



November 19, 2010

Ms. Jaclynne Drummond
NCDENR DWM Solid Waste Section
1646 Mail Service Center
Raleigh, North Carolina 27699-1646

**RE: Landfill Gas Off-Site Investigation
Avery County Closed MSW Landfill
Spruce Pine, North Carolina**

Dear Ms. Drummond:

As you are aware, Richardson Smith Gardner (RSG) presented a plan for a landfill gas (LFG) investigation for properties adjacent to the closed Avery County MSW landfill¹. This investigation was undertaken on October 25-27, 2010 in response to LFG concentration exceedances near the MSW landfill property line in LFG probes P-3 and P-7. In previous correspondence², RSG submitted monitoring data collected in accordance with the Landfill Gas Monitoring Plan³ for the site.

Investigation Area

RSG performed an investigation in the following areas:

- along the Brushy Creek property line of the landfill (on the Northeast property corner near P-4);
- on the Unimin Corporation (Unimin) property to the north across Brushy Creek Road (near P-3);
- on the Unimin property to the south of the landfill (near P-7); and
- on the Avery County Airport Authority property located west of the landfill (near P-7).

The adjacent properties and soil gas survey locations are shown on **Figure 1**.

Investigation Procedures

RSG personnel used a soil gas probe system to perform the preliminary investigation of LFG extent. This system utilizes 1/2-inch diameter metal rods that are driven into the subsurface either by a slide hammer, or by electric hammer drill. In almost all instances, approximately nine (9) feet of probe rod were driven into the subsurface prior to measuring methane concentrations. In one instance (the probe located directly south of P-7), only six (6) feet of

¹ Letter to Jaclynne Drummond, NCDENR dated October 4, 2010 from Richardson Smith Gardner and Assoc.

² Letter to Mr. Bill Wagner, NCDENR dated June 30, 2010 from Richardson Smith Gardner and Assoc.

³ Landfill Gas Monitoring Plan Avery County MSW Landfill, Richardson Smith Gardner and Associates, Inc., January 2010

probe rod were advanced due to the location of surface water at an elevation approximately seven (7) feet below the probe elevation. At the end of the probe there is a retractable tip that allows for LFG testing through a tube that is placed in the probe rod. A GEM 2000 was utilized to measure methane concentrations. No permanent monitoring probes were installed during this investigation.

Results

Brushy Creek Road Property Line

Our investigation of methane concentrations near the property line (on the northeast property corner, near P-4), indicated no measurable concentrations of methane.

Unimin Property North of Brushy Creek Road

The investigation of this portion of the Unimin property consisted of eight (8) soil gas probe locations. Investigation of the property started approximately 100 feet from probe P-3 to the northeast and northwest. Based upon these readings, the investigation moved radially to locations approximately 200 feet from P-3. Based upon these readings probes were radially installed at 400 and 500 feet from P-3 to ascertain a distance where no LFG (as indicated by methane concentrations) was detected. The soil gas probe locations and detected methane concentrations are shown on **Figure 1**. This investigation area consisted of mainly sandy, to extremely weathered, quartz soils.

Unimin Property South of MSW Landfill

One soil gas probe was advanced to the southeast of P-7 in order to evaluate LFG concentrations off-site in this direction. This probe yielded concentrations of 0% methane. It should be noted that discharge from the sedimentation basin located in on the Avery County Airport property (west of the probe location) discharges to the southeast between P-7 and the soil gas probe toward Brushy Creek. This probe was advanced to a depth of six (6) feet in order to prevent the probe from entering groundwater associated with the presence of the surface water discharge. This investigation area consisted of organic topsoil.

Avery County Airport Property West of MSW Landfill

RSG investigated this property with three (3) soil gas probes. The two (2) probes closest to the landfill indicated elevated concentrations of methane. It should be noted that concentrations of methane were higher further from the property line near the hanger buildings. The location to the west of the buildings indicated 0% methane. This investigation area consisted of typical fill type soils. According to Mr. Montague of the Avery County Airport Authority, the airport was constructed using soils obtained from Unimin.

