary

GLOSSARY

Acronyms

DL - Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the limit of quantitation (LOQ). The DL includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

EDL - Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).

EMPC - Estimated Maximum Possible Concentration: The concentration that results from the signal present at the retention time of an analyte when the ions meet all of the identification criteria except the ion abundance ratio criteria. An EMPC is a worst-case estimate of the concentration.

EPA - Environmental Protection Agency.

LCS - Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

LCSD - Laboratory Control Sample Duplicate: Refer to LCS.

LFB - Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

LOD - Limit of Detection: This value represents the level to which a target analyte can reliably be detected for a specific analyte in a specific matrix by a specific method. The LOD includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

LOQ - Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

MDL - Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

MS - Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. For Method 332.0, the spike recovery is calculated using the native concentration, including estimated values.

MSD - Matrix Spike Sample Duplicate: Refer to MS.

NA - Not Applicable.

NC - Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.

NDPA/DPA - N-Nitrosodiphenylamine/Diphenylamine.

NI - Not Ignitable.

NP - Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.

RL - Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

RPD - Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.

SRM - Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.

STLP - Semi-dynamic Tank Leaching Procedure per EPA Method 1315.

TEF - Toxic Equivalency Factors: The values assigned to each dioxin and furan to evaluate their toxicity relative to 2,3,7,8-TCDD.

TEQ - Toxic Equivalent: The measure of a sample's toxicity derived by multiplying each dioxin and furan by its corresponding TEF and then summing the resulting values.

TIC - Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Footnotes

Report Format: DU Report with 'J' Qualifiers

1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Difference: With respect to Total Oxidizable Precursor (TOP) Assay analysis, the difference is defined as the Post-Treatment value minus the Pre-Treatment value.

Final pH: As it pertains to Sample Receipt & Container Information section of the report, Final pH reflects pH of container determined after adjustment at the laboratory, if applicable. If no adjustment required, value reflects Initial pH.

Frozen Date/Time: With respect to Volatile Organics in soil, Frozen Date/Time reflects the date/time at which associated Reagent Water-preserved vials were initially frozen. Note: If frozen date/time is beyond 48 hours from sample collection, value will be reflected in 'bold'.

Initial pH: As it pertains to Sample Receipt & Container Information section of the report, Initial pH reflects pH of container determined upon receipt, if applicable.

PAH Total: With respect to Alkylated PAH analyses, the 'PAHs, Total' result is defined as the summation of results for all or a subset of the following compounds: Naphthalene, C1-C4 Naphthalenes, 2-Methylnaphthalene, 1-Methylnaphthalene, Biphenyl, Acenaphthylene, Acenaphthene, Fluorene, C1-C3 Fluorenes, Phenanthrene, C1-C4 Phenanthrenes/Anthracenes, Anthracene, Fluoranthene, Pyrene, C1-C4 Fluoranthenes/Pyrenes, Benz(a)anthracene, Chrysene, C1-C4 Chrysenes, Benzo(b)fluoranthene, Benzo(j)+(k)fluoranthene, Benzo(e)pyrene, Benzo(a)pyrene, Perylene, Indeno(1,2,3-cd)pyrene, Dibenz(ah)+(ac)anthracene, Benzo(g,h,i)perylene. If a 'Total' result is requested, the results of its individual components will also be reported.

PFAS Total: With respect to PFAS analyses, the 'PFAS, Total (5)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA and PFOS. If a 'Total' result is requested, the results of its individual components will also be reported.

The target compound Chlordane (CAS No. 57-74-9) is reported for GC ECD analyses. Per EPA,this compound "refers to a mixture of chlordane isomers, other chlorinated hydrocarbons and numerous other components." (Reference: USEPA Toxicological Review of Chlordane, In Support of Summary Information on the Integrated Risk Information System (IRIS), December 1997.)

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Data Qualifiers

A - Spectra identified as "Aldol Condensates" are byproducts of the extraction/concentration procedures when acetone is introduced in the process.

B - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

C - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

D - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

E - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

G - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

H - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

I - The lower value for the two columns has been reported due to obvious interference.

M - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

NJ - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

Q - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

R - Analytical results are from sample re-analysis.

Report Format: DU Report with 'J' Qualifiers

Data Qualifiers

RE - Analytical results are from sample re-extraction.

S - Analytical results are from modified screening analysis.

J - Estimated value. The Target analyte concentration is below the quantitation limit (RL), but above the Method Detection Limit (MDL) or Estimated Detection Limit (EDL) for SPME-related analyses. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

ND - Not detected at the method detection limit (MDL) for the sample, or estimated detection limit (EDL) for SPME-related analyses.

Report Format: DU Report with 'J' Qualifiers

Metals

Inorganic Data
(Mercury Analysis)

Sample Results Summary

Form 1
METALS

Client	: Partner Engineering & Science, Inc.	**Lab Number**	: L2020571
Project Name	: WALL BOE	**Project Number**	: 20-277423.1
Lab ID	: L2020571-01	**Date Collected**	: 05/18/20 09:12
Client ID	: HS518-1	**Date Received**	: 05/19/20
Sample Location	: WALL, NJ	**Date Analyzed**	: 05/22/20 01:55
Sample Matrix	: SOLID	**Dilution Factor**	: 2
Analytical Method	: 1,7471B	**Analyst**	: AL
Lab File ID	: WG1373359.csv	**Instrument ID**	: NIC1
Sample Amount	: 0.342g	**%Solids**	: 100
Digestion Method	: EPA 7471B	**Date Digested**	: 05/21/20

		mg/kg			
CAS NO.	**Parameter**	**Results**	**RL**	**MDL**	**Qualifier**
7439-97-6	Mercury, Total	3.03	0.146	0.095	

Form 1
METALS

Client	: Partner Engineering & Science, Inc.	**Lab Number**	: L2020571
Project Name	: WALL BOE	**Project Number**	: 20-277423.1
Lab ID	: L2020571-02	**Date Collected**	: 05/18/20 09:25
Client ID	: HS518-2	**Date Received**	: 05/19/20
Sample Location	: WALL, NJ	**Date Analyzed**	: 05/22/20 01:58
Sample Matrix	: SOLID	**Dilution Factor**	: 20
Analytical Method	: 1,7471B	**Analyst**	: AL
Lab File ID	: WG1373359.csv	**Instrument ID**	: NIC1
Sample Amount	: 0.338g	**%Solids**	: 100
Digestion Method	: EPA 7471B	**Date Digested**	: 05/21/20

		mg/kg			
CAS NO.	**Parameter**	**Results**	**RL**	**MDL**	**Qualifier**
7439-97-6	Mercury, Total	6.63	1.48	0.964	

Form 1
METALS

Client	: Partner Engineering & Science, Inc.	**Lab Number**	: L2020571
Project Name	: WALL BOE	**Project Number**	: 20-277423.1
Lab ID	: L2020571-03	**Date Collected**	: 05/18/20 10:00
Client ID	: HS518-3	**Date Received**	: 05/19/20
Sample Location	: WALL, NJ	**Date Analyzed**	: 05/21/20 19:55
Sample Matrix	: SOLID	**Dilution Factor**	: 1
Analytical Method	: 1,7471B	**Analyst**	: AL
Lab File ID	: WG1373359.csv	**Instrument ID**	: NIC1
Sample Amount	: 0.399g	**%Solids**	: 100
Digestion Method	: EPA 7471B	**Date Digested**	: 05/21/20

		mg/kg			
CAS NO.	**Parameter**	**Results**	**RL**	**MDL**	**Qualifier**
7439-97-6	Mercury, Total	0.910	0.063	0.041	

