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8 May 2007

Mr. Joseph T. Martella II, Senior Engineer
RIDEM - Office of Waste Management
Site Remediation Program
235 Promenade Street
Providence, Rhode Island 02908

RE: 26 April 2007 Air Sampling Event/Order of Approval Compliance Follow-Up Letter
Adelaide Avenue School, 333 Adelaide Avenue, Providence, Rhode Island
Case No. 2005-029
EA Project No. 61965.01

Dear Mr. Martella:

On behalf of the Providence Department of Public Property (City), EA Engineering, Science, and Technology, Inc. (EA) is providing this letter in accordance with Item 6(e)(vi) of the Department's Order of Approval (OA) issued in June 2006 and amended in February 2007 (Amended Order) for the referenced Adelaide Avenue School site (the Site).

As communicated via telephone message to the Rhode Island Department of Environmental Management (the Department) at approximately 6:10 pm on Monday, 7 May 2007, several volatile organic compounds (VOCs) were identified in indoor air at the site in concentrations that exceed the Indoor Air Action Levels for this project during the sampling event completed on 26 April 2007. We have attached tables summarizing the pertinent data, figures illustrating the sampling locations, and copies of the laboratory analytical reports for your reference. We have also provided the weekly field monitoring data collected since the schedule in the Amended Order was implemented and an overall evaluation of all three rounds of data collected to date to illustrate the demonstrated effectiveness of the sub-slab depressurization system operating at the site.

Regarding the Indoor Air Action Levels established for this project, we would like to reiterate that these levels are based upon the Connecticut Department of Environmental Protection's (CTDEP) Draft Revisions to the Residential Targeted Air Concentrations (RTACs) dated March 2003 and proposed to be included in the CTDEP Remediation Standard Regulations. The Draft RTACs being used as Indoor Air Action Levels for this project take into account exposure by children and are based upon an ultra conservative 24-hour per day exposure scenario for 350 days per year for a period of 30 years. In reality, students that will attend the school will be present for only approximately 6 hours per day for 200 days per year for no more than 4 years for the majority of students. Therefore, these Action Levels for indoor air are not intended to be treated as acute exposure criteria when compared to indoor air concentrations for any residential scenario, and especially not intended to be treated as such at the Adelaide Avenue School where the period of exposure will be significantly less than that used to establish the RTACs.

1. SUMMARY OF 26 APRIL 2007 SAMPLING ROUND

In accordance with the requirements of the Amended Order, EA collected eight sub-slab vapor samples, eight indoor air samples, and one ambient air sample at the Site on 26 April 2007, and submitted the samples to Alpha Woods Hole Labs (Westborough, MA) for analysis of volatile organic compounds (VOCs) via Method TO-15. This sampling completed on 26 April 2007 was the third sampling round completed at the Site in accordance with the schedule mandated by the Amended Order. Based upon our preliminary review of the data, we offer the following observations:

1.1 Sub-Slab Region

The eight sub-slab vapor samples were collected from a series of monitoring points located at various locations within the gravel layer beneath the concrete slab of the school. These monitoring points are labeled MP-1 through MP-8 on the figure provided in Attachment A. A summary table and a copy of the laboratory analytical report for the sub-slab data is also provided in Attachment A.

- The data collected at all sub-slab sampling locations over the first three sampling events at the Site since March 2007 has clearly shown impact from the two VOC compounds (Acetone and 2-Butanone) that are primary components of PVC primer and solvent cement which were used to connect sections of the PVC piping that make up the monitoring points. With the exception of these two compounds and Methylene Chloride in one sample (MP-5) on 15 March 2007, and in one sample (MP-8) on 26 April 2007, all VOC compounds analyzed during the three sampling events were reported by the laboratory as "Not Detected," although with elevated laboratory reporting limits necessitated by the high concentrations of the Acetone and 2-Butanone. However, the average concentration of Acetone and 2-Butanone in every sub-slab sampling location has decreased over time by an average of 99.4%. Correspondingly, the reporting limits of all other VOCs being analyzed have been dramatically reduced over time to the point where over 50% of the VOC compounds are now being reported by the lab as "Not Detected" with reporting limits that are lower than the conservative Action Levels established for indoor air at the Site.

- With respect to compliance with OA Provision 6(e)(v), indoor air samples from locations that correspond to the sub-slab sampling locations (i.e., are located above the sub-slab locations) were collected at the same time as the sub-slab samples on 26 April 2007. Therefore, compliance with OA Provision 6(e)(v) has been achieved.

1.2 Ambient Outdoor Air

The ambient outdoor sampling location is shown on the Figure provided in Attachment B. A copy of the laboratory analytical report for the ambient data is also provided in Attachment B.

- Carbon Tetrachloride was detected in ambient outdoor air at a concentration that exceeds the Indoor Air Action Level during this sampling event. Carbon Tetrachloride was also detected in ambient air at similar concentrations during both March 2007 sampling events. For comparative purposes, all the Carbon Tetrachloride concentrations in ambient air reported for each of the three sampling events (0.57 to 0.71 ug/m^3) are less than the promulgated State of Connecticut Residential Target Air Concentration for this compound (1 ug/m^3).

Furthermore, on each sampling occasion, the prevailing wind direction was variable at speeds ranging from between 5 and 17 miles per hour (mph), suggesting that the concentrations are widespread and not localized to the Adelaide Avenue area. Therefore, these similar concentrations of Carbon Tetrachloride in ambient air collected during varying climatological conditions suggest that Carbon Tetrachloride is a background chemical in outdoor air for both the Site and the surrounding vicinity.

