



May 9, 2012

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

**RE: Operations, Monitoring, and Maintenance Report – April 2012
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 April 2012 monitoring period. Mr. Don Misenheimer with RSG, performed the April site visit on April 17, 2012. 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. Well rehabilitation will likely occur in FY 2012-2013.
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. Well rehabilitation activities will likely occur in FY 2012-2013.
3. **Condensate Liquid Level:** RSG noted during this event that the liquid level of condensate in the collection tank is high. RSG is working with Avery County to dispose of collected leachate.

LFG EXTRACTION WELL MONITORING REQUIREMENTS

As set forth in the *Off-site Landfill Gas Mitigation Plan*¹, approved, via letter, on February 10, 2011 by NCDENR Division of Waste Management², monthly monitoring of the LFGCCS will include the following:

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

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

- CH₄, O₂, CO₂, and Pressure monitoring at each extraction well head;
- CH₄, O₂, CO₂, 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 April 17, 2012. When RSG arrived to the site, there was approximately 40 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 through W-8:** RSG performed CH₄, O₂, CO₂, and pressure monitoring and any required/needed adjustment at each extraction well head (adjustments consisted of slight changes of applied vacuum to the well).
- **Orifice Plates:** RSG will continue to evaluate orifice plate sizes on wells W-5 through W-8 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. Due to a lack of flare “blow out” due to high winds, we do not believe a flare collar is necessary at this time. Should high winds interfere with proper flare operation in the future, a flare collar may be considered.
- The Landfill Gas Collection Blower System has been determined to be appropriately sized for the current operation of the well field. Should conditions change, the blower size may need to be evaluated further.
- 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 the liquid removed from this tank. **RSG will continue to monitor this liquid level and work with the County to dispose of the collected condensate.**

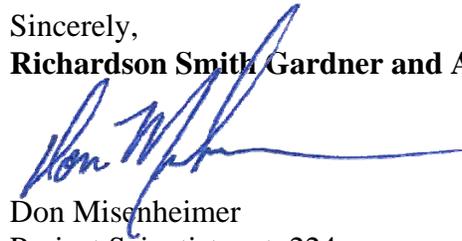
LFG MONITORING WELL (PERIMETER) MONITORING

RSG personnel conducted the April 2012 monitoring of the perimeter LFG monitoring wells on April 17, 2012. Results of this monitoring event are included in **Attachment 1**. Monitoring wells P1, P7, P3 and P11 each measured over the 100% LEL or 5% by volume of CH₄. Monitoring well P13 measured less than 50% LEL or 2.5% by volume of CH₄, while all other wells had no detectable concentrations of CH₄. These wells will continue to be monitored and data will be submitted in this reporting format.

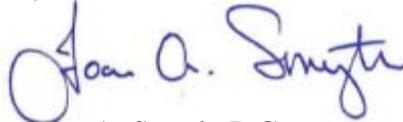
The next routine monitoring event is tentatively scheduled for the third week of May 2012. If you have any questions, or require additional information, please contact us at your earliest convenience at 919-828-0577 or by e-mail (address below).

Sincerely,

Richardson Smith Gardner and Associates, Inc.



Don Misenheimer
Project Scientist, ext. 224
don@rsgengineers.com



Joan A. Smyth, P.G.
Senior Hydrogeologist ext. 221
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: April 20, 2012

BY: DMM

**Table 1
Avery County Closed MSW Landfill
Landfill Gas Collection and Control System Monitoring
April 2012**

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	4/17/2012 11:53	71.1	27.6	1.2	0.1	75	-39.8	-39.9	-0.015	<<>>	<<>>	-39.85
Avery-W2	4/17/2012 11:56	54	26.6	0.1	19.3	73	-39.8	-39.3	-0.008	<<>>	<<>>	-40.36
Avery-W3	4/17/2012 11:59	65	29.9	0.2	4.9	74	-39.8	-39.8	-0.024	<<>>	<<>>	-40.15
Avery-W4	4/17/2012 12:02	24.1	23.9	0.3	51.7	75	-31.4	-31.5	-0.04	<<>>	<<>>	-40.26
Avery-W5	4/17/2012 12:07	27	24.3	0.9	47.8	72	-24.4	-24.5	1.596	3	3	-40.42
Avery-W6	4/17/2012 12:10	8.5	20.5	1.7	69.3	75	-4.3	-4.4	0.188	1	1	-40.3
Avery-W7	4/17/2012 12:13	8.8	18	2.5	70.7	72	-1.5	-1.6	3.867	1	1	-40.29
Avery-W8	4/17/2012 12:16	14.7	23.9	0.6	60.8	75	-11.3	-9.1	0.217	3	1	-40.91
Flare Station	4/17/2012 12:24	33.2	22.9	2.6	41.3	N/A	0.9	N/A	0.437	<<>>	17	41.2

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.

