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May 11, 2016

Mr. David P. Kwiatkowski
North Carolina Department of
Environmental Quality
Division of Waste Management
Superfund Section
Pre-Regulatory Landfill Unit
1646 Mail Service Center
Raleigh, North Carolina 27699-1646

Subject: Remedial Investigation – Contaminant Delineation
Old Charlotte Landfill/Vanguard Center
Charlotte, Mecklenburg County, North Carolina
Site Identification Number: NONCD0001065
Task Order 1065DP-9

Dear Mr. Kwiatkowski:

CDM Smith Inc. (CDM Smith) is pleased to submit the Remedial Investigation – Contaminant Delineation report for the Old Charlotte Landfill/Vanguard Center located in Charlotte, Mecklenburg County, North Carolina as part of Task Order 1065DP-9. The investigation was performed in accordance with the Work Plan approved by the Department of Environmental Quality's (NCDEQ) Division of Waste Management - Superfund Section - Inactive Hazardous Sites Branch - Pre-Regulatory Landfill Unit on April 18, 2016, and CDM Smith's Standard Operating Procedures and Quality Assurance manual.

Field activities were completed on April 29, 2016, as summarized in the notes provided in **Appendix A**. The landfill gas (LFG) monitoring network consists of LFG probes GP-1 through GP-12. Field activities consisted of screening each LFG probe for oxygen, carbon dioxide, methane, hydrogen sulfide, and volatile organic compounds (VOCs). Field activities and screening results are summarized below.

Landfill Gas Probe Screening

All LFG probes were screened on April 29, 2016 for methane, hydrogen sulfide, oxygen, carbon dioxide, and VOCs, using a Landtec GEM 2000 Plus (GEM) and a photoionization detector (PID). The GEM quick-connect was connected to the LFG probe stopcock using Teflon®-lined tubing. Water levels



were also measured at each LFG probe using an electronic water level meter with an accuracy of 0.01 feet. The GEM and PID were calibrated prior to initiating the screening in accordance with the manufacturer's instructions. Barometric pressure, ambient temperature, and humidity were measured every hour during screening activities. A hygrometer was used to measure humidity and ambient temperature and the GEM was used to measure barometric pressure. A bump test to verify calibration and instrument accuracy was performed during and after the screening. LFG probe locations are provided on **Figure 1**.

All LFG probes had detections of methane with the exception of GP-8. Methane ranged from 14.1 percent in GP-7 to 71.0 percent in GP-10. Total VOCs ranged from 0.7 parts per million (ppm) in GP-5 to 10.0 ppm in GP-4. LFG probes GP-1, -4, -5, -7, -9, and -11 had detections of hydrogen sulfide ranging from 1 ppm in GP-4 and -5 to 11 ppm in GP-7. Water was measured in or above the screen in GP-2, -3, -4, -6, -8, and -9. Water was measured at less than 6 inches in the bottom of the screen interval in LFG probes GP-5, -10, -11, and -12. Water levels for each landfill gas probe are provided in **Table 1** and the LFG probe screening results are summarized in **Table 2**.

Report Certification

The report certification as specified in the *Inactive Hazardous Sites Program, Guidelines for Addressing Pre-Regulatory Landfills & Dumps, November 2015* is provided in **Appendix B**.

Sole Use Statement

This report is solely intended for use by the NCDEQ for the services that were performed in accordance with CDM Smith's proposal dated January 29, 2016, as authorized by NCDEQ Task Order 1065DP-9 dated April 18, 2016.

If you have any questions or require further explanation, please do not hesitate to call me at (919) 325-3569.

