

**NC DENR**  
**Division of Waste Management - Solid Waste**

**Environmental Monitoring Reporting Form**

**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):**  
 Smith Gardner, Inc.

**Contact for questions about data formatting. Include data preparer's name, telephone number and E-mail address:**  
 Name: Madeline German, PG Phone: 919-828-0577 x 222  
 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)
Halifax Coal Ash Landfill	921 Liles Rd, Aurellan Springs, NC	42-04	.0500	February 19, 2013

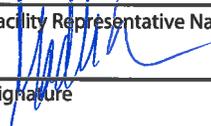
**Environmental Status: (Check all that apply)**  
 Initial/Background Monitoring  Detection Monitoring  Assessment Monitoring  Corrective Action

**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 919-828-0577 x 222  
 Facility Representative Name (Print) Title (Area Code) Telephone Number  
 Signature Date 3/28/13  
 Affix NC Licensed Professional Geologist Seal

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



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**Groundwater Monitoring Report  
February 2013 Semi-Annual Event**

**Halifax County Coal Ash Landfill  
Littleton, North Carolina  
NC Solid Waste Permit #42-04**

Prepared for:

**Halifax County Solid Waste Department  
P.O. Box 70  
Halifax, North Carolina 27839**



**March 2013**

Prepared by:

**SMITH+GARDNER**

14 N. Boylan Avenue, Raleigh NC 27603 | 919.828.0577



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# Groundwater Monitoring Report

## Halifax County Coal Ash Landfill Littleton, North Carolina

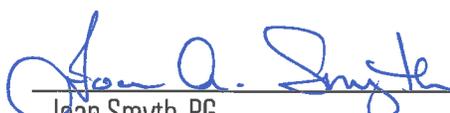
Prepared For:

**Halifax County**  
**Halifax, North Carolina**

**S+G Project No. Halifax-8**

  
\_\_\_\_\_  
Madeline German, PG  
Project Geologist



  
\_\_\_\_\_  
Joan Smyth, PG  
Senior Hydrogeologist



**March 2013**

# SMITH+GARDNER

14 N. Boylan Avenue, Raleigh NC 27603 | 919.828.0577

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# Halifax County Coal Ash Landfill Groundwater Monitoring Report

## February 2013 Semi-Annual Event

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## 1.0 INTRODUCTION

Smith Gardner, Inc (S+G) is pleased to submit this semi-annual sampling report on behalf of the Halifax County Coal Ash Landfill, operating under Solid Waste Permit #42-04, in accordance with Solid Waste Section Rule 15A NCAC 13B. This report presents semi-annual monitoring results for the event performed February 19, 2013.

The Halifax County Coal Ash Landfill is a monofill landfill that only accepts coal ash from power generation. The ground water monitoring network includes six wells located around the landfill perimeter, a surface water sampling point, a sedimentation basin discharge location and two sediment sampling locations in the stream immediately upgradient and downgradient of the sedimentation basin discharge. This report includes a field procedure summary, laboratory analyses, summary tables and ground water characterization.

## 2.0 SITE HYDROGEOLOGY

The *1985 North Carolina Geological Map and Ground Water in the Halifax Area, North Carolina* (Dept. of Conservation and Development Bulletin #51, 1946) indicates the Halifax County Coal Ash Landfill is situated on the eastern edge of the Eastern Piedmont Physiographic Province, just west of the Coastal Plain overlap. Western Halifax County is underlain by an assemblage of felsic to intermediate crystalline igneous and metamorphic rocks of early to late Paleozoic age. Eastern piedmont rocks exhibit a northeast strike and locally dip gently eastward as a result of regional metamorphism and folding that produced a broad plunging anticline. The area was simultaneously intruded by a number of felsic (granite) plutons. The rock formation underlying the subject site is a granitic pluton identified as the Butterwood Creek intrusive.

Depths to ground water generally range from near surface in lowland areas along Brewer's Creek and its tributary to around 45 ft. below grade in the MW-12 area. Ground water generally flows to the south.

## 3.0 SAMPLING LOCATIONS AND PROCEDURES

The sampling event, performed by Environment 1, Inc., on February 19, 2013 was conducted in accordance with the approved site Water Quality Monitoring Plan<sup>1</sup>. Sampling methods followed the protocol outlined in the Solid Waste Section Guidelines for Groundwater, Soil and Surface Water Sampling<sup>2</sup>. The depth to water in each well was gauged prior to purging and sampling. Field measurements for pH, specific conductivity, turbidity and temperature were recorded at each well.

The monitoring network at the Halifax Coal Ash Landfill currently includes six ground water wells (MW-8, MW-9, MW-10, MW-11, MW-12 and MW-17), a surface water location (SW-1) one sample collected from Sediment Basin 1 (Basin 1) and two sediment samples collected

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<sup>1</sup> Halifax County Landfill, Water Quality Monitoring Plan, November 2012 by Smith Gardner, Inc.