Based upon these readings, RSG personnel performed LFG monitoring around the five (5) buildings in the vicinity of the elevated methane concentrations. Building investigations included readings at each of the four corners, at cracks in the pavement, inside one of the buildings (the only one open at the time), and in a stormwater drain system located between the rows of buildings. These monitoring locations yielded 0% methane results. The soil gas probe locations and methane concentrations are shown on **Figure 1**.

Conclusions

Based upon this investigation, it appears that LFG has migrated onto the Unimin property north of Brushy Creek Road and onto the Avery County Airport property west of the closed MSW landfill.

Recommendations

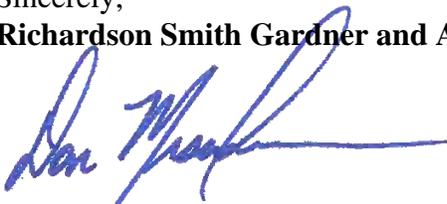
Based upon these findings of LFG on adjacent properties, RSG recommends the following:

1. Installation of three (3) permanent LFG monitoring probes on the Unimin property north of Brushy Creek Road. These probes should be installed in locations shown on **Figure 1**. These probe installations depend upon the outcome of ongoing discussions with Unimin to allow this work to be completed.
2. Installation of two (2) permanent LFG monitoring probes on the Avery County Airport property. The proposed locations of these probes are shown on **Figure 1**.
3. Implementation of monthly monitoring at all eight (8) permanent LFG monitoring probes and any permanent off-site probes installed based on this investigation. Monthly monitoring in and around buildings in the vicinity of the determined LFG plume (on the Avery County airport property) should also be conducted.
4. Preparation of a Remediation Plan to mitigate the migration of LFG off property. This plan may include, but is not limited to, expanding the current LFG Collection and Control System or installing passive relief vent trenching.

If you have any questions, or require additional information, please contact us at your earliest convenience at 919-828-0577 or by e-mail (address below).

Sincerely,

Richardson Smith Gardner and Associates, Inc.