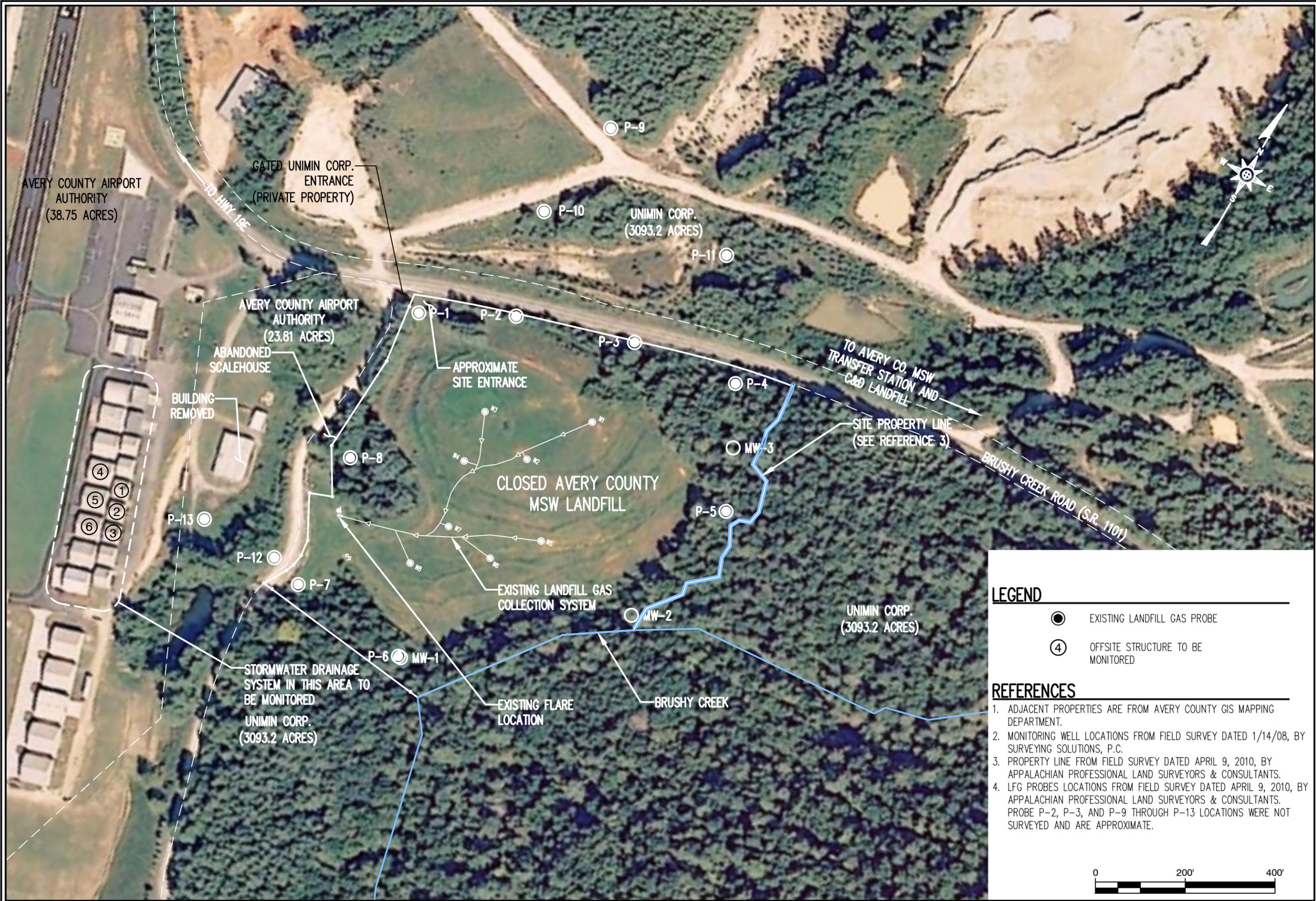
<<>> = measurement out of range of GEM 2000 meter. The reading was likely too low for measurement by the instrument.

