

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 Mail Service Center, Raleigh, NC 27699-1646.

**Solid Waste Monitoring Data Submittal Information**  
 Name of entity submitting data (laboratory, consultant, facility owner):

Richardson Smith Gardner and Associates, Inc.

Contact for questions about data formatting. Include data preparer's name, telephone number and E-mail address:  
 Name: Joan A. Smyth, P.G. Phone: 919-828-0577 x 221  
 E-mail: joan@rsgengineers.com

Facility name:	Facility Address:	Facility Permit #	NC Landfill Rule: (.0500 or .1600)	Actual sampling dates (e.g., October 20-24, 2006)
Washington Co. Closed MSW Landfill	718 Landfill Rd Roper, NC	94-01	.0500	September 1, 2010

**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.

Joan A. Smyth, P.G. Senior Hydrogeologist 919-828-0577 x 221  
 Facility Representative Name (Print) Title (Area Code) Telephone Number  
 Signature Joan A. Smyth 12/23/10 Affix NC Licensed/ Professional Geologist Seal  
 Date

14 N. Boylan Avenue Raleigh, NC 27603  
 Facility Representative Address  
 C0828  
 NC PE Firm License Number (if applicable effective May 1, 2009)



# **Washington County Closed MSW Landfill**

## **Ground Water Monitoring Report**

### **Fall 2010 Semi-annual Monitoring Event**

**Washington County Closed MSW Landfill  
Plymouth, North Carolina  
NC Solid Waste Permit # 94-01-MSWLF-1980**

Prepared for:

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

**December 2010**



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# Fall 2010 Ground Water Monitoring Report

## Washington County Closed MSW Landfill Washington, North Carolina NC Solid Waste Permit # 94-01 MSWLF-1980

Prepared for:

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

RSG Project No. **Wash 08-2**



Joan A. Smyth, P.G.  
Senior Hydrogeologist



**December 2010**



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**Washington County Closed MSW Landfill**

**Semi-annual Ground Water Monitoring Report  
Fall 2010 Event**

1.0 INTRODUCTION .....1

2.0 REGIONAL GEOLOGY .....1

3.0 SAMPLING PROCEDURES .....1

4.0 FIELD AND LABORATORY RESULTS .....1

    4.1 Laboratory Analysis.....1

    4.2 Field and Laboratory Results .....2

5.0 GROUND WATER CHARACTERIZATION.....2

6.0 CONCLUSIONS.....2

**FIGURES**

Figure 1 – Washington County Landfill Site Map

**TABLES**

- Table 1 – Groundwater Elevations
- Table 2 – Field Parameter Results
- Table 3 – Detected Inorganic Constituents
- Table 4 – Detected Organic Constituents

**APPENDICES**

Appendix A – Laboratory Analytical Reports

## **1.0 Introduction**

The Washington County Closed MSW Landfill, operating under Solid Waste Permit #94-01-MSWLF-1980 is required to submit semi-annual ground water monitoring reports for ground water monitoring. This report presents the results of the second semi-annual monitoring event for 2010, conducted on September 1, 2010.

This report includes summaries of the field procedures, laboratory analyses, and ground water characterization. Also included are laboratory analytical reports.

## **2.0 Regional Geology**

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

## **3.0 Sampling Procedures**

The sampling event, performed by Environment 1, Inc. on September 1, 2010 consisted of collecting samples from four (4) ground water wells (MW-1 through MW-4) in accordance with the approved site Sampling and Analysis Plan. Also included in the analysis were trip and field blanks for quality control.

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 of pH, specific conductivity, and temperature were obtained from each well.

All samples were collected in laboratory prepared containers for the specified analytical procedures. Sampling equipment (Teflon bailers) were cleaned in the laboratory and transported to the site in aluminum foil. Ground water samples were properly preserved, placed on ice, and transported to the laboratory facility within the specified holding times for each analysis.

## **4.0 Field & Laboratory Results**

### **4.1 Laboratory Analysis**

The ground and surface water samples were transported to Environment 1, Inc., a North Carolina certified laboratory (NC Wastewater ID #10). Laboratory analysis consisted of the full suite of RCRA Subtitle D Appendix I constituents. Parameters were reported at NC DWM Solid Waste Section Limits (SWSLs). The laboratory analytical report is included as **Appendix A**. No surface water samples are required for monitoring this site.

## 4.2 Field and Laboratory Results

The field parameter results are included in **Table 2**, while detected constituents are presented in **Tables 3 & 4**. Two (2) inorganic constituents, barium (MW-2 & MW-3) & cadmium (MW-2) were detected above the SWSL and shown in **Table 3**. Of these, barium (MW-2) was found to be above the 2L ground water standards.

Three (3) organic constituents (1,4-dichlorobenzene, benzene and chlorobenzene) were detected above the SWSL in MW-2 and MW-3 shown in **Table 4**. Of these, benzene (MW-2 & MW-3) was found to be above the 2L ground water standards.

