John Bel Edwards
GOVERNOR

Dr. Courtney N. Phillips
SECRETARY

State of Louisiana

Louisiana Department of Health
Office of Public Health

July 1, 2020
Estuardo Silva
Louisiana Department of Environmental Quality
605 N. Fifth Street
Baton Rouge, LA 70821

Dear Mr. Silva,

The Louisiana Department of Environmental Quality (LDEQ) requested that the Louisiana Department of Health/Office of Public Health/Section of Environmental Epidemiology (SEET) review environmental samples collected during an off-site investigation of mercury contamination from the LEI, Inc. facility. Through a cooperative agreement with the Agency for Toxic Substances and Disease Registry, SEET has assessed the provided soil, groundwater, and air samples and offered recommendations protective of human health for residents of the property adjacent to LEI.

Site Background

The LEI, Inc. (LEI) facility is located at 46257 Morris Rd, Hammond, Tangipahoa Parish, LA, 70401. The site, which is a permitted commercial hazardous waste facility, was previously engaged in the recycling of fluorescent bulbs. Though bulb recycling ceased two years ago, the recycling operations resulted in the release of elemental (metallic) mercury in production waste, storm water runoff, and through airborne deposition. Such releases are of concern because LEI is located directly adjacent to a residential area.

On-site testing of surface soils at LEI for mercury was performed by LDEQ on February 3, 2020, as part of a Compliance Evaluation Inspection. LDEQ also collected samples from eight off-site locations on February 28, 2020 to determine the extent of off-site migration. Letters of notification were sent to residents in the neighboring community to inform them about this investigation.

LDEQ expressed concerns to LEI about an adjacent residential property occupied by a family with young children, some of whom play in the yard between the site and the residence. LEI sampled soil and groundwater at this property and collected wipe samples and air samples from the interior of the residence. LDEQ requested that SEET evaluate

the levels of mercury detected in samples collected in and around the residential location and provide recommendations for actions that might be necessary to protect human health.

Data Collection

The data assessed by SEET has been summarized in the attached appendix and includes the following:

- off-site soil samples from borings and from multiple depths (Appendix Tables 1 and Figure 1; Tables 2.A and 2.B and Figure 2)
- groundwater samples from the soil borings (Appendix Table 2.D and Figure 2)
- wipes collected from the residence adjacent to the facility (Appendix Table 3)
- air sampled by Lumex from two heights within each room of the residence (Appendix Table 4)

Data Evaluation

The ATSDR chronic inhalation Minimal Risk Level (MRL) for mercury vapor in air is 0.2ug/m^3, or 200 ng/m^3. An MRL is defined as an estimate of the daily exposure level to a hazardous substance that is likely to be without appreciable risk of adverse, non-cancer health effects.

ATSDR's recommended action level for mercury in residential setting is 1 ug/m^3, or 1000 ng/m^3, for chronic exposure. The action level is the indoor air concentration of mercury vapor that should prompt public health and environmental officials to consider implementing response actions. ATSDR also recommends that the breathing zone of a residence not exceed a mercury vapor concentration of 1 ug/m^3 once the home has been remediated and ventilated[1].

Comparison values used to evaluate soil and groundwater samples for mercury and other metals are listed in the attached appendix in Table 2.C.

Exposure Pathway

The main routes of exposure for elemental mercury are ingestion, dermal absorption and inhalation of mercury vapors. The inhalation of high levels of elemental mercury is the most hazardous route and can cause permanent neurological damage and kidney impairment.

[1] Agency for Toxic Substances and Disease Registry. "Chemical-Specific Health Consultation for Joint EPA/ATSDR National Mercury Cleanup Policy Workgroup Action Levels For Elemental Mercury Spills". March 22, 2012.
https://www.atsdr.cdc.gov/emergency_response/action_levels_for_elemental_mercury_spills_2012.pdf

Mercury Background

Elemental (metallic) mercury is a shiny, silver-white metal that exists as a liquid at room temperature and is used in thermometers, batteries, and some electrical switches. At room temperature, some of the metallic mercury will evaporate and form mercury vapors which are colorless and odorless. The higher the temperature, the more vapors will be released from liquid metallic mercury. Mercury vapor is readily absorbed through the lungs and rapidly diffuses to all tissues in the body; the major target organisms are the kidneys and the central nervous system. Excretion is through the urine and feces. All forms of mercury cross the placenta and may affect the developing fetus. Vulnerable subpopulations have been identified as young children (particularly under 6 years), pregnant women, women who might become pregnant, and nursing mothers[2].

