



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

30 December 2016

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. 37
Alvarez High School, 333 Adelaide Avenue, Providence, Rhode Island
Case No. 2005-029
EA Project No. 15066.04*

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 subslab vapor and indoor air sampling for the period from September 2016 through November 2016.

If you have any questions or require additional information, please contact me at (401) 736-3440, Ext. 1809.

Sincerely,

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

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

cc: B. Luger, Prov. Dept. of Public Schools
D. Granlek, Prov. Redevelopment Agency
R. Dorr, Neighborhood Resident
Rep. Scott Slater
Knight Memorial Library Repository
A. Sepe, Prov. Dept. of Public Property
S. Fischbach, RI Legal Services
J. Pichardo, Senator
Principal Hawkins, Alvarez High School



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

301 Metro Center Blvd, Suite 102
Warwick, Rhode Island 02886
Telephone: 401-736-3440
www.eaest.com

This page intentionally left blank



Quarterly O&M Status Report No. 37

Summarizing Subslab 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. 15066.04
December 2016



This page intentionally left blank

TABLE OF CONTENTS

	<u>Page</u>
1. INTRODUCTION AND BACKGROUND	1
2. SUMMARY OF SSD SYSTEM AND INDOOR METHANE MONITORING. SYSTEM PERFORMANCE	2
2.1 SSD System	2
2.2 Indoor Methane Monitoring System	2
2.3 Ambient Outdoor and Indoor Air Sampling	3
2.4 Subslab Vapor Sampling and Evaluation of Potential VOC Rebound Effect	4
2.5 Summary of Rooftop VOC Emissions	5
2.6 Conclusions	5
3. FUTURE ACTIVITIES AND NEXT QUARTERLY SUMMARY REPORT	7

FIGURES

FIGURE 1:	SITE LOCATION MAP
FIGURE 2:	INDOOR AIR SAMPLING AND METHANE MONITORING SYSTEM DIAGRAM
FIGURE 3:	AS-BUILT SUBSLAB MONITORING AND SAMPLING PLAN

APPENDICES

APPENDIX A:	O&M FIELD FORMS
APPENDIX B:	INDOOR AND AMBIENT OUTDOOR AIR ANALYTICAL SUMMARY
APPENDIX C:	SUBSLAB VAPOR ANALYTICAL SUMMARY
APPENDIX D:	ROOFTOP EMISSION ANALYTICAL SUMMARY
APPENDIX E:	INDOOR AIR, AMBIENT OUTDOOR AIR, AND SUBSLAB VAPOR LABORATORY ANALYTICAL REPORTS
APPENDIX F:	LABORATORY DETECTION LIMITS CORRESPONDENCE

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. 37 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 subslab 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 subslab 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 3-month period from September 2016 through November 2016 (Quarterly Reporting Period No. 37). Please refer to Quarterly O&M Status Reports No. 1 through No. 36 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

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 subslab vacuum monitoring (15 September 2016, 21 October 2016, and 16 November 2016) at 11 monitoring locations, as illustrated on the As-Built Subslab Monitoring and Sampling Plan provided as Figure 3.
- Quarterly sampling (21 October 2016) of eight indoor air locations, one ambient outdoor air location, and six subslab points.
- Monthly inspections and monitoring (air velocity and vacuum) and annual sampling of 3 rooftop fans to verify proper operation and effluent concentrations.
- Continuous electronic monitoring (with automatic alarm notification via audible signal and phone notification) at each of three SSD system extraction fans to ensure continuous operation.

Vacuum measurements taken at each interior and perimeter subslab monitoring/sampling locations ranged from -0.01 to -0.08 in. of water column. Negative measurements confirm that a negative pressure exists beneath the building slab as a result of the continuous fan operation.

There were no alarms from the control panel for the indoor methane monitoring system during this monitoring period. EA tested the cell phone autodialer unit by triggering an alarm condition during the September, October, and November monitoring events. The autodialer functioned as intended and notified emergency contacts of the alarm condition. The annual cell phone contract is scheduled to be renewed on or before its end date of 15 December 2016.

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

2.2 INDOOR METHANE MONITORING SYSTEM

Indoor methane concentrations were continuously 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. In addition, the methane monitoring system was inspected and filters were replaced on 21 October 2016. The next filter replacement is scheduled for January 2017.

2.3 AMBIENT OUTDOOR AND INDOOR AIR SAMPLING

One ambient outdoor air sample and the eight indoor air samples were collected at the site at RIDEM-approved sampling locations during the quarterly sampling event on 21 October 2016.