Form 1
METALS

Client	: Partner Engineering & Science, Inc.	**Lab Number**	: L2020571
Project Name	: WALL BOE	**Project Number**	: 20-277423.1
Lab ID	: L2020571-04	**Date Collected**	: 05/18/20 10:33
Client ID	: WB518-1	**Date Received**	: 05/19/20
Sample Location	: WALL, NJ	**Date Analyzed**	: 05/21/20 19:59
Sample Matrix	: SOLID	**Dilution Factor**	: 1
Analytical Method	: 1,7471B	**Analyst**	: AL
Lab File ID	: WG1373359.csv	**Instrument ID**	: NIC1
Sample Amount	: 0.339g	**%Solids**	: 100
Digestion Method	: EPA 7471B	**Date Digested**	: 05/21/20

		mg/kg			
CAS NO.	**Parameter**	**Results**	**RL**	**MDL**	**Qualifier**
7439-97-6	Mercury, Total	ND	0.074	0.048	U

Form 1
METALS

Client	: Partner Engineering & Science, Inc.	**Lab Number**	: L2020571
Project Name	: WALL BOE	**Project Number**	: 20-277423.1
Lab ID	: L2020571-05	**Date Collected**	: 05/18/20 10:45
Client ID	: WB518-2	**Date Received**	: 05/19/20
Sample Location	: WALL, NJ	**Date Analyzed**	: 05/21/20 20:02
Sample Matrix	: SOLID	**Dilution Factor**	: 1
Analytical Method	: 1,7471B	**Analyst**	: AL
Lab File ID	: WG1373359.csv	**Instrument ID**	: NIC1
Sample Amount	: 0.302g	**%Solids**	: 100
Digestion Method	: EPA 7471B	**Date Digested**	: 05/21/20

		mg/kg			
CAS NO.	**Parameter**	**Results**	**RL**	**MDL**	**Qualifier**
7439-97-6	Mercury, Total	ND	0.083	0.054	U

Form 1
METALS

Client	: Partner Engineering & Science, Inc.	**Lab Number**	: L2020571
Project Name	: WALL BOE	**Project Number**	: 20-277423.1
Lab ID	: L2020571-06	**Date Collected**	: 05/18/20 11:30
Client ID	: AE518-1	**Date Received**	: 05/19/20
Sample Location	: WALL, NJ	**Date Analyzed**	: 05/21/20 20:05
Sample Matrix	: SOLID	**Dilution Factor**	: 1
Analytical Method	: 1,7471B	**Analyst**	: AL
Lab File ID	: WG1373359.csv	**Instrument ID**	: NIC1
Sample Amount	: 0.303g	**%Solids**	: 100
Digestion Method	: EPA 7471B	**Date Digested**	: 05/21/20

		mg/kg			
CAS NO.	**Parameter**	**Results**	**RL**	**MDL**	**Qualifier**
7439-97-6	Mercury, Total	ND	0.083	0.054	U

Form 1
METALS

Client	: Partner Engineering & Science, Inc.	**Lab Number**	: L2020571
Project Name	: WALL BOE	**Project Number**	: 20-277423.1
Lab ID	: L2020571-07	**Date Collected**	: 05/18/20 11:40
Client ID	: AE518-2	**Date Received**	: 05/19/20
Sample Location	: WALL, NJ	**Date Analyzed**	: 05/21/20 20:09
Sample Matrix	: SOLID	**Dilution Factor**	: 1
Analytical Method	: 1,7471B	**Analyst**	: AL
Lab File ID	: WG1373359.csv	**Instrument ID**	: NIC1
Sample Amount	: 0.381g	**%Solids**	: 100
Digestion Method	: EPA 7471B	**Date Digested**	: 05/21/20

		mg/kg			
CAS NO.	**Parameter**	**Results**	**RL**	**MDL**	**Qualifier**
7439-97-6	Mercury, Total	ND	0.066	0.043	U

Form 1
METALS

Client	: Partner Engineering & Science, Inc.	**Lab Number**	: L2020571
Project Name	: WALL BOE	**Project Number**	: 20-277423.1
Lab ID	: WG1373197-1	**Date Collected**	: NA
Client ID	: WG1373197-1BLANK	**Date Received**	: NA
Sample Location	:	**Date Analyzed**	: 05/21/20 19:02
Sample Matrix	: SOIL	**Dilution Factor**	: 1
Analytical Method	: 1,7471B	**Analyst**	: AL
Lab File ID	: WG1373359.csv	**Instrument ID**	: NIC1
Sample Amount	: 0.3g	**%Solids**	: NA
Digestion Method	: EPA 7471B	**Date Digested**	: 05/21/20

		mg/kg			
CAS NO.	**Parameter**	**Results**	**RL**	**MDL**	**Qualifier**
7439-97-6	Mercury, Total	ND	0.083	0.054	U

Blank Results Summary

Form 3
Blanks

Client	: Partner Engineering & Science, Inc.	**Lab Number**	: L2020571
Project Name	: WALL BOE	**Project Number**	: 20-277423.1
Instrument ID	: NIC1		

	Initial Calibration Blank		Continuing Calibration Blank(s)						Preparation Blank	
Lab ID :	R1315479-2		R1315479-4		R1315479-6		R1315479-8		WG1373197-1	
Date Analyzed :	05/21/20 18:49		05/21/20 18:59		05/21/20 19:43		05/21/20 20:25		05/21/20 19:02	
Parameter	mg/l	Q	mg/l	Q	mg/l	Q	mg/l	Q	mg/kg	Q
Mercury	0.000326	U	0.000326	U	0.000326	U	0.000326	U	0.054	U

Form 3
Blanks

Client	: Partner Engineering & Science, Inc.	**Lab Number**	: L2020571
Project Name	: WALL BOE	**Project Number**	: 20-277423.1
Instrument ID	: NIC1		

	Initial Calibration Blank		Continuing Calibration Blank(s)						Preparation Blank	
Lab ID :			R1315479-10		R1315479-12		R1315479-14			
Date Analyzed :			05/21/20 21:05		05/21/20 21:44		05/21/20 22:24			
Parameter	mg/l	Q	mg/l	Q	mg/l	Q	mg/l	Q		Q
Mercury			0.000326	U	0.000326	U	0.000326	U		

Form 3
Blanks

Client	: Partner Engineering & Science, Inc.	**Lab Number**	: L2020571
Project Name	: WALL BOE	**Project Number**	: 20-277423.1
Instrument ID	: NIC1		

	Initial Calibration Blank		Continuing Calibration Blank(s)						Preparation Blank	
Lab ID :			R1315479-16		R1315479-18		R1315479-20			
Date Analyzed :			05/21/20 23:03		05/21/20 23:43		05/22/20 00:23			
Parameter	mg/l	Q	mg/l	Q	mg/l	Q	mg/l	Q		Q
Mercury			0.000326	U	0.000326	U	0.000326	U		

Form 3
Blanks

Client	: Partner Engineering & Science, Inc.	**Lab Number**	: L2020571
Project Name	: WALL BOE	**Project Number**	: 20-277423.1
Instrument ID	: NIC1		

	Initial Calibration Blank		Continuing Calibration Blank(s)						Preparation Blank	
Lab ID :			R1315479-22		R1315479-24		R1315479-26			
Date Analyzed :			05/22/20 01:09		05/22/20 01:48		05/22/20 02:05			
Parameter	mg/l	Q	mg/l	Q	mg/l	Q	mg/l	Q		Q
Mercury			0.000326	U	0.000326	U	0.000326	U		

Calibration Summary

Form 2A
Initial and Continuing Calibration Verification

Client	: Partner Engineering & Science, Inc.	**Lab Number**	: L2020571
Project Name	: WALL BOE	**Project Number**	: 20-277423.1
Instrument ID	: NIC1	**Units**	: mg/l

		Initial Calibration			Continuing Calibration(s)						
Lab ID	:	R1315479-1			R1315479-3			R1315479-5		R1315479-7	
Date Analyzed	:	05/21/20 18:44			05/21/20 18:55			05/21/20 19:39		05/21/20 20:22	
Parameter		**True**	**Found**	**%R**	**True**	**Found**	**%R**	**Found**	**%R**	**Found**	**%R**
Mercury		0.00300	0.0032	106	0.0100	0.0101	101	0.00990	99	0.0100	100