Constituents detected below the SWSL are denoted as “J” values and are also included in **Tables 3 & 4**.

## 5.0 Ground Water Characterization

A potentiometric surface map was prepared from ground water elevation data collected during this sampling event. The data indicates that ground water is flowing to the northeast. Hydraulic conductivity data is not available for these wells so ground water velocities could not be calculated. The potentiometric surface map (**Figure 1**) is also attached for your review.

## 6.0 Conclusions

The data indicates relatively stable ground water quality at the Washington County Closed MSW Landfill. The next ground water monitoring event is scheduled for April 2011. Results will be reported upon completion of laboratory analysis.

Figures

G:\CAD\Washington County\Wash 08-2\sheets\WASH-B0022.dwg - 12/22/2010 10:44 AM

**LEGEND**

-  150 EXISTING 10' CONTOUR (SEE REFERENCE 1)
-  EXISTING 2' CONTOUR
-  STREAM/POND/DITCH BOUNDARY
-  0.5 POTENTIOMETRIC SURFACE (DASHED WHERE INFERRED)
-  WETLANDS BOUNDARY AREA (SEE REFERENCE 1)
-  DIRECTION OF GROUNDWATER FLOW
-  MW-1 MONITORING WELL

WETLANDS (TYP.)

MW-2  
TOC=9.70  
DTW=9.35  
GWE=0.35

C&D LANDFILL

EXISTING COVER SOIL  
BORROW AREA

LCID AREA

CLOSED MSW  
LANDFILL

MW-1  
TOC=10.01  
DTW=9.75  
GWE=0.26

MW-3  
TOC=11.30  
DTW=10.95  
GWE=0.35

MW-4  
TOC=9.02  
DTW=7.88  
GWE=1.14

**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 9/1/10.



**RICHARDSON SMITH GARDNER & ASSOCIATES**  
INC. LIC. NO. C-0028 (Engineering)  
 www.rsgengineers.com

14 N. Boylan Ave.  
 Raleigh, N.C. 27603  
 ph: 919-826-0577  
 fax: 919-826-3888

FIGURE NO.	1	FILE NAME	WASH-B0022
SCALE:	AS SHOWN	PROJECT NO.	WASH 08-2
CHECKED BY:	J.A.S.	DATE:	Dec. 2010
DRAWN BY:	J.A.L.		

TITLE:  
**WASHINGTON COUNTY  
 MSW LANDFILL  
 POTENTIOMETRIC SURFACE MAP  
 FALL 2010**

Tables

**Table 1**  
**Groundwater Elevation Data**  
**Washington County MSW Landfill**  
**9/1/2010**

Well	Northing	Easting	TOC Elevation (feet)	Water Level (feet)	GW Elev (feet)
MW-1	797426.27	2691416.85	10.01	9.75	0.26
MW-2	798555.67	2690813.33	9.7	9.35	0.35
MW-3	797500.35	2689659.95	11.3	10.95	0.35
MW-4	796852.09	2690320.91	9.02	7.88	1.14

Data from Environment 1 laboratory report dated 9/1/2010, ID# 6018.

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**  
**9/1/2010**

Well	pH (Std units)	Spec Cond (umhos/cm)	Temp (celsius)	Static Water Level (feet)
MW-1	5.4	602	18	9.75
MW-2	6.5	1591	21	9.35
MW-3	6.0	549	18	10.95
MW-4	5.7	141	17	7.88

**Note:** PH measured with a 'Hanna" pH/EC/TDS Meter, type HI9811  
 Temperature measured with a laboratory grade thermometer.  
 Data from Environment 1 laboratory report dated 9/1/2010, ID# 6018.

**Table 3**  
**Detected Inorganic Constituents**  
**Washington County Closed MSW Landfill**  
**9/1/2010**

Parameter	SWSL	2L	MW-1	MW-2	MW-3	MW-4
Arsenic	10	10	5.8 J	6.4 J	4.4 J	ND
Barium	100	700	89.6 J	<b>830</b>	<b>117</b>	29.5 J
Cadmium	1	2	0.4 J	<b>1.1</b>	0.1 J	0.1 J
Total Chromium	10	10	1 J	0.6 J	0.2 J	2.1 J
Lead	10	15	1 J	0.5 J	0.1 J	1.3 J
Mercury	0.2	1	ND	ND	ND	ND
Selenium	10	20	1.8 J	1.8 J	1.4 J	ND
Silver	10	20	ND	0.1 J	ND	ND

- SWSL - Solid Waste Quantitation Limit
- ND - Not detected at or above SWSL
- Shading - Levels above 2L standard or no 2L standard
- Bold Letters - Constituent detected above SWSL
- J - Detected constituents below SWSL limit

All SWSLs, 2L Standards and Results are in ug/l.  
Data from Environment 1 laboratory report dated 9/1/2010, ID# 6018.



