

October 30, 2003

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Mr. Jeffrey Crawford  
Rhode Island Department of Environmental Management  
Office of Waste Management  
235 Promenade Street  
Providence, RI 02908-5767

Subject: Quarterly Monitoring for Springfield Street School Complex, 50 Springfield Street, Providence, RI – July 2003 Monitoring Round

Dear Jeff:

Quarterly monitoring was conducted in July, 2003 at the above referenced site. The monitoring was performed in accordance with the *Long-Term Operation and Maintenance Plan and Site Contingency Plan (O&M Plan)* contained in the *Remedial Action Work Plan* prepared by ATC dated April 2, 1999, revised May 3, 1999 and May 9, 1999. The *Remedial Action Work Plan (RAWP)* was approved by the Rhode Island Department of Environmental Management (RIDEM) in a letter dated June 4, 1999.

Results of monitoring are provided in the following sections and in the attachments.

## SOIL COVER MONITORING

LFR conducted a visual survey of the site for evidence of significant soil cover erosion, or for any areas where the orange snow fencing indicator barrier was visible. We did not observe any areas where the orange indicator barrier was visible during the July monitoring. However, we did observe some areas where settling and /or erosion due to heavy winter and spring rains had caused soil erosion or sinkholes. These areas are described below and are shown on the attached site plan:

- In the paved section of a courtyard on the northern end of the Middle School, the pavement has settled and broken around the catch basin in the middle of the area, and underlying soil is exposed.
- In the same courtyard area, some settling has occurred along the eastern building wall.
- On the south side of the Middle School, adjacent to the HVAC unit and a transformer, settling has occurred around the catch basin and in this general vicinity. Several holes and a depressed area were observed.

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- Along the western wall of the middle school adjacent to the HVAC unit and transformer, several deep holes were observed along the building foundation.
- On the southern side of the paved driveway around the Middle School, there is a small area where it appears that a plow scraped up some dirt along the edge of the driveway.

**SUB-SLAB VENTILATION SYSTEM**

The sub-slab ventilation system was inspected by LFR during the quarterly monitoring on July 16, 2003. Influent and effluent air from the two blowers at the elementary school and the two blowers at the middle school were sampled. Samples of influent and effluent gas were collected at each location for screening for methane, carbon dioxide, carbon monoxide, hydrogen sulfide, and volatile organic compounds (VOC). Results are provided in Attachment 1. Methane was not detected in any of the system samples collected.

The sub-slab ventilation system operated without interruptions or problems during the period covered by this monitoring report.

**INDOOR AIR MONITORING**

Indoor air monitoring was conducted on July 16, 2003 using a Landtec GA-90 landfill gas monitor and an hNu photoionization detector. A Drager MiniWarn 4 gas meter was also used at each location and the results are recorded in the field notes. Results of monitoring are provided in the field notes in Attachment 1. No parameters were detected at concentrations above the action levels specified in the Remedial Action Work Plan during this round of monitoring.

Diamond Calibration performed regular calibration of the methane monitoring system at both schools during the quarter ending in June 2003. The monitors were functioning properly at the time of the quarterly monitoring.

**GROUNDWATER MONITORING**

Five groundwater monitoring wells were sampled by LFR on July 17, 2003. Prior to sampling, the depth to water was gauged, and a volume of water equivalent to approximately three well volumes was removed from the well. Temperature, specific conductance, dissolved oxygen, and pH were measured in the field prior to sampling. Depth to groundwater ranged between 11.79 to 17.84 feet below the ground surface. Groundwater sampling logs are provided as Attachment 2.

Laboratory certificates of analysis are provided in Attachment 3. Samples were analyzed for VOC by ESS laboratory via EPA method 8260. Two compounds were detected by the

laboratory analysis of groundwater samples. Trichloroethene was detected in ATC-1 at 1.27  $\mu\text{g/L}$ , which is well below the GB Groundwater Objective of 540  $\mu\text{g/L}$  for this compound. Methyl tertiary-butyl ether (MTBE) was detected in ATC-4 at a concentration of 1.19  $\mu\text{g/L}$ . The GB Groundwater Objective for this compound is 5,000  $\mu\text{g/L}$ .

## SOIL GAS MONITORING

Soil gas monitoring was conducted at 29 locations on July 14, 15, and 17, 2003. Sampling was conducted by placing an air sampling gripper cap on each well and attaching a piece of tubing. A volume of air equivalent to approximately 3 well volumes was removed from each well using an SKC Airchek Sampling pump. Soil gas was then screened using a Landtec GA-90 Gas Analyzer and an Hnu Photoionization Detector. Air samples were collected in Tedlar bags using the SKC airchek Pump from wells WB-3 and MPL-6. The Tedlar bags were submitted to Con-test Analytical Laboratory for analysis for VOC via EPA method TO-14.

### *Soil Gas Field Monitoring Results*

Soil gas samples were screened for methane, carbon monoxide, hydrogen sulfide, carbon dioxide, oxygen, and total VOCs. Soil gas survey results are provided in Table 1.