Child Health Considerations

In communities faced with air, water, or food contamination, the many physical differences between children and adults demand special emphasis. Children could be at greater risk than adults from certain kinds of exposure to hazardous substances. Children play outdoors and sometimes engage in hand-to-mouth behaviors that increase their exposure potential. Children are shorter than adults; this means they breathe dust, soil, and vapors close to the ground. A child's lower body weight and higher intake rate results in a greater dose of hazardous substance per unit of body weight. If toxic exposure levels are high enough during critical growth stages, the developing body systems of children can sustain permanent damage. Finally, children are dependent on adults for access to housing, for access to medical care, and for risk identification. Thus adults need as much information as possible to make informed decisions regarding their children's health.

Exposure to mercury vapors is more dangerous for children than for adults, because inhaled mercury vapors easily pass into the brain and nervous system of young children and may interfere with the development process.

Conclusion and Recommendations

Mercury from the LEI facility has migrated off-site and on to the adjacent property where children live and play. Given the proximity of the adjacent home, the evidence of off-site mercury contamination and the potential exposure risk to young children, consider referring the family to their health care provider for a laboratory test. Any recent seafood consumption should be noted as dietary sources of mercury can impact the results.

> *Urine levels of mercury provide the most appropriate assessment of elemental mercury exposure and are useful for the assessment of acute and chronic exposures. A 24-hour urine specimen collected in an acid-washed plastic container is the preferred specimen[3].*

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[2]Agency for Toxic Substances and Disease Registry. Toxicological Profile for Mercury. March, 1999. https://www.atsdr.cdc.gov/toxprofiles/tp46.pdf

[3] Agency for Toxic Substances and Disease Registry. Evaluating Mercury Exposure:

Although current readings (May 2020) within the home are below action levels for mercury in indoor air (1 ug/m^3), mercury vapor was detected throughout the house and is exposing children to mercury. The yard along the side of the house between the site and the residence is a known spot for children's recreational activities. The contaminated soil should be remediated/excavated to prevent exposure during outdoor recreation and eliminate the opportunity for mercury-contaminated soil to be tracked into the home. The home should then be thoroughly remediated for residual mercury contamination. A barrier should also be installed at the site to keep further migration of mercury onto offsite properties.

Sincerely,

Rosalind Green, Sc.D.
Environmental Health Scientist Supervisor
LDH/Office of Public Health/Section of Environmental Epidemiology and Toxicology

Information for Health Care Providers. February 2009.
https://www.atsdr.cdc.gov/mercury/docs/physician_hg_flier.pdf

