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10 September 2024

Mr. Joseph T. Martella II, Senior Engineer Site Remediation Program Office of Waste Management RI Department of Environmental Management 235 Promenade Street Providence, RI 02908

RE: Quarterly O&M Status Report No. 68 Alvarez High School, 333 Adelaide Avenue, Providence, Rhode Island Case No. 2005-029 EA Project No. 15066.12

Dear Mr. Martella:

On behalf of the City of Providence School Department (City), EA Engineering, Science, and Technology, Inc., PBC (EA) is providing this Quarterly Operations and Maintenance (O&M) Status Report in accordance with Provision 6(f) of the Order of Approval and amendments (Amended OA) for the referenced Alvarez High School site (the Site, formerly Adelaide Avenue High School).

This O&M Report summarizes recently completed Site activities related to compliance sub-slab vapor and indoor air sampling for the period from June 2024 through August 2024.

If you have any questions or require additional information, please contact me at (401) 287-0370.

Sincerely,

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC., PBC

13/200

Frank B. Postma, LSP, LEP, PG Project Manager

cc: Superintendent, Prov. Dept. of Public Schools Director, Prov. Dept. of Public Property
 A. DeGrace, Prov. Redevelopment Agency
 R. Dorr, Neighborhood Resident
 Rep. Scott Slater

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Quarterly O&M Status Report No. 68

Summarizing Sub-slab Depressurization and Indoor Air Monitoring and Sampling Activities

Alvarez High School Site (Formerly Adelaide Avenue High School) Providence, Rhode Island

Prepared for

City of Providence School Department 797 Westminster Street Providence, Rhode Island 02903

Prepared by:

EA Engineering, Science, and Technology, Inc., PBC 301 Metro Center Blvd., Suite 102 Warwick, Rhode Island 02886 (401) 736-3440

> EA Project No. 15066.12 September 2024

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1. INTRODUCTION AND BACKGROUND

On behalf of the City of Providence School Department (the City), EA Engineering, Science, and Technology, Inc., PBC (EA) has prepared this Quarterly Operations and Maintenance (O&M) Status Report No. 68 for the Parcel B area of the former Gorham Manufacturing site in Providence, Rhode Island, formerly referred to as Adelaide Avenue High School and now referred to as Alvarez High School (the Site). A Site Location Map is provided as Figure 1. This report has been prepared to satisfy provision 6(f) of the Rhode Island Department of Environmental Management (RIDEM) Order of Approval (OA) issued in June 2006, as amended in February 2007, July 2007, and July 2009. For the purposes of this report, the original and the amended OA will collectively be referred to as the Amended OA.

The Amended OA specifies the details of the approved remedy for the Site including, but not limited to, the installation of a sub-slab depressurization (SSD) system, installation of a continuous indoor air methane monitoring system, and implementation of an associated periodic monitoring and sampling program. In August 2007, the RIDEM-approved remedy for the Site was completed and a Remedial Action Closure Report (RACR) was submitted to RIDEM. In July 2009, the periodic indoor air and sub-slab vapor sampling schedule was reduced to quarterly sampling from previously required monthly sampling.

This report summarizes the O&M, monitoring, and sampling activities completed at the Site for the three-month period from June 2024 through August 2024 (Quarterly Reporting Period No. 68). Please refer to Quarterly O&M Status Reports No. 1 through No. 67 for information regarding monitoring and sampling at the Site during the previous quarters. The RACR and previously submitted monthly correspondence contain details regarding the results of the monitoring and sampling program for the period prior to Reporting Period No. 1.

2. SUMMARY OF SSD SYSTEM AND INDOOR METHANE MONITORING SYSTEM PERFORMANCE

2.1 SSD SYSTEM AND RELATED MONITORING

The following SSD system performance parameters were inspected and/or monitored at the frequencies indicated below in accordance with the Amended OA and through discussions with RIDEM to evaluate system performance:

- Monthly indoor air monitoring of vapor-phase constituents and methane (12 June 2024, 31 July 2024, and 29 August 2024) at 8 monitoring locations, as illustrated on the Indoor Air Sampling and Methane Monitoring System Diagram provided as Figure 2.
- Monthly sub-slab monitoring of vacuum pressure, vapor-phase constituents, and methane (12 June 2024, 31 July 2024, and 29 August 2024) at 11 monitoring locations, as illustrated on the As-Built Sub-slab Monitoring and Sampling Locations provided as Figure 3.
- Monthly inspections and monitoring (air velocity and vacuum) of the three rooftop fans to verify proper operation and effluent concentrations.
- Monthly inspections of the electronic monitoring system associated with each of three SSD system extraction fans and the methane sensor system (automatic alarm notification via audible signal and phone notification).
- Monthly inspections of the RIDEM approved engineered cap.
- Quarterly sampling could not occur in July or August this quarter due to a lapse in contracting and a waxing of the floors, respectively.

