



January 3, 2012

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

**RE: Operations, Monitoring, and Maintenance Report – December 2011  
Avery County Closed MSW Landfill  
Spruce Pine, North Carolina**

Dear Ms. Drummond:

This report provides information concerning the operation and monitoring (O&M) of the Avery County Closed MSW Landfill (Permit No. 06-01) Landfill Gas Collection and Control System (LFGCCS). This report covers the December 2011 monitoring period. Mr. Don Misenheimer with RSG, performed the December site visit on December 12, 2011. Details of this inspection are provided below.

**ACTION LIST**

RSG has identified the following items to be addressed in order for the LFGCCS to operate as designed:

1. **W-1 and W-3:** These wells have been determined to be watered out/totally clogged. **RSG is currently evaluating options to address this condition.**
2. **W-2 and W-4:** These wells have been determined to be partially watered out/partially clogged and are only able have minimal system pressure applied for LFG extraction. **RSG is currently evaluating options for well rehabilitation to address this condition.**
3. **W-5, W-6, W-7 & W-8:** Orifice plate sizes should continue to be evaluated and adjusted as necessary.
4. **Flare:** An extended flare collar should be considered for possible high wind related issues onsite.
5. **Blower:** RSG is continuing to evaluate the blower size for optimal system performance.

**LFG EXTRACTION WELL MONITORING REQUIREMENTS**

As set forth in the *Off-site Landfill Gas Mitigation Plan*<sup>1</sup>, approved, via letter, on February 10,

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<sup>1</sup> *Off-Site Gas Mitigation Plan*. Richardson Smith Gardner and Assoc. January 18, 2011

2011 by NCDENR Division of Waste Management<sup>2</sup>, monthly monitoring of the LFGCCS will include the following:

- CH<sub>4</sub>, O<sub>2</sub>, CO<sub>2</sub>, and Pressure monitoring at each extraction well head;
- CH<sub>4</sub>, O<sub>2</sub>, CO<sub>2</sub>, and Pressure monitoring at the flare station; and
- adjustment of LFGCCS to balance recovery and ensure safe operation of the system.

The County will maintain this LFGCCS for a period of at least 12 months to evaluate the effectiveness of increased LFG recovery from the waste mass in alleviating off-site migration of LFG. During this time, LFG monitoring at the landfill and for off-site properties will be continued on a monthly basis. Reporting of these results will be accordance with the approved LFG Monitoring Plan.

RSG has submitted the revised Landfill Gas Monitoring Plan. As this plan is approved, monitoring requirements may be updated.

### **LFG EXTRACTION WELL MONITORING ACTIVITIES**

RSG performed the flare station and well field monitoring on December 12, 2011. When RSG arrived to the site, there was approximately 42 inches of available vacuum at each of the LFG wells across the well field. The results of this event are summarized below. Recommended actions are made in **bold**. Well field data and flare station data are provided in the **attached Table 1**.

The following actions were taken at the well field and flare station during this period:

#### **Well Field**

- **W-1 and W-3:** These wells have been determined to be watered out/totally clogged. **Outstanding Action Item: RSG is currently evaluating options to address this condition.**
- **W-2 and W-4:** These wells have been determined to be partially watered out/partially clogged and are only able have minimal system pressure applied for LFG extraction. **Outstanding Action Item: RSG is currently evaluating options to address this condition.**
- **Outstanding Action Item: Orifice plate sizes on wells W-5, W-6 &W-8, should continue to be evaluated and adjusted as necessary.**

#### **Flare Station**

- The flare was burning and the temperature data logger at the flare was checked and determined to be operational during this site visit. **An extended flare collar should be considered for possible high wind related issues onsite.**

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<sup>2</sup> *Off-Site Gas Mitigation Plan- Approval.* Letter from Jaclynne Drummond, NCDENR, February 10, 2011

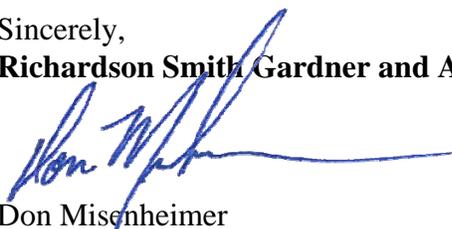
- **Outstanding Action Item: RSG is continuing to evaluate the blower size for optimal system performance.**
- The gas quality at the flare is improving and options to increase gas flow are being evaluated.
- The condensate tank on-site was again observed to have a high liquid level. RSG notified Avery County to have this pumped out. **RSG will continue to monitor this liquid level.**

