

**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):

S&ME, Inc. (Consultant)

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

Name: William M. Miller, P.E.

Phone: 828-687-9080

E-mail: wmillersmeinc.com

Facility name:	Facility Address:	Facility Permit #	NC Landfill Rule: (.0500 or .1600)	Actual sampling dates (e.g., October 20-24, 2006)
Duke Energy Marshall Steam Station FGD Landfill	8320 East Hwy 150 Terrell, Catawba County, NC	18-09	.0500	September 8, 2009

**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.

William M. Miller, P.E.

Senior Project Engineer

828-687-9080

Facility Representative Name (Print)

Title

(Area Code) Telephone Number

*William M. Miller*  
Signature

October 23, 2009

Affix NC Licensed/ Professional Geologist Seal

Date

44 Buck Shoals Rd, Suite C-3, Arden, NC 28704

Facility Representative Address

F-0176

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

Revised 6/2009



**TABLE 2 - FIELD AND ANALYTICAL RESULTS**  
**DUKE ENERGY MARSHALL STEAM STATION**  
**FGD LANDFILL - PERMIT #18-09**  
**GROUNDWATER MONITORING REPORT**  
**S&ME PROJECT 1411-09-047**

10/23/2009

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<b>Facility: Marshall Steam Station FGD Landfill #18-09</b>	<b>Laboratory Certificate Codes:</b> <b>Duke Power Field #5193</b> <b>Pace Lab #12</b>
<b>Sample Date: September 8, 2009 (Field and Geochemistry Data)</b>	
<b>Field sampling performed by Duke Energy</b>	

Parameter	SW ID	Units	Certificate Codes	Monitoring Well Identification						SWSL	15A NCAC 2L*
				1809-MS-8	1809-MS-9	1809-MS-10	1809-MS-11	1809-MS-12	1809-MS-13		
Field pH	320	Std. Units	5193	5.9	7.0	5.0	5.4	4.9	5.1		6.5-8.5
Field Spec. Conductance	323	umho/cm	5193	44	123	23	39	22	91		
Temperature	325	C	5193	16.8	15.9	17.1	15.2	14.9	14.8		
Top Casing	328	msl-feet		872.34	868.04	851.29	859.78	835.66	841.90		
Depth to Water	318	feet		45.93	42.78	18.13	33.94	23.68	31.02		
Water Elevation	319	msl-feet		826.41	825.26	833.16	825.84	811.98	810.88		
Well Depth	41	feet		51.58	53.00	23.34	42.72	31.09	41.52		
Arsenic	14	ug/L	12	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	10	50
Barium	15	ug/L	12	49.7 J	39.0 J	170	76.1 J	77.2 J	123	100	2000
Boron	NE	ug/L	12	31.7	30.2	14.9	15.0	14.5	14.1	NE	315
Cadmium	34	ug/L	12	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.0	1.75
Chloride	301	ug/L	12	5000 U	5000 U	5000 U	5000 U	5000 U	5550	NE	25000
Chromium	51	ug/L	12	8.0 J	1.7 J	0.5 J	3.1 J	0.50 J	0.4 U	10	50
Copper	54	ug/L	12	2.2 J	0.98 J	0.34 J	1.3 J	0.36 J	4.8 J	10	1000
Fluoride	312	ug/L	12	160 J	120 J	100 U	100 U	100 U	100 U	2000	2000
Iron	340	ug/L	12	1230	114 J	169 J	1040	140 J	51.9 J	300	300
Lead	131	ug/L	12	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	10	15
Manganese	342	ug/L	12	17.2 J	16.2 J	34.4 J	23.8 J	18.1 J	17.7 J	50	50
Mercury	132	ug/L	12	0.089 J	0.091 J	0.091 J	0.088 J	0.087 J	0.091 J	0.20	1.05
Nickel	152	ug/L	12	3.3 J	1.7 U	3.7 J	1.7 U	1.7 U	1.7 U	50	100
Nitrate (as Nitrogen)	303	ug-N/L	12	100 U	100 U	1320 J	100 U	100 U	3360 J	10000	10000
Selenium	183	ug/L	12	3.8 U	3.8 U	5.9 J	4.4 J	3.8 U	3.8 U	10	50
Silver	184	ug/L	12	0.23 J	0.35 J	0.10 U	0.24 J	0.10 U	0.74 J	10	17.5
Sulfate	315	ug/L	12	5000 U	5000 U	5000 U	5000 U	5000 U	5000 U	25000	25000
Total Dissolved Solids	311	ug/L	12	66000	82000	26000	34000	20000 U	62000	NE	50000
Zinc	213	ug/L	12	7.2 J	5.5 J	4.9 J	5.0 J	3.5 J	5.3 J	10	1050

\* Maximum Contaminant Level (MCL)

**Notes:**

15A NCAC 2L = 15A NCAC 2L .0200, Groundwater Quality Standards for Class GA groundwater

**BOLD VALUES** indicate a values that attain or exceed the 15A NCAC 2L MCL.

Values in gray cells indicate values that equal or exceed the SWSL.

