

**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).

**Instructions:**

- Prepare one form for each individually monitored unit.
- Please type or print legibly.
- Attach a notification table with values that attain or exceed NC 2L groundwater standards or NC 2B surface water standards. The notification must include a preliminary analysis of the cause and significance of each value. (e.g. naturally occurring, off-site source, pre-existing condition, etc.).
- Attach a notification table of any groundwater or surface water values that equal or exceed the reporting limits.
- Attach a notification table of any methane gas values that attain or exceed explosive gas levels. This includes any structures on or nearby the facility (NCAC 13B .1629 (4)(a)(i)).
- Send the original signed and sealed form, any tables, and Electronic Data Deliverable to: Compliance Unit, NCDENR-DWM, Solid Waste Section, 1646 Mall Service Center, Raleigh, NC 27699-1646.

**Solid Waste Monitoring Data Submittal Information**

Name of entity submitting data (laboratory, consultant, facility owner):

Smith Gardner, Inc.

Contact for questions about data formatting. Include data preparer's name, telephone number and E-mail address:

Name: Madeline German Phone: 919-828-0577x222

E-mail: madeline@smithgardnerinc.com

Facility name:	Facility Address:	Facility Permit #	NC Landfill Rule: (.0500 or .1600)	Actual sampling dates (e.g., October 20-24, 2006)
Washington County Closed MSW Landfill	718 Landfill Road, Roper, NC	94-01	.0500	September 4, 2012

**Environmental Status: (Check all that apply)**

- Initial/Background Monitoring  Detection Monitoring  Assessment Monitoring  Corrective Action

**Type of data submitted: (Check all that apply)**

- Groundwater monitoring data from monitoring wells  Methane gas monitoring data  
 Groundwater monitoring data from private water supply wells  Corrective action data (specify) \_\_\_\_\_  
 Leachate monitoring data  Other(specify) \_\_\_\_\_  
 Surface water monitoring data

**Notification attached?**

- No. No groundwater or surface water standards were exceeded.  
 Yes, a notification of values exceeding a groundwater or surface water standard is attached. It includes a list of groundwater and surface water monitoring points, dates, analytical values, NC 2L groundwater standard, NC 2B surface water standard or NC Solid Waste GWPS and preliminary analysis of the cause and significance of any concentration.  
 Yes, a notification of values exceeding an explosive methane gas limit is attached. It includes the methane monitoring points, dates, sample values and explosive methane gas limits.

**Certification**

To the best of my knowledge, the information reported and statements made on this data submittal and attachments are true and correct. Furthermore, I have attached complete notification of any sampling values meeting or exceeding groundwater standards or explosive gas levels, and a preliminary analysis of the cause and significance of concentrations exceeding groundwater standards. I am aware that there are significant penalties for making any false statement, representation, or certification including the possibility of a fine and imprisonment.

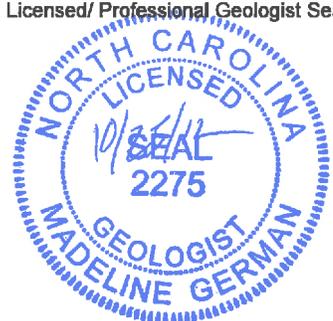
Madeline German, PG Geologist 919-828-0577x222  
 Facility Representative Name (Print) Title (Area Code) Telephone Number  
 Signature 10/25/2012 Affix NC Licensed/ Professional Geologist Seal

14 N. Boylan Ave, Raleigh, NC 27603

Facility Representative Address

CO828

NC PE Firm License Number (if applicable effective May 1, 2009)



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**Ground Water Monitoring Report  
Fall 2012 Semi-Annual Event**

**Washington County Closed MSW Landfill  
Roper, North Carolina  
NC Solid Waste Permit No. 94-01 – MSWLF-1980**

Prepared for:



**Washington County  
P.O.Box 1007  
Plymouth, North Carolina 27962**

**October 2012**

Prepared by:

