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September 20, 2011

Project # _____

File # _____

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Mr. Ervin Lane
Hydrogeologist
Environmental Compliance
Solid Waste Section
Division of Waste Management
North Carolina Department of Environment and Natural Resources
1646 Mail Service Center
Raleigh, North Carolina 27699-1646

RE: Corrective Action Plan
Macon County Landfill
Permit No. 57-03
Macon County, North Carolina

Dear Mr. Lane:

On behalf of Macon County, and as a follow-up to our conversation of the above date, McGill Associates is notifying the Solid Waste Section, Division of Waste Management, North Carolina Department of Environment and Natural Resources (NCDENR) that Macon County has completed the work associated with the selected remedy as outlined in the approved Assessment of Corrective Measures. The remedy included alterations to the grading of the Phase 1 cap system of the Macon County Landfill and the installation of a landfill gas cut-off trench, complete with a passive venting system. The selected remedy has been constructed in general conformance with the approved plans and specifications as approved by the Solid Waste Section.

I have also enclosed a Log prepared by the Macon County Department of Solid Waste Management that describes the construction activities associated with the installation of the landfill gas cut-off trench system. The Log is broken down into three sections, with each section describing a specific activity associated with the construction and monitoring of the landfill gas cut-off trench system. Section I. Trench Construction, describes the construction of the passive trench system within the waste limits of Phase I. Section II. Vent Construction, covers the installation of the passive landfill gas vents within the passive trench system. Section III. Landfill Gas Monitoring, provides a tabulation of the initial landfill gas measurements for selected landfill gas wells/probes as well as the initial landfill gas measurements for the passive landfill gas vents. The affected landfill gas monitoring wells/probes will continue to be monitored on a regular cycle and the results submitted to the NCDENR Solid Waste Section for review.

E n g i n e e r i n g • P l a n n i n g • F i n a n c e

McGill Associates, P.A. • P.O. Box 2259, Asheville, NC 28802 • 55 Broad Street, Asheville, NC 28801

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We appreciate your working with Macon County, McGill Associates and Bunnell-Lammons Engineering, Inc. during the preparation of the Assessment of Corrective Measures and the implementation of the selected remedy. Should you have any questions or require additional information please give us a call.

Sincerely,
MCGILL ASSOCIATES, P.A.



WILLIAM H. SPERRY, PE
Project Manager

Enclosure

cc: Mr. Chris Stahl, Solid Waste Director, Macon County, w/o enclosure
Mr. Jeff Bishop, PE, McGill Associates, w/o enclosure
Mr. Andrew W. Alexander, PG, Bunnell-Lammons Engineering, Inc., w/o enclosure

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Macon County Department of Solid Waste Management

109 Sierra Drive, Franklin, North Carolina 28734

Phone: (828) 349-2100; Fax: (828) 349-2185

Email: cstahl@maconnc.org

August 11, 2011

Log: Installation of passive landfill gas trench on Cell I, Macon County MSW Landfill as part of Corrective Action Plan: July 25, 2011 – August 2, 2011.

The following is a narrative of the construction of a passive landfill gas trench installed in Cell I of the Macon County MSW Landfill. In addition to this description of the project, there are several photographs that illustrate our progress at various points in the construction.

I. Trench Construction:

July 25, 2011: Construction began at 9:00am. Trench excavated to 9-9.5 feet. Appears that at bottom of trench, we are encountering the third waste layer. Waste removed with small track hoe with a 15" bucket. Waste is being placed directly into a dump truck, and taken to Cell II active face for immediate burial. Small amounts of waste spilled from bucket being raked back into trench for re-loading onto truck. No sign of leachate; bottom of trench is dry. Construction progressed approximately 80-feet. First vent installed (see installation log below). Trench was backfilled with gravel stockpiled on the former compost pad to the top layer of waste. Fabric was placed on top of the gravel to prevent the passive trench from being clogged with dirt from the cover material. Cover soil placed back over trench to within 15 feet of the excavation point. Trench construction ended at 4:100pm. Brief drizzle of rain at about 4:30pm. Tarps supported by 2x4 studs covered the fill gap. Received a visit by Field Specialist, Troy Harrison of the NCDENR Solid Waste Section.