Copies of O&M field forms summarizing SSD System monitoring data collected during this reporting period are provided in Appendix A.

2.1.1 Sub-Slab Monitoring

Vacuum measurements taken at each interior and perimeter sub-slab monitoring/sampling locations ranged from -0.096 to 0.022 inches of water column. Positive pressure points were observed at MP-3 in all months and at MP-4 in August. All rooftop fans were observed to be operating correctly during this reporting period; pressure and air velocity recorded at all rooftop fans were within normal ranges. During the June 2024 to August 2024 quarter, indoor sub-slab monitoring points have had normal PID readings and adequate vacuum pressures below the slab with a notable exception in IMP-3. IMP-3 had a zero pressure in July and PID readings above 1000 ppb in June and August and above 3000 ppb in July.

2.1.2 Rooftop Extraction Fans

The rooftop extraction fans were replaced with upgraded models on 20 October 2023 as part of the proposed mitigation strategy to address volatile organic compounds (VOCs) in the sub-slab. Each fan had inspection ports installed along their position on the 1st floor to allow for measurements of pressure between the slab and the roof. Each of these three trunk lines was shown to have adequate vacuum on the 1st floor. In addition, on 7 November 2023 the SSD system was video inspected to determine if blockages existed in the PVC trunk lines below the slab. The video inspection found unobstructed trunk lines and sump pits in each line accessible by the video system, representing 50% of the installed sub-slab piping/sump pit network. These trunk lines and sump pits that were clear were SP-4, SP-5, SP-7, and SP-8.

The pressure sensors on each rooftop fan are connected to an alarm panel and autodialer system, which is triggered when a change in pressure is detected in the rooftop exhaust fans. The exhaust fan alarm system is connected to back-up battery packs in the control panel, which have sufficient capacity to operate for multiple days in the event of an electrical outage or power disruption to the system. Negative fan vacuums, fan speeds, and the negative sub-slab pressures observed at the site were within normal ranges and the system is operating properly. Sub-slab pressures observed at the site were mostly negative with four exceptions of zero or positive values across two monitoring points.

2.1.3 Engineered Cap

The engineered cap appeared in good condition. Previously eroded areas of the cap on Parcel B were filled with clean loam and seeded on 7 July 2022. EA will continue to monitor the cap for any future deficiencies.

In April 2020, PPSD installed two 10-foot (ft) by 20-ft by 4-in thick concrete throwing pads in the southwestern corner of Parcel C on the grassed recreation field between Dr. Jorge Alvarez High School and Mashapaug Pond. The pads were constructed in accordance with the Temporary Parcel C Cap Disturbance Notification letter submitted to RIDEM on 31 March 2020. The concrete pads remain in place as part of the engineered cap and concrete pad inspections have been incorporated into the routine monitoring events. The concrete pads appeared to be in good condition and no cracks or chips were observed. Shotput and discus landing zones also appeared in good condition and no erosion damage to the cap was present. A site plan depicting the location of the shotput and discus throwing pads is included as Figure 4.

Any and all future landscaping work, including gardening at Alvarez High School (Parcel B), and/or the shot-put and discus throwing field (Parcel C) must adhere to the Soil Management Plan and the Amended OA to ensure the engineered cap is not damaged and the protective cover soil layer is maintained. EA will continue to inspect the pads on a monthly basis and report findings and routine maintenance in the Quarterly O&M Status Reports.

2.2 INDOOR METHANE MONITORING SYSTEM

Indoor methane concentrations were monitored by an indoor methane monitoring system equipped with automatic alarm notification via audible signal and phone notification within the school at eight RIDEM-approved locations (refer to the Indoor Air Sampling and Methane Monitoring System Diagram provided as Figure 2) during this reporting period. The methane monitoring system was inspected during each monitoring event and the filters were last replaced on 31 July 2024. The next filter replacement is scheduled for October 2024. This methane alarm was triggered multiple times during this quarter due to power outages at the school. EA responded to each of them within 48 hours to inspect the system and found no indication of heightened methane concentrations in the school.