**SMITH+GARDNER**

14 N. Boylan Avenue, Raleigh NC 27603 | 919.828.0577



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# Washington County Closed MSW Landfill Ground Water Monitoring Report Semi-Annual Event – Fall 2012

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## 1.0 INTRODUCTION

The Washington County Closed MSW Landfill, operating under Solid Waste Permit #94-01-MSWLF-1980, is required to conduct semi-annual ground water monitoring in accordance with Solid Waste Section Rule 15A NCAC 13B.0500 (et seq.). This report presents the semi-annual sampling results for the event conducted on September 4, 2012; and includes a field procedure summary, laboratory analyses and ground water characterization for the site. The laboratory analytical results and a single-day potentiometric surface map are also included.

## 2.0 REGIONAL GEOLOGY

The Washington County Landfill is located near Roper, North Carolina. According to the Geologic Map of North Carolina (*USGS, 1985*) this site is underlain by Quaternary surficial deposits that include sand, gravel, clay, and peat deposited in marine, fluvial, eolian and lacustrine environments; typical for a coastal plain environment.

## 3.0 SAMPLING PROCEDURES

The sampling event, reportedly performed by Environment 1, Inc. on September 4, 2012, entailed sample collection from four ground water monitoring wells (MW-1 through MW-4) in accordance with the approved site Sampling and Analysis Plan. As part of quality control a trip blank was analyzed for Appendix I volatile organic compounds (VOCs).

Sampling methods followed the protocol outlined in the North Carolina Water Quality Monitoring Guidance Document for Solid Waste Facilities (North Carolina Department of Environment and Natural Resources, Division of Waste Management). The depth to water in each well was gauged prior to purging and sampling. Field measurements for pH, specific conductivity, and temperature were recorded for each well.

Samples were collected in laboratory prepared containers for the specified analytical procedures. Ground water samples were properly preserved, placed on ice and transported to the laboratory facility within the specified holding times for each analysis.

Surface water samples are not included with semi-annual monitoring requirements for this site.

## 4.0 FIELD & LABORATORY DATA

### 4.1 Laboratory Analysis

The ground water samples were transported to Environment 1, Inc., in Greenville, NC, a North Carolina certified laboratory (NC Wastewater ID #10). Samples were analyzed for the Appendix I VOCs via EPA Test Method 8260B and metals via EPA Test Method 200.8. The laboratory analytical report is included as **Appendix A**.

## 4.2 Field and Laboratory Results

Barium was detected above the SWSL in MW-2, MW-3 and MW-4. No inorganic constituents were detected above the 2L Standard.

Three organic constituents, 1,4-dichlorobenzene, benzene and chlorobenzene were detected above the SWSL in MW-2 and MW-3. The following parameter was reported above the 2L Standard:

- benzene (MW-2).

The field parameter results are shown in **Table 2**. Detected inorganic constituents (metals) are presented in **Table 3** and organic constituents (VOCs) are presented in **Table 4**.

Graphs of historic detected organic constituents are included in **Appendix B**. Constituents detected between the Method Detection Limit (MDL) and SWSL are denoted as “J” qualified values; which are not quantifiable values.

## 5.0 GROUND WATER CHARACTERIZATION

A single-day potentiometric surface map was prepared from ground water data collected during this sampling event; from both the closed MSW landfill and the adjacent C&D landfill. The groundwater elevations indicate that ground water flows in a general north-northwest direction. Hydraulic conductivity data is not available for these wells so ground water velocities could not be calculated. The potentiometric surface map is presented as **Figure 1**.

## 6.0 CONCLUSIONS

Laboratory results indicate that water quality at the Washington County Closed MSW Landfill is generally consistent with reported historical detections. In MW-2 benzene, chlorobenzene and 1,4 dichlorobenzene concentrations increased and set new peak levels, above those set in the spring 2010. MW-3 continued to follow a decreasing trend for all three constituents.

The next ground water monitoring event is scheduled for March 2013. Results will be reported following laboratory analysis.

