

January 17, 2007

Ms. Sheila Gaston  
Colorado Department of Public Health and Environment  
Hazardous Materials and Waste Management Division  
4300 Cherry Creek Drive South  
Denver, Colorado 80246-1530

RE: Groundwater, Surface Water, and Soil Vapor Monitoring Report  
Post-Closure Monitoring - Fourth Quarter 2006  
Operable Unit 2 (OU-2) Landfill Site  
Former Lowry Air Force Base  
Denver, Colorado

Dear Ms. Gaston:

LT Environmental, Inc. (LTE) has been retained by Lowry Assumption, LLC (LAC) to conduct quarterly groundwater, surface water, and soil vapor sampling events at the above-referenced site (Figure 1). In accordance with the requirements set forth in the Colorado Department of Public Health and Environment (CDPHE)-approved *Phase 2 Corrective Action Plan for the Operable Unit 2 Landfill Closure at Lowry (MACTEC, 2004) (Phase 2 CAP)*, LTE initiated the post-closure monitoring activities for OU-2 on November 13, 2006. Ten monitoring wells (LZ-13, LFPOC07 through LFPOC13, BG-5 and BG-6) were sampled on November 13, 2006. In addition to groundwater sampling, three surface water samples (SW-1, SW-2, and SW-3) were sampled on November 21, 2006. Twenty seven soil vapor points (GP-01 through GP-27) were field screened for the presence of methane on November 21 and 22, 2006 and January 10, 2007; the first two of twelve monthly soil vapor monitoring events. The analytical results from the Fourth quarter 2006 groundwater and surface water sampling and the soil vapor monitoring activities are discussed below.

### **Groundwater Sampling**

Depth to groundwater was measured in each monitoring well prior to purging. All monitoring wells sampled were purged with a peristaltic pump using a low-flow purge method. Measurements of temperature, pH, and electrical conductivity (EC) were collected and each monitoring well was sampled after the three parameters were determined to be stabilized (i.e., readings within +/- 10 percent of the previous reading). Field parameters were measured using a YSI 556<sup>®</sup> Multi-Probe Field Meter (YSI 556<sup>®</sup> Meter). Additional field parameters were measured with a Mini Rae 2000, photoionization detector (PID) to screen for the presence of volatile organic compounds (VOCs) present in the headspace of the well prior to purging. Groundwater was inspected for odor and the presence of phase-separated hydrocarbons (PSH). The field inspection information was recorded on monitoring well development/purging forms as well as in the field logbook. Copies of the monitoring well development/purge forms are included in Attachment 1.

Groundwater samples were collected in laboratory prepared hydrochloric acid (HCl) preserved 40-milliliter (ml) vials, nitric acid preserved 500-ml poly bottles, and sulfuric acid preserved 250-ml amber bottles. Samples were placed on ice and delivered with a completed chain-of-custody (COC)

form to Paragon Analytics Laboratories (Paragon) located in Fort Collins, Colorado. In accordance with the Phase 2 CAP, groundwater samples were submitted for analysis of the following:

- Alkalinity, Carbonates, Bicarbonates by United States Environmental Protection Agency (EPA) Method 310.1;
- Gross Alpha and Gross Beta by EPA Method 9310;
- Ion Chromatography for Chloride, Nitrite, Nitrate and Sulfate by EPA Method 9056;
- Total Organic Carbon (TOC) by Method 9060;
- Total ICP Metals by Method 601; and
- Volatile Organic Compounds (VOCs) by EPA Method 8260B.

Table 1 summarizes VOC analytical results for the groundwater samples collected during the 2006 fourth quarter monitoring event. Total Metal analytical results for groundwater are summarized in Table 2. Table 3 summarizes water quality parameters in groundwater. Gross Alpha and Gross Beta results are summarized in Table 4. Groundwater analytical laboratory reports, laboratory quality assurance/quality control (QA/QC) data, and COC documentation are presented in an electronic format as Attachment 2.

### **Surface Water Sampling**

Surface water samples were collected from three designated locations along Westerly Creek on November 21, 2006. The approximate surface water sample locations are shown on Figure 1. Prior to the collection of surface water samples at each sample location, water parameters including pH, temperature, and EC were measured using a YSI 556<sup>®</sup> Meter and recorded in the field log book. In addition to water parameters, creek conditions including flow direction, estimated flow velocity, turbidity, and water depth were recorded. Every effort was made not to disturb creek sediment during the collection of water samples. In addition, surface water was collected in order of downstream to upstream to avoid cross contamination from any disturbed sediment load. LTE installed three fence posts at each surface water sample location to ensure that all future sampling events are conducted at or near the same locations.