July 26, 2011: Construction of the trench resumed at 8:00am. No sign of water infiltration from light rain the previous afternoon. Construction progressed approximately 90-feet. The second passive vent pipe was installed. Nothing notable in the waste with the exception of one spot where a cross-tie was encountered at about 8-feet deep that could not be removed. Trench closed out as in the previous day at 4:30pm.

July 27, 2011: Trench construction began at 7:30am. At about 200-foot mark, encountered an area of moisture. Liquid was seen dripping from a large piece of carpet on the uphill side of the trench. Damp area ran for approximately 15 feet. Third vent installed. No other notable accounts from the day.

July 28, 2011: Trench construction continues. Visited by Mr. Troy Harrison of NCDENR. Most notably, in digging today, we cut through a pipe that contained a good bit of water. This pipe was installed several years ago to drain impounded water from the landfill as the last corner was being filled. This line was installed through waste by excavating a trench down the slope so that the water could gravity drain to the leachate pond. The line was buried instead of being removed. We have long attributed this line to a damp spot that was often visible on the side slope of the landfill. While we have



never witnessed any indication of the moisture reaching the surface and running outside of the landfill, we were hoping to find and cut the line when installing this trench. The pipe was split and dripped water for several minutes. The waste in the area of the pipe was “wetter” than what we have seen in the rest of the trench; presumably as the liquid in the line was seeping back through the waste. Fourth vent installed.

***** Discovered today from review of plans that while vent locations were marked, the ends of the trench were not. Consequently, the trench was started about 5 feet from vent #1, instead of the 25 feet that is shown on the drawing.**

July 29, 2011: We only dug about half the day today so that we could make sure that we had the trench well covered for the weekend. About a 20-foot gap left open so that digging could resume on Monday. The gap area was covered with plywood wrapped in tarps. A small berm was constructed in the area above the gap and a head ditch was dug at the leading end of the gap so that if it rained, stormwater runoff would be directed around the trench and not into the gap. Approximately 400 feet of trench constructed and vent number 5 was installed.

August 1, 2011: Had some rain this weekend, but no standing water observed in the trench when the temporary cover materials were removed. Vent number 6 installed today. Most notably, a strong pocket of landfill gas odor was encountered as we moved around the corner of the Cell. This area is directly upgradient of the methane gas probe (GMP-10a) located just outside the anchor trench that has historically yielded methane readings in excess of 50%. Hopefully, we have found and cut through the seam the landfill gas is traveling.

August 2, 2011: Vent number seven installed. Trench completed at 2:15pm. Gravel, fabric and cover completed at 3:30pm. Trench installation complete.

II. Vent Construction:

All passive landfill gas vents constructed of 6-inch PVC pipe. Bottom section of pipe perforated with 4 ½-inch holes drilled around pipe in six inch intervals. Bottom of perforated section capped. Length of perforated section was determined by depth of trench and depth of uppermost waste layer. Upper section of vent was solid pipe that extended from the uppermost waste layer to approximately six feet above grade. Two 90 degree elbows were glued together and placed on top of the pipe to prevent rain infiltration into the trench.

Vent #1:	Depth of Trench:	9 feet 6 inches
	Depth to Waste:	3 feet 6 inches
	Perforated pipe length:	6 feet
	Solid pipe length:	9 feet



Vent #2:	Depth of Trench:	9 feet 9 inches
	Depth to Waste:	3 feet 6 inches
	Perforated pipe length:	6 feet
	Solid pipe length:	9 feet

Vent #3:	Depth of Trench:	9 feet 3 inches
	Depth to Waste:	2 feet 3 inches
	Perforated pipe length:	7 feet
	Solid pipe length:	8 feet

