SMITH+GARDNER
ENGINEERS

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14 N. Boylan Avenue, Raleigh NC 27603

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919.828.0577

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January 18, 2013

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

RE: **Operations, Monitoring, and Maintenance Report – December 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 December 2012 monitoring period. Mr. Don Misenheimer with S+G performed the November site visit on December 28, 2012. Details of this inspection are provided below.

ACTION LIST

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

1. LFGCCS System: An expansion of the LFGCCS system, as proposed in the *Annual Landfill Gas Monitoring Report*[1], has been approved[2] by the division of Waste Management. Phase One of the expansion project will consist of:

    - installation of two (2) landfill gas extraction wells that are four inches in diameter and approximately 60 feet deep on the northern portion of the property between current landfill gas extraction wells W1 and W3 and the limits of waste near Brushy Creek Road;
    - installation of an isolation valve along the landfill gas header to isolate the southern landfill gas extraction wells; and
    - installation of a flare collar extension;

    Phase Two of the expansion project will be discussed in a similar report when Phase One has been evaluated as effective. Phase One of the system expansion is currently planned for February 2013. Monthly LFG monitoring will continue at the site.

[1] *Annual Landfill Gas Monitoring Report,* Closed Avery County MSW Landfill. Submitted by Smith Gardner , November 2012.

[2] Approval response letter, Closed Avery County MSW Landfill (Annual Landfill Gas Monitoring Report). Sent by Jaclynne Drummond, Solid Waste Section, November 15, 2012.

2. **W-1 and W-3:** These wells have been determined to be watered out/totally clogged. **The approved expansion discussed above should improve over-all gas quality at the flare as well as substantially increasing LFG flow across the site.**

3. **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. **The approved expansion discussed above should improve over-all gas quality at the flare as well as substantially increasing LFG flow across the site.**

4. **Flare:** Flare "blow out" and re-lighting problems seem to be present during steady wind conditions. An extended flare collar should be considered. **The approved expansion discussed above includes the installation of a flare collar extension.**

5. **Blower:** The blower is not operational and repair is needed. **The blower will be removed and returned to the manufacturer for evaluation/repair during the next (January 2013) monthly monitoring event.**

LFG EXTRACTION WELL MONITORING ACTIVITIES

S+G arrived onsite to perform the flare station and well field monitoring on December 28, 2012. When S+G arrived to the site, the system was not operating. S+G attempted to restart the system by resetting the breaker that had been tripped. When this breaker was reset, an obvious blower malfunction was observed and the breaker, subsequently, tripped back off.

Please note that this blower was installed during the October 2012 site visit. The blower will be removed and returned to the manufacturer for evaluation/repair during the next (January 2013) monthly monitoring event.

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

Flare Station

- **Flare**: Although the system was not operational when S+G arrived, the system was free venting through the flare and the flare was burning. **The system/flare was left free venting when S+G left the site.**

- **Condensate Tank:** The condensate tank was observed during this site visit; the liquid was at an acceptable level. **S+G will continue to monitor the liquid level of the condensate tank.**

- **Blower:** As stated above, the blower was observed to be non-operational and will be removed and returned to the manufacturer for evaluation/repair during the next (January 2013) monthly monitoring event.

LFG MONITORING WELL (PERIMETER) MONITORING

S+G personnel conducted the November 2012 monitoring of the perimeter LFG monitoring wells on December 28, 2012. 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 CH4. Monitoring well P13 measured less than 50% LEL or 2.5% by volume of CH_4, while all other wells had no detectable concentrations of CH_4. 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 2013. 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,

SMITH-GARDNER, 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. – S+G
File

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FIGURE

Operations Monitoring and Maintenance Report - LFGCCS
Avery County Closed MSW Landifll
Permit No. 06-91