### **LFG MONITORING WELL (PERIMETER) MONITORING**

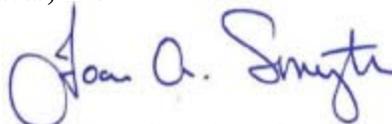
RSG personnel conducted the December 2011 monitoring of the perimeter LFG monitoring wells on December 12, 2011. Results of this monitoring event are included in **Attachment 1**. Monitoring wells P1, P3, P7, and P11 each measured over the 100% LEL or 5% by volume of CH<sub>4</sub>. Monitoring wells P12 and P13 each measured less than 50% LEL or 2.5% by volume of CH<sub>4</sub>, while all other wells had no detectable concentrations of CH<sub>4</sub>. These wells will continue to be monitored and data will be submitted in this reporting format.

The next routine monitoring event is tentatively scheduled for the third week of January 2012. 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, ext. 224  
[don@rsgengineers.com](mailto:don@rsgengineers.com)



Joan A. Smyth, P.G.  
Senior Hydrogeologist ext. 221  
[joan@rsgengineers.com](mailto:joan@rsgengineers.com)

Attachments

CC: Buddy Norris – Avery County  
Deb Aja – NCDENR  
Stacey Smith, P.E. – RSG  
File

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## **Table**

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DATE: December 21, 2011

BY: DMM

**Table 1  
Avery County Closed MSW Landfill  
Landfill Gas Collection and Control System Monitoring  
December 2011**

DataField CS - GEM Mode Data Output

Device ID	Date/Time mm/dd/yyyy	CH4 %	CO2 %	O2 %	Balance %	Adj. Temperature degF	Init. Static Pressure in H2O	Adj. Static Pressure in H2O	Adj. Diff. Pressure in H2O	Init. Flow Scfm	Adj. Flow Scfm	System Pressure in H2O
Avery-W1	12/12/2011 14:08	61	26	2.5	10.5	62	-41.7	-41.7	-0.041	132	<<>>	-42.02
Avery-W2	12/12/2011 14:11	49.1	26.3	1.2	23.4	62	-32.9	-32.9	-0.006	2	<<>>	-41.08
Avery-W3	12/12/2011 14:14	57.5	29.3	1.6	11.6	61	-38.2	-38.2	-0.053	<<>>	<<>>	-41.84
Avery-W4	12/12/2011 14:18	50.8	18.6	5.6	25	70	-4.9	-4.9	-0.155	<<>>	<<>>	-41.47
Avery-W5	12/12/2011 14:22	28.1	25.1	0.6	46.2	60	-19.8	-19.8	1.614	4	4	-42.02
Avery-W6	12/12/2011 14:24	24.4	24.6	0	51	60	-2.7	-2.5	0.169	2	1	-42.14
Avery-W7	12/12/2011 14:27	34.5	29.1	0	36.4	61	0	0	0.672	0	0	-41.74
Avery-W8	12/12/2011 14:30	36.8	29.3	0.1	33.8	60	-1.8	-1.7	0.073	0	0	-42.01
Flare Station	12/12/2011 14:36	38.4	24.4	2.9	34.3	NA	0.5	NA	0.6	19	NA	-42.87

The differential pressure measurement should be positive. A negative differential pressure indicates no gas flow. Negative differential pressure may be the result of dirt or water obstructing the pitot tube perforations. Overpulling by adjacent extraction wells may also result in negative pressure being displayed.