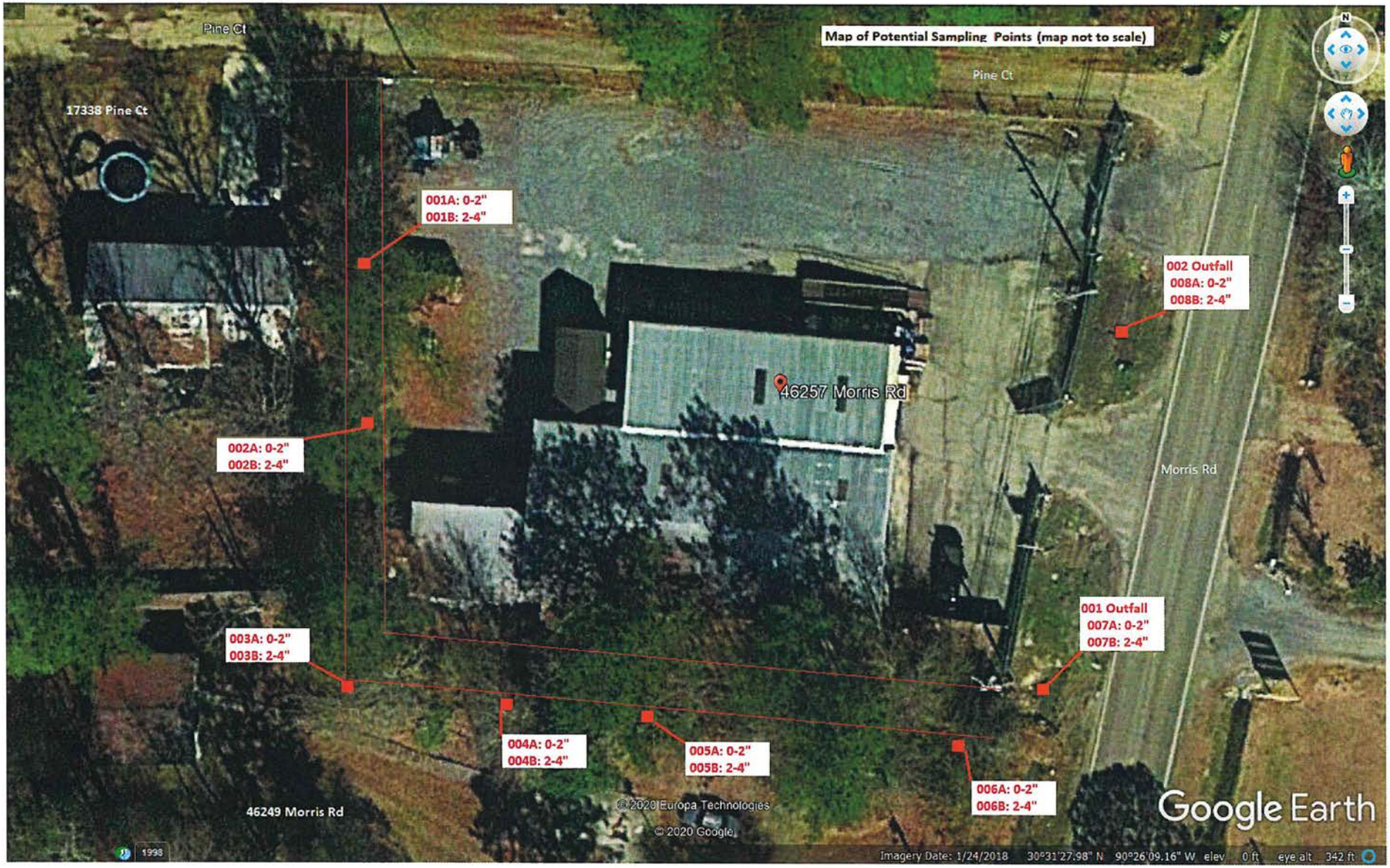
APPENDIX: RESIDENTIAL MERCURY DATA SUMMARY

1. Preliminary Off-site Investigation (May 2020)

Table 1. Preliminary Off-site Soil Data (February 2020)

Client Project	Sample ID	Lab ID	Collected Date	Method	Matrix	Parameter	Results	Units	PQL
Hammond	498-022820-001A	20144443001	02/28/2020 09:30	EPA 7471	Solid	Mercury	0.60 (Preliminary)	mg/kg	0.016
Hammond	498-022820-001B	20144443002	02/28/2020 09:35	EPA 7471	Solid	Mercury	0.23 (Preliminary)	mg/kg	0.013
Hammond	498-022820-002A	20144443003	02/28/2020 09:50	EPA 7471	Solid	Mercury	2.9 (Preliminary)	mg/kg	0.14
Hammond	498-022820-002B	20144443004	02/28/2020 10:00	EPA 7471	Solid	Mercury	1.9 (Preliminary)	mg/kg	0.18
Hammond	498-022820-003A	20144443005	02/28/2020 10:10	EPA 7471	Solid	Mercury	0.47 (Preliminary)	mg/kg	0.018
Hammond	498-022820-003B	20144443006	02/28/2020 10:20	EPA 7471	Solid	Mercury	0.33 (Preliminary)	mg/kg	0.019
Hammond	498-022820-004A	20144443007	02/28/2020 10:25	EPA 7471	Solid	Mercury	0.63 (Preliminary)	mg/kg	0.12
Hammond	498-022820-004B	20144443008	02/28/2020 10:30	EPA 7471	Solid	Mercury	0.73 (Preliminary)	mg/kg	0.029
Hammond	498-022820-005A	20144443009	02/28/2020 10:35	EPA 7471	Solid	Mercury	2.3 (Preliminary)	mg/kg	0.16
Hammond	498-022820-005B	20144443010	02/28/2020 10:40	EPA 7471	Solid	Mercury	1.1 (Preliminary)	mg/kg	0.18
Hammond	498-022820-006A	20144443011	02/28/2020 10:50	EPA 7471	Solid	Mercury	0.34 (Preliminary)	mg/kg	0.013
Hammond	498-022820-006B	20144443012	02/28/2020 10:55	EPA 7471	Solid	Mercury	0.066 (Preliminary)	mg/kg	0.014
Hammond	498-022820-007A	20144443013	02/28/2020 11:00	EPA 7471	Solid	Mercury	0.48 (Preliminary)	mg/kg	0.15
Hammond	498-022820-007B	20144443014	02/28/2020 11:05	EPA 7471	Solid	Mercury	0.78 (Preliminary)	mg/kg	0.015
Hammond	498-022820-008A	20144443015	02/28/2020 11:25	EPA 7471	Solid	Mercury	2.1 (Preliminary)	mg/kg	0.15
Hammond	498-022820-008B	20144443016	02/28/2020 11:30	EPA 7471	Solid	Mercury	0.91 (Preliminary)	mg/kg	0.034
Sample ID: A denotes 0-2” soil and B denotes 2-4” soil.									
Results are total mercury.									