Surface water samples were collected in laboratory prepared HCl preserved 40-ml vials, nitric acid preserved 500-ml poly bottles, and sulfuric acid preserved 250-ml amber bottles. Samples were placed on ice and delivered with a completed COC form to Paragon. In accordance with the Phase 2 CAP, surface water samples were submitted for analysis of the following:

- Alkalinity, Carbonates, Bicarbonates by EPA Method 310.1;
- Gross Alpha and Gross Beta by EPA Method 9310;
- Ion Chromatography for Chloride, Nitrite, Nitrate and Sulfate by EPA Method 9056;
- TOC by Method 9060;
- Total ICP Metals by Method 6010; and

- VOCs by EPA Method 8260B.

Table 1 includes VOC analytical results for the surface water samples collected during the fourth quarter 2006 monitoring event. Total Metals analytical results for surface water samples for this monitoring event are included in Table 2. Table 3 summarizes water quality parameters for surface water samples collected during the fourth quarter 2006 monitoring event. Gross Alpha and Gross Beta analytical results for surface water samples collected during this monitoring event are included Table 4. Surface water analytical laboratory reports, laboratory quality assurance/quality control (QA/QC) data, and COC documentation are presented in an electronic format as Attachment 3.

### **Soil Vapor Point Monitoring**

The first monthly post-closure soil vapor monitoring event was initiated on November 21, 2006. Twenty seven soil vapor points (GP-01 through GP-27) were purged of three liters of gas with an electronic pump prior to collection of the soil vapor sample. The soil vapor point was field screened with a Mine Safety Appliances (MSA) Gasport<sup>®</sup> Gas Tester (Gasport<sup>®</sup>) to assess the presence of methane (CH<sub>4</sub>) and with a Mini Rae 2000, PID to screen for the presence of VOCs.

The MSA Gasport<sup>®</sup> was used to measure methane in each soil vapor point. The MSA Gasport<sup>®</sup> reads up to 100 percent lower explosive limit (five percent by volume of methane) then converts to read percent by volume methane up to 100 percent methane. In the event the MSA Gasport<sup>®</sup> measured methane in a soil vapor point that equaled or exceeded one percent by volume of methane, a Tedlar<sup>®</sup> bag containing the sample would be placed in a cooler, and delivered with a completed COC to Data Chem Analytical Laboratories, Inc. for analysis of methane by EPA Method GC FID. During the November 2006 monitoring event, field screening indicated the possible presence of methane in GP-24. Pending clarification of the soil gas actions levels set forth in the Phase 2 CAP (e-mail correspondence from Paul Weaverling [LAC] to Sheila Gaston [CDPHE], dated December 13, 2006), LTE and LAC conservatively opted to collect a sample from GP-24 and submitted it to the laboratory for analysis. The result of the sample was less than five parts per million by volume of methane (<5 ppmv), which is reported as non-detect, well below the soil gas action level of one percent methane, thus no further action was required.

Due to adverse weather conditions in late December, the second monthly soil vapor sampling event scheduled for December 20<sup>th</sup> could not be conducted despite several efforts to do so. The second monthly soil vapor monitoring was completed on January 10, 2006. There were no detections of methane above soil gas action levels in any of the 27 gas probes based on the field screening.

Laboratory data and field screening measurements for the soil vapor sample collected during the first two monthly monitoring events are presented in Table 5. Soil vapor laboratory analytical data, laboratory QA/QC data, and COC documentation are presented in Attachment 4.

### **Quality Assurance and Quality Control (QA/QC)**

Field quality control (QC) samples consisted of trip blanks and duplicate samples. One trip blank accompanied every shipment of samples to be analyzed for VOCs. A blind duplicate surface water

sample also was submitted for this sampling event and was analyzed for the same parameters as the routine groundwater samples.

The laboratory general practices and analytical QC samples included in the fourth quarter 2006 monitoring event consisted of a method blank and a matrix spike/matrix spike duplicate (MS/MSD) for each sample event. QA/QC data are presented in Attachment 3.

#### Site Update

The second of eight quarterly groundwater and surface water monitoring events is scheduled for February 5 through 9, 2007. Soil vapor monitoring will continue on a monthly schedule with monthly post-closure operation and maintenance activities. The next soil vapor event is scheduled for February 8, 2006. Please contact our office at 303-433-9788 if you have any questions about the data provided or need further information regarding the site.