Methane was not detected in any of the samples during monitoring.

Carbon dioxide concentrations were generally lower than the previous monitoring event, but some locations exceed the action limit. Carbon dioxide concentrations ranged from 0 to 8.9% during this monitoring event.

Concentrations of carbon monoxide were detected in 29 wells, but none of the concentrations exceeded the action level during this round of monitoring.

Hydrogen sulfide was detected in 24 wells during this round of monitoring, but none of the concentrations exceeded the action level.

### *Soil Gas Laboratory Results*

In accordance with the O&M Plan, two soil gas samples were collected in Tedlar bags and submitted to Con-Test Analytical Laboratories for analysis by method TO-14. Results of analysis are summarized in Table 3, and the laboratory report is provided in Attachment 4. The results of analysis did not reveal any unusual contaminants.

## COMPARISON OF RESULTS FROM DIRECT READ METERS

During this round of monitoring, two direct read meters were used to measure concentrations of methane, carbon monoxide, oxygen, and hydrogen sulfide. The instruments used were a Landtec GA-90 Landfill Gas monitor, the instrument used during previous rounds of monitoring, and a Drager MiniWarn four gas meter. The meters were used to provide side by side readings for quality control purposes.

Both meters were calibrated prior to the start of the project using compressed gases with known concentrations of the parameters to be measured. All samples were collected by the methods described in this report. Consistent methodologies were used for all similar sampling points (i.e. all soil gas wells were sampled the same way, all indoor air locations were sampled the same way).

Instrument specifications, as reported by the manufacturer for each parameter are provided in the following table:

|   | Units                          |                    | Range    |                 | Resolution |        |
|---|--------------------------------|--------------------|----------|-----------------|------------|--------|
|   | Landtec                        | Drager             | Landtec  | Drager          | Landtec    | Drager |
| <b>Methane/<br/>Combustible<br/>Gas</b> | % CH <sub>4</sub> by<br>volume | % LEL <sup>1</sup> | 0 – 100% | 0 – 100%<br>LEL | 0.1%       | 1%     |
| <b>Carbon<br/>Monoxide</b>              | ppm <sup>2</sup>               | ppm                | 0 - 1000 | 0 – 2000        | 1 ppm      | 1 ppm  |
| <b>Oxygen</b>                           | % by<br>volume                 | % by<br>volume     | 0 – 25%  | 0 – 25%         | 0.1%       | 0.1%   |
| <b>Hydrogen<br/>Sulfide</b>             | ppm                            | ppm                | 0 - 200  | 0 – 100<br>ppm  | 0.1 ppm    | 1 ppm  |
| <b>Carbon<br/>Dioxide</b>               | % by<br>volume                 | NA                 | 0 – 50%  | NA              | 0.1%       | NA     |

<sup>1</sup> LEL = Lower Explosive Limit

<sup>2</sup> ppm = parts per million

The results of monitoring using the two instruments were compared. Both instruments read zero for methane throughout the monitoring. Oxygen concentration readings for the two

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instruments also agreed well. The relative percent difference (RPD) between the readings given by the two instruments was calculated, and ranged from 1% to 48%. There were two locations with an RPDs of 48%, and all other readings had an RPD of 20% or less. The average RPD for all the soil gas well measurements was 10%, which indicates good agreement for this parameter.

Hydrogen sulfide readings for both instruments were between 0 and 1.2. The Drager MiniWarn has a resolution of 1 ppm for this parameter, compared to a resolution of 0.1 ppm for the Landtec. Therefore the MiniWarn gave 0 warnings for most locations while the Landtec gave readings of less than 1. This indicates that the readings were within the expected range.

The average RPD for the carbon monoxide readings from the soil gas wells for the two instruments was 58%. The average RPD for carbon monoxide in indoor air readings was 38%. Because of the small numbers involved (i.e. all reading were less than less than or equal to 7 ppm) and the resolution of the instruments (1 ppm), the RPDs appear to be within an acceptable range. Because the readings were all in the single digits, a difference of 1 ppm between readings results in an RPD of 29%.

The readings did not indicate any discernable patterns of bias in the readings of one instrument relative to the other (i.e. there was no indication that one instrument was reading consistently high or low relative to the other instrument).

## CONCLUSIONS

The only action item identified based on the quarterly monitoring results is that the areas of settling and erosion of soil at the site need to be filled and/or repaired. Monitoring of soil gas, groundwater and indoor air did not reveal any unusual results or areas of concern.

If you have any questions regarding this letter, please contact me at 738-3887.

Sincerely,

A handwritten signature in black ink, appearing to read "Donna Holden Pallister".