- Methylene Chloride was detected in ambient outdoor air at a concentration that exceeds the Indoor Air Action Level but was not detected in any of the indoor air samples collected within the school during this sampling event. For comparative purposes, the Methylene Chloride concentration reported for this sampling event (5.1 ug/m^3) is less than the promulgated State of Connecticut Residential Target Air Concentration for this compound (45 ug/m^3) and the New York State Department of Health Air Guideline for this compound (60 ug/m^3).

1.3 Indoor Air

The eight indoor air samples were collected from rooms located throughout the school in accordance with the Amended Order. These indoor sampling locations are shown on the figure provided in Attachment C. A summary table and a copy of the laboratory analytical report for the indoor air data is also provided in Attachment C.

- The 26 April 2007 samples were collected while some VOC-emitting construction activities were still ongoing within the building. As such, in general, several VOCs related to construction activities and/or building materials (1,2-Dichloroethane, 1,3,5-Trimethylbenzene, and 1,2,4-Trimethylbenzene) were detected in one or more sampling locations within the school building. In general, the majority of these indoor air concentrations reported for the 26 April 2007 samples are significantly less than the indoor air concentrations measured during sampling events completed in March 2007, predictably reflecting the overall decrease in construction activity in April compared to March and supporting the position that the presence of these compounds in indoor air is not indicative of soil vapor intrusion.

- One compound detected in indoor air at concentrations that slightly exceed the applicable Indoor Air Action Level, Carbon Tetrachloride, was also detected at approximately the same concentration in outdoor ambient air in the vicinity of the school building (refer to Section 1.2). Therefore, Carbon Tetrachloride within the indoor air is considered to be a background concentration at the site and not attributable to soil vapor intrusion. For comparative purposes, all the Carbon Tetrachloride concentrations reported for this sampling event are less than the promulgated State of Connecticut Residential Target Air Concentration for this compound (1 ug/m^3).

- Neither of the two compounds detected previously in indoor air and known to be by-products of water chlorination processes (Chloroform and Bromodichloromethane), were detected in any of the indoor air samples at concentrations that exceed the applicable Indoor Air Action Level during this sampling round. The fact that these compounds were detected in the school during the time immediately following chlorination of the school's water systems and are no longer present within the school supports the position that the presence of these compounds was not indicative of soil vapor intrusion.

- Several other VOCs, previously detected at concentrations exceeding applicable Indoor Action Levels within indoor air at the Site and known to be related to construction activities and/or found in cigarette smoke (Acetone, Methylene Chloride, 1,2-Dichloropropane, 1,1,2,2-Tetrachloroethane, Trichloroethene, Styrene, and total Xylenes), were not detected above the applicable Indoor Air Action Levels during this sampling event. The absence of these compounds is reflective of the overall decrease in construction and smoking activity in April compared to March and supports the position that soil vapor intrusion is not occurring at the Site.

3.0 EVALUATION OF MARCH – APRIL 2007 MONITORING AND SAMPLING

EA is providing the following analysis of field monitoring and sampling completed during March and April to provide a more informative and accurate analysis of the entire data set collected over the first two months of monitoring activities and sample collection at the Site.

- With respect to the Sub-Slab Depressurization (SSD) System, weekly monitoring has demonstrated that: 1) there have been no interruptions in system operation; 2) the negative pressure field beneath the slab established by the SSD System has been continuously maintained, thereby effectively eliminating the potential vapor intrusion pathway; 3) the total VOC concentrations monitored in sub-slab air with a photoionization detector (PID) have decreased significantly over time to a point where only one sub-slab monitoring location indicates a VOC concentration greater than 0.14 parts per million (ppm) versus previous concentrations within all but one sub-slab location of over 200 ppm; and 4) the total VOC emissions monitored with a PID have decreased significantly over time in the SSD System effluent from rooftop fans such that the average concentration of total VOCs from all three fans is 1.3 ppm versus a maximum average concentration of approximately 60 ppm. Data sheets summarizing the March through April field monitoring events are provided in Attachment D.

- At no time since the SSD System was activated has Acetone or 2-Butanone been identified in any indoor air samples at concentrations exceeding the applicable Indoor Air Action Levels. Considering the extremely high concentrations of Acetone and 2-Butanone initially present within the sub-slab region (up to 19,000,000 ug/m^3 in March 2007) due to construction related activities (PVC glue) and the residual concentrations identified during the April sampling round (up to 93,000 ug/m^3), the absence of these compounds in indoor air is clearly indicative of successful and effective SSD System operation and the lack of soil vapor intrusion at the site.

- As previously stated, although all sub-slab VOC concentrations (with the exceptions noted in Section 1.1) were reported by the laboratory as "Not Detected," the laboratory reporting limits for some of the VOCs exceed the Action Levels applicable to indoor air due to the residual presence of compounds related to PVC cement within the monitoring points. However, even if the conservative assumption is made that the most recent laboratory reporting limits for these compounds are actual VOC concentrations under the slab (approximately between 20 and 50 ug/m^3), the fact that all of these VOCs (with the exception of those construction-related or background VOCs discussed in Section 1.3) are not present

in the school at concentrations exceeding the Action Levels is clearly indicative of successful and effective SSD System operation and the lack of soil vapor intrusion at the site.

4. CONCLUSIONS

In conclusion, we continue to be encouraged by the results of the sampling and monitoring efforts completed thus far at the site, and no SSD System modifications or other actions to address current site conditions are warranted or proposed at this time.

We trust that this correspondence satisfies OA Provision 6(e)(vi). However, if you have any questions or require additional information, please do not hesitate to contact me at 401-736-3440, Ext. 216.

Sincerely,

EA ENGINEERING, SCIENCE,
AND TECHNOLOGY, INC.

Peter M. Grivers, P.E., LSP
Project Manager

Attachments

cc: J. Simmons, City of Providence
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Former Gorham Site, Parcel B – Knight Memorial Library Repository