Sincerely,

LT ENVIRONMENTAL, INC.

Chris Purcell  
Staff Geologist

Tom Murphy, P.G.  
Project Manager

cc: Paul Carroll – AFRPA (2)  
Pat Smith – EPA Region 8  
Alioune Sogue – CCD DEH  
Paul Weaverling - LAC  
John Yerton - LAC (2)

Attachments

**FIGURE AND TABLES**



**TABLE 4**  
**LABORATORY ANALYTICAL RESULTS**  
**GROSS ALPHA AND BETA DETECTED**  
**LOWRY OU2 LANDFILL SITE**  
**FORMER LOWRY AIR FORCE BASE**  
**DENVER, COLORADO**

Sampling Location/ Well ID	Sample Date	Analytical Method	Gross Alpha (pCi/L)	Gross Beta (pCi/L)
<b>Upgradient</b>				
BG-5	11/13/2006	724R9	40.3	26.2
BG-6	11/13/2006	724R9	11.8	5.6
<b>Downgradient</b>				
LFPOC07	11/13/2006	724R9	23.0	9.2
LFPOC08	11/13/2006	724R9	53.6	21.0
LFPOC09	11/13/2006	724R9	35.3	12.0
LFPOC10	11/13/2006	724R9	47.3	14.3
LFPOC11	11/13/2006	724R9	42.1	25.0
LFPOC12	11/13/2006	724R9	13.4	8.4
LFPOC13	11/13/2006	724R9	66.0	40.5
LZ-13	11/13/2006	724R9	17.6	9.0
SW-1	11/21/2006	724R9	7.4	4.3
SW-2	11/21/2006	724R9	15.3	6.2
SW-2 (Dup)	11/21/2006	724R9	11.1	6.7
SW-3	11/21/2006	724R9	16.4	7.8

**Notes:**

pCi/L - pico Curies per Liter

Dup - duplicate sample

**TABLE 5**  
**SOIL VAPOR FIELD AND ANALYTICAL RESULTS**  
**LOWRY OU-2 LANDFILL SITE**  
**FORMER LOWRY AIR FORCE BASE**  
**DENVER, COLORADO**

Vapor Point ID	Date	CH <sub>4</sub> (%)
GP1	11/20/2006	0
	1/10/2007	0
GP2	11/20/2006	0
	1/10/2007	0
GP3	11/20/2006	0
	1/10/2007	0
GP4	11/20/2006	0
	1/10/2007	0
GP5	11/20/2006	0
	1/10/2007	0
GP6	11/20/2006	0
	1/10/2007	0
GP7	11/20/2006	0
	1/10/2007	0
GP8	11/20/2006	0
	1/10/2007	0
GP9	11/20/2006	0
	1/10/2007	0
GP10	11/20/2006	0
	1/10/2007	0
GP11	11/20/2006	0
	1/10/2007	0
GP12	11/20/2006	0
	1/10/2007	0
GP13	11/20/2006	0
	1/10/2007	0
GP14	11/20/2006	0
	1/10/2007	0
GP15	11/20/2006	0
	1/10/2007	0
GP16	11/20/2006	0
	1/10/2007	0
GP17	11/20/2006	0
	1/10/2007	0
GP18	11/20/2006	0
	1/10/2007	0

**TABLE 5**  
**SOIL VAPOR FIELD AND ANALYTICAL RESULTS**  
**LOWRY OU-2 LANDFILL SITE**  
**FORMER LOWRY AIR FORCE BASE**  
**DENVER, COLORADO**

Vapor Point ID	Date	CH <sub>4</sub> (%)
GP19	11/20/2006	0
	1/10/2007	0
GP20	11/21/2006	0
	1/10/2007	0
GP21	11/21/2006	0
	1/10/2007	0.05
GP22	11/21/2006	0
	1/10/2007	0.35
GP23	11/21/2006	0
	1/10/2007	0
GP24	11/21/2006	0.1*
	1/10/2007	0.05
GP25	11/21/2006	0
	1/10/2007	0.1
GP26	11/21/2006	0
	1/10/2007	0
GP27	11/21/2006	0
	1/10/2007	0
<b>Action Level:</b>		<b>1</b>

Notes:

% - percent by volume

CH<sub>4</sub> - methane

\* Laboratory analytical result less than five parts per million by volume (ppmv) or less than 0.0005% CH<sub>4</sub>