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April 4, 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-8

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-8. 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 March 23, 2016, and CDM Smith's Standard Operating Procedures and Quality Assurance manual.

Field activities were completed on March 28, 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 (VOC). Field activities and screening results are summarized below.

Landfill Gas Probe Screening

All LFG probes were screened on March 28, 2016 for methane, hydrogen sulfide, oxygen, carbon dioxide, and VOC, 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 exceptions of GP-8 and -11. Methane ranged from 1.1 percent in GP-7 to 68.3 percent in GP-10. Total VOCs ranged from 0.0 parts per million (ppm) in GP-1, -3, -7, -8, and -11 to 3.1 ppm in GP-6. LFG probes GP-1, -3, and -5 had detections of hydrogen sulfide at 1 ppm. Water was measured in or above the screen in GP-2, -3, -8, -9, -11, and -12. Water was measured at less than 6 inches in the bottom of the screen interval in LFG probes GP-4, -5, -6, and -10, I. 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-8 dated March 23, 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	
	3/28/2016	Dry	
GP-2	1/29/2015	Dry	19.0 - 24.0
	7/14/2015	Dry	
	2/25/2016	Dry	
	3/28/2016	16.55	
GP-3	1/29/2015	24.75	19.6 - 24.6
	7/14/2015	Dry	
	2/25/2016	Dry	
	3/28/2016	23.98	
GP-4	1/29/2015	Dry	14.2 - 19.2
	7/14/2015	Dry	
	2/25/2016	14.82	
	3/28/2016	18.85	
GP-5	1/29/2015	Dry	16.1 - 21.1
	7/14/2015	Dry	
	2/25/2016	Dry	
	3/28/2016	21.01	
GP-6	1/29/2015	Dry	23.7 - 28.7
	7/14/2015	Dry	
	2/25/2016	Dry	
	3/28/2016	28.38	
GP-7	1/29/2015	Dry	18.6 - 23.6
	7/14/2015	Dry	
	2/25/2016	Dry	
	3/28/2016	Dry	
GP-8	1/29/2015	Dry	11.2 - 16.2
	7/14/2015	Dry	
	2/25/2016	10.43	
	3/28/2016	14.96	
GP-9	1/29/2015	Dry	15.0 - 20.0
	7/14/2015	Dry	
	2/25/2016	13.34	
	3/28/2016	14.78	
GP-10	1/29/2015	19.79	14.9 - 19.9
	7/14/2015	19.72	
	2/25/2016	19.55	
	3/28/2016	19.84	
GP-11	1/29/2015	Dry	9.1 - 11.1
	7/15/2015	Dry	
	2/25/2016	8.42	
	3/28/2016	9.87	
GP-12	1/29/2015	Dry	18.4 - 23.4
	7/14/2015	Dry	
	2/25/2016	20.03	
	3/28/2016	20.38	

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
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
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
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
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
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
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
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
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
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

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-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
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

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%

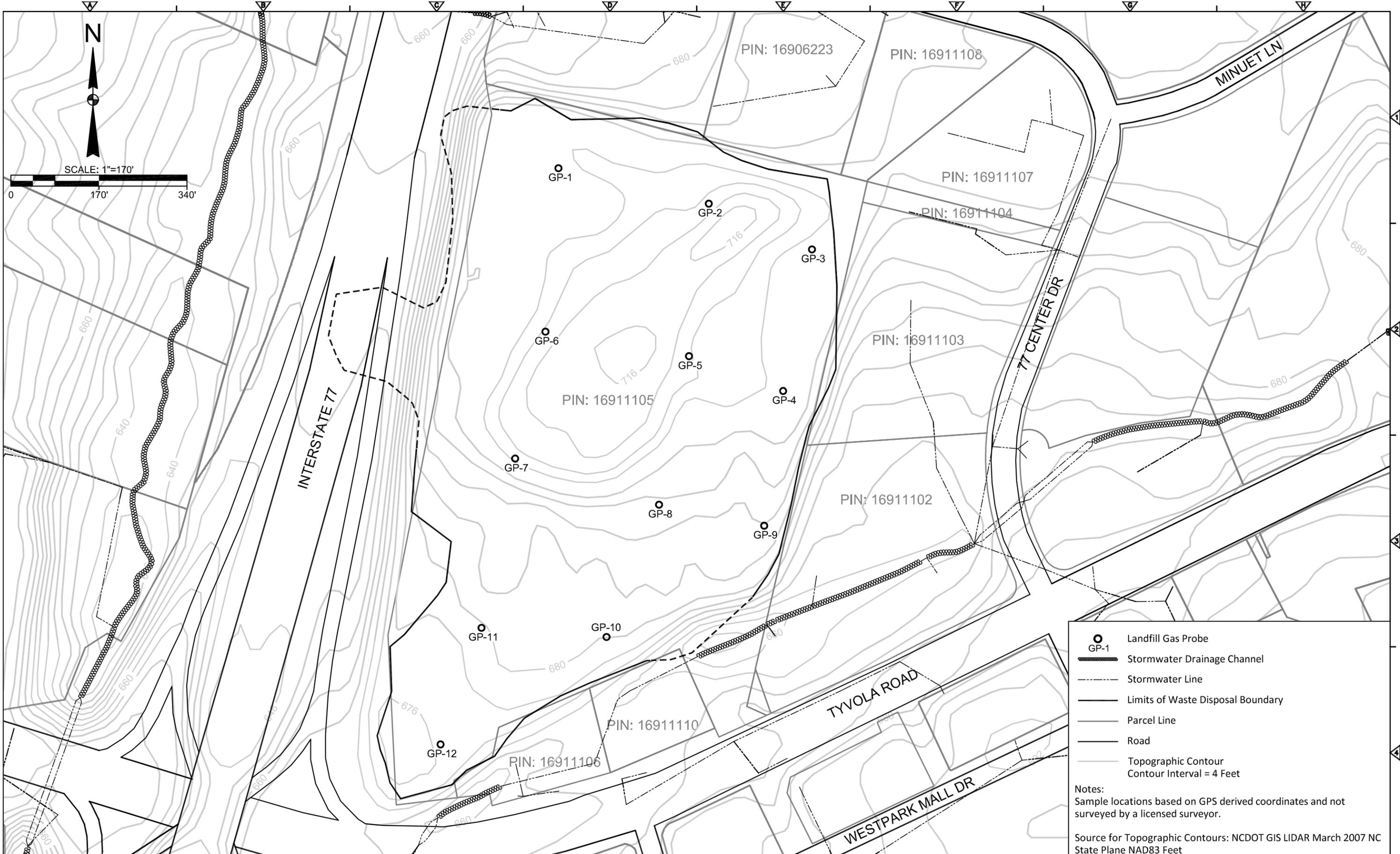
7. 07/14/2015 Weather Conditions: Temperature = 87°F, Barometric Pressure = 29.83" Hg, Humidity = 79%

