
Landfill Gas Migration Monitoring Report

Prepared for

Graham County Closed Unlined MSWLF
Robbinsville, North Carolina

May 2012

Permit Number: 38-01

MESCO Project Number: G11038.0

Reported on May 17, 2012

Performed on May 8, 2012



Municipal Engineering Services Company, P.A.
Garner and Boone, North Carolina



May 17, 2012

Ms. Elizabeth Werner
 Solid Waste Section Hydrogeologist
 Division of Waste Management, SWS
 1646 Mail Service Center
 Raleigh, NC 27699-1646
 Phone: (919) 508-8496
 Email: elizabeth.werner@ncdenr.gov

Re: Landfill Gas Migration Monitoring Report
 Graham County Inactive Closed MSWLF
 Permit Number: 38-01

Dear Ms. Werner:

Introduction

In response to a *Notice of Deficiency* issued by the Solid Waste Section on March 8, 2012 this report is intended to provide evidence that explosive gas monitoring has been performed and methane has not been detected thus the facility meets the design standards for landfill gas found in Rule .0503(2)(a)(i)(ii).

A landfill gas (LFG) migration monitoring network was installed at the Inactive Closed Graham County MSWLF-(38-01) by Municipal Engineering Services Company, P.A. (MESCO) personnel on May 7, 2012. The facility is very rural, located upon gated property owned by the US Forest Service, sits atop a mountain and is surrounded by streams which effectively mitigates potential risk of exposure to LFG migration. The LFG monitoring system consists of six LFG monitoring probes surrounding the perimeter of the waste. MESCO personnel recorded LFG levels from the monitoring system on May 8, 2012. This report contains a description of the monitoring network, monitoring procedures, summary of monitoring results, and findings. A site areal photograph depicting monitoring locations, a schematic of the methane probes, instrument calibration certificate, and a tabulation of recorded LFG levels are also attached.

Methane Monitoring Network

Six LFG probes were installed surrounding the perimeter of the closed landfill to monitor LFG gas levels migrating through soil. The number and location of probes were based upon several factors such as proximity of off-site structures, subsurface soil stratigraphy, and hydrogeological barriers. Structures are not located on the landfill facility and the closest identified potential off-site structure is located over 1,000 linear feet, 280 vertical feet separation and beyond a perennial hydrogeologic barrier from the bottom of the waste boundary. A site aerial photograph depicting the monitoring system is attached as **Figure 1**.

The methane probes were constructed by a NC-Certified Well Contractor (NCWC-3301-A) and consisted of 3/4 inch PVC screen and riser pipe. The probes were installed in a borehole with a filter pack around the screen and a bentonite then concrete seal over the filter. The methane probes are equipped with a ball valve and barb fitting to facilitate connecting a gas monitoring instrument to accurately measure potentially accumulated landfill gas. A schematic detail of the methane probes are presented in attached **Figure 1**.

Monitoring Procedures

MESCO personnel performed LFG migration monitoring of the network on May 8, 2012. Monitoring was performed in accordance with procedures outlined in the NCDENR Solid Waste Section *Landfill Gas Monitoring Guidance Document* dated November 2010 utilizing a properly approved/calibrated GEM 2000 analyzer (calibration certificate attached). LFG readings were taken from 6 LFG probes (MP-1 through MP-6) in the afternoon and during a period of falling barometric pressure which are considered optimum conditions for detection of methane migrating from a landfill.

Monitoring Results

Detectable concentrations of methane was not detected in any of the probe locations. LFG readings are presented in the attached Landfill Gas Monitoring Data Form.

Findings

The LFG migration monitoring system as implemented is expected to sufficiently detect LFG migration through the soil around the perimeter of the landfill. Methane gas was not found to be migrating from the landfill in concentrations in exceedance of the applicable regulations during the May 8, 2012 event. There appears to be no evidence to suggest that any receptors are at risk from potential methane migration at this time.