Vent #4:	Depth of Trench:	8 feet 9 inches
	Depth to Waste:	2 feet 3 inches
	Perforated pipe length:	6 feet 6 inches
	Solid pipe length:	8 feet 6 inches

Vent #5:	Depth of Trench:	8 feet 6 inches
	Depth to Waste:	3 feet 6 inches
	Perforated pipe length:	5 feet
	Solid pipe length:	9 feet

Vent #6:	Depth of Trench:	9 feet 3 inches
	Depth to Waste:	2 feet 3 inches
	Perforated pipe length:	7 feet
	Solid pipe length:	8 feet 6 inches

Vent #7:	Depth of Trench:	9 feet
	Depth to Waste:	2 feet
	Perforated pipe length:	7 feet
	Solid pipe length:	8 feet



III. Landfill Gas Monitoring:

August 9, 2011: Conducted methane monitoring of trench vents and down gradient landfill gas probes to get a very early look at performance of the trench. Results of methane monitoring are below:

Landfill Gas Measurements Field Worksheet

Macon County MSW Landfill : #57-03

Name of Person Taking Readings: Chris Stahl

Date: August 9, 2011

Weather Conditions: Cloudy, 65% Humidity

Ambient Temp: 80 ° F

Atmospheric Pressure: 29.87 in Hg, Steady

**Serial #:
GM05480**

Gas Monitoring Equipment: Land-Tec GEM 2000

Factory Calibration Date: June 2011

Field Calibration 50% Methane: 8/9/2011

Gas Readings Field Worksheet

Well or Probe ID	Readings	Purge Time	Time	%LEL	%CH ₄	%CO ₂	%O ₂	Probe Pressure/Vacuum
GP-1a	Stable	120 sec	13:52	0	0.0	3.2	18.0	0.00
GP-1b	Stable	120 sec	14:01	0	0.0	2.1	18.8	0.00
GP-1c	Stable	120 sec	13:57	174	8.7	13.3	4.8	0.00
GP-10a	Stable	120 sec	14:31	300	15.0	22.6	1.5	0.00
								Max CH₄ Reading
Vent #1	Stable	120 sec	14:05	572	28.6	21.5	7.4	29.5
Vent #2	Stable	120 sec	14:08	36	1.8	1.8	19.6	3.7
Vent #3	Stable	120 sec	14:12	64	3.2	4.1	17.3	4.2
Vent #4	Stable	120 sec	14:15	84	4.2	3.7	17.6	25.5
Vent #5	Stable	120 sec	14:19	496	24.8	24.7	1.1	25.8
Vent #6	Stable	120 sec	14:23	526	26.3	25.2	3.9	26.5
Vent #7	Stable	120 sec	14:26	506	25.3	25.3	4.1	25.3

Field Notes:

- Vents numbered in order of installation.
- Vents sampled by inserting vacuum hose over elbows in into vertical pipe. Wind seems to be impacting readings. In the future, need to make a cap to close the vent while sampling.



IV. Historic Landfill Gas Readings:

Below are the landfill gas readings taken during the routing landfill gas monitoring events at the MSW Landfill for landfill gas probes GP-1a, GP-1b, GP-1c, GP-10a. These probes are all located in the impacted area of Cell I, and are measured for historic data. These probes are not compliance sampling points as noted in the nomenclature of the probes ending in a small letter. The table below lists methane reading at each probe for the past twelve sampling events:

Probe	12-08	3-09	6-09	9-09	12-09	3-10	6-10	9-10	12-10	3-11	6-11	8-11
GP-1a	0.0	0.0	0.0	25.5	0.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0
GP-1b	4.7	0.4	0.0	0.0	0.0	9.3	0.0	0.0	7.4	0.0	0.1	0.0
GP-1c	21.6	9.2	29.4	6.6	5.7	0.7	0.4	4.3	5.1	2.5	0.0	8.7
GP-10a	56.4	72.9	42.7	66.1	65.5	65.6	46.7	51.0	75.3	65.9	54.9	15.0