2.3 AMBIENT OUTDOOR AND INDOOR AIR SAMPLING

Clean and certified summa canisters from a lab typically requires two weeks between order and delivery to use them for sampling. A new annual purchase order from the Providence Public School District (PPSD) was not received until 25 July and due to this, quarterly sampling could not be conducted in the month of July. During a visit to Alvarez High School on 5 August, floor wax and sealant were observed being applied to the first floor of the school. These products have previously been determined to increase air concentrations of VOCs and thus interfere with sampling results. For this reason, no sampling event was conducted in August either. July's sampling was conducted on 4 September 2024 and will thus be discussed in the next quarter's report, Report No. 69.

2.4 SUB-SLAB VAPOR SAMPLING AND EVALUATION OF POTENTIAL VOC REBOUND EFFECT

A total of 11 RIDEM-approved sub-slab sampling locations are installed at the Site. Six sub-slab samples are typically collected on the rotating schedule in accordance with the Amended OA and analyzed for VOCs via US EPA Method TO-15 SIM. No such interior or exterior sub-slab vapor samples could be collected in July or August 2024.

2.5 SUMMARY OF ROOFTOP VOC EMISSIONS

Previous rooftop effluent sampling rounds conducted in March 2007 (immediately after SSD system startup), June 2007, June 2008, September 2009, and annually in July thereafter (2010 – 2022) indicated compliance with all Air Pollution Control Permit Applicability Thresholds. Additionally, in October 2014 RIDEM conducted roofline and downwind outdoor air sampling to determine if rooftop fan exhaust was possibly infiltrating the building or impacting downwind air. The roofline and downwind sample concentrations were approximately the same as the upwind sample concentration and significantly lower than those concentrations observed in the rooftop fan exhaust, indicating that exhausted vapors from the rooftop fans were well dispersed and are not causing significant impacts downwind or inside the building.

The Amended OA requires that rooftop VOC sampling be completed on an annual basis. Concentrations of VOCs in rooftop fan vents continue to be evaluated based on the regulatory thresholds and their effect to background air at the school and the nearby residential neighborhood. Rooftop fan sampling was not conducted during this quarter, but rather during the next quarter on 4 September. Results of this sampling will be discussed in the next quarterly report.

3. CONCLUSIONS

The following conclusions are made based upon the completed inspections, monitoring, and sampling performed during this reporting period:

- Measured sub-slab pressures were generally negative, with the exception of 3 positive measurements. Overall, this would indicate that the sub-slab system is working.
- The continuous operation of the SSD System and non-continuous sub-slab vacuum beneath the school illustrates ongoing, effective operation of the SSD System.
- The concrete pads and throwing areas on Parcel C appeared to be in good condition and no signs of cap degradation or erosion were observed.
- The sub-slab data was evaluated for potential rebound in accordance with the Amended OA. No evidence of increasing VOCs (i.e., VOC rebound) beneath the school has been observed. Significant fluctuations in concentrations were noted during this reporting period; these variations do not constitute an increasing trend.

4. FUTURE ACTIVITIES AND NEXT QUARTERLY SUMMARY REPORT

The following activities will be completed in accordance with the Amended OA during the next quarterly status reporting period from September 2024 to November 2024:

- Continuous monitoring of the operational status of three rooftop extraction fans;
- Monthly site inspections and monitoring using a calibrated photoionization detector with part-per-billion sensitivity and a Landtec multi-gas meter;
- Collection of air samples from nine indoor locations, one ambient outdoor location, and six sub-slab monitoring points and three rooftop fans in September 2024 as a stand-in for the missed July sampling;
- Collection of air samples from nine indoor locations, one ambient outdoor location, and six sub-slab monitoring points in October 2024;
- EA will continue to work with PPSD and RIDEM to ensure that the Parcel A remedial systems are maintained and data reported in accordance with regulations;
- Any future landscaping projects and erosion repairs by PPSD must be conducted in accordance with the site-specific Soil Management Plan and the Amended OA to prevent damage to the engineered cap;
- The engineered cap on Parcel B as well as the concrete throwing pads on Parcel C will be inspected during the routine monthly sub-slab inspections and reported in future Quarterly O&M reports;

These activities will be summarized in the next status report (Quarterly Status Report No. 69), expected to be submitted by the end of December 2024.