<sup>2</sup> Solid Waste Section Guidelines for Groundwater, Soil and surface Water Sampling, NCDENR, DWM, April 2008.

upstream and downstream of the sedimentation basin discharge point (Sediment 1 and Sediment 2). Sampling location details are presented in **Table 1**.

Samples were collected by Environment 1, Inc. personnel in laboratory prepared containers for the specified analytical procedures. Sampling equipment (bailers) was cleaned at 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 hold times for each analysis.

Sampling locations are shown on **Figure 1**.

## **4.0 FIELD AND LABORATORY RESULTS**

### **4.1 Field Results**

Temperature, pH and specific conductance were measured in the field prior to sampling via direct read instruments. The field parameter results are summarized in **Table 2** and have remained consistent with previously reported sampling events.

### **4.2 Laboratory Analysis**

The samples were transported under proper chain of custody, in a cooler with ice to Environment 1, Inc., a North Carolina certified laboratory (NC Wastewater ID #10) located in Greenville, NC. Ground and surface water samples were analyzed for Appendix I metals plus mercury, total organic carbon (TOC), chloride and sulfate via the SWS approved test methods specified in the laboratory report. Sediment samples were analyzed by Environmental Chemists, Inc. (NC Certification ID #94) located in Wilmington, NC. Samples were analyzed for specific metals detailed in the laboratory report using approved TCLP methods. Parameters were reported at NC Solid Waste Section Practical Quantitation Limits (SWSLs).

The laboratory analytical report is included as **Appendix A**.

### **4.3 Laboratory Results**

The laboratory analysis were compared with the 15A NCAC 2L 0200 Groundwater Standard (2L Standard) and SWSL. Inorganic results remain generally consistent with historically reported detections. Zinc (MW-9 and MW-12) were detected above the SWSL. No metals were detected above the 2L Standard. Most inorganic levels were reported as "J-qualified" indicating they are a non-quantifiable value that falls between the method limit and the SWSL. High turbidity levels, indicating increased sediment in the samples, may have contributed to elevated metal concentrations for this event.

No metals were identified in the surface water sample; however, SW-1 had reportable concentrations of chloride and TOC.

The Sample from basin 1 contained zinc at a reportable concentration above the SWSL. Chloride and sulfate were also identified at reportable concentrations.

Barium was detected in both sediment samples.

Detected inorganic constituents from ground or surface water samples are presented in **Table 3**. Sediment sample results are shown in **Table 4**.

## **5.0 GROUND WATER CHARACTERIZATION**

The depth to water data indicates that ground water is flowing generally south towards the unnamed tributary to Brewer's Creek; which is consistent with historic ground water flow patterns. The ground water flow map is included as **Figure 1**.

## **6.0 CONCLUSIONS**

Current and historic analytical data indicate no ground water impact at this site. Turbidity levels for this event in MW-11, MW-12 and MW-17 were reported at 37, 70 and 35 nephelometric turbidity units (NTU) respectively. These turbidity levels may have "biased high" inorganic results due to their natural occurrence in local soil. The landfill is not likely the contamination source. The next semi-annual event is scheduled for August 2013. An event report will be submitted after receipt and analysis of those sampling results.