Very truly yours,



Mathew F. Colone, P.G.
CDM Smith Inc.

cc: Aaron Weispenning, CDM Smith
Daniel Forbes, CDM Smith

Tables

Table 1
Landfill Gas Probe Groundwater Measurements
Old Charlotte Landfill/Vanguard Center
Mecklenburg County, North Carolina

Landfill Gas Probe Code	Date	Depth to Water from Top of Casing (feet)	Screen Interval (feet BTOC)
GP-1	1/29/2015	Dry	18.7 - 23.7
	7/14/2015	Dry	
	2/25/2016	Dry	
	3/27/2016	Dry	
	4/29/2016	Dry	
GP-2	1/29/2015	Dry	19.0 - 24.0
	7/14/2015	Dry	
	2/25/2016	Dry	
	3/27/2016	15.55	
	4/29/2016	18.98	
GP-3	1/29/2015	24.75	19.6 - 24.6
	7/14/2015	Dry	
	2/25/2016	Dry	
	3/27/2016	22.98	
	4/29/2016	22.90	
GP-4	1/29/2015	Dry	14.2 - 19.2
	7/14/2015	Dry	
	2/25/2016	14.82	
	3/27/2016	17.85	
	4/29/2016	16.99	
GP-5	1/29/2015	Dry	16.1 - 21.1
	7/14/2015	Dry	
	2/25/2016	Dry	
	3/27/2016	20.01	
	4/29/2016	20.97	
GP-6	1/29/2015	Dry	23.7 - 28.7
	7/14/2015	Dry	
	2/25/2016	Dry	
	3/27/2016	27.38	
	4/29/2016	23.54	
GP-7	1/29/2015	Dry	18.6 - 23.6
	7/14/2015	Dry	
	2/25/2016	Dry	
	3/27/2016	Dry	
	4/29/2016	Dry	
GP-8	1/29/2015	Dry	11.2 - 16.2
	7/14/2015	Dry	
	2/25/2016	10.43	
	3/27/2016	13.96	
	4/29/2016	13.96	
GP-9	1/29/2015	Dry	15.0 - 20.0
	7/14/2015	Dry	
	2/25/2016	13.34	
	3/27/2016	13.78	
	4/29/2016	16.27	
GP-10	1/29/2015	19.79	14.9 - 19.9
	7/14/2015	19.72	
	2/25/2016	19.55	
	3/27/2016	18.84	
	4/29/2016	19.85	
GP-11	1/29/2015	Dry	9.1 - 11.1
	7/15/2015	Dry	
	2/25/2016	8.42	
	3/27/2016	8.87	
	4/29/2016	11.08	

Table 1
Landfill Gas Probe Groundwater Measurements
Old Charlotte Landfill/Vanguard Center
Mecklenburg County, North Carolina

Landfill Gas Probe Code	Date	Depth to Water from Top of Casing (feet)	Screen Interval (feet BTOC)
GP-12	1/29/2015	Dry	18.4 - 23.4
	7/14/2015	Dry	
	2/25/2016	20.03	
	3/27/2016	19.38	
	4/29/2016	23.29	

Notes:

1. BTOC - below top of casing

Table 2
Landfill Gas Probe Screening Measurements
Old Charlotte Landfill/Vanguard Center
Mecklenburg County, North Carolina