The samples collected in October 2016 were submitted to Con-Test Analytical Laboratory (Con-Test) for analysis of volatile organic compounds (VOCs) via Method TO-15 Selective Ion Monitoring (SIM). All samples were collected within individually certified summa canisters. The typical summa canister certification process occurs in batches. However, individual certification was requested by RIDEM for this and future sampling events after residual contamination affected the 1 August 2014 sampling event results. Each summa canister used during this monitoring period was individually analyzed to certify that all compounds were below the 0.2 parts per billion (ppb) limit before the sampling event. Sample results were compared to the State of Connecticut's Draft Proposed Indoor Residential Targeted Air Concentrations (CT RTACs) and the RIDEM approved threshold level in accordance with the Amended OA.

The laboratory method detection limits (MDLs) for several VOCs reported via TO-15 analysis were greater than the respective CT RTACs/RIDEM threshold levels even though analyzed via the SIM procedure. Refer to Appendix F for an MDL verification letter from Con-Test verifying that where MDLs are not able to be met, the detection limit was the lowest currently achievable. The elevated MDLs occurred primarily with analytes that are not the constituents of concern (COCs) for the project. Additionally, many of these analytes have never been detected at concentrations greater than the applicable standards. Therefore, the slightly elevated MDLs for some analytes were not significant and do not disqualify the dataset.

Sampling locations for the indoor and sub-slab air samples are illustrated on Figure 3. The ambient outdoor air sample was collected upwind (northeast) of the school. A data summary table is provided as Appendix B and copies of the laboratory data reports associated with these sampling events are provided in Appendix E.

Four analytes were identified in indoor and ambient outdoor air above the CT RTACs and RIDEM threshold levels during the October 2016 quarterly sampling event.

Benzene was detected in the Ambient Outdoor Air sample at a concentration of $3.3 \mu\text{g}/\text{m}^3$, which is at the RIDEM amended threshold value of $3.3 \mu\text{g}/\text{m}^3$. Benzene was detected well below the RIDEM threshold value in all indoor air samples, at concentrations ranging between 0.29 and $0.93 \mu\text{g}/\text{m}^3$. Benzene has never been detected in indoor air above the RIDEM threshold value. Benzene has previously been detected above the $3.3 \mu\text{g}/\text{m}^3$ in outdoor ambient air samples. The last detection of benzene above the RIDEM threshold value in ambient outdoor air was in 2011. During the October 2016 sampling event, outdoor air was noted as being stagnant. The detected benzene in the ambient outdoor air sample likely came from an outdoor source. Benzene is not likely to cause soil vapor intrusion indoors since all indoor air samples had benzene concentrations below the RIDEM threshold value.

Carbon tetrachloride was detected in the Gymnasium at a concentration of $0.54 \mu\text{g}/\text{m}^3$, which exceeded the RIDEM amended threshold value of $0.5 \mu\text{g}/\text{m}^3$. Carbon tetrachloride is a documented background ambient compound in the area and the compound has consistently been detected in ambient outdoor air and inside the school during many of the sampling events completed at the Site at concentrations ranging between 0.19 and $0.77 \mu\text{g}/\text{m}^3$. The detections during the October 2016 sampling event are consistent with historical detections and not attributable to soil vapor intrusion.

Chloroform was detected in the Kitchen Storage Room at a concentration of $1.5 \mu\text{g}/\text{m}^3$ and in the Cafeteria at a concentration of $0.58 \mu\text{g}/\text{m}^3$, which exceed the RIDEM amended threshold value of $0.5 \mu\text{g}/\text{m}^3$. Chloroform is a common ingredient in, or can form as a byproduct of, cleaning products and some insecticides as well as a common laboratory contaminant. Insecticides and cleaning chemicals have historically been used at the school, though typically during the summer. Chloroform was last detected over the threshold value during the use of floor stripping chemicals in the summers of 2014 and 2015, in the fall of 2015, and the spring and summer of 2016. Detections of chloroform are not believed to be indicative of a soil-vapor intrusion pathway due to the low concentration of chloroform in the soil vapor (maximum of $0.16 \mu\text{g}/\text{m}^3$) and the dilution that occurs when soil vapor migrates to indoor air.