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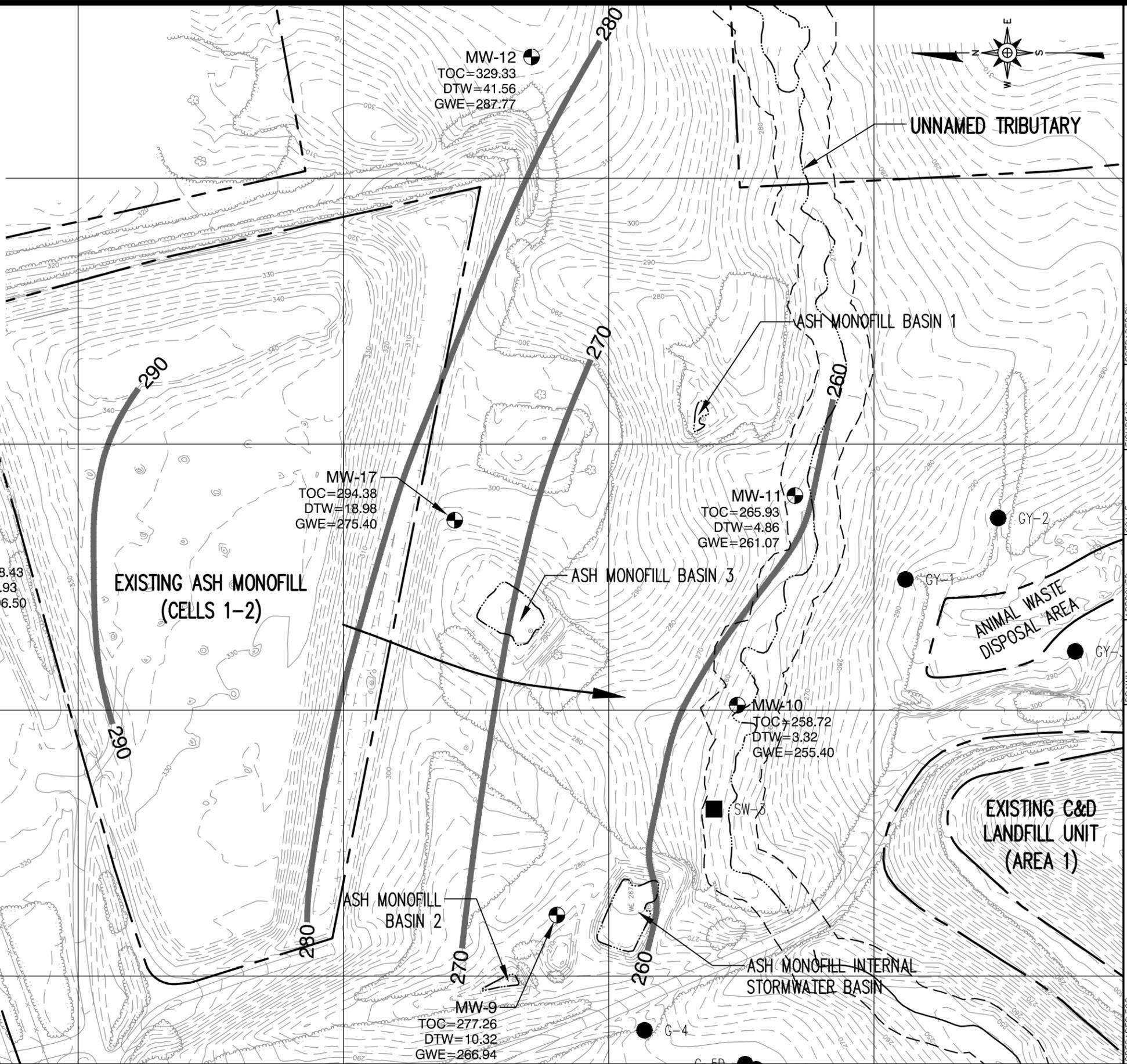
## **FIGURES**

**Groundwater Monitoring Report  
February 2013 Event  
Halifax County Coal Ash Landfill**

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**LEGEND**

-  200 EXISTING 10' CONTOUR (SEE REFERENCE 1)
-  EXISTING 2' CONTOUR
-  STREAM/WATER BODY
-  APPROXIMATE EXISTING WASTE LIMITS
-  50-FT TAR-PAMLICO RIPARIAN BUFFER
-  MW-10 EXISTING GROUND WATER MONITORING WELL
-  GY-2 EXISTING PIEZOMETER
-  SW-1 EXISTING SURFACE WATER MONITORING LOCATION
-  GROUNDWATER POTENTIOMETRIC CONTOUR
-  GROUNDWATER FLOW DIRECTION



ASH MONOFILL BASIN 4

MW-8  
TOC=308.43  
DTW=11.93  
GWE=296.50

EXISTING ASH MONOFILL (CELLS 1-2)

MW-17  
TOC=294.38  
DTW=18.98  
GWE=275.40

ASH MONOFILL BASIN 3

MW-11  
TOC=265.93  
DTW=4.86  
GWE=261.07

ANIMAL WASTE DISPOSAL AREA

EXISTING C&D LANDFILL UNIT (AREA 1)

ASH MONOFILL INTERNAL STORMWATER BASIN

MW-9  
TOC=277.26  
DTW=10.32  
GWE=266.94

G-4

SW-3

MW-10  
TOC=258.72  
DTW=3.32  
GWE=255.40

**REFERENCE:**  
1. OVERALL SITE TOPOGRAPHY PROVIDED BY GEODATA CORPORATION, ZEBULON, NC, BASED ON MAY 25, 2012 AERIAL PHOTOGRAPHY. AND NCDOT GIS DEPARTMENT DATA RELEASE MARCH 2005.