## **TABLES**

**Groundwater Monitoring Report  
Washington County Closed MSW Landfill  
Semi-Annual Event – Fall 2012**

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**Table 1  
Groundwater Elevation Data  
Washington County MSW Landfill  
9/4/2012**

<b>Well</b>	<b>Northing</b>	<b>Easting</b>	<b>Top of Casing (TOC) Elevation (feet)</b>	<b>Depth to Water (feet)</b>	<b>Groundwater Elevation (feet)</b>
MW-1	797426.27	2691416.85	10.01	7.29	2.72
MW-2	798555.67	2690813.33	9.70	7.76	1.94
MW-3	797500.35	2689659.95	11.30	9.42	1.88
MW-4	796852.09	2690320.91	9.02	5.93	3.09

Data from Environment 1 laboratory report dated 09/18/2012, ID# 6018.

Depth to Water measured from top of PVC casing.

Well locations and elevations provided by Sanborn, Charlotte, NC from field survey conducted on 4/8/09.

**Table 2**  
**Field Parameter Results**  
**Washington County MSW Landfill**  
**9/4/2012**

Well	pH (Std units)	Specific Conductivity (umhos/cm)	Temperature (Celsius)	Static Water Level (feet)
MW-1	5.3	788	20	7.29
MW-2	6.6	1317	22	7.76
MW-3	6.1	485	19	9.42
MW-4	5.7	199	19	5.93

**Note:** Temperature and pH measured with a laboratory grade thermometer.  
Data from Environment 1 laboratory report dated 09/18/2012, ID# 6018.

**Table 3**  
**Detected Inorganic Constituents**  
**Washington County Closed MSW Landfill**  
**9/4/2012**

Parameter	MDL	SWSL	2L	MW-1	MW-2	MW-3	MW-4
Arsenic	0.13	10	10	3.1 J	6.3 J	3.4 J	0.60 J
Barium	0.07	100	700	<b>121</b>	<b>519</b>	<b>111</b>	31.1 J
Cadmium	0.03	1	2	0.12 J	0.21 J	0.04 J	0.18 J
Total Chromium	0.18	10	10	0.54 J	1.1 J	0.91 J	4.0 J
Lead	0.08	10	15	0.44 J	0.53 J	0.26 J	0.24 J
Mercury	0.02	0.2	1	0.04 J	0.07 J	<0.02	0.03 J
Selenium	0.17	10	20	1.3 J	0.75 J	0.29 J	<0.17

- SWSL - Solid Waste Section Quantitation Limit
- 2L - Groundwater Standard (15A NCAC 2L 0200)
- MDL - Method Detection Limit
- <MDL - Not detected at or above MDL
- Shading - Levels above 2L standard
- Bold Letters - Constituent detected above SWSL
- J - Detected between MDL and SWSL limit

SWSL, 2L Standards and Results are presented in ug/l.  
Data from Environment 1 laboratory report dated 09/18/2012, ID# 6018.

**Table 4**  
**Detected Organic Constituents**  
**Washington County MSW Landfill**  
**9/4/2012**

Parameter	MDL	SWSL	2L Standard	MW-1	MW-2	MW-3	MW-4
1,4-Dichlorobenzene	0.39	1	6	<0.39	<b>3.6</b>	<b>2.7</b>	<0.39
Benzene	0.24	1	1	<0.24	<b>1.6</b>	1	<0.24
Chlorobenzene	0.3	3	50	<0.30	<b>10.4</b>	<b>14.8</b>	<0.30

Note: Results are presented in ug/l (ppb)

- SWSL - Solid Waste Section Quantitation Limits
- 2L - Groundwater Standards (15A NCAC 2L 0200)
- MDL - Method Detection Limit
- Shading - Levels above 2L standard or no 2L standard
- Bold Letters - Levels above SWSL
- < MDL - Level not detected above the MDL

Note: Data from Environment 1 laboratory report dated 09/18/2012, ID# 6018.