By: LAQ  
Date: 10/11/2010

**Table 4**  
**Detected Organic Constituents**  
**Washington County MSW Landfill**  
**9/1/2010**

Parameter	SWSL	2L or GWP Standard	MW-1	MW-2	MW-3	MW-4
1,2-Dichlorobenzene	5	24	ND	ND	0.5 J	ND
1,4-Dichlorobenzene	1	6	ND	<b>3.6</b>	<b>5.1</b>	ND
Benzene	1	1	ND	<b>1.4</b>	<b>2.6</b>	ND
Chlorobenzene	3	50	ND	<b>6.9</b>	<b>33.2</b>	ND

Note: All results in ug/l (ppb)

- ND - Not detected at or above SWSL
- Shading - Levels above 2L standard or no 2L standard
- Bold Letters - Levels below 2L standard
- SWSL - Solid Waste Section Quantitation Limits
- J - Detected constituents below the SWSL limit.
- 2L - Groundwater Standards (15A NCAC 2L 0200).
- GWP - Groundwater Protection Standards.

Note: Data from Environment 1 laboratory report dated 9/1/2010, ID# 6018.

Appendix A

Laboratory Analytical Report

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: 09/01/10  
DATE REPORTED : 09/13/10

REVIEWED BY: 

PARAMETERS	MDL	SWSL	MW-1	MW-2	MW-3	MW-4	Analysis		Method
							Date	Analyst	Code
PH (field measurement), Units			5.4	6.5	6.0	5.7	09/01/10	RJH	SM4500HB
Arsenic, ug/l	0.04	10.0	5.8 J	6.4 J	4.4 J	---	09/03/10	LFJ	EPA200.8
Barium, ug/l	0.03	100.0	89.6 J	830	117	29.5 J	09/03/10	LFJ	EPA200.8
Cadmium, ug/l	0.02	1.0	0.4 J	1.1	0.1 J	0.1 J	09/03/10	LFJ	EPA200.8
Total Chromium, ug/l	0.03	10.0	1 J	0.6 J	0.2 J	2.1 J	09/03/10	LFJ	EPA200.8
Lead, ug/l	0.01	10.0	1 J	0.5 J	0.1 J	1.3 J	09/03/10	LFJ	EPA200.8
Mercury, ug/l	0.08	0.20	---	---	---	---	09/03/10	LFJ	EPA200.8
Selenium, ug/l	0.32	10.0	1.8 J	1.8 J	1.4 J	---	09/03/10	LFJ	EPA200.8
Silver, ug/l	0.03	10.0	---	0.1 J	---	---	09/03/10	LFJ	EPA200.8
Conductivity (at 25c), uMhos	1.0	1.0	602	1591	549	141	09/01/10	RJH	SM2510B
Temperature, °C			18	21	18	17	09/01/10	RJH	SM2550B
Static Water Level, feet			9.75	9.35	10.95	7.88	09/01/10	RJH	
Well Depth, feet			23.09	19.30	19.97	22.90	09/01/10	RJH	

# 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: 09/01/10  
DATE ANALYZED: 09/08/10  
DATE REPORTED: 09/13/10

Page: 1

REVIEWED BY: 