Acceptance Criteria:

ICV:	95-105%	(Methods 200.7, 245.1)
	90-110%	(Methods 200.8, 6010, 6020, 7470, 7471, 7474)
	85-115%	(Method 1631)
CCV:	90-110%	(Methods 200.7, 245.1, 6010, 6020, 7474)
	85-115%	(Methods 200.8, 1631)
	80-120%	(Methods 7470, 7471)

Form 2A
Initial and Continuing Calibration Verification

Client	: Partner Engineering & Science, Inc.	**Lab Number**	: L2020571
Project Name	: WALL BOE	**Project Number**	: 20-277423.1
Instrument ID	: NIC1	**Units**	: mg/l

	Initial Calibration			Continuing Calibration(s)						
Lab ID :				R1315479-9			R1315479-11		R1315479-13	
Date Analyzed :				05/21/20 21:01			05/21/20 21:41		05/21/20 22:20	
Parameter	**True**	**Found**	**%R**	**True**	**Found**	**%R**	**Found**	**%R**	**Found**	**%R**
Mercury				0.0100	0.00990	99	0.00990	99	0.00990	99

Acceptance Criteria:

ICV:	**95-105%**	**(Methods 200.7, 245.1)**
	90-110%	**(Methods 200.8, 6010, 6020, 7470, 7471, 7474)**
	85-115%	**(Method 1631)**
CCV:	**90-110%**	**(Methods 200.7, 245.1, 6010, 6020, 7474)**
	85-115%	**(Methods 200.8, 1631)**
	80-120%	**(Methods 7470, 7471)**

Form 2A
Initial and Continuing Calibration Verification

Client	: Partner Engineering & Science, Inc.	**Lab Number**	: L2020571
Project Name	: WALL BOE	**Project Number**	: 20-277423.1
Instrument ID	: NIC1	**Units**	: mg/l

	Initial Calibration			Continuing Calibration(s)						
Lab ID :				R1315479-15			R1315479-17		R1315479-19	
Date Analyzed :				05/21/20 23:00			05/21/20 23:40		05/22/20 00:19	
Parameter	**True**	**Found**	**%R**	**True**	**Found**	**%R**	**Found**	**%R**	**Found**	**%R**
Mercury				0.0100	0.00990	99	0.00990	99	0.0100	100

Acceptance Criteria:

ICV:	95-105%	(Methods 200.7, 245.1)
	90-110%	(Methods 200.8, 6010, 6020, 7470, 7471, 7474)
	85-115%	(Method 1631)
CCV:	90-110%	(Methods 200.7, 245.1, 6010, 6020, 7474)
	85-115%	(Methods 200.8, 1631)
	80-120%	(Methods 7470, 7471)

Form 2A
Initial and Continuing Calibration Verification

Client	: Partner Engineering & Science, Inc.	**Lab Number**	: L2020571
Project Name	: WALL BOE	**Project Number**	: 20-277423.1
Instrument ID	: NIC1	**Units**	: mg/l

	Initial Calibration			Continuing Calibration(s)						
Lab ID :				R1315479-21			R1315479-23		R1315479-25	
Date Analyzed :				05/22/20 01:06			05/22/20 01:45		05/22/20 02:02	
Parameter	**True**	**Found**	**%R**	**True**	**Found**	**%R**	**Found**	**%R**	**Found**	**%R**
Mercury				0.0100	0.00990	99	0.0100	100	0.0100	100

Acceptance Criteria:

ICV:	**95-105%**	**(Methods 200.7, 245.1)**
	90-110%	**(Methods 200.8, 6010, 6020, 7470, 7471, 7474)**
	85-115%	**(Method 1631)**
CCV:	**90-110%**	**(Methods 200.7, 245.1, 6010, 6020, 7474)**
	85-115%	**(Methods 200.8, 1631)**
	80-120%	**(Methods 7470, 7471)**

LCS Sample Results Summary

Form 7
Laboratory Control Sample

Client	: Partner Engineering & Science, Inc.	**Lab Number**	: L2020571
Project Name	: WALL BOE	**Project Number**	: 20-277423.1
Client Sample ID	: NA	**Matrix**	: SOIL
Lab Sample ID	: WG1373197-2	**LCS Analysis Date**	: 05/21/20 19:05
Dup Sample ID	:	**LCSD Analysis Date**	:

	Laboratory Control Sample			Laboratory Control Duplicate					
Parameter	**True (mg/kg)**	**Found (mg/kg)**	**%R**	**True (mg/kg)**	**Found (mg/kg)**	**%R**	**RPD**	**Recovery Limits**	**RPD Limit**
Mercury, Total	**7.61**	**6.62**	**87.**					**60-141**	**20**

Run Logs

Form 13
Analysis Run Log

Client	: Partner Engineering & Science, Inc.	**Lab Number**	: L2020571
Project Name	: WALL BOE	**Project Number**	: 20-277423.1
Instrument ID	: NIC1	**Analysis Method**	: 1,7471B
Start Date	: 05/21/20 18:44	**End Date**	: 05/22/20 02:05

Sample Number	Dilution Factor	Analysis Time	Mercury, Total
R1315479-1 ICV	1	18:44:29	X
R1315479-2 ICB	1	18:49:18	X
R1315479-3 CCV	1	18:55:54	X
R1315479-4 CCB	1	18:59:12	X
WG1373197-1 BLANK	1	19:02:31	X
WG1373197-2 LCS	2	19:05:49	X
R1315479-5 CCV	1	19:39:46	X
R1315479-6 CCB	1	19:43:04	X
L2020571-03	1	19:55:54	X
L2020571-04	1	19:59:12	X
L2020571-05	1	20:02:30	X
L2020571-06	1	20:05:48	X
L2020571-07	1	20:09:06	X
R1315479-7 CCV	1	20:22:18	X
R1315479-8 CCB	1	20:25:35	X
R1315479-9 CCV	1	21:01:54	X
R1315479-10 CCB	1	21:05:12	X
R1315479-11 CCV	1	21:41:27	X
R1315479-12 CCB	1	21:44:44	X
R1315479-13 CCV	1	22:20:56	X
R1315479-14 CCB	1	22:24:14	X
R1315479-15 CCV	1	23:00:31	X
R1315479-16 CCB	1	23:03:49	X
R1315479-17 CCV	1	23:40:12	X
R1315479-18 CCB	1	23:43:29	X
R1315479-19 CCV	1	00:19:48	X
R1315479-20 CCB	1	00:23:05	X

Form 13
Analysis Run Log

Client	: Partner Engineering & Science, Inc.	**Lab Number**	: L2020571
Project Name	: WALL BOE	**Project Number**	: 20-277423.1
Instrument ID	: NIC1	**Analysis Method**	: 1,7471B
Start Date	: 05/21/20 18:44	**End Date**	: 05/22/20 02:05

Sample Number	Dilution Factor	Analysis Time	Mercury, Total
R1315479-21 CCV	1	01:06:04	X
R1315479-22 CCB	1	01:09:22	X
R1315479-23 CCV	1	01:45:38	X
R1315479-24 CCB	1	01:48:56	X
L2020571-01	2	01:55:30	X
L2020571-02	20	01:58:48	X
R1315479-25 CCV	1	02:02:05	X
R1315479-26 CCB	1	02:05:23	X