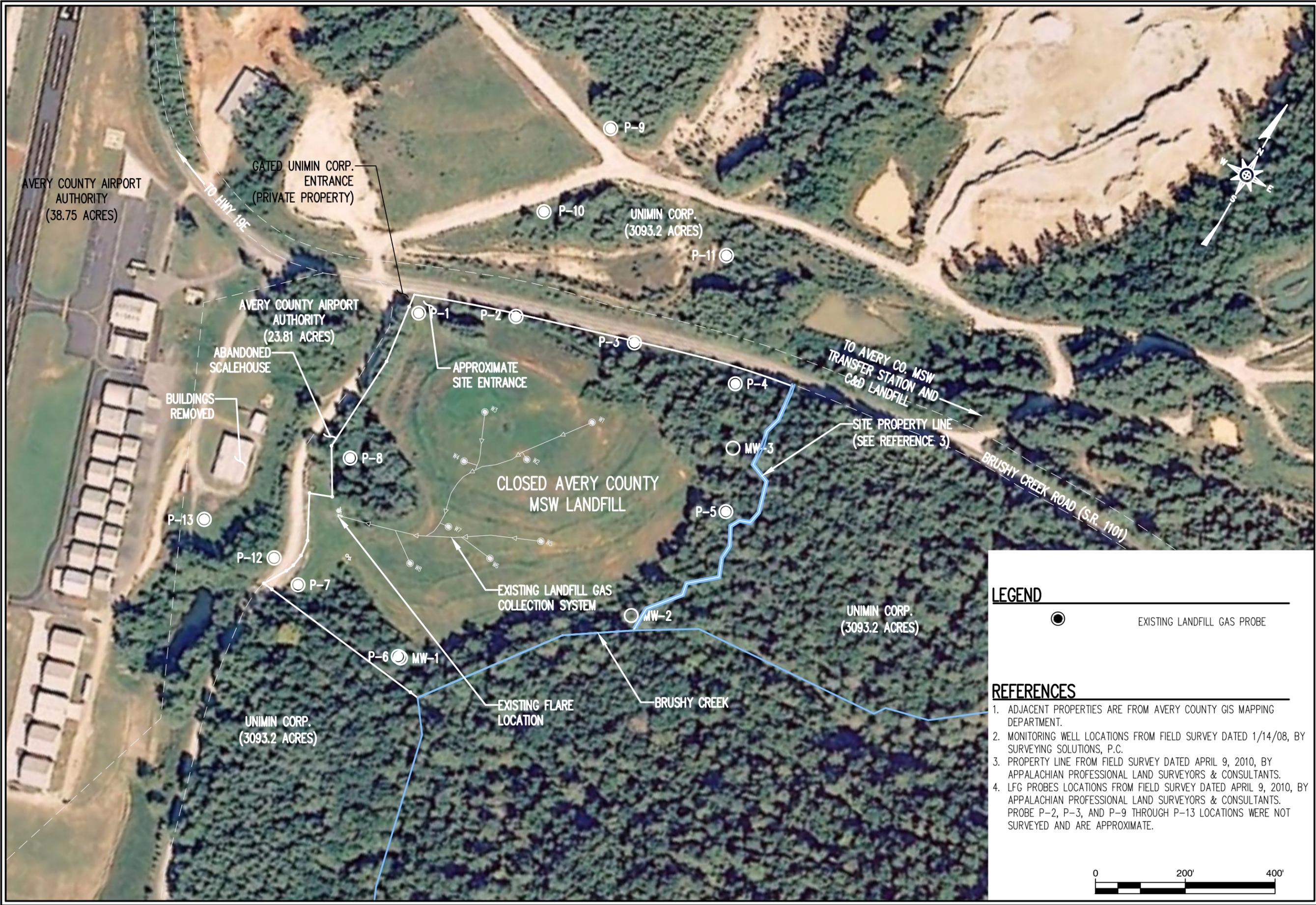
<<>> = measurement out of range of GEM 2000 meter. The reading was likely too low for measurement by the instrument.

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**Figure**

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G:\CAD\Avery County\Avery 10-2\sheets\AVERY-B0172.dwg - 12/2/2011 2:56 PM



**LEGEND**

● EXISTING LANDFILL GAS PROBE

**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, P-3, AND P-9 THROUGH P-13 LOCATIONS WERE NOT SURVEYED AND ARE APPROXIMATE.



**RICHARDSON SMITH GARDNER & ASSOCIATES**  
INC. LIC. NO. C-2828 (Engineering)  
 www.rsgengineers.com

ph: 919-526-0577  
 fax: 919-526-3899

14 N. Boylan Ave.  
 Raleigh, N.C. 27603

FIGURE NO.	1	FILE NAME	AVERY-B0172
SCALE:	AS NOTED	PROJECT NO.	AVERY 11-6
CHECKED BY:	J.A.S.	DATE:	Dec. 2011
DRAWN BY:	C.T.J.		

**TITLE:**  
 LANDFILL GAS  
 MONITORING SYSTEM  
 AVERY COUNTY CLOSED MSWLF  
 SPRUCE PINE, NC

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## **Attachment 1**

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DENR USE ONLY:

Paper Report  Electronic Data - Email CD (data loaded: Yes / No)

Doc/Event #:

NC DENR

# Environmental Monitoring Reporting Form

Division of Waste Management - Solid Waste

Notice: This form and any information attached to it are "Public Records" as defined in NC General Statute 132-1. As such, these documents are available for inspection and examination by any person upon request (NC General Statute 132-6).