PREPARED FOR: **GROUNDWATER POTENTIOMETRIC MAP HALIFAX COAL ASH LANDFILL FEBRUARY 2013**  
 DRAWN: C.T.J.  
 APPROVED: M.M.G.  
 SCALE: AS SHOWN  
 FIGURE NO: 1  
 PREPARED BY: NC LIC. NO. C-0828 (ENGINEERING)

**SMITH+GARDNER**  
 14 N. Boylan Avenue, Raleigh NC 27603 | 919.828.0577

PROJECT NO: HALIFAX-8  
 FILENAME: HALI-B0257  
 DATE: Mar 2013

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## **TABLES**

**Groundwater Monitoring Report  
February 2013 Event  
Halifax County Coal Ash Landfill**

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**Table 1  
Halifax County Coal Ash Landfill  
Ground Water Elevations & Velocities  
February 18, 2013**

Monitoring Location	Northing	Easting	TOC Elevation (ft)	Well Depth (ft)	Depth to Water (ft)	Water Table Elevation (ft)	Hydraulic Conductivity (ft/day)	Porosity	Hydraulic Gradient (ft/ft)	Ground Water Velocity (ft/day)
MW-8	959780.42	2350290.39	308.43	23.38	11.93	296.50	0.047	0.2	0.0213	0.0050
MW-9	958597.68	2349614.73	277.26	21.92	10.32	266.94	0.047	0.2	0.0186	0.0044
MW-10	958257.68	2350009.33	258.72	16.14	3.32	255.40	0.047	0.2	0.0575	0.0135
MW-11	958149.07	2350403.19	265.93	21.72	4.86	261.07	0.047	0.2	0.0357	0.0084
MW-12	958645.55	2351227.97	329.33	51.34	41.56	287.77	0.047	0.2	0.0818	0.0192
MW-17	958790.40	2350356.85	294.38	26.88	18.98	275.40	0.047	0.2	0.0386	0.0091

NOTE:

Hydraulic Conductivity averaged from Closed MSW well data

Porosity values assumed from Groundwater & Wells (Driscoll)

Velocity Calculated from  $V=K*i/n$

V = velocity

K = Hydraulic Conductivity

i = Gradient

n = Porosity

**Table 2  
Halifax County Coal Ash Landfill  
Field Parameters  
February 18, 2013**

Monitoring Location	pH (std units)	Static Water Level (feet)	Specific Conductivity (umhos/cm)	Temperature degrees C)	Turbidity (NTU)
MW-8	4.8	11.93	66	13	13
MW-9	4.9	10.32	31	15	8.1
MW-10	4.8	3.32	39	11	1.1
MW-11	5.9	4.86	98	12	37
MW-12	4.9	41.56	29	14	70
MW-17	5.1	18.98	25	16	35
SW-1	6.8	NA	112	6	2.7
Basin 1	7.2	NA	6.0	7.0	<1

NOTE:

1. NA = Not Applicable
2. <MDL

**Table 3**  
**Halifax County Coal Ash Landfill**  
**Inorganic Constituents Detected in Water Samples**  
**February 18, 2013**

Monitoring Location	MDL	SWSL	2L Standard	MW-8	MW-9	MW-10	MW-11	MW-12	MW-17	SW-1	Basin #1
Total Organic Carbon	300	NE	NE	1260	<300	<300	<300	<300	<300	2050	<300
Chloride	5000	--	250000	<5000	5000	<5000	9000	8000	<5000	700	1509000
Sulfate	5000	250000	250000	10200 J	14100 J	13800 J	14600 J	10400 J	<5000	101000 J	3271000
Arsenic	0.13	10	10	0.20 J	<0.13	<0.13	<0.13	0.26 J	0.14 J	0.24 J	<0.25
Barium	0.07	100	700	56.4 J	38.7J	24.6 J	8.8 J	57.0 J	37.7 J	14.4 J	47.2 J
Cadmium	0.03	1	2	0.15 J	0.10 J	0.03 J	0.03 J	0.27 J	0.09 J	<0.03	0.36 J
Chromium, total	0.18	10	10	0.27 J	<0.18	<0.18	<0.18	1.2 J	0.81 J	<0.18	3.2 J
Copper	0.06	10	1000	1.1 J	0.84 J	0.34 J	0.23 J	2.4 J	3.0 J	0.28 J	1.1 J
Lead	0.08	10	15	1.6 J	0.64 J	0.30 J	<0.08	2.0 J	0.36 J	0.09 J	0.14 J
Selenium	0.17	10	20	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.54	3.2 J
Zinc	0.48	10	1000	5.0 J	<b>11</b>	3.2 J	2.5 J	<b>16</b>	8.1 J	3.8 J	32

NOTE:

- MDL - Method Detection Limit
- SWSL - Solid Waste Section Quantitation Limit
- 2L - Groundwater Standard (15A NCAC 2L 0200)
- < MDL - Not detected at or above the MDL
- Shading - Levels above 2L Standard
- Bold Letters - Constituent detected above SWSL
- J - "J-qualified" reported from laboratory as data between the MDL and SWSL

Results are presented in ug/l.

Data from 03/11/2013 Environment 1, Incorporated Laboratory Report #6042.