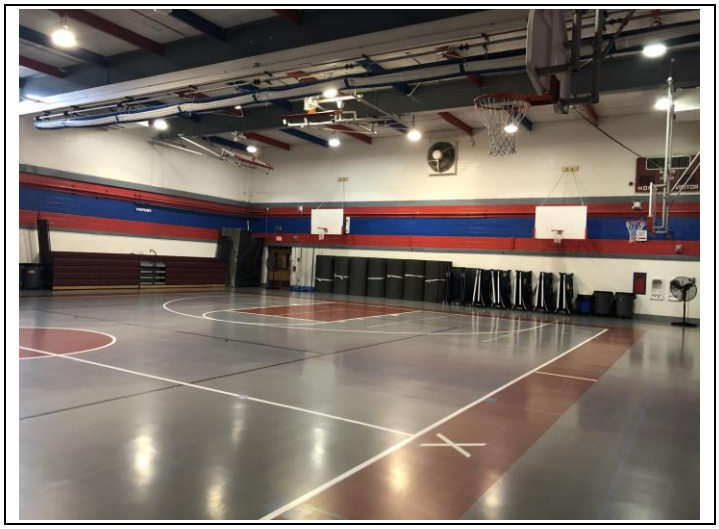
Digestion Logs
Mercury

Form 12
Preparation Log

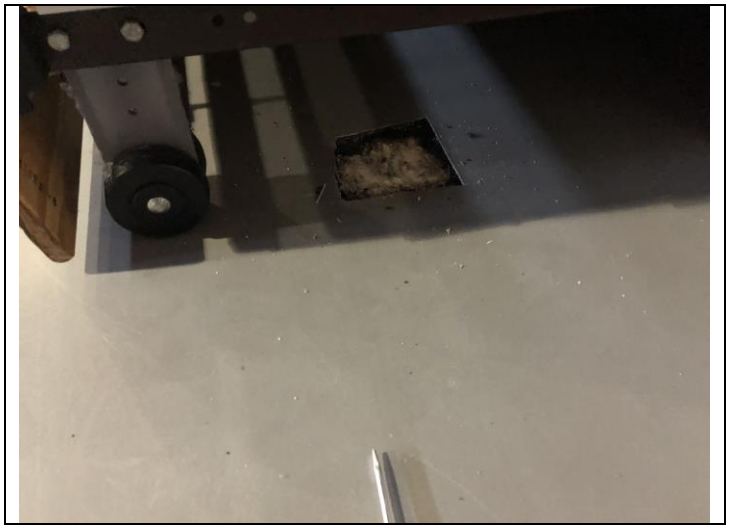
Client	: Partner Engineering & Science, Inc.	**Lab Number**	: L2020571
Project Name	: WALL BOE	**Project Number**	: 20-277423.1
Matrix	: SOLID	**Prep Method**	: EPA 7471B

Sample Number	Preparation Date	Weight (gram)	Volume (mL)
L2020571-01	05/21/20 16:50	0.34	-
L2020571-02	05/21/20 16:50	0.34	-
L2020571-03	05/21/20 16:50	0.40	-
L2020571-04	05/21/20 16:50	0.34	-
L2020571-05	05/21/20 16:50	0.30	-
L2020571-06	05/21/20 16:50	0.30	-
L2020571-07	05/21/20 16:50	0.38	-
WG1373197-1	05/21/20 16:50	0.30	-
WG1373197-2	05/21/20 16:50	0.16	-

APPENDIX B

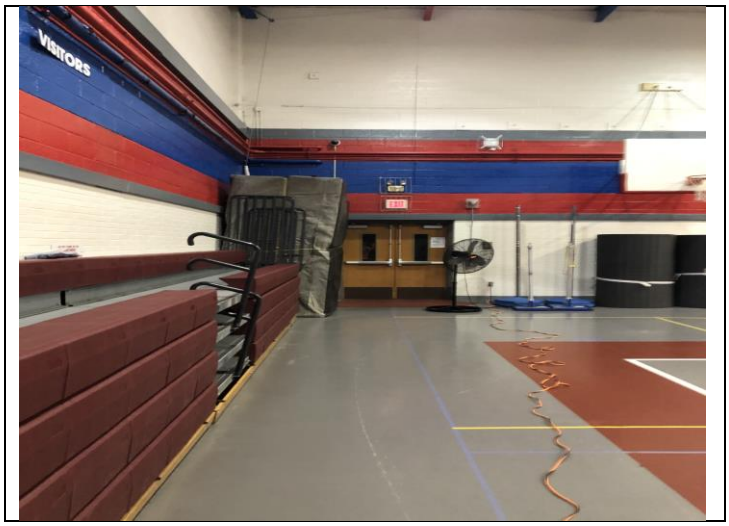


1. View of Wall High School – South Gym



2. View of HS518-1 sample area.

3. View of HS518-2 sample area

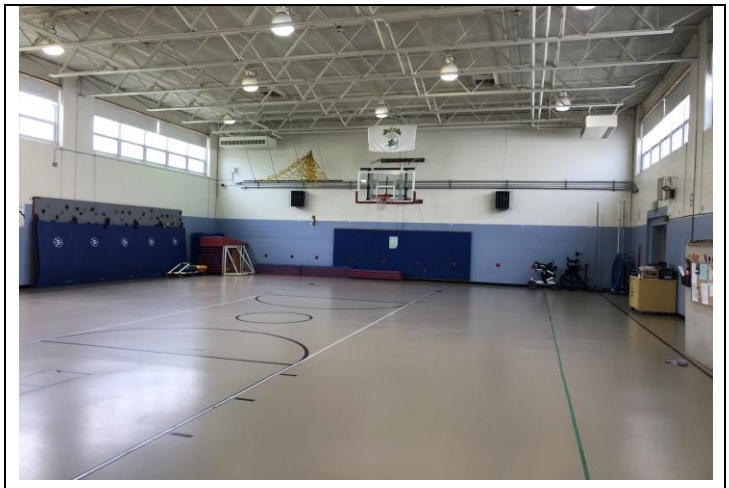


4. View of HS518-3 sample area

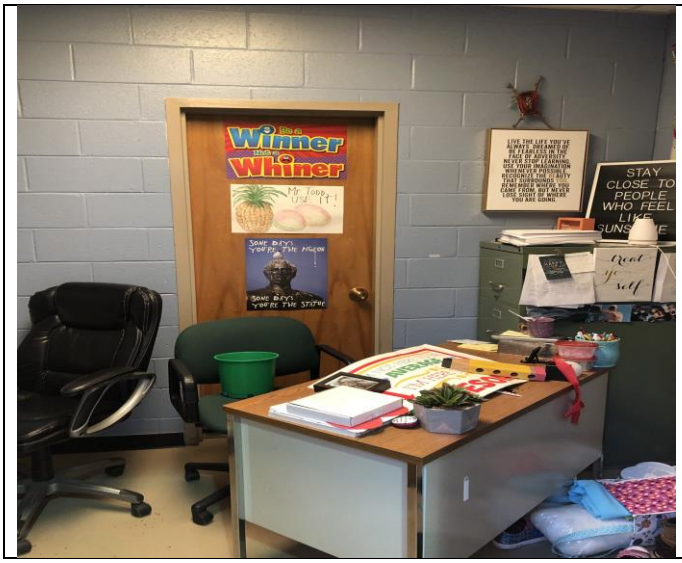
5. View of West Belmar School Gym

5. View of WB518-1 sample area.

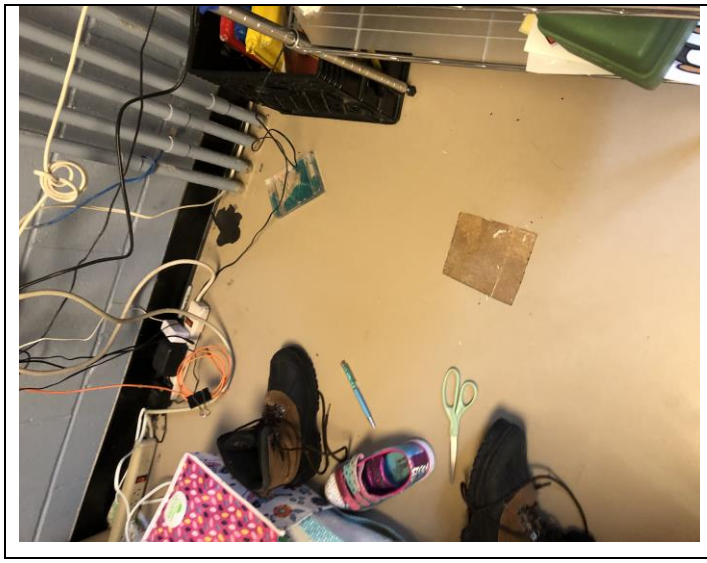
6. View of WB518-2 sample area.