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Figure

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G:\CAD\Avery County\Avery 10-2\sheets\AVERY-B0173.dwg - 12/20/2011 4:36 PM



LEGEND

- EXISTING LANDFILL GAS PROBE
- ④ OFFSITE STRUCTURE TO BE MONITORED

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
NC LIC. NO. C-0828 (Engineering)
 www.rsgengineers.com
 14 N. Boylan Ave.
 Raleigh, N.C. 27603
 ph: 919-826-0577
 fax: 919-826-3899

FIGURE NO.	1	FILE NAME	AVERY-B0173
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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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 Landfill Permit Number: 06-01

Date of Sampling: 4.17.12 NC Landfill Rule (.0500 or .1600): .0500

Name and Position of Sample Collector: DON MISENHEIMER (RSG)

Type and Serial Number of Gas Meter: GMO700ZHP (GEM 2000) Calibration Date of Gas Meter: 9.20.11

Date and Time of Field Calibration: 4.17.12 12:26p

Type of Field Calibration Gas (15/15 or 35/50): 15/15 Expiration Date of Field Calibration Gas Canister: 4/13

Pump Rate of Gas Meter: 0.5 l/min

Ambient Air Temperature: 70 Barometric Pressure: 27.27 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	1:56p	760s	7100	7100	58.1	3.3	24.5	
P2	760s	1:52p	760s	0	0	0	20.1	0.2	
P3	760s	1:49p	760s	7100	7100	51.1	2.6	27.8	
P4	760s	1:45p	760s	0	0	0	17.5	4.0	
P5	760s	1:18p	760s	0	0	0	19.9	0.5	
P6	760s	12:39p	760s	0	0	0	17.6	2.4	
P7	760s	12:33p	760s	7100	7100	34.2	4.2	10.4	
P8	760s	12:28p	760s	0	0	0	19.5	1.4	
P9	760s	2:06p	760s	0	0	0	19.3	0.9	
P10	760s	2:04p	760s	0	0	0	16.7	2.4	

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 Misener (RSG)
SIGNATURE

PROJECT SCIENTIST
TITLE

NC Division of Waste Management - Solid Waste Section

Landfill Gas Monitoring Data Form

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Facility Name: Avery County Closed MSW Landfill Permit Number: 06-01

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

Name and Position of Sample Collector: [SEE PAGE 1]

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	2:10p	7605	7100	7100	45.1	3.1	19.9	
P12	7605	2:18p	7605	0	0	0	20.2	0.5	
P12	7605	2:18p	7605	0	0	0	20.2	0.5	
P13	7605	2:22p	7605	38	38	1.9	9.2	6.0	

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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.

SIGNATURE [Handwritten Signature] (RSG)

TITLE PROJECT SCIENTIST

NC Division of Waste Management - Solid Waste Section

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Facility Name: Avery County Closed MSW Landfill Permit Number: 06-01

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

Name and Position of Sample Collector: [SEE PAGE 1]

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

Table with 10 columns: Location or LFG Well ID, Sample Tube Purge, Time, Time Pumped (s), Initial %LEL, Stabilized %LEL, %CH4 by Volume, %O2, %CO2, Notes. Data rows include NE Corner, NW Corner, SE Corner, SW Corner, and a section for additional locations.

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Certification

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Handwritten signature and initials (RSU) over the label SIGNATURE

PROJECT SCIENTIST over the label TITLE

NC Division of Waste Management - Solid Waste Section

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Facility Name: Avery County Closed MSW Landfill Permit Number: 06-01

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

Name and Position of Sample Collector: [SEE PAGE 1]

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
AVERY COUNTY AIRPORT STRUCTURE #2									
NE Corner	7605	2:38p	7605	0	0	0	20.4	0.3	
NW Corner	7605	2:40p	7605	0	0	0	20.4	0.2	
SE Corner	7605	2:42p	7605	0	0	0	20.5	0.2	
SW Corner	7605	2:44p	7605	0	0	0	20.4	0.2	
ADD ANY ADDITIONAL LOCATIONS AT OR NEAR STRUCTURE WITH METHANE PRESENT BELOW OR ON ADDITIONAL SHEETS									

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.