**Table 4**  
**Halifax County Coal Ash Landfill**  
**Inorganic Constituents Detected in Sediment**  
**February 18, 2013**

Monitoring Location	LOQ/CL	SWSL	2L Standard	Sediment #1 Upstream	Sediment #2 Downstream
Arsenic	100	10	10	<100	<100
Barium	100	100	700	124	150
Cadmium	100	1	2	<100	<100
Chromium, total	100	10	10	<100	<100
Lead	100	10	15	<100	<100
Mercury	2	0.2	1	<2	<2
Selenium	100	10	20	<100	<200
Silver	100	10	20	<100	<100

NOTE:

- LOQ/CL - Reporting Limit/Control Limit for the parameter recovery result
- SWSL - Solid Waste Section Quantitation Limit
- 2L - Groundwater Standard (15A NCAC 2L 0200)
- < LOQ/CL - Not detected at or above the LOQ/CL
- Shading - Levels above 2L Standard
- Bold Letters - Constituent detected above SWSL
- J - "J-qualified" reported from laboratory as data between the MDL and SWSL

Results are presented in ug/l unless otherwise noted.  
Results from envirochem report #2013-02096.

## **Appendix A**

### **Laboratory Analytical Report**

**Groundwater Monitoring Report  
February 2013 Event  
Halifax County Coal Ash Landfill**

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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#: 6042

HALIFAX CO. (COAL ASH LANDFILL)  
MS. GWEN MATTHEWS  
P.O. BOX 70  
HALIFAX ,NC 27839

DATE COLLECTED: 02/19/13  
DATE REPORTED : 03/11/13

REVIEWED BY: 

PARAMETERS	MDL	SWSL	Well	Well	Well	Well	Well	Analysis Date	Method Analyst Code
			#8	#9	#10	#11	#12		
PH (field measurement), Units			4.8	4.9	4.8	5.9	4.9	02/19/13BF	4500HB-00
Total Organic Carbon, mg/l	0.30	1.0	1.26	---	---	---	---	02/22/13SEJ	5310C-00
Chloride, mg/l	5.0	5.0	---	U	---	U	---	02/21/13HMB	4500CLB-97
Chloride, mg/l	5.0	5.0		5	---	U	9	02/22/13HMB	4500CLB-97
Sulfate, mg/l	5.0	250.0	10.2 J	14.1 J	13.8 J	14.6 J	10.4 J	02/26/13TRB	4500SO42E97
Arsenic, ug/l	0.13	10.0	0.20 J	---	---	U	0.26 J	02/22/13LFJ	EPA200.8
Barium, ug/l	0.07	100.0	56.4 J	38.7 J	24.6 J	8.8 J	57.0 J	02/22/13LFJ	EPA200.8
Cadmium, ug/l	0.03	1.0	0.15 J	0.10 J	0.03 J	0.03 J	0.27 J	02/22/13LFJ	EPA200.8
Copper, ug/l	0.06	10.0	1.1 J	0.84 J	0.34 J	0.23 J	2.4 J	02/22/13LFJ	EPA200.8
Total Chromium, ug/l	0.18	10.0	0.27 J	---	---	U	1.2 J	02/22/13LFJ	EPA200.8
Lead, ug/l	0.08	10.0	1.6 J	0.64 J	0.30 J	---	2.0 J	02/26/13LFJ	EPA200.8
Mercury, ug/l	0.02	0.20	---	---	---	U	---	02/22/13LFJ	EPA6020A
Selenium, ug/l	0.17	10.0	---	---	---	U	---	02/22/13LFJ	EPA200.8
Silver, ug/l	0.10	10.0	---	---	---	U	---	03/04/13LFJ	EPA200.8
Zinc, ug/l	0.48	10.0	5.0 J	11	3.2 J	2.5 J	16	02/22/13LFJ	EPA200.8
Turbidity, NTU	1.0	1.0	13.0	8.1	1.1	37.0	70.0	02/19/13MSG	2130B-01
Conductivity (at 25c), uMhos/cm	1.0	1.0	66	31	39	98	29	02/19/13BF	2510B-97
Temperature, °C			13	15	11	12	14	02/19/13BF	2550B-00
Static Water Level, feet			11.93	10.32	3.32	4.86	41.56	02/19/13BF	
Well Depth, feet			23.38	21.92	16.14	21.72	51.34	02/19/13BF	

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

ID#: 6042

HALIFAX CO. (COAL ASH LANDFILL)  
MS. GWEN MATTHEWS  
P.O. BOX 70  
HALIFAX ,NC 27839

DATE COLLECTED: 02/19/13  
DATE REPORTED : 03/11/13

REVIEWED BY: 