Landfill Gas Probe Code	Screening Date	Time	Methane		Carbon Dioxide (%)	Oxygen (%)	LEL (%)	Hydrogen Sulfide (ppm)	Total VOCs (ppm)
			(%)	($\mu\text{g}/\text{m}^3$)					
GP-1	1/29/2015	0840	34.8	22,857,985.3	29.2	3.6	>100	0	4.2
	7/14/2015	1400	66.4	43,614,086.8	33.6	0.0	>100	18	0.0
	2/25/2016	1114	0.0	0.0	0.0	21.5	0.0	0	0.0
	3/28/2016	1144	64.3	42,234,725.6	35.6	0.0	>100	1	0.0
	4/29/2016	1148	64.5	42,366,093.4	34.7	0.0	>100	6	3.9
GP-2	1/29/2015	0850	2.2	1,445,045.0	1.7	18.2	44.0	0	4.7
	7/14/2015	1028	49.6	32,579,197.4	31.5	0.0	>100	5	0.4
	2/25/2016	1120	0.0	0.0	0.1	21.4	0.0	0	1.2
	3/28/2016	1156	47.5	31,199,836.2	27.1	3.5	>100	0	0.9
	4/29/2016	1156	52.4	34,418,345.6	31.1	3.5	>100	0	1.4
GP-3	1/29/2015	0900	8.1	5,320,393.1	8.1	12.9	>100	0	3.3
	7/14/2015	0948	43.5	28,572,481.6	25.3	0.0	>100	0	0.3
	2/25/2016	1147	0.0	0.0	0.0	21.4	0.0	0	0.1
	3/28/2016	1221	51.7	33,958,558.6	24.9	0.0	>100	1	0.0
	4/29/2016	1228	44.9	29,492,055.7	22.2	0.0	>100	0	1.8
GP-4	1/29/2015	0910	17.6	11,560,360.4	26.2	2.6	>100	0	12.5
	7/14/2015	1016	16.8	11,034,889.4	25.4	0.6	>100	0	0.3
	2/25/2016	1000	21.1	13,859,295.7	25.2	1.8	>100	0	0.7
	3/28/2016	1021	23.3	15,304,340.7	24.2	3.0	>100	0	1.4
	4/29/2016	1008	27.4	17,997,379.2	29.1	3.0	>100	1	10.0
GP-5	1/29/2015	0920	48.0	31,528,255.5	24.4	3.7	>100	0	2.4
	7/14/2015	1107	72.8	47,817,854.2	24.0	0.0	>100	3	0.5
	2/25/2016	1141	0.0	0.0	0.0	21.5	0.0	0	1.4
	3/28/2016	1204	55.5	36,454,545.5	24.2	0.0	>100	1	1.2
	4/29/2016	1207	71.0	46,635,544.6	20.8	0.0	>100	1	0.7
GP-6	1/29/2015	0930	0.6	394,103.2	0.3	20.5	12.0	0	7.6
	7/14/2015	1044	61.0	40,067,158.1	33.0	0.4	>100	0	0.3
	2/25/2016	1049	0.0	0.0	0.1	21.3	0.0	0	2.9
	3/28/2016	1129	40.9	26,864,701.1	22.9	6.8	>100	0	3.1
	4/29/2016	1122	64.7	42,497,461.1	34.1	6.8	>100	0	9.5
GP-7	1/29/2015	0940	0.0	0.0	0.0	21.1	0.0	0	0.7
	7/14/2015	1054	1.8	1,182,309.6	5.4	14.9	0.0	0	0.2
	2/25/2016	1055	0.0	0.0	0.1	21.3	0.0	0	1.3
	3/28/2016	1121	1.1	722,522.5	0.9	18.4	22.0	0	0.0
	4/29/2016	1110	14.1	9,261,425.1	17.0	2.0	>100	11	1.2
GP-8	1/29/2015	0950	0.0	0.0	4.9	15.3	0.0	0	2.5
	7/14/2015	1306	0.3	197,051.6	21.7	0.8	0.0	0	0.0
	2/25/2016	1134	0.0	0.0	0.0	21.5	0.0	0	0.0
	3/28/2016	1212	0.0	0.0	13.3	4.1	0.0	0	0.0
	4/29/2016	1219	0.0	0.0	9.2	9.6	0.0	0	1.8

Table 2
Landfill Gas Probe Screening Measurements
Old Charlotte Landfill/Vanguard Center
Mecklenburg County, North Carolina