## VOLATILE ORGANICS EPA METHOD 8260B

PARAMETERS, ug/l	MDL	SWSL	MW-1	MW-2	MW-3	MW-4
1. Chloromethane	0.77	1.0	--- U	--- U	--- U	--- U
2. Vinyl Chloride	0.63	1.0	--- U	--- U	--- U	--- U
3. Bromomethane	0.67	10.0	--- U	--- U	--- U	--- U
4. Chloroethane	0.48	10.0	--- U	--- U	--- U	--- U
5. Trichlorofluoromethane	0.24	1.0	--- U	--- U	--- U	--- U
6. 1,1-Dichloroethene	0.17	5.0	--- U	--- U	--- U	--- U
7. Acetone	9.06	100.0	--- U	--- U	--- U	--- U
8. Iodomethane	0.26	10.0	--- U	--- U	--- U	--- U
9. Carbon Disulfide	0.23	100.0	--- U	--- U	--- U	--- U
10. Methylene Chloride	0.64	1.0	--- U	--- U	--- U	--- U
11. trans-1,2-Dichloroethene	0.23	5.0	--- U	--- U	--- U	--- U
12. 1,1-Dichloroethane	0.20	5.0	--- U	--- U	--- U	--- U
13. Vinyl Acetate	0.20	50.0	--- U	--- U	--- U	--- U
14. Cis-1,2-Dichloroethene	0.25	5.0	--- U	--- U	--- U	--- U
15. 2-Butanone	2.21	100.0	--- U	--- U	--- U	--- U
16. Bromochloromethane	0.27	3.0	--- U	--- U	--- U	--- U
17. Chloroform	0.25	5.0	--- U	--- U	--- U	--- U
18. 1,1,1-Trichloroethane	0.19	1.0	--- U	--- U	--- U	--- U
19. Carbon Tetrachloride	0.22	1.0	--- U	--- U	--- U	--- U
20. Benzene	0.24	1.0	--- U	1.40	2.60	--- U
21. 1,2-Dichloroethane	0.27	1.0	--- U	--- U	--- U	--- U
22. Trichloroethene	0.23	1.0	--- U	--- U	--- U	--- U
23. 1,2-Dichloropropane	0.21	1.0	--- U	--- U	--- U	--- U
24. Bromodichloromethane	0.21	1.0	--- U	--- U	--- U	--- U
25. Cis-1,3-Dichloropropene	0.24	1.0	--- U	--- U	--- U	--- U
26. 4-Methyl-2-Pentanone	1.19	100.0	--- U	--- U	--- U	--- U
27. Toluene	0.23	1.0	--- U	--- U	--- U	--- U
28. trans-1,3-Dichloropropene	0.28	1.0	--- U	--- U	--- U	--- U
29. 1,1,2-Trichloroethane	0.25	1.0	--- U	--- U	--- U	--- U
30. Tetrachloroethene	0.17	1.0	--- U	--- U	--- U	--- U
31. 2-Hexanone	1.57	50.0	--- U	--- U	--- U	--- U
32. Dibromochloromethane	0.24	3.0	--- U	--- U	--- U	--- U
33. 1,2-Dibromoethane	0.26	1.0	--- U	--- U	--- U	--- U
34. Chlorobenzene	0.30	3.0	--- U	6.90	33.20	--- U
35. 1,1,1,2-Tetrachloroethane	0.22	5.0	--- U	--- U	--- U	--- U
36. Ethylbenzene	0.21	1.0	--- U	--- U	--- U	--- U
37. Xylenes	0.68	5.0	--- U	--- U	--- U	--- U
38. Dibromomethane	0.28	10.0	--- U	--- U	--- U	--- U
39. Styrene	0.19	1.0	--- U	--- U	--- U	--- U
40. Bromoform	0.20	3.0	--- U	--- U	--- U	--- U
41. 1,1,2,2-Tetrachloroethane	0.26	3.0	--- U	--- U	--- U	--- U
42. 1,2,3-Trichloropropane	0.43	1.0	--- U	--- U	--- U	--- U
43. 1,4-Dichlorobenzene	0.39	1.0	--- U	3.60	5.10	--- U
44. 1,2-Dichlorobenzene	0.32	5.0	--- U	--- U	0.50 J	--- U
45. 1,2-Dibromo-3-Chloropropane	0.34	13.0	--- U	--- U	--- U	--- U
46. Acrylonitrile	2.72	200.0	--- U	--- U	--- U	--- U
47. trans-1,4-Dichloro-2-Butene	0.42	100.0	--- U	--- U	--- U	--- U

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

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	DISINFECTION			Field pH	Metals	Conductivity	Temperature	Field Parameter	EPA 8260B	8260 Dup. 1	8260 Dup. 2	CHLORINE NEUTRALIZED AT COLLECTION	PH CHECK (LAB)	CONTAINER TYPE, PG	CHEMICAL PRESERVATION
	DATE	TIME				<input type="checkbox"/> CHLORINE	<input type="checkbox"/> UV	<input type="checkbox"/> NONE												
MW-1	09/21/10	1135		18	5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	A	A	A	A								
MW-2	09/01/10	1808		21	4	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	P	A	P	P								
MW-3	09/01/10	0945		18	4	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	P	A	P	P								
MW-4	09/01/10	0935		17	4	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	P	A	P	P								
RELINQUISHED BY (SIG.)	DATE/TIME	RECEIVED BY (SIG.)	DATE/TIME	RECEIVED BY (SIG.)	DATE/TIME	COMMENTS:														
<i>[Signature]</i>	09/01/10	<i>[Signature]</i>	09/01/10	<i>[Signature]</i>																
RELINQUISHED BY (SIG.)	DATE/TIME	RECEIVED BY (SIG.)	DATE/TIME	RECEIVED BY (SIG.)	DATE/TIME	COMMENTS:														
<i>[Signature]</i>		<i>[Signature]</i>		<i>[Signature]</i>																

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 211908

CLASSIFICATION:

WASTEWATER (NPDES)

DRINKING WATER

DWQ/GW

SOLID WASTE SECTION

CHAIN OF CUSTODY MAINTAINED DURING SHIPMENT/DELIVERY

SAMPLES COLLECTED BY: *[Signature]*

(Please Print)

SAMPLES RECEIVED IN LAB AT *0.8* °C