7. View of Allenwood School gym.



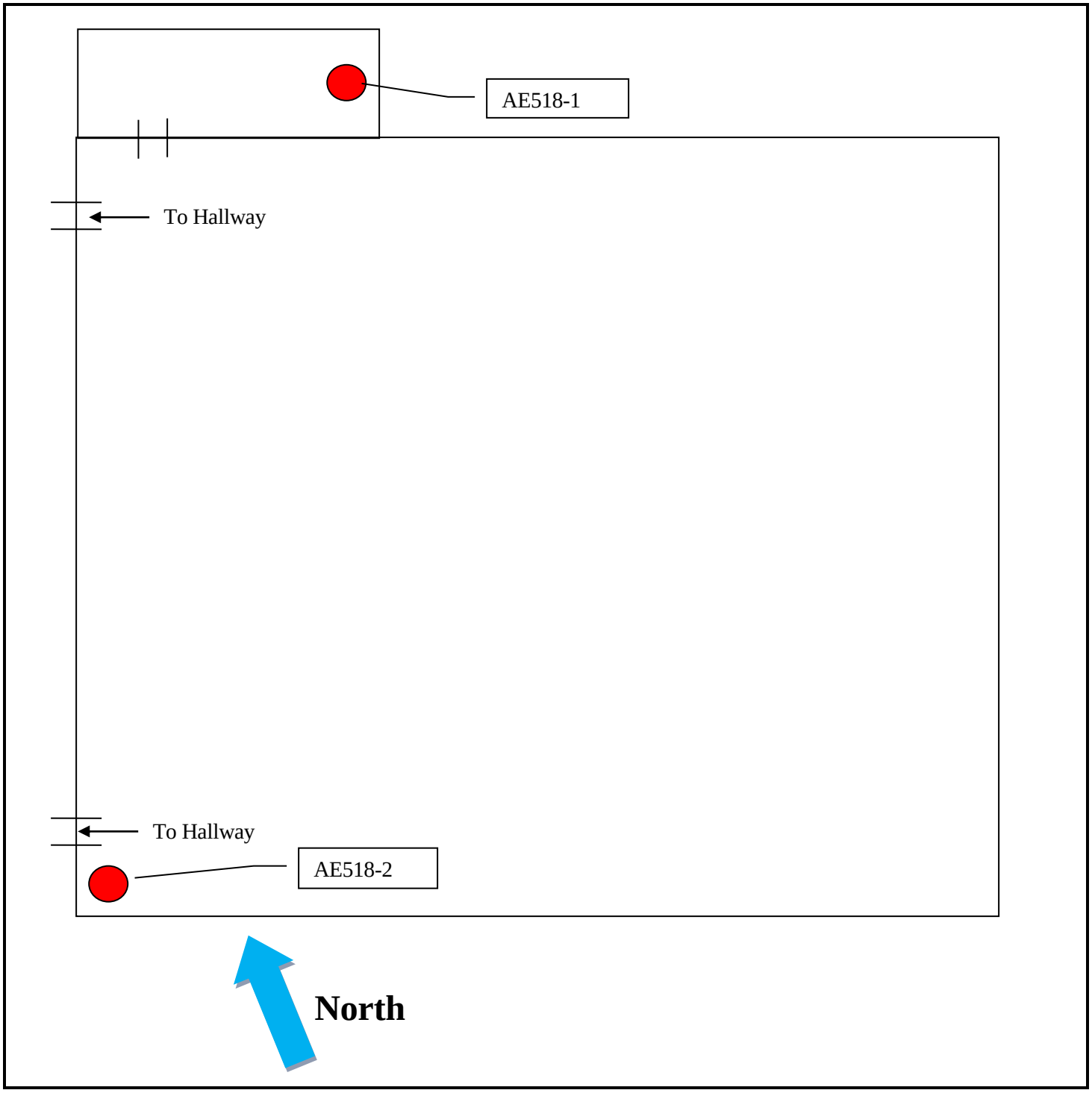
8. View of gym office.