Landfill Gas Probe Code	Screening Date	Time	Methane		Carbon Dioxide (%)	Oxygen (%)	LEL (%)	Hydrogen Sulfide (ppm)	Total VOCs (ppm)
			(%)	($\mu\text{g}/\text{m}^3$)					
GP-9	1/29/2015	1000	33.4	21,938,411.1	25.6	0.0	>100	0	4.6
	7/14/2015	0938	68.4	44,927,764.1	27.9	0.0	>100	0	0.4
	2/25/2016	1007	0.0	0.0	0.1	20.8	0.0	0	0.5
	3/28/2016	1034	4.9	3,218,509.4	10.3	16.4	98.0	0	0.6
	4/29/2016	1023	70.7	46,438,493.0	26.7	0.4	>100	6	1.7
GP-10	1/29/2015	1010	0.7	459,787.1	2.5	18.5	14.0	0	21.6
	7/14/2015	0900	47.2	31,002,784.6	27.7	0.0	>100	0	0.3
	2/25/2016	1025	0.0	0.0	0.1	21.0	0.0	0	0.0
	3/28/2016	1047	68.3	44,862,080.3	24.0	1.8	>100	0	0.9
	4/26/2016	1042	56.2	36,914,332.5	26.1	0.3	>100	0	1.0
GP-11	1/29/2015	1030	8.8	5,780,180.2	19.6	0.0	>100	0	4.7
	7/15/2015	0958	13.2	8,670,270.3	21.8	0.0	>100	0	0.0
	2/25/2016	1040	0.0	0.0	0.1	21.1	0.0	0	0.0
	3/28/2016	1107	0.0	0.0	5.9	18.1	0.0	0	0.0
	4/29/2016	1059	16.5	10,837,837.8	15.2	2.2	>100	2	1.2
GP-12	1/29/2015	1020	12.1	7,947,747.7	19.2	7.0	>100	0	15.3
	7/14/2015	0911	24.0	15,764,127.8	22.2	0.0	>100	0	0.3
	2/25/2016	1031	0.0	0.0	0.1	21.0	0.0	0	2.3
	3/28/2016	1053	17.5	11,494,676.5	20.4	5.3	>100	0	2.2
	4/29/2016	1052	15.3	10,049,631.4	17.7	6.9	>100	0	9.3

Notes:

1. Methane ($\mu\text{g}/\text{m}^3$) was calculated using the following formula: $=[((\% \text{ by volume}) * 16.04) / 24.42] * 1,000,000$

Formula variables:

16.04 grams/mol - the molecular weight of methane

24.45 - conversion factor that represents the volume of one mole of gas at a temperature of 25° C and a pressure of 1 atmosphere (29.9" of Hg)

1,000,000 - conversion factor from g to μg

2. LEL - lower explosive limit

3. VOCs - volatile organic compounds

4. ppm - parts per million

5. (%) - percent

6. 01/29/2015 Weather Conditions: Temperature = 46°F, Barometric Pressure = 30.09" Hg, Humidity = 28%

7. 07/14/2015 Weather Conditions: Temperature = 87°F, Barometric Pressure = 29.83" Hg, Humidity = 79%