PARAMETERS	MDL	SWSL	Well	Analysis	Method
			#17	Date	Analyst
PH (field measurement), Units			5.1	02/19/13BF	4500HB-00
Total Organic Carbon, mg/l	0.30	1.0	---	U 02/22/13SEJ	5310C-00
Chloride, mg/l	5.0	5.0	---	U 02/22/13HMB	4500CLB-97
Sulfate, mg/l	5.0	250.0	---	U 02/26/13TRB	4500S042E97
Arsenic, ug/l	0.13	10.0	0.14	J 02/22/13LFJ	EPA200.8
Barium, ug/l	0.07	100.0	37.7	J 02/22/13LFJ	EPA200.8
Cadmium, ug/l	0.03	1.0	0.09	J 02/22/13LFJ	EPA200.8
Copper, ug/l	0.06	10.0	3.0	J 02/22/13LFJ	EPA200.8
Total Chromium, ug/l	0.18	10.0	0.81	J 02/22/13LFJ	EPA200.8
Lead, ug/l	0.08	10.0	0.36	J 02/26/13LFJ	EPA200.8
Mercury, ug/l	0.02	0.20	---	U 02/22/13LFJ	EPA6020A
Selenium, ug/l	0.17	10.0	---	U 02/22/13LFJ	EPA200.8
Silver, ug/l	0.10	10.0	---	U 03/04/13LFJ	EPA200.8
Zinc, ug/l	0.48	10.0	8.1	J 02/22/13LFJ	EPA200.8
Turbidity, NTU	1.0	1.0	35.0	02/19/13MSG	2130B-01
Conductivity (at 25c), uMhos/cm	1.0	1.0	25	02/19/13BF	2510B-97
Temperature, °C			16	02/19/13BF	2550B-00
Static Water Level, feet			16.98	02/19/13BF	
Well Depth, feet			26.88	02/19/13BF	

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

ID#: 6042 A

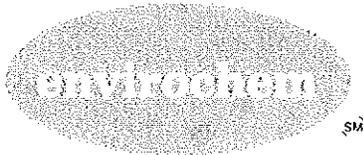
HALIFAX CO. (COAL ASH LANDFILL)  
MS. GWEN MATTHEWS  
P.O. BOX 70  
HALIFAX ,NC 27839

DATE COLLECTED: 02/18/13  
DATE REPORTED : 03/12/13

REVIEWED BY: 

PARAMETERS	MDL	SW-1 SWSL	Basin #1	Analysis		Method Code
				Date	Analyst	
PH (field measurement), Units			6.8	7.2	02/18/13BF	4500HB-00
Total Organic Carbon, mg/l	0.30	1.0	2.05	---	U 02/22/13BEJ	5310C-00
Chloride, mg/l	5.0	5.0	7	1509	02/21/13HMB	4500CLB-97
Sulfate, mg/l	5.0	250.0	10.1 J	3271	02/19/13TRB	4500SO42E97
Arsenic, ug/l	0.25	10.0	0.24 J		02/22/13LFFJ	EPA200.8
Arsenic, ug/l	0.25	10.0		---	U 02/28/13MEL	3113B-04
Barium, ug/l	0.07	100.0	14.4 J	47.2 J	02/22/13LFFJ	EPA200.8
Cadmium, ug/l	0.03	1.0	---	U 0.36 J	02/22/13LFFJ	EPA200.8
Copper, ug/l	0.06	10.0	0.28 J	1.1 J	02/22/13LFFJ	EPA200.8
Total Chromium, ug/l	0.18	10.0	---	U 3.2 J	02/22/13LFFJ	EPA200.8
Lead, ug/l	0.08	10.0	0.09 J	0.14 J	02/22/13LFFJ	EPA200.8
Mercury, ug/l	0.03	0.20	---	U 02/22/13LFFJ	EPA6020A	
Mercury, ug/l	0.03	0.20		---	U 03/04/13ADD	245.1 R3-94
Selenium, ug/l	0.54	10.0	---	U 02/22/13LFFJ	EPA200.8	
Selenium, ug/l	0.54	10.0		3.2 J	03/04/13MEL	3113B-04
Silver, ug/l	0.10	10.0	---	U 03/04/13LFFJ	EPA200.8	
Zinc, ug/l	0.48	10.0	3.8 J	32	02/22/13LFFJ	EPA200.8
Turbidity, NTU	1.0	1.0	2.7	---	U 02/18/13MSG	2130B-01
Conductivity (at 25c), uMhos/cm	1.0	1.0	112	6	02/18/13BF	2510B-97
Temperature, °C			6	7	02/18/13BF	2550B-00

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



# Environmental Chemists, Inc.

6602 Windmill Way • Wilmington, NC 28405  
(910) 392-0223 (Lab) • (910) 392-4424 (Fax)  
710 Bowsertown Road • Manteo, NC 27954  
(252) 473-5702

ANALYTICAL & CONSULTING  
CHEMISTS

NCDENR: DWQ CERTIFICATE #94. DLS CERTIFICATE #37729

**Environment - 1**  
Post Office Box 7085  
Greenville NC 27858  
Attention: Deedee Woolard

**Date of Report:** Mar 06, 2013  
**Customer PO #:**  
**Report #:** 2013-02096  
**Report to:** Deedee Woolard  
**Project ID:**

Lab ID	Sample ID: #1	Collect Date/Time	Matrix	Sampled by
13-04959	Site:	2/18/2013 10:40 AM	Solid/Sludge	Client