Donna Holden Pallister, P.E.  
Senior Engineer

Thomas L. Daley  
Senior Engineer

## TABLES

**Table 1**  
**Soil Gas Survey Results**  
**Springfield Street School Complex**  
**Providence, RI**  
**July 2003**

| Monitoring Well | Methane % by volume |        | Carbon Dioxide % by volume | Oxygen % by volume |        | Carbon Monoxide PPM |        | Hydrogen Sulfide PPM |        | Organic Vapors PPM |
|-----------------|---------------------|--------|----------------------------|--------------------|--------|---------------------|--------|----------------------|--------|--------------------|
|                 | Landtec             | Drager |                            | Landtec            | Drager | Landtec             | Drager | Landtec              | Drager |                    |
| WB-1            | 0                   | 0      | 2.1                        | 17.1               | 20.9   | 0                   | 4      | 0                    | 0      | 0                  |
| WB-2            | 0                   | 0      | 1.8                        | 18.0               | 20.9   | 2                   | 3      | 0                    | 0      | 0                  |
| WB-3            | 0                   | 0      | 0                          | 20.5               | 20.9   | 3                   | 3      | 0.8                  | 0      | 0                  |
| WB-4            | 0                   | 0      | 0                          | 20.3               | 20.9   | 1                   | 4      | 0.2                  | 0      | 0                  |
| WB-5            | 0                   | 0      | 0                          | 19.8               | 20.9   | 4                   | 4      | 0.2                  | 0      | 0                  |
| WB-6            | 0                   | 0      | 0.5                        | 19.7               | 20.9   | 5                   | 4      | 0.5                  | 0      | 0                  |
| WB-7            | 0                   | 0      | 0                          | 20.4               | 20.9   | 4                   | 5      | 0.2                  | 0      | 0                  |
| WB-8            | 0                   | 0      | 0                          | 20.1               | 20.9   | 5                   | 4      | 0.2                  | 0      | 0                  |
| WB-12           | 0                   | 0      | 2.0                        | 18.2               | 20.9   | 5                   | 3      | 0.5                  | 0      | 0                  |
| WB-13           | 0                   | 0      | 2.5                        | 15.3               | 17.6   | 5                   | 6      | 5                    |        | 0                  |





**Table 1 (continued)**  
**Soil Gas Survey Results**  
**Springfield Street School Complex**  
**Providence, RI**  
**July 2003**

| Monitoring Well                                | Methane % by volume |        | Carbon Dioxide % by volume | Oxygen % by volume |        | Carbon Monoxide PPM |        | Hydrogen Sulfide PPM |        | Organic Vapors PPM |
|--|---------------------|--------|----------------------------|--------------------|--------|---------------------|--------|----------------------|--------|--------------------|
|  | Landtec             | Drager |                            | Landtec            | Drager | Landtec             | Drager | Landtec              | Drager |                    |
| MG5  | 0                   | 0      | 0.5                        | 18.2               | 19.0   | 5                   | 6      | 0.7                  | 0      | 0                  |
| MPL2   | 0                   | 0      | 0                          | 20.1               | 20.9   | 6                   | 5      | 0.7                  | 0      | 0                  |
| MPL3   | 0                   | 0      | 5.2                        | 8.8                | 9.6    | 6                   | 5      | 0.2                  | 0      | 0                  |
| MPL5   | 0                   | 0      | 7.6                        | 7.0                | 7.1    | 3                   | 5      | 0.9                  | 0      | 0                  |
| MPL6   | 0                   | 0      | 6.6                        | 10.4               | 16.9   | 3                   | 6      | 0.4                  | 0      | 0                  |
| MPL7   | 0                   | 0      | 8.9                        | 7.4                | 7.1    | 3                   | 5      | 0.2                  | 0      | 0                  |
| MPL8   | 0                   | 0      | 0                          | 20.0               | 12.3   | 0.5                 | 4      | 0.2                  | 0      | 0                  |
| <b>Remedial Action Work Plan Action Levels</b> | <b>0.5%</b>         |        | <b>1,000 PPM</b>           | <b>NA</b>          |        | <b>9 PPM</b>        |        | <b>10 PPM</b>        |        | <b>5 PPM</b>       |

**Date:** 7/14/03, 7/15/03 and 7/17/03      **Sampled by:** Christina L. Taggart  
**Weather Conditions:** 7/14 – cloudy 75degrees F, 7/15 – sunny 80 degrees F and 7/17 – sunny 81 degrees F  
**Sampling Equipment:** Landtec GA-90, SKC Pump, PID Meter, Drager 4 gas meter

**Table 2**  
**Soil Gas Laboratory Analysis Results**  
**Springfield Street School Complex**  
**July 15, 2003**

| Parameter                         | Results of Analysis in parts per billion by volume (PPBv) |      |
|-----------------------------------|---|------|
|                                   | MPL-6   | WB-3 |
| Ethylbenzene                      | ND  | 0.5  |
| Methylene Chloride                | ND  | 2.0* |
| Toluene                           | ND  | 3.4  |
| Trichlorofluoromethane (Freon 11) | ND  | 2.1  |
| M/p-Xylene                        | ND  | 1.1  |

Table lists only detected compounds. See laboratory report for full list of analytes.

\* Methylene chloride is a common laboratory containamt.