## **FIGURES**

**Groundwater Monitoring Report  
Washington County Closed MSW Landfill  
Semi-Annual Event – Fall 2012**

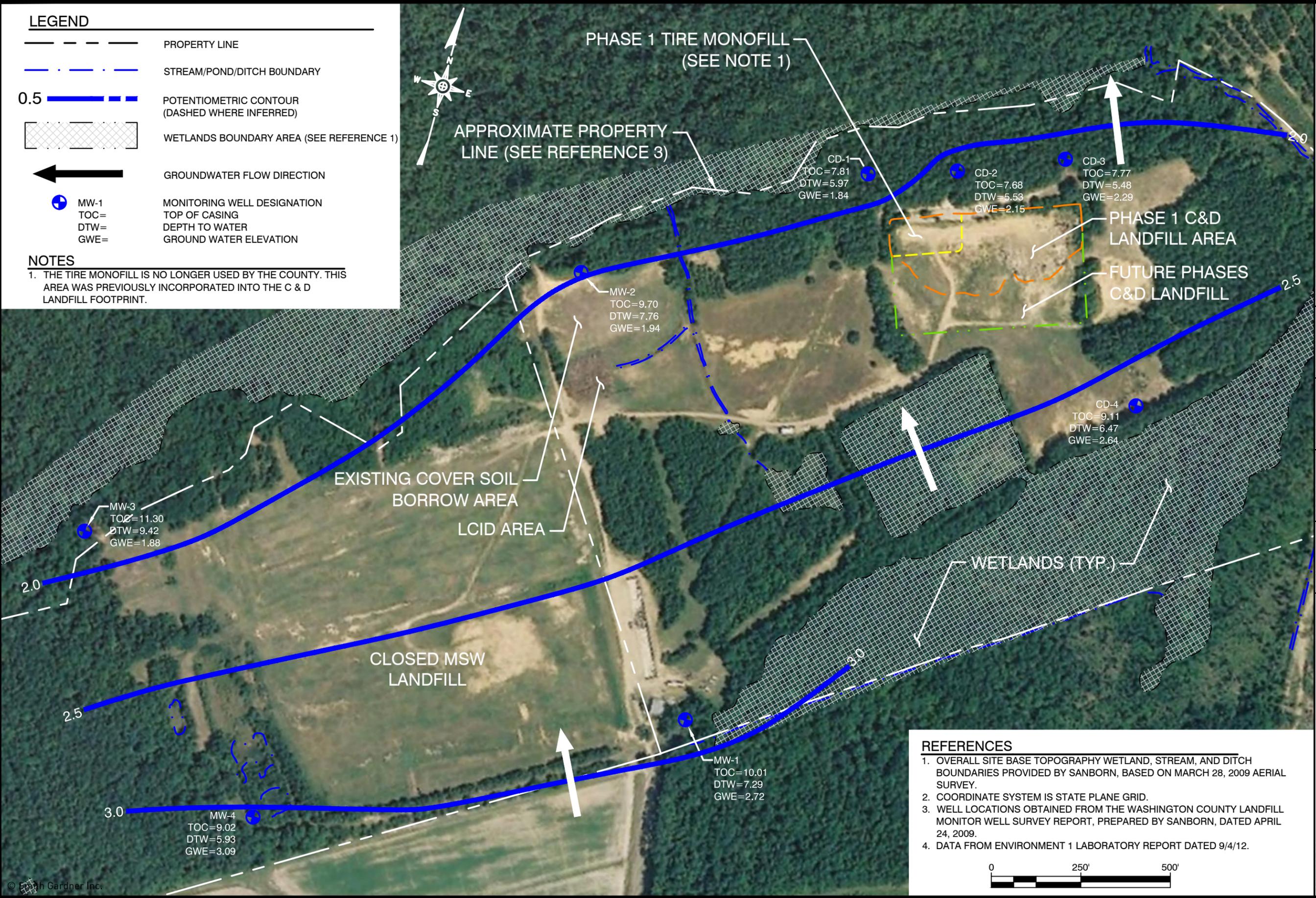
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**LEGEND**