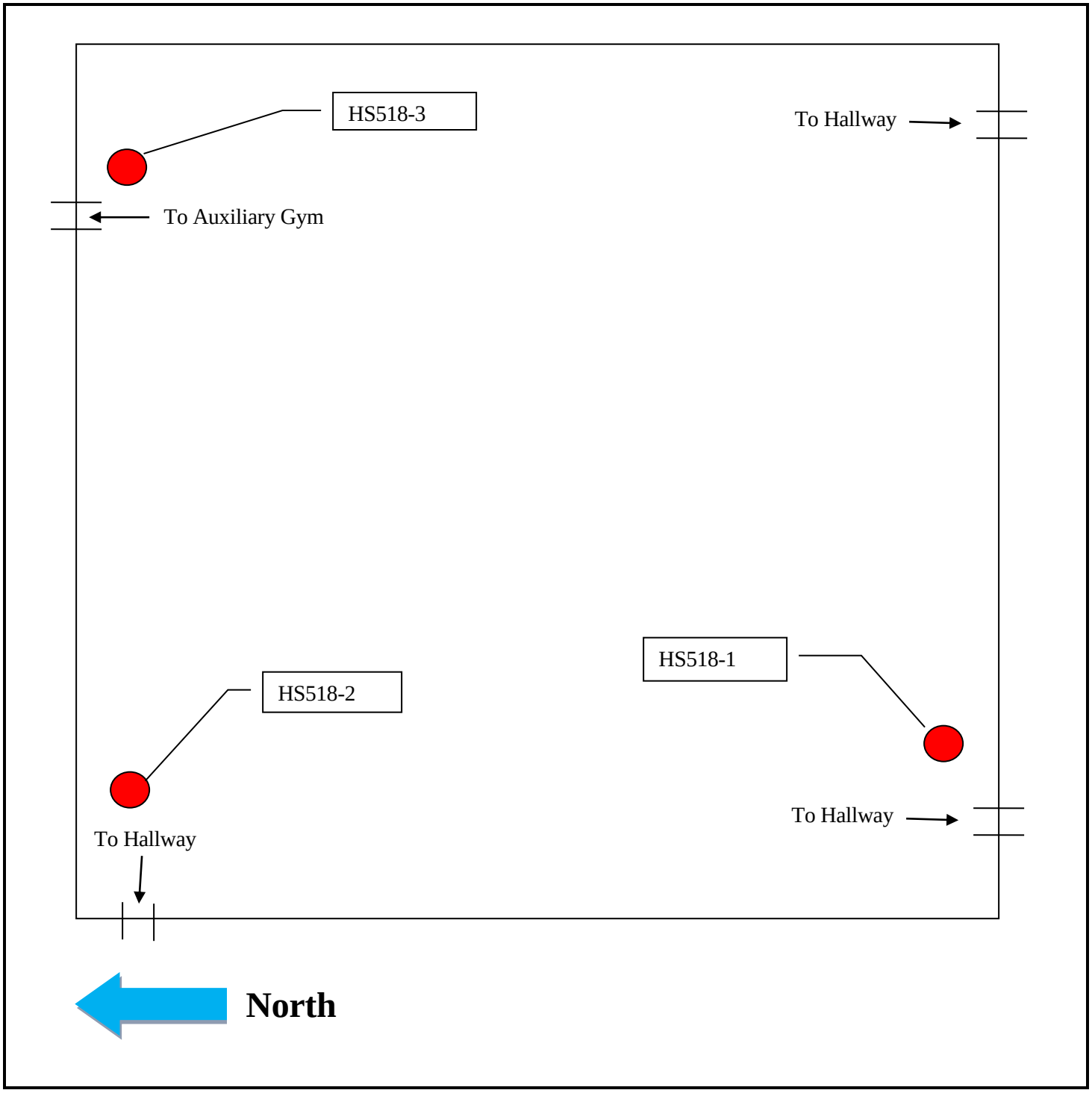


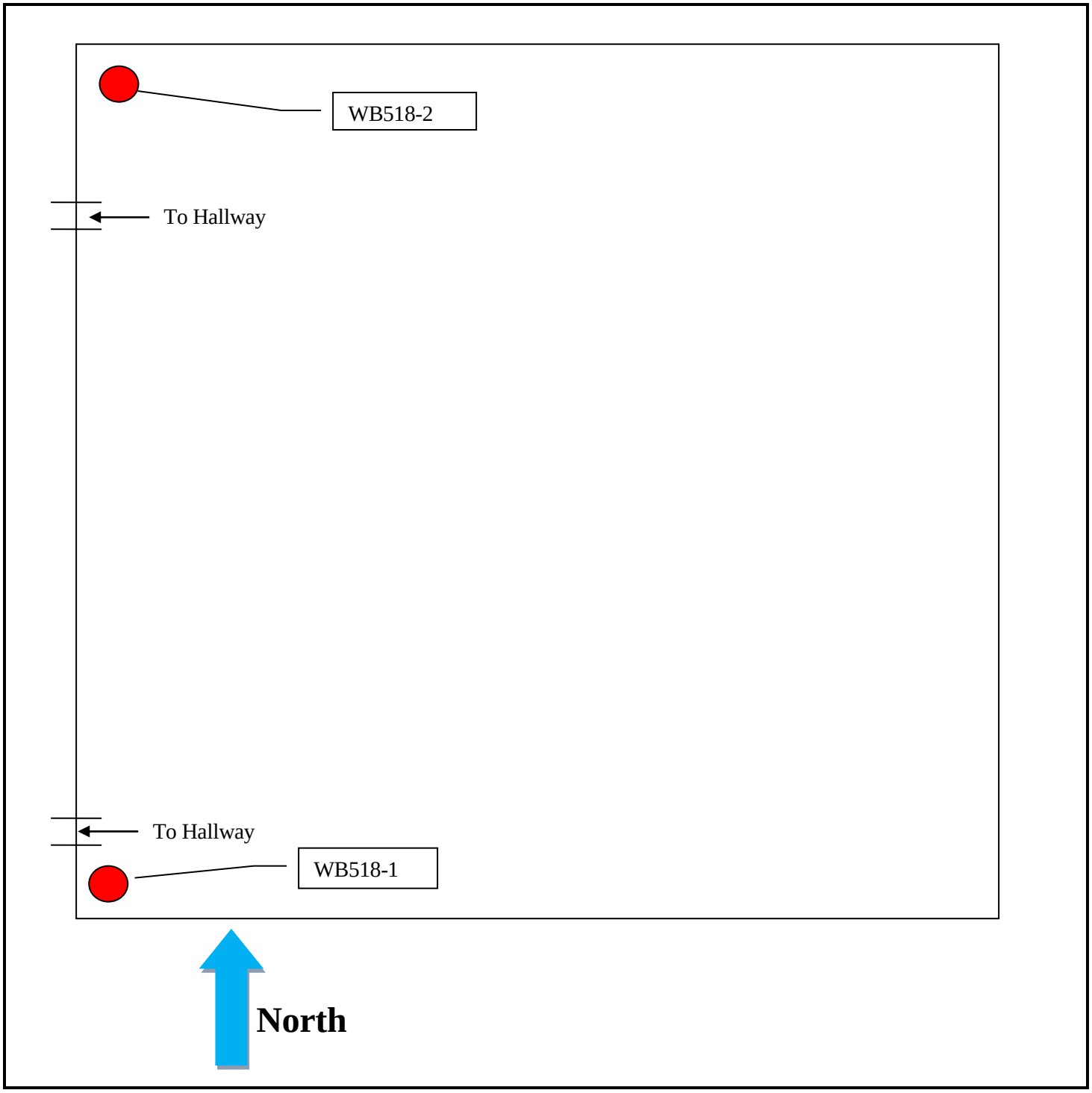
9. View of AE518-1 sample area

10. View of AE518-2 sample area.

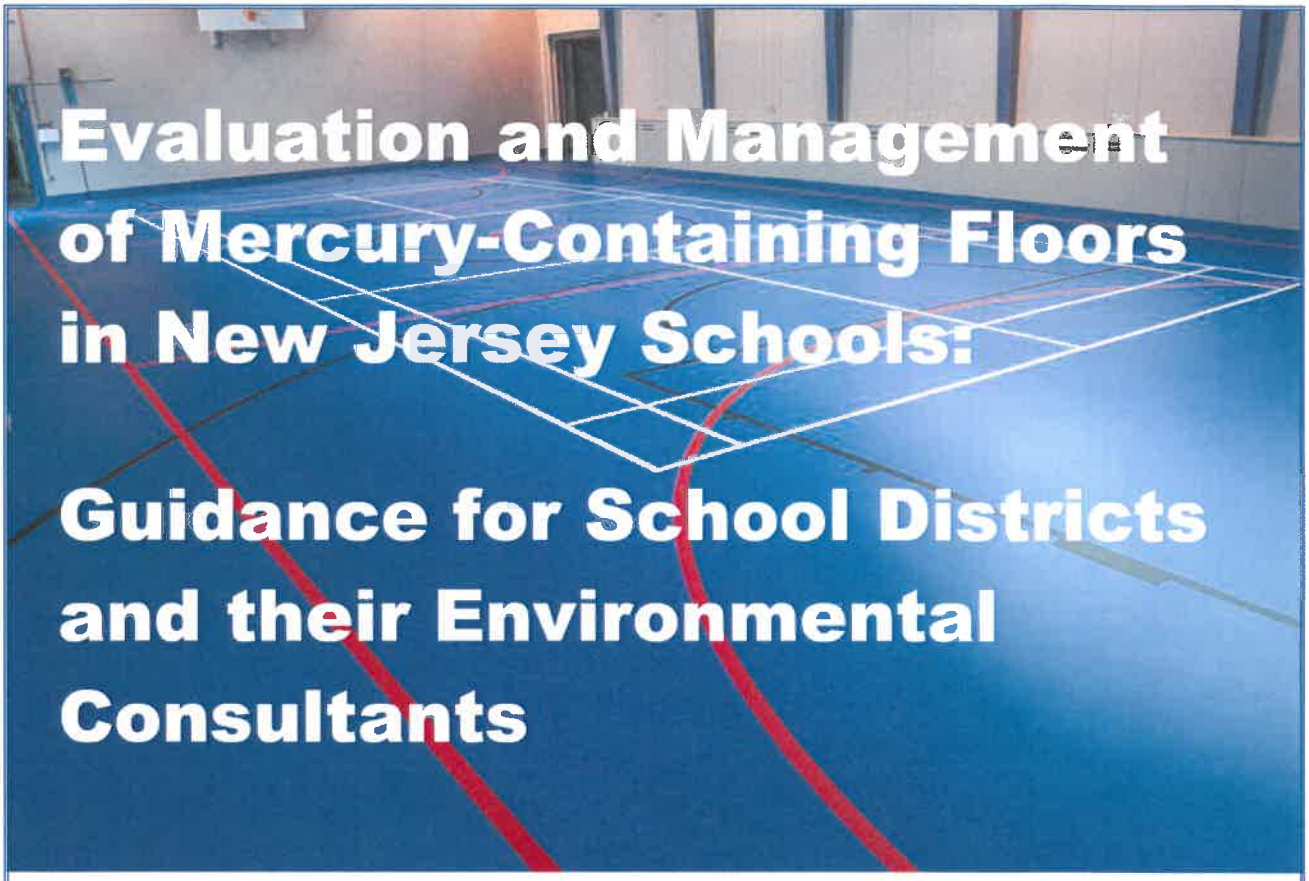
APPENDIX C


AE518-1
To Hallway
To Hallway
AE518-2
North


HS518-3
To Hallway
To Auxiliary Gym
HS518-1
HS518-2
To Hallway
To Hallway
North


WB518-2
To Hallway
To Hallway
WB518-1
North

APPENDIX D



Evaluation and Management of Mercury-Containing Floors in New Jersey Schools:

Guidance for School Districts and their Environmental Consultants

February 6, 2020

Health Consultation
prepared by:

New Jersey Department of Health
Environmental and Occupational Health Surveillance Program

Table of Contents

Purpose

This guidance document provides a systematic approach for school districts and their environmental consultants to evaluate whether installed mercury-containing flooring systems emit mercury vapors in excess of New Jersey Department of Health's (NJDOH) recommended maximum contaminant level of 0.8 micrograms per cubic meter ($\mu g/m^3$) of air.