Figure 1: Map depicting sample locations (Preliminary Soil Data February 2020)



2. Off-site Investigation (May 2020)

A. Soil Samples

ATSDR does not have a soil comparison value for elemental mercury; however, the most recent EPA Regional screening level (RSL) for elemental mercury in soil is 1.1 mg/kg, which is the non-carcinogenic child screening level. Results above the RSL have been highlighted.

Table 2.A Soil Samples collected 5/29/2020

Sample ID	Mercury Concentration.	Reporting Limit	Units	Depth (inches)
SS-1A	< 0.080	0.08	mg/kg	0-2
S-1B	< 0.069	0.069	mg/kg	2-4
SS-1C	< 0.077	0.077	mg/kg	4-6
SS-2A	< 0.080	0.08	mg/kg	0-2
SS-2B	< 0.074	0.074	mg/kg	2-4
SS-2C	< 0.080	0.08	mg/kg	4-6
SS-3A	0.43	0.08	mg/kg	0-2
SS-3B	0.48	0.069	mg/kg	2-4
SS-3C	0.38	0.074	mg/kg	4-6
SS-4A	0.7	0.074	mg/kg	0-2
SS-4B	0.4	0.08	mg/kg	2-4
SS-4C	0.27	0.077	mg/kg	4-6
SS-5A	0.29	0.071	mg/kg	0-2
SS-5B	0.61	0.08	mg/kg	2-4
SS-5C	0.13	0.077	mg/kg	4-6
SS-6A	< 0.077	0.077	mg/kg	0-2
SS-6B	0.081	0.077	mg/kg	2-4
SS-6C	0.072	0.071	mg/kg	4-6
SS-7A	0.091	0.069	mg/kg	0-2
SS-7B	0.11	0.069	mg/kg	2-4
SS-7C	< 0.074	0.074	mg/kg	4-6
SS-8A	0.28	0.077	mg/kg	0-2
SS-8B	0.33	0.071	mg/kg	2-4
SS-8C	0.11	0.074	mg/kg	4-6
SS-9A	< 0.080	0.08	mg/kg	0-2
SS-9B	< 0.074	0.074	mg/kg	2-4
SS-9C	< 0.071	0.071	mg/kg	4-6
SS-10A	0.16	0.074	mg/kg	0-2
SS-10B	< 0.069	0.069	mg/kg	2-4
SS-10C	< 0.071	0.071	mg/kg	4-6
SS-11A	0.81	0.074	mg/kg	0-2
SS-11B	0.17	0.08	mg/kg	2-4
SS-11C	0.33	0.08	mg/kg	4-6
SS-12A	0.46	0.08	mg/kg	0-2
SS-12B	0.39	0.071	mg/kg	2-4
SS-12C	< 0.080	0.08	mg/kg	4-6
SS-13A	2.2	0.37	mg/kg	0-2
SS-13B	0.97	0.074	mg/kg	2-4
SS-13C	0.55	0.074	mg/kg	4-6
SS-14A	1.7	0.37	mg/kg	0-2
SS-14B	0.79	0.077	mg/kg	2-4
SS-14C	0.26	0.069	mg/kg	4-6