Test	Method	Results	Date Analyzed
<b>TCLP Metals</b>			
Arsenic	EPA 200.7	<0.100 mg/L	03/04/2013
Barium	EPA 200.7	0.124 mg/L	03/04/2013
Cadmium	EPA 200.7	<0.100 mg/L	03/04/2013
Chromium	EPA 200.7	<0.100 mg/L	03/04/2013
Lead	EPA 200.7	<0.100 mg/L	03/04/2013
Selenium	EPA 200.7	<0.100 mg/L	03/04/2013
Silver	EPA 200.7	<0.100 mg/L	03/04/2013
Mercury	EPA 245.1	<0.002 mg/L	03/05/2013

Lab ID	Sample ID: #2	Collect Date/Time	Matrix	Sampled by
13-04960	Site:	2/18/2013 11:05 AM	Solid/Sludge	Client

Test	Method	Results	Date Analyzed
<b>TCLP Metals</b>			
Arsenic	EPA 200.7	<0.100 mg/L	03/04/2013
Barium	EPA 200.7	0.150 mg/L	03/04/2013
Cadmium	EPA 200.7	<0.100 mg/L	03/04/2013
Chromium	EPA 200.7	<0.100 mg/L	03/04/2013
Lead	EPA 200.7	<0.100 mg/L	03/04/2013
Selenium	EPA 200.7	<0.100 mg/L	03/04/2013
Silver	EPA 200.7	<0.100 mg/L	03/04/2013
Mercury	EPA 245.1	<0.002 mg/L	03/05/2013

Comment:

Reviewed by: Manolo Olijas Jan Peice

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

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

CLIENT: 6042 Week: 9

HALIFAX CO. (COAL ASH LANDFILL)  
 MS. GWEN MATTHEWS  
 P.O. BOX 70  
 HALIFAX NC 27839

(252) 583-1807

CHAIN OF CUSTODY RECORD

SAMPLE LOCATION	COLLECTION		TOTAL CHLORINE, mg/l OR ug/l AT COLLECTION	TEMPERATURE, °C AT COLLECTION	# OF CONTAINERS	DISINFECTION		Field pH	TOC	Chloride	Sulfate	Metals	Turbidity	Conductivity	Temperature	Field Parameter	CHLORINE NEUTRALIZED AT COLLECTION	pH CHECK (LAB)	CONTAINER TYPE, P/G	CHEMICAL PRESERVATION	
	DATE	TIME				<input type="checkbox"/> CHLORINE	<input type="checkbox"/> UV														
Well #8	2-19-13	0905		13	6	<input type="checkbox"/>	<input type="checkbox"/>														
Well #9	2-19-13	1015		15	6	<input type="checkbox"/>	<input type="checkbox"/>														
Well #10	2-19-13	1005		11	6	<input type="checkbox"/>	<input type="checkbox"/>														
Well #11	2-19-13	0940		12	6	<input type="checkbox"/>	<input type="checkbox"/>														
Well #12	2-19-13	0925		14	6	<input type="checkbox"/>	<input type="checkbox"/>														
Well #17	2-19-13	0955		16	6	<input type="checkbox"/>	<input type="checkbox"/>														
REINQUISHED BY (SIG.)			DATE/TIME	RECEIVED BY (SIG.)	DATE/TIME	COMMENTS:															
Bobby Fox			2-19-13 14:12	[Signature]	2/19/13 2:19																
REINQUISHED BY (SIG.)			DATE/TIME	RECEIVED BY (SIG.)	DATE/TIME																
REINQUISHED BY (SIG.)			DATE/TIME	RECEIVED BY (SIG.)	DATE/TIME																

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 255048

PARAMETERS  
 A - NONE D - NAOH  
 B - HNO<sub>3</sub> E - HCL  
 C - H<sub>2</sub>SO<sub>4</sub> F - ZINC ACETATE/NAOH  
 G - NA THIOSULFATE

CLASSIFICATION:  
 WASTEWATER (NPDES)  
 DRINKING WATER  
 DMO/GW  
 SOLID WASTE SECTION

CHAIN OF CUSTODY MAINTAINED DURING SHIPMENT/DELIVERY  
 N

SAMPLES COLLECTED BY: Bobby Fox  
 (Please Print)