4.1 FUTURE CORRECTIVE ACTION AND INVESTIGATION

Sub-slab VOC vapor concentrations have decreased from their previous levels in the past two quarters, which may suggest that fan operation at Parcel A has resumed. Sub-slab and interior air VOC vapor concentrations will continue to be observed and analyzed next quarter. The necessity of previously proposed exterior-mounted radon fans will be evaluated over the next quarter.

FIGURES





-METHANE SYSTEM CONTROLLER LOCATION; ADMINISTRATION WORK ROOM

- METHANE SENSOR LOCATION (TYP.)
- PLC LOCATION IN EAST WING; ELECTRICAL ROOM/MAINTENANCE OFFICE AREA

NOTE: NOT TO SCALE

QUARTERLY STATUS REPORT FIGURE 2





APPENDIX A

O&M Field Forms

EA Engineering, Science, and Technology, Inc., PBC

Alvarez High School - SSD & Interior Methane Monitoring System O&M

Date of O&M:	6.12.24		Performed by:	TC		
PID/Methane Calibration?	no	(yes/no)	PID Calibration Result:	0:00	_	
Date of last Methane Sensor Filter Replacement:	4.25.24	Re	placed this O&M Visit?	no	(yes/no)	
Auto Dialer Functioning (yes/no): 1	/es					
General Status of SSD System:	good					
General Status of Methane Monitoring System:	good					

Eng. Cap/Fence Inspection

Performed/Notes: fine

			VOC Monitoring	Methane Monitoring			Air/Vapor Sample Collection						Comments/Notes (Ambient weather conditions, status of HVAC, possible
Monitoring/ Sampling Location	Sub-slab or gauge vacuum	Air Velocity (fpm)	PID (ppb)	Indoor Sensor (ppm)	(% Gas)	(% LEL)*	Summa Can ID	Controller ID	Start Time	Start Vac (inches Hg)	End Time	End Vac (inches Hg)	monitoring/sampling interferences, etc continue on separate sheet if needed)
Gymnasium	NA	NA	64	0	0	0							
Cafeteria	NA	NA	104	0	0	0							
Kitchen Storage Room	NA	NA	115	0	0	0							
Elevator Hallway	NA	NA	101	0	0	0							
Room 145	NA	NA	28	0	0	0							
Room 152	NA	NA	170	0	0	0							
Room 118	NA	NA	107	0	0	0							
Room 110	NA	NA	175	0	0	0							Relatively warm,
Room 116	NA	NA	93	NA	0	0							
MP-1	-0.081	NA	76	NA	0	0	<u> </u>						1
MP-2	-0.071	NA	120	NA	0	0	<u> </u>						1
MP-3	0.022	NA	216	NA	0	0							
MP-4	-0.028	NA	145	NA	0	0							
MP-5	-0.056	NA	166	NA	0	0							
MP-6	-0.004	NA	204	NA	0	0							
MP-7	-0.025	NA	164	NA	0	0							
MP-8	-0.096	NA	183	NA	0	0							
IMP-1	-0.055	NA	68	NA	0	0							
IMP-2	-0.026	NA	302	NA	0	0							
IMP-3	-0.006	NA	1115	NA	0	0							
Roof-Top Fan 1	-4	2550	174	NA	0	0							
Roof-Top Fan 2	-3	2182	80	NA	0	0							
Roof-Top Fan 3	-3.8	1993	200	NA	0	0							
Ambient Outdoor Air	NA	NA	2	NA	0	0							

NA: not applicable.

NM: not monitored on this date.

NS : not sampled on this date.

* RIDEM Action Level for methane %LEL beneath the building is 10% and within the building is 1%.

If these methane levels are exceeded, immediately notify EA Project Manager to initiate response protocol.

Activity in the school is far lower than average



Alvarez High School - SSD & Interior Methane Monitoring System O&M

Date of O&M:	7.31.24		Performed by:	TC				
PID/Methane Calibration?	no	no (yes/no) PID Calib		0:00	_			
Date of last Methane Sensor Filter Replacement:	4.25.24	Re	placed this O&M Visit?	Yes	(yes/no)			
Auto Dialer Functioning (yes/no): No, breaker flipped. Addressed and fixed								

General Status of SSD System: No, breaker flipped. Addressed and fixed General Status of Methane