### Instructions:

- Prepare one form for each individually monitored unit.
- Please type or print legibly.
- Attach a notification table with values that attain or exceed NC 2L groundwater standards or NC 2B surface water standards. The notification must include a preliminary analysis of the cause and significance of each value. (e.g. naturally occurring, off-site source, pre-existing condition, etc.).
- Attach a notification table of any groundwater or surface water values that equal or exceed the reporting limits.
- Attach a notification table of any methane gas values that attain or exceed explosive gas levels. This includes any structures on or nearby the facility (NCAC 13B .1629 (4)(a)(i)).
- Send the original signed and sealed form, any tables, and Electronic Data Deliverable to: Compliance Unit, NCDENR-DWM, Solid Waste Section, 1646 Mail Service Center, Raleigh, NC 27699-1646.

### Solid Waste Monitoring Data Submittal Information

Name of entity submitting data (laboratory, consultant, facility owner):

Richardson Smith Gardner and Associates, Inc.

Contact for questions about data formatting. Include data preparer's name, telephone number and E-mail address:

Name: Joan A. Smyth, P.G.

Phone: 919-828-0577 x 221

E-mail: joan@rsgengineers.com

Facility name:	Facility Address:	Facility Permit #	NC Landfill Rule: (.0500 or .1600)	Actual sampling dates (e.g., October 20-24, 2006)
Closed Avery Co. MSW Landfill	Brushy Creek Road Spruce Pine, NC	06-01	.0500	12-21-2011

### Environmental Status: (Check all that apply)

- Initial/Background Monitoring  Detection Monitoring  Assessment Monitoring  Corrective Action

### Type of data submitted: (Check all that apply)

- Groundwater monitoring data from monitoring wells  Methane gas monitoring data  
 Groundwater monitoring data from private water supply wells  Corrective action data (specify) \_\_\_\_\_  
 Leachate monitoring data  Other(specify) \_\_\_\_\_  
 Surface water monitoring data

### Notification attached?

- No. No groundwater or surface water standards were exceeded.  
 Yes, a notification of values exceeding a groundwater or surface water standard is attached. It includes a list of groundwater and surface water monitoring points, dates, analytical values, NC 2L groundwater standard, NC 2B surface water standard or NC Solid Waste GWPS and preliminary analysis of the cause and significance of any concentration.  
 Yes, a notification of values exceeding an explosive methane gas limit is attached. It includes the methane monitoring points, dates, sample values and explosive methane gas limits.

### Certification

To the best of my knowledge, the information reported and statements made on this data submittal and attachments are true and correct. Furthermore, I have attached complete notification of any sampling values meeting or exceeding groundwater standards or explosive gas levels, and a preliminary analysis of the cause and significance of concentrations exceeding groundwater standards. I am aware that there are significant penalties for making any false statement, representation, or certification including the possibility of a fine and imprisonment.

Joan A. Smyth, P.G.

Senior Hydrogeologist

919-828-0577 x 221

Facility Representative Name (Print)

Title

(Area Code) Telephone Number

Affix NC Licensed/ Professional Geologist Seal

Signature

Date

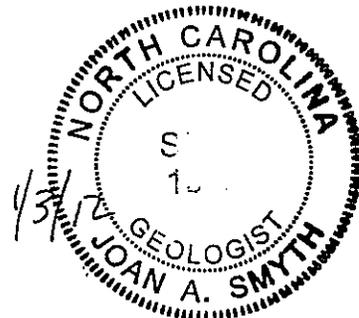
14 N. Boylan Avenue Raleigh, NC 27603

Facility Representative Address

C-0828

NC PE Firm License Number (if applicable effective May 1, 2009)

Revised 6/2009



NC Division of Waste Management - Solid Waste Section

Landfill Gas Monitoring Data Form

Notice: This form and any information attached to it are "Public Records" as defined in NC General Statute 132-1. As such, these documents are available for inspection and examination by any person upon request (NC General Statute 132-6).