SS-15A	2.3	0.35	mg/kg	0-2
SS-15B	4.4	0.35	mg/kg	2-4
SS-15C	2.9	0.38	mg/kg	4-6
SS-16A	3.8	0.4	mg/kg	0-2
SS-16B	2	0.33	mg/kg	2-4
SS-16C	0.91	0.08	mg/kg	4-6

Table 2.B Soil Borings collected 5/27/2020
(Non-detects are expressed as less than the detection limit)

Sample B-1	**Result (mg/kg)**			
	(0-2')	**(10-12')**	**(12-14')**	**(14-16')**
Arsenic	< 5.0	< 4.9	< 4.7	< 4.7
Barium	37.9	< 9.8	10	11.7
Cadmium	< 2.5	< 2.5	< 2.4	< 2.4
Chromium	8.2	< 4.9	5.1	9.8
Lead	9.0	< 4.9	< 4.7	5.8
Selenium	< 5.0	< 4.9	< 4.7	< 4.7
Silver	< 5.0	< 4.9	< 4.7	< 4.7
Mercury	< 0.077	< 0.080	< 0.069	< 0.077

Sample B-2	**Result (mg/kg)**			
	(0-2')	**(2-4')**	**(10-12')**	**(14-16')**
Arsenic	5.6	< 4.7	< 5.0	4.8
Barium	43.5	35.8	20.9	24.9
Cadmium	< 2.3	< 2.4	< 2.5	< 2.3
Chromium	12.8	14.5	9.7	12.0
Lead	22.9	7.7	6.5	8.1
Selenium	< 4.5	< 4.7	< 5.0	< 4.6
Silver	< 4.5	< 4.7	< 5.0	< 4.6
Mercury	< 0.069	< 0.080	< 0.080	< 0.080

Sample B-3	**Result (mg/kg)**			
	(0-2')	**(2-4')**	**(8-10')**	**(14-16')**
Arsenic	< 5.0	<4.9	< 5.0	< 5.0
Barium	31.4	32.9	12.4	34.4
Cadmium	< 2.5	< 2.5	< 2.5	< 2.5
Chromium	6.3	12.0	5.0	11.0
Lead	13.7	7.8	< 5.0	12.3
Selenium	< 5.0	<4.9	< 5.0	< 5.0
Silver	< 5.0	<4.9	< 5.0	< 5.0
Mercury	0.15	<0.069	<0.077	<0.071

Sample B-4	**Result (mg/kg)**		
	(0-2')	**(8-10')**	**(14-16')**
Arsenic	< 5.0	< 5.0	< 5.0

Barium	35.3	<10	28.2
Cadmium	< 2.5	< 2.5	< 2.5
Chromium	6.9	<5.0	10.2
Lead	12	<5.0	10.7
Selenium	< 5.0	< 5.0	< 5.0
Silver	< 5.0	< 5.0	< 5.0
Mercury	<0.077	<0.080	<0.074

Table 2.C Soil Comparison Values (Ref. ATSDR unless otherwise noted)

	Recc CV (mg/kg)	CV source	other CV	Source
Arsenic	16	Chronic EMEG child	0.26	(CREG, is below background levels for As)
Barium	10,000	Chronic EMEG child		
Cadmium	5.2	Chronic EMEG child		
Chromium	see notes below*			
Lead	400	EPA Action Level for Play Areas		
Selenium	260	Chronic EMEG child		
Silver	260	RMEG child		
Mercury	1.1	EPA RSL		

***no values for total Chromium**	Recommended CV	CV source	other CV	Source
Chromium VI	0.22	CREG	47	Child chronic EMEG
Chromium VI Pica exposure			27	child Pica EMEG
Chromium III	78,000	child RMEG		

Table 2.D Groundwater from soil borings (Mercury-- All Non-detect)

Sample ID	Mercury Conc.	RL	units	Date Sampled
B-4GW	< 0.20	0.2	ug/l	5/29/2020
B-4GW (filtered)	< 0.20	0.2	ug/l	5/29/2020
B-2GW	< 0.20	0.2	ug/l	5/29/2020
B-2GW (filtered)	< 0.20	0.2	ug/l	5/29/2020
B-1GW	< 0.20	0.2	ug/l	5/29/2020
B-1GW (filtered)	< 0.20	0.2	ug/l	5/29/2020