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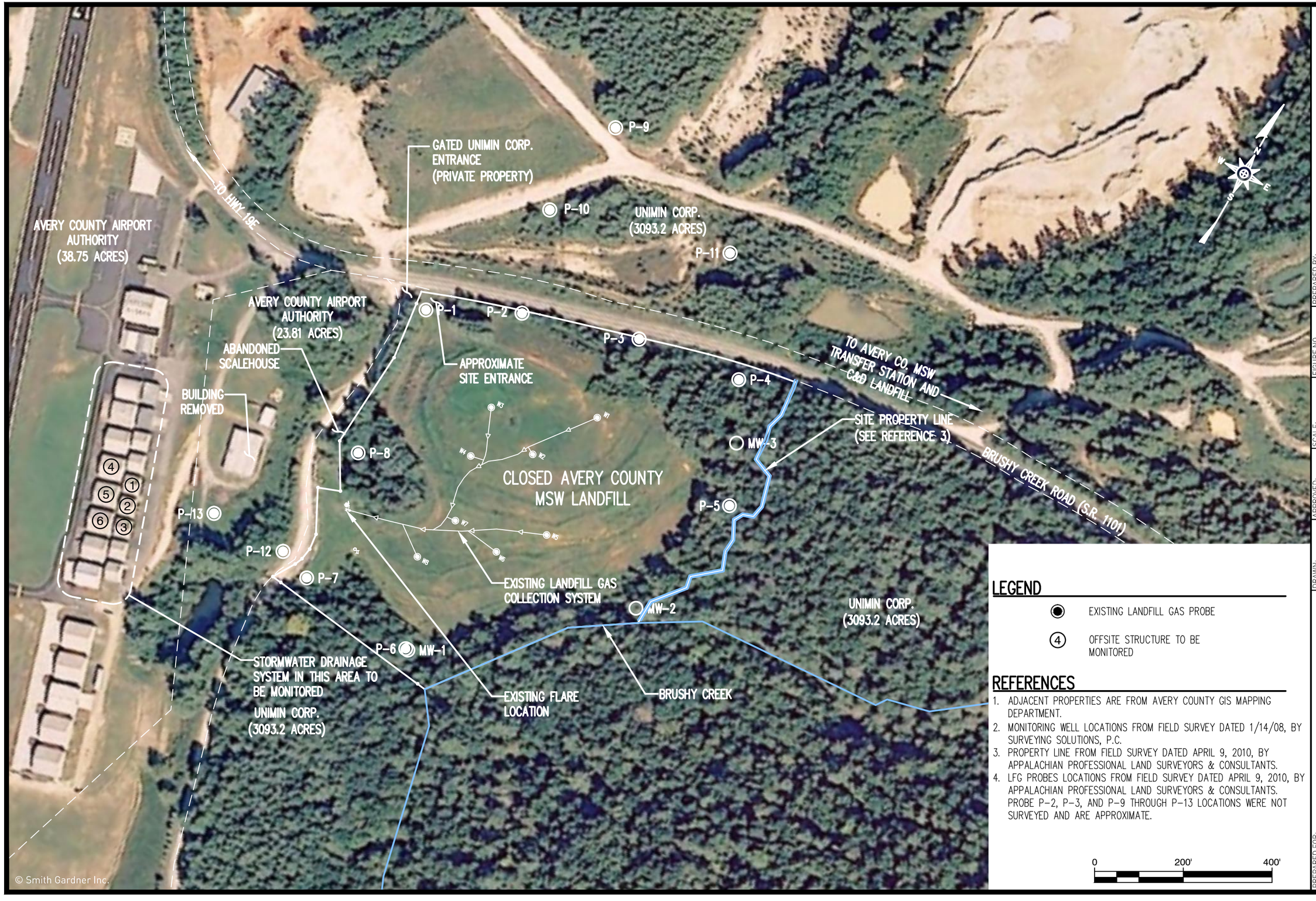

LEGEND

- 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.

0 200' 400'

PREPARED BY:
SMITH+GARDNER
NC LIC. NO. C-0828 (ENGINEERING)
14 N. Boylan Avenue, Raleigh NC 27603 | 919.828.0577

FIGURE NO.	1
FILENAME:	AVERY-B0192
SCALE:	AS SHOWN
PROJECT NO:	AVERY 12-6
APPROVED:	D.M.M.
DRAWN:	W.R.B.
DATE:	Oct 2012

PREPARED FOR:

LANDFILL GAS MONITROING SYSTEM
AVERY COUNTY CLOSED MSWLF
SPRUCE PINE, NORTH CAROLINA

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Attachment 1

Operations, Monitoring and Maintenance Report - LFGCCS
Avery County Closed MSW Landfill
Permit No. 06-91

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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: 12·28·12 NC Landfill Rule (.0500 or .1600): .0500

Name and Position of Sample Collector: DON MISENHEIMER

Type and Serial Number of Gas Meter: GEM 2000 GM 07579 Calibration Date of Gas Meter: _____

Date and Time of Field Calibration: 12.28.12 9:00 am

Type of Field Calibration Gas (15/15 or 35/50): 15/15 Expiration Date of Field Calibration Gas Canister: 4/2013