-  PROPERTY LINE
-  STREAM/POND/DITCH BOUNDARY
-  0.5 POTENTIOMETRIC CONTOUR (DASHED WHERE INFERRED)
-  WETLANDS BOUNDARY AREA (SEE REFERENCE 1)
-  GROUNDWATER FLOW DIRECTION
-  MW-1  
TOC=  
DTW=  
GWE= MONITORING WELL DESIGNATION  
TOP OF CASING  
DEPTH TO WATER  
GROUND WATER ELEVATION

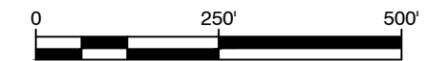
**NOTES**

1. THE TIRE MONOFILL IS NO LONGER USED BY THE COUNTY. THIS AREA WAS PREVIOUSLY INCORPORATED INTO THE C & D LANDFILL FOOTPRINT.



**REFERENCES**

1. OVERALL SITE BASE TOPOGRAPHY WETLAND, STREAM, AND DITCH BOUNDARIES PROVIDED BY SANBORN, BASED ON MARCH 28, 2009 AERIAL SURVEY.
2. COORDINATE SYSTEM IS STATE PLANE GRID.
3. WELL LOCATIONS OBTAINED FROM THE WASHINGTON COUNTY LANDFILL MONITOR WELL SURVEY REPORT, PREPARED BY SANBORN, DATED APRIL 24, 2009.
4. DATA FROM ENVIRONMENT 1 LABORATORY REPORT DATED 9/4/12.



PREPARED FOR: WASHINGTON COUNTY MSW AND C&D LANDFILLS POTENTIOMETRIC SURFACE MAP FALL 2012  
 DRAWN: W.R.B. DATE: Oct 2012  
 APPROVED: M.M.G. PROJECT NO: WASH 08-2  
 SCALE: AS SHOWN FILENAME: WASH-B0034  
 FIGURE NO: 1  
 PREPARED BY: SMITH+GARDNER NC LIC. NO. C-0828 (ENGINEERING) 14 N. Boylan Avenue, Raleigh NC 27603 | 919.828.0577

**SMITH+GARDNER**

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## **Appendix A**

### **Laboratory Analytical Reports**

**Groundwater Monitoring Reports  
Washington County Closed MSW Landfill  
Semi-Annual Event – Fall 2012**

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# Environment 1, Incorporated

Drinking Water ID: 37715  
Wastewater ID: 10

P.O. BOX 7085, 114 OAKMONT DRIVE  
GREENVILLE, N.C. 27835-7085

PHONE (252) 756-6208  
FAX (252) 756-0633

ID#: 6018

WASHINGTON CO. LANDFILL  
MR. CARL CRITCHER  
P.O. BOX 1007  
PLYMOUTH ,NC 27962

DATE COLLECTED: 09/04/12  
DATE REPORTED : 09/18/12

REVIEWED BY: 

PARAMETERS	MDL	SWSL	MW-1	MW-2	MW-3	MW-4	Trip	Analysis	Method
							Blank	Date	Analyst
PH (field measurement), Units			5.3	6.6	6.1	5.7		09/04/12RJH	SM4500HB
Arsenic, ug/l	0.13	10.0	3.1 J	6.3 J	3.4 J	0.60 J		09/13/12LFS	EPA200.8
Barium, ug/l	0.07	100.0	121	519	111	31.1 J		09/13/12LFS	EPA200.8
Cadmium, ug/l	0.03	1.0	0.12 J	0.21 J	0.04 J	0.18 J		09/13/12LFS	EPA200.8
Total Chromium, ug/l	0.18	10.0	0.54 J	1.1 J	0.91 J	4.0 J		09/13/12LFS	EPA200.8
Lead, ug/l	0.08	10.0	0.44 J	0.53 J	0.26 J	2.4 J		09/13/12LFS	EPA200.8
Mercury, ug/l	0.02	0.20	0.04 J	0.07 J	---	0.03 J		09/13/12LFS	EPA200.8
Selenium, ug/l	0.17	10.0	1.3 J	0.75 J	0.29 J	---		09/13/12LFS	EPA200.8
Silver, ug/l	0.10	10.0	---	---	---	---		09/13/12LFS	EPA200.8
Conductivity (at 25c), uMhos/cm	1.0	1.0	788	1317	485	199		09/04/12RJH	SM2510B
Temperature, °C			20	22	19	19		09/04/12RJH	SM2550B
Static Water Level, feet			7.29	7.76	9.42	5.93		09/04/12RJH	
Well Depth, feet			23.09	19.30	19.97	22.90		09/04/12RJH	