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%

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

2-25-16 50°F Sunny
Bump tests and weather conditions

1100 temp = 51°F
humidity = 43%
baro pressure = 29.81" Hg

1110 bump test PID 100ppm isobutylene
GEM 50% CH₄
35% CO₂

1150 temp = 50.0°F
humidity = 39%
baro pressure = 29.83" Hg

1155 bump test PID 100ppm isobutylene
GEM 50% CH₄
35% CO₂

Jacobs

3-28-16 70°F cloudy

0645 Depart Raleigh office
0945 Arrive onsite M. Darwin
and J. Bauer for second
LFG screening

calibrate equipment:

GEM 2000+, SN GMI32587/11
Cal gas 35/50 exp 11-30-2016
CH₄ 50% → 50% pass
CO₂ 35% → 35% pass

Mini Rae 3000, SN: 592-910541
Cal gas 150 100 exp. 12-5-18
isobutylene 100 ppm → 100 ppm pass.
temp: 60.8 F

baro pressure = 29.25" Hg

humidity: ^{88%} WL ground ^{78%} BWL ground

Well ID WL TD GP ID WL TD

31 MW-3	33.28	30.64	GP-1	21.04	44.0	
29.5 1	49.87	48.39	2	16.55	17.52	24.0
30.25 4	26.56	24.00	3	23.98	19.39	42
26.5 5	38.05	27.80	4	18.85	15.01	34.25
39.1 6	27.97	24.67	5	21.01	17.20	45.25
31.75 7	34.62	31.55	6	28.38	24.68	44
32.25 8	26.98	24.30	7	23.22	19.65	42.5
26.5 9	35.67	33.41	8	14.96	10.73	38.5
			9	14.78	11.79	37.2
			10	17.84	16.96	34.4
			11	9.87	5.81	48.25
			12	20.38	16.94	40.9

3-28-16 70°F cloudy

ID	time	purge	CH ₄	iEL	iEL	CO ₂	O ₂	H ₂ S	VOC
GP-1	1144	361	64.3	-	77	35.6	0.0	1	0.0
2	1156	69	47.5	77	77	27.1	3.5	0	9.9
3	1221	578	51.7	77	77	24.9	0.0	1	0.0
4	1081	64	23.3	77	77	14.2	3.0	0	1.4
5	1204	62	55.5	77	77	24.2	0.0	1	1.2
6	1129	70	40.9	77	77	22.9	6.8	0	3.1
7	1121	72	1.1	-	22	0.9	18.4	0	0.0
8	1212	68	0.0	-	-	13.3	4.1	0	0.0
9	1034	62	4.9	-	98	10.3	16.4	0	0.6
10	1047	65	68.3	77	77	24.0	1.8	0	0.9
11	1107	65	0.0	-	-	5.9	18.1	0	0.0
12	1053	68	17.5	77	77	20.4	5.3	0	2.2

wasp nest at MW-5

1103 temp: 70°F
baro pressure 29.90" Hg
humidity: 63%

1130 bump test
PID 100 ppm isobutylene
GEM 50% CH₄
35% CO₂

1202 temp 73.0°F
baro pressure 29.90" Hg
humidity 44%

3-28-16 75°F p. cloudy

1245 bump test
PID 100 ppm isobutylene
GEM 35% CO₂
50% CH₄

1315 M. Darwin and J. Bauer
offsite

1630 Arrive at office.

Janelle Bauer

Appendix B

Report Certification

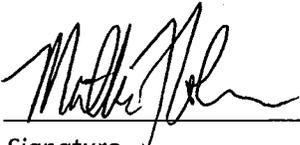
Old Charlotte Landfill/Vanguard Center
Site Identification Number: NONCD0001065

REPORT CERTIFICATION

Document Name: Remedial Investigation – Contaminant Delineation
Site Name: Old Charlotte Landfill/Vanguard Center
Site ID: NONCD0001065
Task Order: Task Order 1065DP-8

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



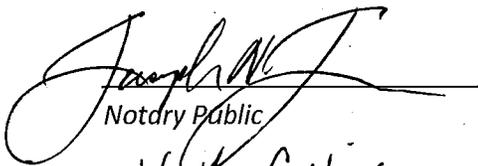
Signature

4/4/2016

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 4th day of April, 2016.



Notary Public
North Carolina

State of

5/31/2019

My Commission Expires On
Wake

County of