Pump Rate of Gas Meter: 0.5 L/min

Ambient Air Temperature: 30° Barometric Pressure: 30.19 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	>60s	9:15a	>60s	>100	>100	52.6	0.1	29.6	
P2	>60s	9:17a	>60s	0	0	0	19.9	0.5	
P3	>60s	9:19a	>60s	>100	>100	59.7	1.7	32.1	
P4	>60s	9:25a	>60s	0	0	0	16.8	2.9	
P5	>60s	9:30a	>60s	0	0	0	19.4	0.6	
P6	>60s	9:34a	>60s	0	0	0	18.5	3.0	
P7	>60s	9:36a	>60s	>100	>100	42.9	2.4	17.9	
P8	>60s	9:40a	>60s	0	0	0	20.0	2.4	
P9	>60s	10:00	>60s	0	0	0	20.1	1.5	
P10	>60s	10:02	>60s	0	0	0	19.0	0.6	

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 SR

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: [SAME AS 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	760s	10:07a	760s	>100	>100	45.7	2.9	19.8	
P12	760s	9:38a	760s	0	0	0	19.9	2.4	
P13	760s	10:16a	760s	0	0	0.3	11.2	8.7	

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Von Mark Stg — 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: [SAME AS 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 #1									
NE Corner	760s	10:18a	760s	0	0	0	✓	✓	O_2 + CO_2
NW Corner	760s	10:20a	760s	0	0	0	✓	✓	normal
SE Corner	760s	10:22a	760s	0	0	0	✓	✓	
SW Corner	760s	10:24a	760s	0	0	0	✓	✓	
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 5+6 TITLE PROJECT SCIENTIST

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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: [SAME AS 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	760s	10:26a	760s	0	0	0	✓	✓	
NW Corner	760s	10:28a	760s	0	0	0	↓O2	↑ CO2 normal	
SE Corner	760s	10:30a	760s	0	0	0	✓	✓	
SW Corner	760s	10:32a	760s	0	0	0	✓	✓	
ADD ANY ADDITIONAL LOCATIONS AT OR NEAR STRUCTURE WITH METHANE PRESENT BELOW OR ON ADDITIONAL SHEETS									

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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: [redacted]

Type and Serial Number of Gas Meter: [SAME AS PAGE 1] 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	10:34a	760s	0	0	0	✓	✓	
NW Corner	760s	10:36a	760s	0	0	0	✓	✓	O2 + CO2
SE Corner	760s	10:38a	760s	0	0	0	✓	✓	normal
SW Corner	760s	10:40a	760s	0	0	0	✓	✓	
ADD ANY ADDITIONAL LOCATIONS AT OR NEAR STRUCTURE WITH METHANE PRESENT BELOW OR ON ADDITIONAL SHEETS									

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[signature] PROJECT SCIENTIST

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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: _____

Type and Serial Number of Gas Meter: [SAME AS PAGE 1] 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	>60s	10:42a	>60s	0	0	0	✓	✓	
NW Corner	>60s	10:44a	>60s	0	0	0	✓	✓	O2 + CO2
SE Corner	>60s	10:46a	>60s	0	0	0	✓	✓	normal
SW Corner	>60s	10:48a	>60s	0	0	0	✓	✓	
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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S+G

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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: [SAME AS 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	10:50a	760s	0	0	0	✓	✓	
NW Corner	760s	10:52a	760s	0	0	0	✓	✓	O2 & CO2
SE Corner	760s	10:54a	760s	0	0	0	✓	✓	normal
SW Corner	760s	10:56a	760s	0	0	0	✓	✓	
ADD ANY ADDITIONAL LOCATIONS AT OR NEAR STRUCTURE WITH METHANE PRESENT BELOW OR ON ADDITIONAL SHEETS									

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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: _____

Type and Serial Number of Gas Meter: [SAME AS PAGE 1] 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	>60s	10:59a	>60s	0	0	0	✓	✓	
NW Corner	>60s	11:00a	>60s	0	0	0	✓	✓	O_2 + CO_2
SE Corner	>60s	11:02a	>60s	0	0	0	✓	✓	normal
SW Corner	>60s	11:04a	>60s	0	0	0	✓	✓	
ADD ANY ADDITIONAL LOCATIONS AT OR NEAR STRUCTURE WITH METHANE PRESENT BELOW OR ON ADDITIONAL SHEETS									

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