J = Parameters are values greater than Method Detection Limit (MDL) but less than the SWSL

U = Not detected above the method detection limit, for reporting purposes concentrations have been set equal to the method detection limit

NC SWSL = North Carolina Solid Waste Section Limit

NE = Not established

**TABLE 2 - FIELD AND ANALYTICAL RESULTS  
DUKE ENERGY MARSHALL STEAM STATION  
FGD LANDFILL - PERMIT #18-09  
GROUNDWATER MONITORING REPORT  
S&ME PROJECT 1411-09-047**

10/23/2009

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**Facility: Marshall Steam Station FGD Landfill #18-09**  
**Sample Date: September 8, 2009 (Field and Geochemistry Data)**

Field sampling performed by Duke Energy

*Laboratory Certificate Codes:  
Duke Power Field #5193  
Pace Lab #12*

Parameter	SW ID	Units	Certificate Codes	Monitoring Well Identification				FIELD BLANK	SWSL	15A NCAC 2L*
				1809-MS-14	1809-MS-15	1809-MS-16	1809-SW-1			
Field pH	320	Std. Units	5193	6.1	7.6	6.2	5.5			6.5-8.5
Field Spec. Conductance	323	umho/cm	5193	45	140	85	37			
Temperature	325	C	5193	16.3	16.4	17.7	18.7			
Top Casing	328	msl-feet		844.07	861.47	836.98				
Depth to Water	318	feet		36.37	52.31	25.47				
Water Elevation	319	msl-feet		807.70	809.16	811.51				
Well Depth	41	feet		44.38	63.08	37.46				
Arsenic	14	ug/L	12	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	10	50
Barium	15	ug/L	12	41.8 J	70.3 J	118	78.2 J	0.63 J	100	2000
Boron	NE	ug/L	12	14.3	19.2	10.6	26.2	8.4	NE	315
Cadmium	34	ug/L	12	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.0	1.75
Chloride	301	ug/L	12	5000 U	5000 U	5000 U	5000 U	5000 U	NE	250000
Chromium	51	ug/L	12	0.40 U	16.4	4.8 J	0.57 J	0.4 U	10	50
Copper	54	ug/L	12	0.6 J	0.3 U	2.2 J	1.2 J	0.3 U	10	1000
Fluoride	312	ug/L	12	110 J	120 J	220 J	100 U	100 U	2000	2000
Iron	340	ug/L	12	437	172 J	4400	1260	14.0 U	300	300
Lead	131	ug/L	12	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	10	15
Manganese	342	ug/L	12	5.7 J	2.5 J	56.4	271	2.4 J	50	50
Mercury	132	ug/L	12	0.095 J	0.07 U	0.07 U	0.07 U	0.07 U	0.20	1.05
Nickel	152	ug/L	12	1.7 U	1.7 U	2.8 J	1.8 J	1.7 U	50	100
Nitrate (as Nitrogen)	303	ug-N/L	12	100 U	477 J	337 J	100 U	100 U	10000	10000
Selenium	183	ug/L	12	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	10	50
Silver	184	ug/L	12	0.40 J	0.62 J	0.36 J	0.18 J	0.10 U	10	17.5
Sulfate	315	ug/L	12	5000 U	5000 U	5000 U	5000 U	5000 U	250000	250000
Total Dissolved Solids	311	ug/L	12	66000	130000	112000	66000		NE	500000
Zinc	213	ug/L	12	2.2 J	1.0 J	11.8	8.0 J	0.4 U	10	1050

\* Maximum Contaminant Level (MCL)

**Notes:**

15A NCAC 2L = 15A NCAC 2L .0200, Groundwater Quality Standards for Class GA groundwater

**BOLD VALUES** indicate a values that attain or exceed the 15A NCAC 2L MCL.

Values in gray cells indicate values that equal or exceed the SWSL.

J = Parameters are values greater than Method Detection Limit (MDL) but less than the SWSL

U = Not detected above the method detection limit, for reporting purposes concentrations have been set equal to the method detection limit

NC SWSL = North Carolina Solid Waste Section Limit

NE = Not established

**DUKE ENERGY  
MARSHALL STEAM STATION  
FLUE GAS DESULFURIZATION (FGD) LANDFILL  
PERMIT #18-09  
GROUNDWATER MONITORING REPORT  
SEPTEMBER 2009 SAMPLING EVENT  
S&ME Project No. 1411-09-047**

Prepared For:



Prepared By:



S&ME, Inc.  
44 Buck Shoals Road Suite C-3  
Arden, North Carolina 28704

October 23, 2009



October 23, 2009

Ms. Jackie Drummond  
North Carolina Department of Environment and Natural Resources  
Division of Waste Management  
Solid Waste Section  
1646 Mail Service Center  
Raleigh, N.C. 27699-1646

**Reference: Semi-Annual Groundwater Monitoring Report  
Duke Energy Carolinas – Marshall Steam Station  
Flue Gas Desulfurization (FGD) Landfill  
Permit # 18-09  
S&M# Project 1411-09-047**

Dear Ms. Drummond:

Attached is the groundwater monitoring report for the Marshall Steam Station FGD Landfill (Permit # 18-09). Groundwater sampling for the landfill was performed on September 8, 2009.