Don Misenheimer
Project Scientist

don@rsgengineers.com ext. 224

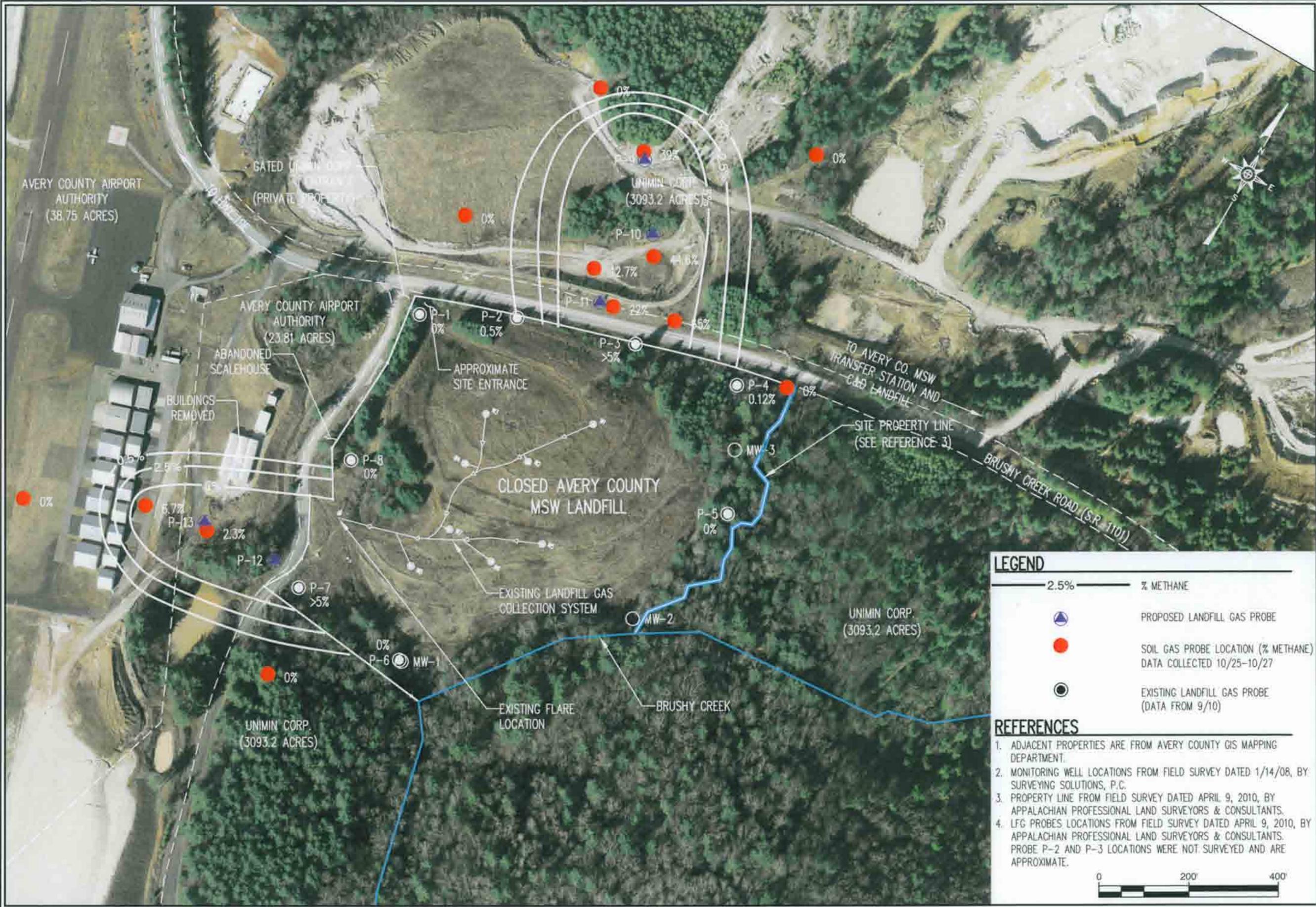


Joan A. Smyth, P.G.
Senior Hydrogeologist

joan@rsgengineers.com ext. 221

Attachments

CC: Buddy Norris – Avery County
Bill Wagner – NCDENR- ARO
Mike Vencill – Unimin Corp.
Stacey Smith, P.E. – RSG
File

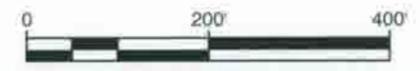


LEGEND

- 2.5% — % METHANE
- ▲ PROPOSED LANDFILL GAS PROBE
- SOIL GAS PROBE LOCATION (% METHANE) DATA COLLECTED 10/25-10/27
- EXISTING LANDFILL GAS PROBE (DATA FROM 9/10)

REFERENCES

1. ADJACENT PROPERTIES ARE FROM AVERY COUNTY GIS MAPPING DEPARTMENT.
2. MONITORING WELL LOCATIONS FROM FIELD SURVEY DATED 1/14/08, BY SURVEYING SOLUTIONS, P.C.
3. PROPERTY LINE FROM FIELD SURVEY DATED APRIL 9, 2010, BY APPALACHIAN PROFESSIONAL LAND SURVEYORS & CONSULTANTS.
4. LFG PROBES LOCATIONS FROM FIELD SURVEY DATED APRIL 9, 2010, BY APPALACHIAN PROFESSIONAL LAND SURVEYORS & CONSULTANTS. PROBE P-2 AND P-3 LOCATIONS WERE NOT SURVEYED AND ARE APPROXIMATE.



RICHARDSON SMITH GARDNER & ASSOCIATES
 14 N. Boylan Ave.
 Raleigh, N.C. 27603
 www.rsgengineers.com
 ph: 919-428-0577
 fax: 919-428-3899

FIGURE NO.	1
SCALE	AS NOTED
CHECKED BY:	J.A.S.
DRAWN BY:	C.T.J.
PROJECT NO.	AVERY 10-2
FILE NAME	AVERY-B0145
DATE:	Nov. 2010

TITLE:
 OFF-SITE SOIL GAS SURVEY
 INVESTIGATION RESULTS OCT. 2010
 AVERY COUNTY CLOSED MSWLF
 SPRUCE PINE, NC