Introduction

In the 1960s, a number of companies began manufacturing and installing a thin layer of synthetic, polyurethane flooring on top of concrete sub-floors, to provide a resilient and rubberlike surface (ATSDR 2010; ATSDR 2006a; ATSDR 2006b). Typically, liquid polyurethane was poured directly over concrete sub-floors, and in some cases over a rubberized shock-absorbing cushion material. Certain formulations of polyurethane incorporated mercury catalysts, such as phenylmercuric acetate (PMA), to produce a solid, seamless rubber-like floor. Depending on the required thickness of the floor, multiple pours of polyurethane were often employed. The concentration of mercury in such polyurethane flooring systems are reported to contain between 0.1 and 0.2 percent total mercury (Bush 2011; ATSDR 2006a; Reiner 2005).

Mercury-containing polyurethane floors were widely installed in school gymnasiums across the United States until being reportedly discontinued amid concerns over their emissions of elemental mercury vapor (NEWMOA 2010). It is to be noted that depending on the type and brand of polyurethane flooring, these floors may have been installed even as late as in 2005 or 2006 (Washington Township, New Jersey 2019; Bush 2011).

The following list of manufacturers are consistently referenced as having produced polyurethane products known to contain PMA in their formulation (Garrison, 2019). It is important to recognize this list is not an all-inclusive list. It is believed other manufacturers may also have included mercury catalysts in their polyurethane flooring systems.

- 3M under the name of Tartan® floors and Tartan® track
- American Biltrite Rubber Co. Inc.
- Amtico Rubber Flooring
- Athletic Polymer Systems (APS)
- Chemothane
- Crossfields Products (DexOTex)
- Mondo Rubber
- Pitzer Inc.
- Pulastic Systems
- Robbins Sport Surfaces - Chemturf
- Selby Battersby & Company Surfacing Systems

- Sportan Surfaces, Inc.
- Whittaker Synthetic Surfaces

Studies have shown that some of these flooring systems emit mercury vapor into the indoor air, leading to a concern about mercury exposures in schools. It is not known how many of these floors currently exist, whether they are still being installed, or what schools have them (ATSDR 2004; ATSDR 2006a; ATSDR 2006b; ATSDR 2010; Bush 2011; Garrison 2019).

This document provides guidance to school districts investigating the potential mercury vapors being emitted from these floors.

Steps for Assessment of Flooring

1. School districts should conduct a visual inspection to determine if poured-polyurethane floors (soft material in one contiguous piece that is clearly not wood or tile) have been installed in the school. If this type of flooring is identified in the school, a licensed indoor environmental consultant should be hired. A list of these consultants can be found on the Department's website at: https://www.nj.gov/health/ceohs/documents/childcare/conslt.pdf

2. Check if the manufacturer is noted in the list above and/or review the floor's Safety Data Sheet (SDS) for PMA. If the presence of PMA is confirmed, then skip step 3 below (as bulk sampling is not necessary to confirm the presence of mercury). It is not possible to rule out the potential presence of mercury based on the list above as other flooring system manufacturers and installers may have incorporated PMA in their polyurethane formulations. Further, the SDS may not be conclusive as the company might list the PMA ingredient as proprietary information.

3. If the record review was inconclusive, the district and its consultant may choose to collect a bulk sample of the flooring material to test for the presence of mercury. A bulk sampling plan overview is outlined below for the consultant to follow. The consultant will determine the timing between the bulk sampling and any indoor air sampling as these should not occur concurrently. The bulk sampling test may be informative in confirming there is no mercury present. The bulk sample must be analyzed by an American Industrial Hygiene Association (AIHA) accredited laboratory available at: https://www.aihaaccreditedlabs.org/

4. If the record review or bulk sampling confirmed the presence of mercury in the flooring, an appropriate air testing and monitoring program is warranted. A sampling plan overview is outlined below for your consultant to follow.

Sampling Plan Overview

A sampling plan that includes specific sampling and analytical methods is critical for evaluating mercury levels contained in synthetic flooring and the mercury levels in the indoor air. The district should hire and work with a licensed environmental consultant to understand the sampling plan before the plan is implemented. The consultant must provide sampling protocols, procedures, and an understanding of how to interpret the results to the district. The details for these procedures are provided in the sections below.

Bulk Sampling

The purpose of the bulk sampling is to determine if mercury is present in the flooring material and if indoor air monitoring is necessary. A sampling plan must be developed to ensure that the bulk samples are representative of the floor area(s) being evaluated. As noted above, the consultant will determine the timing between the bulk sampling and any indoor air sampling as these should not occur concurrently. The plan must include a diagram of the floor(s) showing the sampling locations and the laboratory results of the bulk samples. The environmental consultant should identify the rooms that contain the suspect flooring, coordinate the collection of bulk samples with school facilities staff, and execute the bulk sampling plan. The environmental consultant must ensure that all floor sampling locations are sealed and repaired after the bulk samples are collected.

Sampling Methods and Procedures

1. An appropriate size sample of the flooring material needs to be collected for analysis. The thickness of most poured polyurethane floors typically ranges from ¼-inch to 1-inch. Bulk samples of rubberized floor must represent the entire thickness/depth of the floor material. Sampling of only the surface or partial thickness of the floor must be avoided. Coring tools are commonly used to collect the bulk sample of the floor material. The environmental consultant must provide information on the bulk sample collection tools as well as the procedure to collect the sample from the entire thickness of the floor.

2. The recommended number of samples is: one floor sample from rooms that are less than 1,000 square feet, two samples from rooms 1,000 to 5,000 square feet, and three samples from rooms greater than 5,000 square feet. The sample locations should be selected, to the extent possible, in areas where the sample extraction is less likely to present a visual blemish (such as in room corners, in closets, behind doors, etc.)

Bulk samples of floor material must be analyzed using USEPA Method 7471B to determine the mercury content. An accredited laboratory should be contacted to ensure the proper amount of floor material is being collected. Typically, laboratories require 10 grams of floor material to analyze for mercury content.

If the floor contains mercury at any concentration, the NJDOH recommends sampling of the indoor air to evaluate the mercury vapor levels.

Indoor Air Sampling

The primary route of exposure to mercury vapor is through inhalation. Therefore, it is important to conduct air sampling to provide data which characterizes the mercury vapor levels in the indoor air.

General Requirements

- An indoor air sampling plan must be developed before any samples are collected. The sampling plan should ensure that air samples are taken from several locations to be representative of the floor area or room being evaluated. Samples should be collected at the breathing zone level, which is typically between three to five feet above the floor. Your consultant should include procedures for using a direct read instrument, the NIOSH 6009 method or both in the plan. See below for general sampling requirements using these methods. For all sampling plans, a diagram of the floor area or room showing the locations of the air samples must be developed. Sampling adjacent hallways and rooms should be included in the sampling plan. Ambient readings should be collected outside the facility to establish background levels.