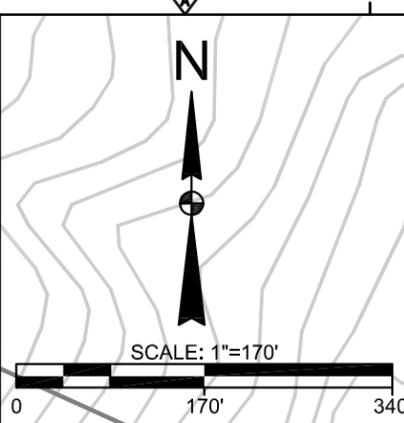
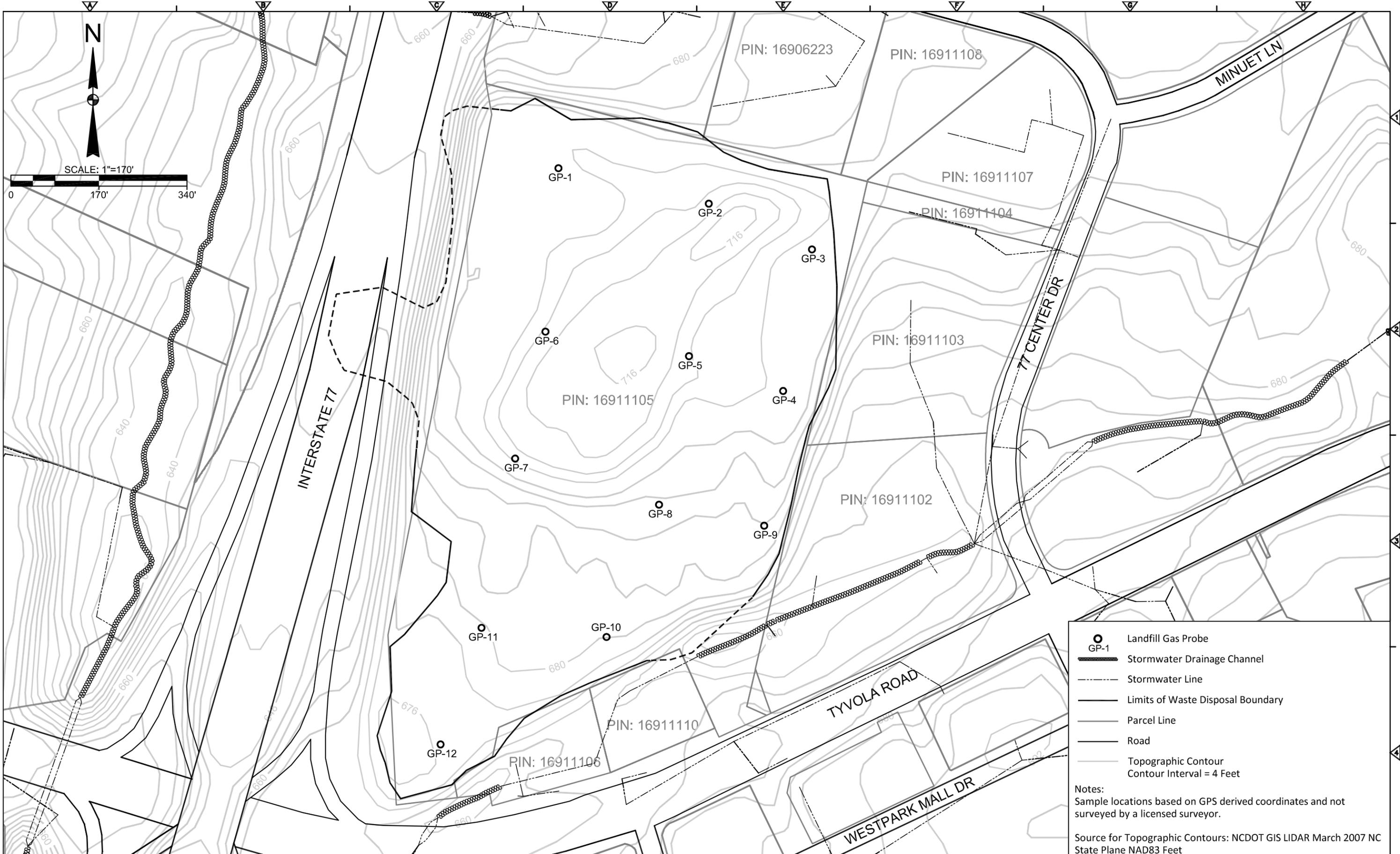
8. 07/15/2015 Weather Conditions: Temperature = 83°F, Barometric Pressure = 29.79" Hg, Humidity = 58%

9. 02/25/2016 Weather Conditions: Temperature = 47°F, Barometric Pressure = 29.79" Hg, Humidity = 50%

10. 03/28/2016 Weather Conditions: Temperature = 70.0°F, Barometric Pressure = 29.90" Hg, Humidity = 63%

11. 04/29/2016 Weather Conditions: Temperature = 65.0°F, Barometric Pressure = 29.21" Hg, Humidity = 52%

Figures



- GP-1 Landfill Gas Probe
- Stormwater Drainage Channel
- Stormwater Line
- Limits of Waste Disposal Boundary
- Parcel Line
- Road
- Topographic Contour
Contour Interval = 4 Feet

Notes:
 Sample locations based on GPS derived coordinates and not surveyed by a licensed surveyor.
 Source for Topographic Contours: NCDOT GIS LIDAR March 2007 NC State Plane NAD83 Feet

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: **A. WEISPFENNING**
 DRAWN BY: **A. WEISPFENNING**
 SHEET CHK'D BY: **D. FORBES**
 CROSS CHK'D BY: **M. COLONE**
 APPROVED BY: **M. COLONE**
 DATE: **JANUARY 2016**