Closing

If you have any questions regarding this report or any facet of the monitoring system please contact us by phone at (919) 772-5393 or by email at jpfohl@mesco.com.

Sincerely,
MUNICIPAL ENGINEERING SERVICES CO., P.A.

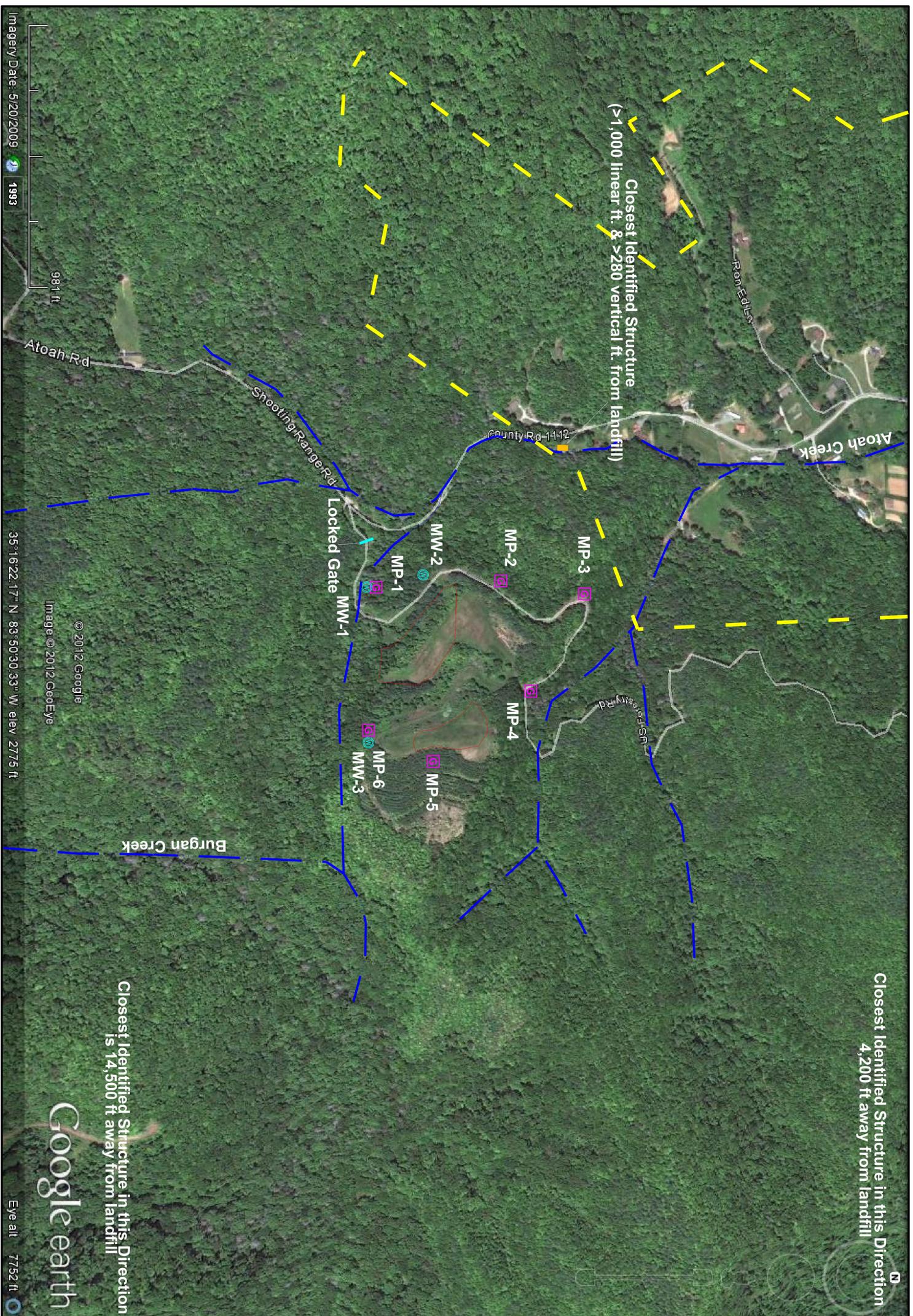


Jonathan Pfohl
Environmental Specialist

Enclosures

cc: Ms. Kim Crisp
Graham County

Mr. Troy Harrison
Solid Waste Section



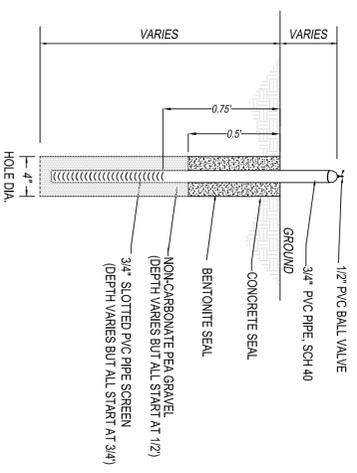
NOTE:
ALL LOCATIONS ARE APPROXIMATE (NOT SURVEYED)
AERIAL PHOTO IS FROM GOOGLE TAKEN 5/20/09.



LEGEND

- US FOREST SERVICE LAND OUTERMOST PROPERTY LINE
- ESTIMATED WASTE LIMITS
- METHANE MONITORING PROBE
- WATER MONITORING WELL
- STREAMS (METHANE MIGRATION BARRIER)

LFG PROBE	LATITUDE (GPS)	LONGITUDE (GPS)
MP-1	35°16'18.58"N	83°50'34.13"W
MP-2	35°16'23.82"N	83°50'35.23"W
MP-3	35°16'28.57"N	83°50'34.15"W
MP-4	35°16'25.69"N	83°50'28.73"W
MP-5	35°16'20.94"N	83°50'25.02"W
MP-6	35°16'18.13"N	83°50'26.06"W



SINGLE METHANE GAS MONITORING PROBE
N.T.S.

**CLOSED UNLINED
MUNICIPAL SOLID WASTE LANDFILL
GRAHAM COUNTY
NORTH CAROLINA**

Municipal Services Engineering Company, P.A.
P.O. BOX 97 GARNER, N.C. 27529 (919) 772-5393
P.O. BOX 349 BOONE, N.C. 28607 (828) 262-1767
LICENSE NUMBER: C-0281

DATE	BY	REV.	DESCRIPTION

LANDFILL GAS MONITORING LOCATIONS

SCALE:	SEE SCALE BAR
DATE:	5/17/12
DRAWN BY:	J. PROHL
CHECKED BY:	J. PROHL
PROJECT NUMBER:	G11038.0
DRAWING NO.:	1 OF 1

FIGURE 1