Airborne mercury levels are affected by the operation of the Heating, Ventilation and Air Conditioning (HVAC) system. Given this relationship, the indoor air samples should be collected under typical HVAC operational conditions. Sampling under these conditions will represent the typical ventilation and temperature conditions under which the building is being maintained and occupied. The room temperature and typical operational settings of the HVAC system should be documented prior to collecting any air samples.

Field notes should include a visual inspection of the condition of the floor at locations where samples are collected, specifically noting if the floor surface is compromised in any manner.

Sampling Methods and Procedures

The following two widely used sampling and analytical methods are available for quantifying mercury levels in the indoor air.

1. Direct Reading Instruments:

- The Lumex RA-915M Mercury Vapor Analyzer (OhioLumex Co., Inc.,) or the Jerome J505 (AMETEK Arizona Instrument) can be used to measure mercury vapor concentrations in air. These direct read instruments are portable mercury

vapor analyzers that have very little cross-sensitivity to chemicals other than elemental mercury. These instruments have low detection limits (ranging from 0.002 micrograms per cubic meter ($\mu g/m^3$) to 0.05 $\mu g/m^3$) and can measure mercury vapor levels under a variety of sample collection protocols.

Sample Collection Procedures

- Ensure that the instrument has been properly calibrated according to the manufacture's recommended procedures. Calibration records must be retained to document that the instrument is functioning correctly.
- Temperature, humidity, and air pressure measurements must be collected during the sampling events.
- Direct read measurements should be taken in a predetermined pattern throughout the gym/room where the flooring material is located.
- Direct reading measurements should be taken at various heights above the floor.
- Readings collected at locations where the floor surface is compromised should be noted.

2. Industrial Hygiene Sampling:

- NIOSH Method 6009 - Analysis of Mercury in Air, is a common method for collecting airborne mercury vapors for laboratory analysis. Using this method, samples may be collected over customized periods of time to represent typical occupied conditions. The sample collection method includes a solid sorbent tube (Hopcalite sample collection media) which is connected to a properly calibrated sampling pump. Sampling pumps must be calibrated using a recognized primary standard to document the sampling flowrate. The NIOSH 6009 method should be consulted for the sample collection flowrates and detection limits.

Sample Collection Procedure

- To be representative of the gym/room, three to five samples should be collected. The number of samples within the gym/room may vary depending on the size of the room being evaluated. When determining the number of samples to be collected, the consultant should ensure that there are a sufficient number of samples to represent the gym/room and adjacent areas being evaluated.
- Temperature, humidity, and air pressure measurements must be collected during the sampling events.
- Samples should be collected at a height between three and five feet above the floor.
- The sampling time should be between six to eight hours to represent a typical day within the gym/room.
- Samples should be collected at a flowrate between 0.20 – 0.25 liters per minute (LPM)
- Collect between 90 and 100 liters of air to ensure that the lowest limit of detection (LOD) for the method is reached.

- Record the sampling information on a chain of custody form for submission to the accredited laboratory.
- Follow the quality control procedures outlined in the method for the submission of blank samples to the laboratory.
- Submit the samples to an accredited laboratory for analysis.

Risk Assessment

The primary exposure to mercury vapor is by inhalation. The NJDOH has adopted Standards for Indoor Environment Certification and for Licensure of Indoor Environmental Consultants (N.J.A.C. 8:50[1]). These regulations provide a risk assessment model that can be used to evaluate indoor air contaminants for school children and staff. This model is very conservative and adjusts for body weight, inhalation rate, and the amount of time spent in school for both children and staff. Based on the toxicological information and this regulated risk assessment model, the NJDOH has issued a guidance maximum contaminant level of 0.8 µg/m^3 for evaluating mercury in flooring. **This level is protective for children as young as three years old and is based on an exposure frequency of 8-hours per day for 180 days (NJDOH 2017).** The NJDOH acknowledges that there are other guidance levels for mercury vapors established by ATSDR, USEPA and other states, but there is no national standard (ATSDR 2004; 2006a; 2006b; 2010; Bush 2011; OEHHA; USEPA). The NJDOH guidance value is based on the exposure scenario in the risk model that is protective of preschool-aged children and a level at which adverse health effects are not likely to occur.

Evaluate and Mitigate Exposures

Based on the air sampling results, school districts may encounter the following scenarios:

Airborne mercury levels lower or equal to 0.8 µg/m^3

- Continue to use the gym/room under the occupied conditions that the samples were collected.
- Quarterly, seasonal sampling is recommended to ensure that the seasonal variability's impact on mercury concentrations is captured. Assessing the seasonal mercury level variation will ensure that the mercury indoor air level is always lower than 0.8 µg/m^3. Mercury vapor levels are related to temperature, so it is important to test during all seasons, especially during the heat of the summer.
- Maintain the room temperature and ventilation system to remain consistent with the operations at the time of sampling.

[1] https://www.nj.gov/health/ceohs/documents/eohap/njac_850_adoption.pdf

- If conditions of the flooring change, i.e., if there are cracks or other signs of deterioration or damage, resampling of mercury vapors in indoor air is necessary.
- Mercury vapor levels can be managed by active ventilation and temperature control of the room.

Airborne mercury levels above 0.8 µg/m³

- Work with the environmental consultant to develop a feasible plan to reduce the mercury vapor levels below 0.8 µg/m³. Mercury vapor levels can be reduced by active ventilation and temperature control of the room.
- Make adjustments to the HVAC system including increasing the ventilation/fresh air intake and/or lowering the temperature in the room. Verify (by retesting) that these adjustments have reduced mercury vapor levels to equal to or less than 0.8 µg/m³.
- If these adjustments are inadequate to maintain the levels to 0.8 µg/m³ or below, reduce the amount of time spent in the room to less than 8 hours per day or do not allow use of the room.
- If ventilation adjustments sufficiently reduce the levels to less than or equal to 0.8 µg/m³, monitor the indoor air at least quarterly to evaluate the mercury levels during other seasons.
- If ventilation adjustments do not sufficiently reduce the levels to less than or equal to 0.8 µg/m³, additional actions including removal of the flooring should be considered. Discussions with the environmental consultant will be needed to determine the appropriate course of action.

In addition, the gym floor should be cleaned using non-abrasive cleaning methods to avoid damaging the floor which could result in an increase in mercury emissions into the air.

Disposal of Floor Materials

If the flooring contains mercury and a decision is made to remove it, a determination needs to be made whether the material would be regulated as a hazardous waste for disposal. Contact the NJDEP's Bureau of Solid and Hazardous Waste[2] for information on the proper disposal of the flooring material. The Bureau of Solid and Hazardous Waste can be reached at (609) 633-1418 or (609) 984-0565.

For general questions, please contact the NJDOH - Consumer, Environmental, & Occupational Health Services at 609-826-4920.

[2] https://www.nj.gov/dep/enforcement/hw.html; https://www.nj.gov/dep/easyaccess/compenf.htm#hazwastecompenf

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Technical Resources

Analytical Methods for Mercury

- EPA 7471B Mercury in solid or semisolid waste (manual cold-vapor technique) https://www.epa.gov/sites/production/files/2015-07/documents/epa-7471b.pdf
- EPA TCLP Method 1311 SW-846 Test Method 1311: Toxicity Characteristic Leaching Procedure https://www.epa.gov/sites/production/files/2015-12/documents/1311.pdf
- NIOSH Method 6009 https://www.cdc.gov/niosh/docs/2003-154/pdfs/6009.pdf
- TCLP test https://www.epa.gov/sites/production/files/2015-12/documents/1311.pdf

Sources for Direct Reading Instruments for Mercury

- Lumex of Ohio, https://www.ohiolumex.com/mercury-analyzer-915m
- Arizona Instruments/Jerome, https://www.azic.com/jerome/j505/

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