Monitoring System: good

Eng. Cap/Fence Inspection Performed/Notes: fine

Comments/Notes (Ambient voc weather conditions, status Monitoring Methane Monitoring Air/Vapor Sample Collection of HVAC, possible monitoring/sampling Indoor Start Vac End Vac Sub-slab or Air interferences, etc .. Monitoring/ Sampling Location (% gauge Velocity Sensor Summa Controlle Start (inches End (inches continue on separate she LEL)* PID (ppb) (% Gas) Can ID Hg) vacuum (fpm) ID Time Hg) Time (ppm) if needed) 105 0 NA NA Gymnasium 210 0 NA NA Cafeteria No access, kitchen 0 NA NA -Kitchen Storage Room closed 0 NA NA 205 Elevator Hallway New shelves and NA NA 595 0 Room 145 carpet NA NA 249 0 Room 152 0 NA 17 NA Room 118 0 NA NA 71 Room 110 Room empty and NA NA 0 NA Room 116 ventilated -0.019 NA 49 NA MP-1 -0.024 NA 133 NA MP-2 0.01 102 NA NA MP-3 -0.004 NA 98 NA MP-4 -0.044 NA 66 NA MP-5 -0.01 NA 33 NA MP-6 -0.03 141 NA NA MP-7 -0.016 NA 104 NA MP-8 -0.018 NA 608 NA IMP-1 -0.038 NA 445 NA IMP-2 3083 0 NA NA IMP-3 -3 2214 288 NA Roof-Top Fan 1 -3 2161 398 NA Roof-Top Fan 2 No access, kitchen -. -NA Roof-Top Fan 3 closed NA NA 0 NA Ambient Outdoor Air

NA: not applicable.

NM: not monitored on this date.

NS : not sampled on this date.

* RIDEM Action Level for methane %LEL beneath the building is 10% and within the building is 1%.

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Activity in the school is far lower than average

EA Engineering, Science, and Technology, Inc., PBC

Alvarez High School - SSD & Interior Methane Monitoring System O&M
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		Alvalez	riigh Sch	001 - 00			ethane	WOINTOIL	ng oy				
[Date of O&M:	8.2	29.24			Perfo	ormed by:		тс				
PID/Methane Calibration?			no	(yes/no)		PID Calibration Result:			0:00				
Date of last Methane	Sensor Filter									_			
I	Replacement:	7.3	31.24	-	Replace	ed this O	&M Visit?	no		(yes/no)			
Auto Dialer Function	ning (yes/no):	Yes											
General Status o General Statu	f SSD System: s of Methane	Yes											
Monit	oring System:	good											
Eng. Cap/Fen Perfc	ce Inspection ormed/Notes:	fine											
			VOC Monitoring	Meth	ane Monit	toring		Air/Va	por Sar	nple Collect	ion		Comments/Notes (Ambient weather conditions, status of HVAC, possible
Monitoring/ Sampling Location	Sub-slab or gauge vacuum	Air Velocity (fpm)	PID (ppb)	Indoor Sensor (ppm)	(% Gas)	(% LEL)*	Summa Can ID	Controller ID	Start Time	Start Vac (inches Hg)	End Time	End Vac (inches Hg)	monitoring/sampling interferences, etc continue on separate sheet if needed)
Gymnasium	NA	NA	0	0	0								
Cafeteria	NA	NA	14	0	0.1								
Kitchen Storage Room	NA	NA	65	0	0.1								
Elevator Hallway	NA	NA	16	0	0.1								
Room 145	NA	NA	125	0	0								
Room 152	NA	NA	242	0	0								
Room 118	NA	NA	243	0	0								
Room 110	NA	NA	183	0	0								
Room 116	NA	NA	166	NA	0								
MP-1	-0.086	NA	36	NA	0								
MP-2	-0.074	NA	22	NA	0								
MP-3	0.034	NA	97	NA	0								
MP-4	0.026	NA	23	NA	0								
MP-5	-0.055	NA	0	NA	0								
	-												

Ambient Outdoor Air

Roof-Top Fan 1

Roof-Top Fan 2

Roof-Top Fan 3

MP-6

MP-7

MP-8

IMP-1

IMP-2

IMP-3

NA: not applicable.

NM: not monitored on this date.

-0.03

-0.007

-0.1

-0.012

-0.039

-0.03

-4

-3

-4.4

NA

NA

NA

NA

NA

NA

NA

2214

2161

2082

NA

0

0

0

100

942

2680

100

144

0

4

NA

0

0

0

0

0

0

0

0

0.1

0

NS : not sampled on this date.

* RIDEM Action Level for methane %LEL beneath the building is 10% and within the building is 1%.

If these methane levels are exceeded, immediately notify EA Project Manager to initiate response protocol.