J = Between MDL and SWSL, U = Below ALL Quantitation Limits.

# Environment 1, Incorporated

Drinking Water ID: 37715  
Wastewater ID: 10

P.O. BOX 7085, 114 OAKMONT DRIVE  
GREENVILLE, N.C. 27835-7085

PHONE (252) 756-6208  
FAX (252) 756-0633

CLIENT: WASHINGTON CO. LANDFILL  
MR. CARL CRITCHER  
P.O. BOX 1007  
PLYMOUTH, NC 27962

CLIENT ID: 6018  
ANALYST: MAO  
DATE COLLECTED: 09/04/12  
DATE REPORTED: 09/18/12

Page: 1

REVIEWED BY: 

## VOLATILE ORGANICS EPA METHOD 8260B R1(96)

PARAMETERS, ug/l	Date Analyzed:		09/10/12	09/07/12	09/10/12	09/10/12	09/10/12	
	MDL	SWSL	MW-1	MW-2	MW-3	MW-4	Trip Blank	
1. Chloromethane	0.77	1.0	---	U	---	U	---	U
2. Vinyl Chloride	0.63	1.0	---	U	---	U	---	U
3. Bromomethane	0.67	10.0	---	U	---	U	---	U
4. Chloroethane	0.48	10.0	---	U	---	U	---	U
5. Trichlorofluoromethane	0.24	1.0	---	U	---	U	---	U
6. 1,1-Dichloroethene	0.17	5.0	---	U	---	U	---	U
7. Acetone	9.06	100.0	---	U	---	U	---	U
8. Iodomethane	0.26	10.0	---	U	---	U	---	U
9. Carbon Disulfide	0.23	100.0	---	U	---	U	---	U
10. Methylene Chloride	0.64	1.0	---	U	---	U	---	U
11. trans-1,2-Dichloroethene	0.23	5.0	---	U	---	U	---	U
12. 1,1-Dichloroethane	0.20	5.0	---	U	---	U	---	U
13. Vinyl Acetate	0.20	50.0	---	U	---	U	---	U
14. Cis-1,2-Dichloroethene	0.25	5.0	---	U	---	U	---	U
15. 2-Butanone	2.21	100.0	---	U	---	U	---	U
16. Bromochloromethane	0.27	3.0	---	U	---	U	---	U
17. Chloroform	0.25	5.0	---	U	---	U	---	U
18. 1,1,1-Trichloroethane	0.19	1.0	---	U	---	U	---	U
19. Carbon Tetrachloride	0.22	1.0	---	U	---	U	---	U
20. Benzene	0.24	1.0	---	U	1.60	1.00	---	U
21. 1,2-Dichloroethane	0.27	1.0	---	U	---	U	---	U
22. Trichloroethene	0.23	1.0	---	U	---	U	---	U
23. 1,2-Dichloropropane	0.21	1.0	---	U	---	U	---	U
24. Bromodichloromethane	0.21	1.0	---	U	---	U	---	U
25. Cis-1,3-Dichloropropene	0.24	1.0	---	U	---	U	---	U
26. 4-Methyl-2-Pentanone	1.19	100.0	---	U	---	U	---	U
27. Toluene	0.23	1.0	---	U	---	U	---	U
28. trans-1,3-Dichloropropene	0.28	1.0	---	U	---	U	---	U
29. 1,1,2-Trichloroethane	0.25	1.0	---	U	---	U	---	U
30. Tetrachloroethene	0.17	1.0	---	U	---	U	---	U
31. 2-Hexanone	1.57	50.0	---	U	---	U	---	U
32. Dibromochloromethane	0.24	3.0	---	U	---	U	---	U
33. 1,2-Dibromoethane	0.26	1.0	---	U	---	U	---	U
34. Chlorobenzene	0.30	3.0	---	U	10.40	14.80	---	U
35. 1,1,1,2-Tetrachloroethane	0.22	5.0	---	U	---	U	---	U
36. Ethylbenzene	0.21	1.0	---	U	---	U	---	U
37. Xylenes	0.68	5.0	---	U	---	U	---	U
38. Dibromomethane	0.28	10.0	---	U	---	U	---	U
39. Styrene	0.19	1.0	---	U	---	U	---	U
40. Bromoform	0.20	3.0	---	U	---	U	---	U
41. 1,1,2,2-Tetrachloroethane	0.26	3.0	---	U	---	U	---	U
42. 1,2,3-Trichloropropane	0.43	1.0	---	U	---	U	---	U
43. 1,4-Dichlorobenzene	0.39	1.0	---	U	3.60	2.70	---	U
44. 1,2-Dichlorobenzene	0.32	5.0	---	U	---	U	---	U
45. 1,2-Dibromo-3-Chloropropane	0.34	13.0	---	U	---	U	---	U
46. Acrylonitrile	2.72	200.0	---	U	---	U	---	U
47. trans-1,4-Dichloro-2-Butene	0.42	100.0	---	U	---	U	---	U