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CHARLOTTE, MECKLENBURG COUNTY, NORTH CAROLINA
OLD CHARLOTTE LANDFILL/VANGUARD CENTER
 (NONCD0001065)

SAMPLING LOCATIONS

PROJECT NO. 127844-100000
 FILE NAME: FIGURE 1.DWG
 FIGURE
1

Appendix A

Field Notes

Old Charlotte Landfill/Vanguard Center
Site Identification Number: NONCD0001065

4-29-10 65°F sunny
 0030 J. Daver and M. Darwin
 depart Raleigh office

0940 Arrive onsite for 3rd LFG
 screening, calibrate equipment
 GFM 2000+, SN: 6M12334/10
 cal gas: 35/50, exp 10-21-18
 CH₄ 50.0% → 50.0% pass
 CO₂ 35.0% → 35.0% pass
 Mini Rae 3000, SN: 592-002605
 cal gas isobutylene exp: 1-20-20
 100.00 ppm → 100.00 ppm pass

temp: 73°F
 baro pressure: 29.21" Hg
 humidity: 64%

GNWELL WL GPWELL WL

MN-1	50.06	GP-1	dry
3	39.78	2	10.98
4	26.84	3	22.90
5	30.91	4	16.99
6	28.84	5	20.97
7	35.05	6	23.54
8	27.26	7	dry
9	35.84	8	13.96
		9	16.27
		10	19.85
		11	11.08
		12	29.29

4-29-10 70°F sunny

ID	time	purge	CH ₄	LEL	SUEL	CO ₂	O ₂	H ₂	VOC
1	1448	274	64.5	>>>	>>>	34.7	0.0	6	3.9
2	1450	297	52.4	>>>	>>>	31.1	0.0	0	1.4
3	1228	200	44.9	>>>	>>>	22.2	0.0	0	1.8
4	1008	327	27.4	>>>	>>>	24.1	0.0	1	10.0
5	1207	277	71.0	>>>	>>>	20.8	0.0	1	0.7
6	1122	422	64.7	>>>	>>>	34.1	0.0	0	9.5
7	1110	496	14.1	11	>>>	17.0	2.0	11	1.2
8	1249	71	0.0	-	-	9.2	9.6	0	1.8
9	1023	73	70.7	>>>	>>>	26.7	0.4	6	1.7
10	1042	269	56.2	>>>	>>>	26.1	0.3	0	1.0
11	1059	344	16.5	87	>>>	15.2	2.2	2	1.2
12	1052	81	15.3	>>>	>>>	17.7	6.9	0	9.3

1100 temp: 70°F
 baro pressure: 29.98" Hg
 humidity: 52%
 bump test
 PID: 100 ppm isobutylene
 GEM: 50% CH₄
 35% CO₂
 temp: 80°F
 baro pressure: 29.97" Hg
 humidity: 42%

1205

4-29-16 75°F sunny

1235 Bump test

PID 100 ppm isobutylene

GEM 50% CH₄

35% CO₂

1245 Put equipment away.

1250 J. Bauer and M. Darwin
offsite

1700 Arrive at office

Power Down

Appendix B

Report Certification

Old Charlotte Landfill/Vanguard Center
Site Identification Number: NONCD0001065

REPORT CERTIFICATION

Document Name: Remedial Investigation – Contaminant Delineation
Site Name: Old Charlotte Landfill/Vanguard Center
Site ID: NONCD0001065
Task Order: Task Order 1065DP-9

I certify that, to the best of my knowledge, after thorough investigation, the information contained in or accompanying this certification is true, accurate, and complete.

Mathew F. Colone, P.G.
Project Manager

Mathew Colone
Signature

5/11/2016
Date

Before me personally appeared Mathew F. Colone to me known and known to me to be the person described in and who executed the foregoing instrument, and acknowledge to and before me that Mathew F. Colone executed said instrument for the purposes therein expressed.

Witness my hand and official seal this 11th day of May, 2016.

Joseph N. Jones
Notary Public
North Carolina
State of

05/31/2017
My Commission Expires On
Wake
County of