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: Graham Co. Closed MSWLF **Permit Number:** 38-01
Date of Sampling: 05/08/12 **NC Landfill Rule (.0500 or .1600):** 0.0500
Name & Position of Sample Collector: Jonathan Pfohl (MESCO Env. Specialist)
Type & Serial Number of Gas Meter: GEM 2000 (GM08087105 Pine) **Calibration Date of Gas Meter:** 05/04/12
Date & Time of Field Calibration: 5/8/12 9 AM OK
Type of Field Calibration Gas (15/15 or 35/50): 15/15 **Expiration Date of Field Calibration Gas Canister:** 04/30/13
Pump Rate of Gas Meter: 300 cc/min
Ambient Air Temperature: 68 F **Barometric Pressure:** 27.02" Hg **General Weather Conditions:** Partly Cloudy

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 Reading Taken	Time Pumped in Seconds	Initial % LEL	Stabilized % LEL	% CH4 by Volume	% O2	% CO2	Notes
Background	200	12:00 PM	250	0	0	0	20.8	0	Ambient Downwind of MSWLF
MP-1	200	02:50 PM	250	0	0	0	16.2	0.1	
MP-2	200	02:36 PM	250	0	0	0	19.2	0.2	
MP-3	200	02:15 PM	250	0	0	0	15.7	1.1	
MP-4	200	01:55 PM	250	0	0	0	16.7	0.2	
MP-5	200	12:31 PM	250	0	0	0	16.5	0.1	
MP-6	200	12:18 PM	250	0	0	0	15.5	1.3	
Background	200	03:05 PM	250	0	0	0	20.8	0	Ambient Downwind of MSWLF

na = Not Available

Baseline = Ambient Air Sample At Facility

Standard at property line 100% LEL, 5% By Volume, 50,000 PPM of Methane

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

Environmental Specialist (MESCO)

TITLE



INSTRUMENT CALIBRATION REPORT

Pine Environmental Services, Inc.