J = Between MDL and SWSL, U = Below ALL Quantitation Limits.

Environment 1, Inc.  
 P.O. Box 7085, 114 Oakmont Dr.  
 Greenville, NC 27858

Phone (252) 756-6208 • Fax (252) 756-0633

CLIENT: 6018 Week: 39

WASHINGTON CO. LANDFILL  
 MR. CARL CRITCHER  
 P.O. BOX 1007  
 PLYMOUTH NC 27962

(252) 793-5615

CHAIN OF CUSTODY RECORD

SAMPLE LOCATION	COLLECTION		TOTAL CHLORINE, mg/l AT COLLECTION	TEMPERATURE, °C AT COLLECTION	# OF CONTAINERS	Field pH	Metals	Conductivity	Temperature	Field Parameter	EPA 8260B	8260 Dup. 1	8260 Dup. 2	PARAMETERS	CLASSIFICATION:
	DATE	TIME													
MW-1	01/04/12	11:25		20	5									A - NONE B - HNO <sub>3</sub> C - H <sub>2</sub> SO <sub>4</sub> D - NaOH E - HCL F - ZINC ACETATE G - Na THIOSULFATE	WASTEWATER (NPDES)
MW-2	01/04/12	10:25		22	4										WASTEWATER (NPDES)
MW-3	01/04/12	09:50		19	4										DRINKING WATER
MW-4	01/04/12	09:30		19	4										DRINKING WATER
Trip Blank					2										SOLID WASTE SECTION
DISINFECTION: <input type="checkbox"/> CHLORINE, <input type="checkbox"/> UV, <input type="checkbox"/> NONE CHLORINE NEUTRALIZED AT COLLECTION: <input type="checkbox"/> pH CHECK (LAB): <input type="checkbox"/> CONTAINER TYPE P/G: <input type="checkbox"/> CHEMICAL PRESERVATION: <input type="checkbox"/>															
RECEIVED BY (SIG.): <i>[Signature]</i> DATE/TIME: 01/04/12															
RECEIVED BY (SIG.): <i>[Signature]</i> DATE/TIME: 01/12/12															
COMMENTS: CHAIN OF CUSTODY MAINTAINED DURING SHIPMENT/DELIVERY SAMPLES COLLECTED BY: <i>[Signature]</i> (Please Print) <i>[Signature]</i> SAMPLES RECEIVED IN LAB AT 0.2°C															

PLEASE READ Instructions for completing this form on the reverse side.