Facility Name: Avery County closed MSW LF Permit Number: 06-1

Date of Sampling: 12.12.11 NC Landfill Rule (.0500 or .1600): .0500

Name and Position of Sample Collector: Don Misenheimer (RSG)

Type and Serial Number of Gas Meter: GEM 2000 GM 07002HP Calibration Date of Gas Meter: 9.20.11

Date and Time of Field Calibration: 2:40pm 12.12.11

Type of Field Calibration Gas (15/15 or 35/50): 15/15 Expiration Date of Field Calibration Gas Canister: 04/2013

Pump Rate of Gas Meter: 0.5 l/min

Ambient Air Temperature: 60° Barometric Pressure: 27.45 General Weather Conditions: overcast

Instructions: Under "Location or LFG Well" identify the monitoring wells or describe the location for other tests (e.g., inside buildings). A drawing showing the location of test must be attached. Report methane readings in both % LEL and % methane by volume. A reading in percent methane by volume can be converted to % LEL as follows: % methane by volume = % LEL/20

Location or LFG Well ID	Sample Tube Purge	Time	Time Pumped (s)	Initial %LEL	Stabilized %LEL	%CH4 by Volume	%O2	%CO2	Notes
P1	760s	3:13p	760s	7100	7100	36.8	3.8	24.1	
P2	760s	3:07p	760s	0	0	0	19.2	1.5	
P3	760s	3:04p	760s	7100	7100	44.1	3.3	24.1	
P4	760s	3:01p	760s	0	0	0	18.1	4.0	
P5	760s	2:57p	760s	0	0	0	20.2	0.6	
P6	760s	2:52p	760s	0	0	0	19.4	0.5	
P7	760s	2:47p	760s	7100	7100	36.7	3.6	12.2	
P8	760s	2:42p	760s	0	0	0	19.4	2.0	
P9	760s	3:21p	760s	0	0	0	19.0	1.7	
P10	760s	3:18p	760s	0	0	0	1	18.8	

If your facility has more gas monitoring locations than there is room on this form, please attach additional sheets listing the same information as contained on this form.

Certification

To the best of my knowledge, the information reported and statements made on this data submittal and attachments are true and correct. I am aware that there are significant penalties for making any false statement, representation, or certification including the possibility of a fine and imprisonment.

Don Misenheimer (RSG)  
SIGNATURE

Project Scientist  
TITLE

NC Division of Waste Management - Solid Waste Section

Landfill Gas Monitoring Data Form

Notice: This form and any information attached to it are "Public Records" as defined in NC General Statute 132-1. As such, these documents are available for inspection and examination by any person upon request (NC General Statute 132-6).

Facility Name: \_\_\_\_\_ Permit Number: \_\_\_\_\_

Date of Sampling: \_\_\_\_\_ NC Landfill Rule (.0500 or .1600): \_\_\_\_\_

Name and Position of Sample Collector: (SEE PREVIOUS PAGE)

Type and Serial Number of Gas Meter: \_\_\_\_\_ Calibration Date of Gas Meter: \_\_\_\_\_

Date and Time of Field Calibration: \_\_\_\_\_

Type of Field Calibration Gas (15/15 or 35/50): \_\_\_\_\_ Expiration Date of Field Calibration Gas Canister: \_\_\_\_\_

Pump Rate of Gas Meter: \_\_\_\_\_

Ambient Air Temperature: \_\_\_\_\_ Barometric Pressure: \_\_\_\_\_ General Weather Conditions: \_\_\_\_\_

Instructions: Under "Location or LFG Well" identify the monitoring wells or describe the location for other tests (e.g., inside buildings). A drawing showing the location of test must be attached. Report methane readings in both % LEL and % methane by volume. A reading in percent methane by volume can be converted to % LEL as follows: % methane by volume = % LEL/20

Location or LFG Well ID	Sample Tube Purge	Time	Time Pumped (s)	Initial %LEL	Stabilized %LEL	%CH4 by Volume	%O2	%CO2	Notes
P11	7605	3:25p	7605	>100	7100	39.3	2.4	21.3	
P12	7605	2:44p	7605	4	4	0.2	18.2	6.5	
P13	7605	<del>2:33</del> 3:33	7605	32	32	1.6	10.4	8.3	

If your facility has more gas monitoring locations than there is room on this form, please attach additional sheets listing the same information as contained on this form.

Certification

To the best of my knowledge, the information reported and statements made on this data submittal and attachments are true and correct. I am aware that there are significant penalties for making any false statement, representation, or certification including the possibility of a fine and imprisonment.

Don Mark (RS6)  
SIGNATURE

PROJECT SCIENTIST  
TITLE

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