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[Signature]
SIGNATURE

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Facility Name: Avery County Closed MSW Landfill Permit Number: 06-01

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

Name and Position of Sample Collector: [SEE PAGE 1]

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: _____

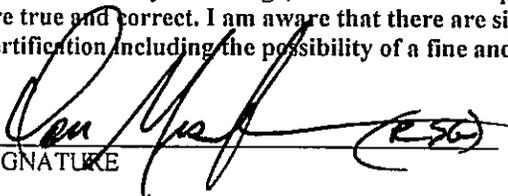
Instructions: Under "Location or LFG Well" identify the monitoring wells or describe the location for other tests (e.g., inside buildings). A drawing showing the location of test must be attached. Report methane readings in both % LEL and % methane by volume. A reading in percent methane by volume can 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
AVERY COUNTY AIRPORT STRUCTURE #3									
NE Corner	760s	2:46p	760s	0	0	0	20.5	0.2	
NW Corner	760s	2:48p	760s	0	0	0	20.4	0.1	
SE Corner	760s	2:50p	760s	0	0	0	20.5	0.2	
SW Corner	760s	2:52p	760s	0	0	0	20.4	0.3	
ADD ANY ADDITIONAL LOCATIONS AT OR NEAR STRUCTURE WITH METHANE PRESENT BELOW OR ON ADDITIONAL SHEETS									

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

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SIGNATURE

PROJECT SCIENTIST
TITLE

NC Division of Waste Management - Solid Waste Section

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Facility Name: Avery County Closed MSW Landfill Permit Number: 06-01

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

Name and Position of Sample Collector: [SEE PAGE 1]

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
AVERY COUNTY AIRPORT STRUCTURE #4									
NE Corner	7605	2:54p	7605	0	0	0	20.6	0.2	
NW Corner	7605	2:56p	7605	0	0	0	20.1	0.2	
SE Corner	7605	2:58p	7605	0	0	0	20.3	0.2	
SW Corner	7605	3:00p	7605	0	0	0	20.3	0.2	
ADD ANY ADDITIONAL LOCATIONS AT OR NEAR STRUCTURE WITH METHANE PRESENT BELOW OR ON ADDITIONAL SHEETS									

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

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[Signature] (PSW)
SIGNATURE

PROJECT SCIENTIST
TITLE

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Facility Name: Avery County Closed MSW Landfill Permit Number: 06-01

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

Name and Position of Sample Collector: [See page 1]

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
AVERY COUNTY AIRPORT STRUCTURE #5									
NE Corner	760s	3:02p	760s	0	0	0	20.7	0.1	
NW Corner	760s	3:04p	760s	0	0	0	20.3	0.2	
SE Corner	760s	3:06p	760s	0	0	0	20.1	0.2	
SW Corner	760s	3:08p	760s	0	0	0	20.2	0.2	
ADD ANY ADDITIONAL LOCATIONS AT OR NEAR STRUCTURE WITH METHANE PRESENT BELOW OR ON ADDITIONAL SHEETS									

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.

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[Signature]
SIGNATURE

PROJECT SCIENTIST
TITLE

NC Division of Waste Management - Solid Waste Section

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Facility Name: Avery County Closed MSW Landfill Permit Number: 06-01

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

Name and Position of Sample Collector: [SEE PAGE 7]

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
AVERY COUNTY AIRPORT STRUCTURE #6									
NE Corner	7605	3:10p	7605	0	0	0	20.2	0.2	
NW Corner	7605	3:10p	7605	0	0	0	20.4	0.3	
SE Corner	7605	3:14p	7605	0	0	0	20.3	0.3	
SW Corner	7605	3:16p	7605	0	0	0	20.3	0.3	
ADD ANY ADDITIONAL LOCATIONS AT OR NEAR STRUCTURE WITH METHANE PRESENT BELOW OR ON ADDITIONAL SHEETS									

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.

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[Signature] (RSG)
SIGNATURE

PROJECT SCIENTIST
TITLE