Figure 2: Map depicting sample locations (Off-site soil samples and borings May 2020)

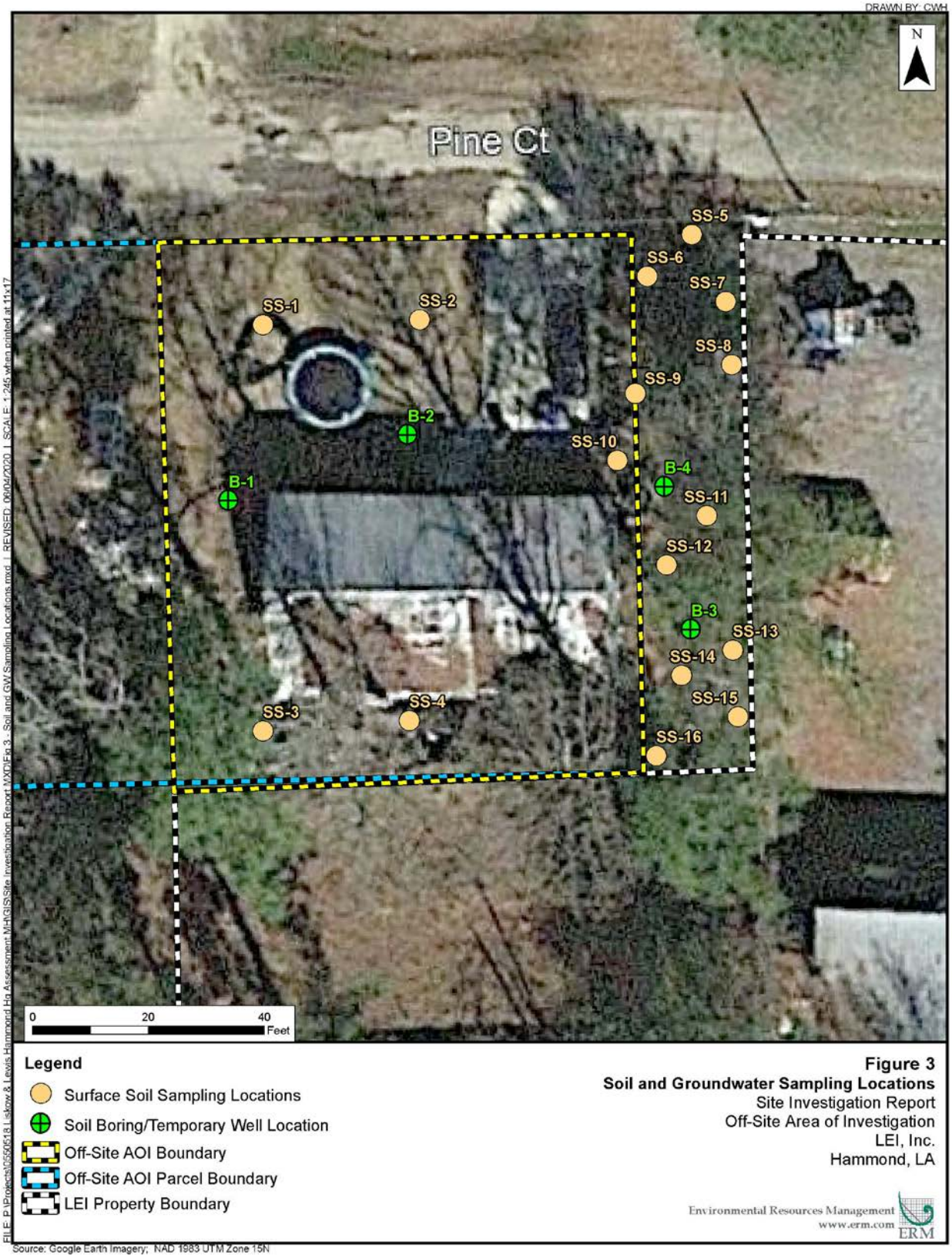


Table 3. Wipe Samples from home adjacent to LEI (no hits)