Sampler must place a "C" for composite sample or a "G" for Grab sample in the blocks above for each parameter requested. No 214680

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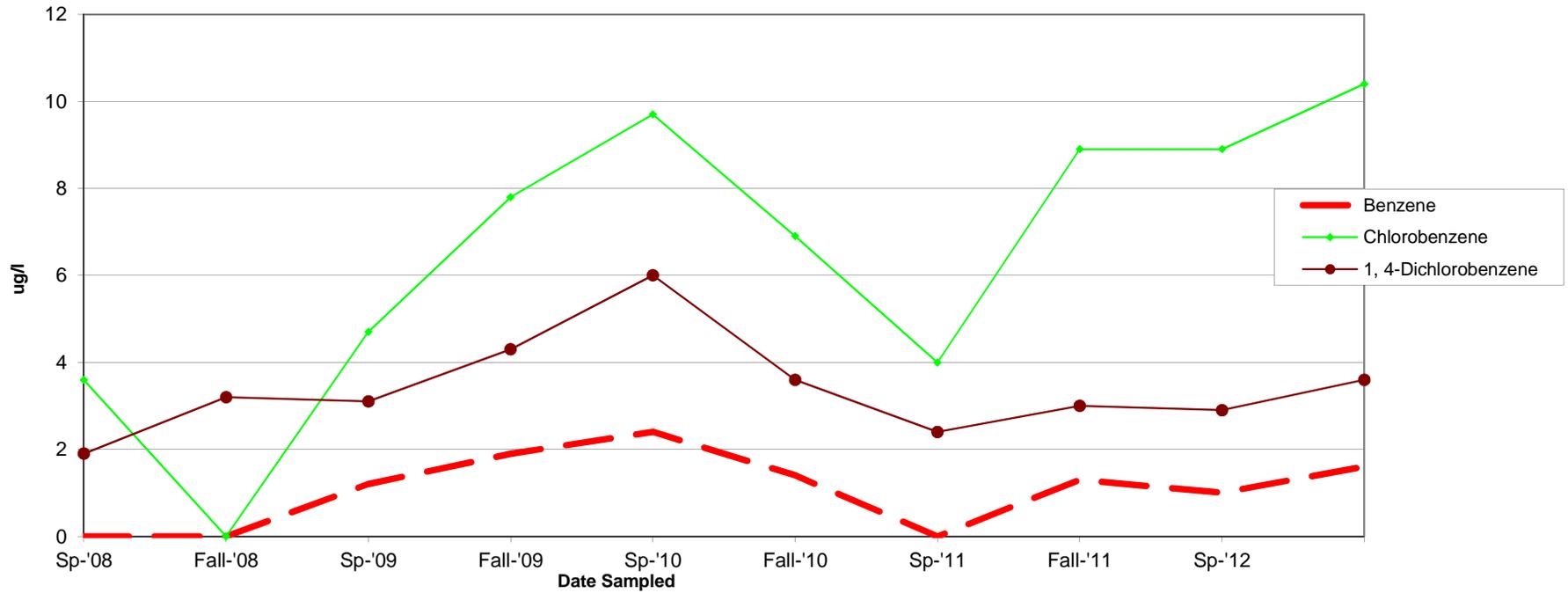
## **Appendix B**

### **Graphs of Organic Constituent Results**

**Groundwater Monitoring Report  
Washington County Closed MSW Landfill  
Semi-Annual Event – Fall 2012**

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Washington County MSW Landfill  
MW-2  
Historic Organic Detection Data



Washington County MSW Landfill  
MW-3  
Historic Organic Detection Data