SAMPLES RECEIVED IN LAB AT 02 °C

Environment 1, Inc.  
P.O. Box ~~2085~~ 14 Oakmont Dr.  
Greenville, NC 27858

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

CLIENT: 6042 A Week: 9

HALIFAX CO. (COAL ASH LANDFILL)  
MS. GWEN MATTHEWS  
P.O. BOX 70  
HALIFAX NC 27839

(252) 583-1807

CHAIN OF CUSTODY RECORD

SAMPLE LOCATION	COLLECTION		TOTAL CHLORINE, mg/l OR ug/l AT COLLECTION	TEMPERATURE, °C AT COLLECTION	# OF CONTAINERS	DISINFECTION		Field pH	TOC	Chloride	Sulfate	Metals	Turbidity	Conductivity	Temperature	TCLP Metals	PARAMETERS	CLASSIFICATION:
	DATE	TIME				CHLORINE	UV											
SW-1	9-18-13	1005		6	6	<input type="checkbox"/>	<input type="checkbox"/>											
Basin #1	9-18-13	1055		7	6	<input type="checkbox"/>	<input type="checkbox"/>											
Sediment Sample #1	9-18-13	1040			1	<input type="checkbox"/>	<input type="checkbox"/>											
Sediment Sample #2	9-18-13	1105			1	<input type="checkbox"/>	<input type="checkbox"/>											
REINQUISHED BY (SIG.) (SAMPLER)	DATE/TIME	DATE/TIME	RECEIVED BY (SIG.)	DATE/TIME	RECEIVED BY (SIG.)	DATE/TIME	DATE/TIME	COMMENTS:										
<i>Bobbie Terry</i>	9-18-13 1542	9/18/13 303	<i>Bobbie Terry</i>	9/18/13 303	<i>Bobbie Terry</i>													
REINQUISHED BY (SIG.)	DATE/TIME	DATE/TIME	RECEIVED BY (SIG.)	DATE/TIME	RECEIVED BY (SIG.)	DATE/TIME	DATE/TIME	COMMENTS:										
<i>Bobbie Terry</i>	9/21/13 800		<i>Bobbie Terry</i>		<i>Bobbie Terry</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 255047

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

CHAIN OF CUSTODY RECORD

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

CLIENT: 6042 A Week: 9

HALIFAX CO. (COAL ASH LANDFILL)  
 MS. GWEN MATTHEWS  
 P.O. BOX 70  
 HALIFAX NC 27839

(252) 583-1807

SAMPLE LOCATION	COLLECTION		DATE	TIME	TOTAL CHLORINE, mg/l OR ug/l AT COLLECTION	DISINFECTION		# OF CONTAINERS	pH	Temperature	Chloride	Sulfate	Metals	Turbidity	Conductivity	Temperature	TCLP Metals	COMMENTS	SAMPLER RECEIVED IN LAB AT _____ °C	
	DATE	TIME				CHLORINE	UV													
<del>Sediment Sample #1</del>	<del>9-18-13</del>	<del>10:40</del>	<del>9-18-13</del>	<del>11:05</del>	<del>7</del>	<input type="checkbox"/>	<input type="checkbox"/>	<del>6</del>	<del>7</del>	<del>23</del>	<del>1</del>	<del>1</del>	<del>1</del>	<del>1</del>	<del>1</del>	<del>1</del>	<del>1</del>	<del>4959</del>	<del>23</del>	<del>010</del>
Sediment Sample #2	9-18-13	11:05	9-18-13	11:05	1	<input type="checkbox"/>	<input type="checkbox"/>	1	7	23	1	1	1	1	1	1	1	4959	23	010
RELINQUISHED BY (SIG.) (SAMPLER)	DATE/TIME		RECEIVED BY (SIG.)		DATE/TIME		RECEIVED BY (SIG.)		DATE/TIME		DATE/TIME		DATE/TIME		DATE/TIME		DATE/TIME		DATE/TIME	
RELINQUISHED BY (SIG.)	2-18-13 15:42		RECEIVED BY (SIG.)		2/18/13 3:43		RECEIVED BY (SIG.)		2/18/13 10:32		2/18/13 10:32		2/18/13 10:32		2/18/13 10:32		2/18/13 10:32		2/18/13 10:32	
RELINQUISHED BY (SIG.)	2/22/13 8:00		RECEIVED BY (SIG.)		2/22/13 10:32		RECEIVED BY (SIG.)		2/22/13 10:32		2/22/13 10:32		2/22/13 10:32		2/22/13 10:32		2/22/13 10:32		2/22/13 10:32	

CHLORINE NEUTRALIZED AT COLLECTION  
 pH CHECK (LAB) 13-02096  
 CONTAINER TYPE: PG  
 CHEMICAL PRESERVATION  
 A - NONE D - NaOH  
 B - HNO<sub>3</sub> E - HCL  
 C - H<sub>2</sub>SO<sub>4</sub> F - ZINC ACETATE/NaOH  
 G - NA THIOSULFATE

CLASSIFICATION:  
 WASTEWATER (NPDES)  
 DRINKING WATER  
 DMQ/GW  
 SOLID WASTE SECTION

CHAIN OF CUSTODY MAINTAINED DURING SHIPMENT/DELIVERY  
 SAMPLES COLLECTED BY: Y  
 (Please Print)  
 SAMPLES RECEIVED IN LAB AT 010 °C  
Robb / Terry

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 255047