Project: LEI Off-Site, Hammond, LA
Collected: 05/28/20
LA64188-1 WALL LIVING ROOM
No hits reported in this sample.
LA64188-2 FLOOR LIVING ROOM
No hits reported in this sample.
LA64188-3 FLOOR KITCHEN
No hits reported in this sample.
LA64188-4 KITCHEN WALL
No hits reported in this sample.
LA64188-5 ADJACENT BEDROOM MASTER FLOOR
No hits reported in this sample.
LA64188-6 ADJACENT BEDROOM MASTER WALL
No hits reported in this sample.
LA64188-7 MASTER BEDROOM FLOOR
No hits reported in this sample.
LA64188-8 MASTER BEDROOM WALL
No hits reported in this sample.
LA64188-9 MASTER BATH WALL
No hits reported in this sample.
LA64188-10 MASTER BATH FLOOR
No hits reported in this sample.
LA64188-11 LAUNDRY ROOM FLOOR
No hits reported in this sample.
LA64188-12 LAUNDRY ROOM WALL
No hits reported in this sample.
LA64188-13 HALL FLOOR
No hits reported in this sample.
LA64188-14 HALL WALL
No hits reported in this sample.
LA64188-15 KITCHEN TABLE
No hits reported in this sample.
LA64188-16 KITCHEN COUNTER
No hits reported in this sample.
LA64188-17 DUP-1
No hits reported in this sample.
LA64188-18 MEDIA-1
No hits reported in this sample.
LA64188-19 KIDS TABLE LIVING ROOM
No hits reported in this sample.
LA64188-20 BATH FLOOR
No hits reported in this sample.
LA64188-21 BATH WALL
No hits reported in this sample.
LA64188-22 KIDS BEDROOM 2 FLOOR
No hits reported in this sample.
LA64188-23 KIDS BEDROOM 2 WALL

No hits reported in this sample.
LA64188-24 KIDS BEDROOM 1 FLOOR
No hits reported in this sample.
LA64188-25 KIDS BEDROOM 1 WALLs
No hits reported in this sample.
LA64188-26 MEDIA-2
No hits reported in this sample.
LA64188-27 MEDIA-3
No hits reported in this sample.
LA64188-28 FB
No hits reported in this sample.

Table 4. Summary from Residential 8-hour Indoor Air Logs

Sampling Location	**Mercury Concentration (ng/m3)***
Front Door	
Knee-Level Height	2 - 35
Waist-Level Height	2 - 44
Indoor Temperature 80.9 – 86.3 °F	
Kitchen Sink	
Knee-Level Height	3 - 32
Waist-Level Height	3 - 43
Indoor Temperature 80.0 – 87.1°F	
Laundry Room	
Knee-Level Height	3 - 33
Waist-Level Height	3 - 42
Indoor Temperature 81.6 – 86.6°F	
Hallway	
Knee-Level Height	2 - 29
Waist-Level Height	2 - 39
Indoor Temp 80.1 – 86.8°F	
Kids Bedroom 2	
Knee-Level Height	6 – 26 (29?)
Waist-Level Height	6 - 37
Indoor Temp 81.2 – 88.2°F	
Kids Bathroom	
Knee-Level Height	2 - 30
Waist-Level Height	2 - 38
Indoor Temp 80.4 – 88.2°F	
Kids Bedroom	
Knee-Level Height	2 - 57
Waist-Level Height	2 - 37
Indoor Temp 82.5 - 89°F	
Master Bedroom	
Knee-Level Height	3 - 56
Waist-Level Height	3 - 53

Indoor Temp 82.6 - 86.8°F	
Master Bathroom	
Knee-Level Height	4 - 62
Waist-Level Height	4 - 66
Indoor Temp 81.8 – 86.6°F	
Kids room adjacent to Master	
Knee-Level Height	4 - 87
Waist-Level Height	6 - 78
Indoor Temp 80.2 - 86.5°F	
Kids Bedroom Floor	
Floor	8 - 45
Indoor Temp 82.9 – 86.0°F	
Living Room Rug	
Floor	7 - 43
Indoor Temp 82.2 – 86.4°F	

*ATSDR's chronic inhalation Minimal Risk Level (MRL) for mercury vapor in air is 0.2 ug/m^3 or 200 ug/m^3