Methylene chloride was detected in Room 152 at a concentration of $4.6 \mu\text{g}/\text{m}^3$, above the RIDEM amended threshold value of $3.0 \mu\text{g}/\text{m}^3$. The analyte was also detected in all other indoor air sampling locations, except Room 145, at concentrations between 0.72 and $1.4 \mu\text{g}/\text{m}^3$. These concentrations have been reported to RIDEM. Methylene chloride is a common laboratory contaminant and byproduct of many cleaning products, including paint strippers. The presence of this contaminant has been previously attributed to use of cleaning products at the school; however, the RIDEM-duplicated samples collected during the October 2014 sampling event had significantly lower concentrations of methylene chloride than those analyzed at Con-Test Laboratory. Methylene chloride is not a contaminant of concern at the site and was detected at an identical magnitude in the sub-slab samples, indicating that the origin is not from soil vapor.

2.4 SUBSLAB VAPOR SAMPLING AND EVALUATION OF POTENTIAL VOC REBOUND EFFECT

A total of 11 RIDEM-approved subslab sampling locations are installed at the Site. Four exterior subslab vapor samples and two interior subslab vapor samples were collected on 21 October 2016 in accordance with the Amended OA rotating sampling schedule and analyzed for VOCs via US EPA Method TO-15 SIM. The subslab analytical results are presented in Appendix C and copies of the laboratory data reports associated with these sampling events are included in Appendix E.

The subslab data has been evaluated for potential rebound. No evidence of increasing VOCs (i.e., VOC rebound) beneath the school has been observed. Slight fluctuations in concentrations were noted during this reporting period. These variations were within historical ranges and do not constitute an increasing trend.

2.5 SUMMARY OF ROOFTOP VOC EMISSIONS

The Amended OA requires that rooftop VOC sampling be completed on an annual basis. Rooftop sampling was conducted on 20 July 2016. The results of rooftop fan sampling event are summarized in Appendix D. No exceedances of the RIDEM Air Pollution Control Permit Applicability Thresholds for hourly, daily, or yearly emissions were observed. The next annual rooftop effluent VOC sampling event is scheduled for July 2017.

Previous rooftop effluent sampling rounds conducted in March 2007 (immediately after SSD system startup), June 2007, June 2008, September 2009, July 2010, July 2011, July 2012, July 2013, October 2014, and July 2015 indicated compliance with all Air Pollution Control Permit Applicability Thresholds. Tabulation of the data and the rooftop sampling analytical report is provided as Appendix D. 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. RIDEM conducted roofline and downwind outdoor air sampling during the 22 October 2014 monitoring event 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. This data indicated that exhausted vapors from the rooftop fans were well dispersed and are not causing significant impacts downwind or inside the building. More data may be sought to evaluate this issue during varying weather conditions.

2.6 CONCLUSIONS

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

- The consistent negative pressure maintained below the floor slab indicates that soil vapor intrusion into Alvarez High School is not occurring.
- The continuous operation of the SSD System and confirmation of continuous sub-slab vacuum beneath the school illustrates ongoing, effective operation of the SSD System.
- The subslab 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. Slight fluctuations in concentrations were noted during this reporting period; these variations do not constitute an increasing trend.
- Four analytes, benzene, carbon tetrachloride, chloroform, and methylene chloride, were detected at concentrations exceeding the CT RTAC/RIDEM threshold values at various locations (Room 152, Gymnasium, Kitchen Storage Room, Cafeteria, and Ambient Outdoor

Air). None of these exceedances were determined to be caused by soil vapor intrusion into the building and are likely from indoor, outdoor, or laboratory sources.

- The use of certified clean summa canisters, as requested by RIDEM, yielded high confidence in the samples collected on 20 July 2016. EA will continue to use certified clean canisters in the upcoming sampling events.

3. 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 December 2016 to February 2017:

- Continuous monitoring of the operational status of the three rooftop fans;
- Monthly site inspections and monitoring using a photoionization detector with part-per-billion sensitivity;
- Collection of air samples from eight indoor locations, one ambient location, and six subslab monitoring points in January 2017.

These activities will be summarized in the next status report (Quarterly Status Report No. 38), expected to be submitted by the end of March 2017.

FIGURES

This page intentionally left blank

APPENDIX A

O&M Field Forms

This page intentionally left blank

APPENDIX B

Indoor and Ambient Outdoor Air Analytical Summary

This page intentionally left blank

APPENDIX C

Subslab Vapor Analytical Summary

This page intentionally left blank

APPENDIX D

Rooftop Emission Analytical Summary

This page intentionally left blank

APPENDIX E

Laboratory Analytical Reports

This page intentionally left blank

APPENDIX F

Laboratory MRL Correspondence

This page intentionally left blank