8411 Garvey Drive, Suite 113
Raleigh, NC 27614
Toll-free: (866) 646-PINE (7463)

Pine Environmental Services, Inc.

Instrument ID 7224
Description Gem 2000
Calibrated 5/4/2012

Manufacturer CES Landtec
Model Number GEM2000
Serial Number/ Lot Number gm08087105
Location North Carolina
Department

State Certified
Status Pass
Temp °C 22
Humidity % 50

Calibration Specifications

				<u>Range Acc %</u>	<u>Reading Acc %</u>	<u>Plus/Minus</u>	<u>Dev%</u>	<u>Pass/Fail</u>
Group # 1				0.0000	3.0000	0.00		
Group Name Methane								
Stated Accy Pct of Reading								
<u>Nom In Val / In Val</u>	<u>In Type</u>	<u>Out Val</u>	<u>Out Type</u>	<u>Fnd As</u>	<u>Lft As</u>		<u>Dev%</u>	<u>Pass/Fail</u>
15.00 / 15.00	%Volume	15.00	%Volume	15.00	15.00		0.00%	Pass
Group # 2				0.0000	3.0000	0.00		
Group Name Carbon Dioxide								
Stated Accy Pct of Reading								
<u>Nom In Val / In Val</u>	<u>In Type</u>	<u>Out Val</u>	<u>Out Type</u>	<u>Fnd As</u>	<u>Lft As</u>		<u>Dev%</u>	<u>Pass/Fail</u>
15.00 / 15.00	%Volume	15.00	%Volume	15.00	15.00		0.00%	Pass
Group # 3				0.0000	3.0000	0.00		
Group Name Oxygen								
Stated Accy Pct of Reading								
<u>Nom In Val / In Val</u>	<u>In Type</u>	<u>Out Val</u>	<u>Out Type</u>	<u>Fnd As</u>	<u>Lft As</u>		<u>Dev%</u>	<u>Pass/Fail</u>
20.90 / 20.90	%	20.90	%	20.90	20.90		0.00%	Pass

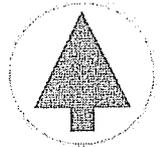
Test Instruments Used During the Calibration

(As Of Cal Entry Date)

<u>Test Standard ID</u>	<u>Description</u>	<u>Manufacturer</u>	<u>Model Number</u>	<u>Serial Number / Lot Number</u>	<u>Last Cal Date / Expiration Date</u>	<u>Next Cal Date / Expiration Date</u>
NC 15% CH4 15% CO2	NC 15% ch4 15% co2 (Lot 012040)	Spec Air	GP12100	Lot 012040		4/30/2013
NC ZERO AIR LOT 052209	NC Zero Air	Spec Air	GP 12510	052209		5/22/2012

Notes about this calibration

INSTRUMENT CALIBRATION REPORT



Pine Environmental Services, Inc.

8411 Garvey Drive, Suite 113
Raleigh, NC 27614
Toll-free: (866) 646-PINE (7463)

Pine Environmental Services, Inc.

Instrument ID 7224
Description Gem 2000
Calibrated 5/4/2012

Calibration Result Calibration Successful
Who Calibrated Andrew Briley

All instruments are calibrated by Pine Environmental Services, Inc. according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

**Notify Pine Environmental Services, Inc. of any defect within 24 hours of receipt of equipment
Please call 866-960-7463 for Technical Assistance**