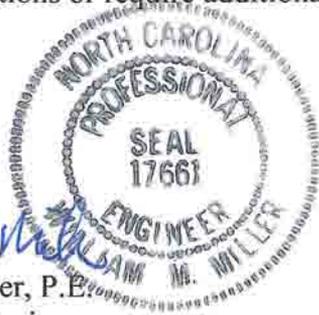
The Groundwater Monitoring Report for the sampling event includes a summary of the analytical results, a figure showing groundwater contours at the site, and preliminary evaluation of values in excess of the NC 2L groundwater standards. Also attached is the Environmental Monitoring Reporting Form. An EXCEL file containing the laboratory results in the Electronic Data Deliverable format will be sent to you by e-mail.

If you have questions or require additional information, please contact us at 828-687-9080.

Sincerely,

S&ME, Inc.

  
William M. Miller, P.E.  
Senior Project Engineer



  
Larry Armstrong, P.E. JFG  
Senior Engineer

WMM/LA

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Table 2	Summary of Field and Analytical Results

**FIGURES**

Figure 1	Groundwater Contours September 2009
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**Chain of Custody**

## **1. BACKGROUND**

Marshall Steam Station is owned and operated by Duke Energy Carolinas (Duke). Marshall Steam Station is located in Catawba County, on Highway NC 150, just west of Lake Norman. The Marshall plant generates 2090 MW of electric power by combustion of coal.

The plant is located in the Piedmont physiographic region. The subsurface conditions in the plant area consist of residual soils and partially weathered rock which have been formed by the in-place weathering of the parent rock.

The FGD landfill is located northwest of the power plant and west of the onsite ash basin. Only Cell 1 of the landfill is in operation and is approximately 18 acres in area. The location of the permitted landfill areas and the associated groundwater monitoring wells is shown on **Figure 1**. In general, the topography of the site slopes from the west-northwest to the east towards the Marshall Ash Basin

The landfill is permitted to receive FGD residue (gypsum) and clarifier sludge. The clarifier sludge is generated from the FGD wastewater treatment system.

## **2. SCOPE OF WORK**

To complete the scope of work requested of S&ME by Duke, we performed the following tasks:

- Received information provided by Duke on field sampling and measurement of groundwater elevations (performed by Duke) for monitoring wells MS-8, MS-9, MS-10, MS-11, MS-12, MS-13, MS-14, MS-15, and MS-16. This sampling was conducted on September 8, 2009.
- Received field sampling information provided by Duke for surface water sample SW-1, collected on September 8, 2009.
- Reviewed the laboratory analytical results for the samples described above. These laboratory analyses were performed by Pace Analytical. The results were provided in both in paper format and in an EXCEL file. The EXCEL file was manipulated to conform to the format requirements of the NCDENR Electronic Data Deliverable template.
- Developed a groundwater flow contour map using map data and groundwater elevation data supplied by Duke.
- Provided a review to determine if analytical results meet or exceed NC 2L groundwater standards.
- Provided a review to determine if analytical results meet or exceed the Solid Waste Section Limits (SWSLs)
- Prepared and submitted this Groundwater Monitoring Report to Duke and the NCDENR.

### **3. RESULTS**

#### **3.1 Site Groundwater Flow**

Groundwater flow contours for the site are shown on **Figure 1**. These contours were developed using the measured groundwater elevations in the wells from the September 8, 2009 sampling and from using the approximate surface water elevations for the Marshall Ash Basin.

Groundwater flow at the site is generally from areas of higher topography towards the Marshall Ash Basin and towards the surface water drainage feature containing surface water sample location, SW-1. Well MS-8 is considered to be the background groundwater monitoring well and is located northwest of the landfill and is at a higher topographic elevation than the landfill and remaining wells.

#### **3.2 Groundwater Analytical Results**

As noted, Duke collected and chemically analyzed water samples from the nine (9) groundwater monitoring wells and one (1) surface water sample location comprising the landfill monitoring network. A summary of the field data is presented in Table 1.

Samples were analyzed for the compounds listed on the Chain of Custody form (attached). The results of the laboratory analyses are summarized in Table 2.<sup>1</sup>

Results from the groundwater monitoring well samples and surface water sample were below the corresponding NCAC 2L groundwater quality standards with the exceptions noted below:

- pH – pH values below 6.5 were measured in monitoring wells MS-8, MS-10, MS-11, MS-12, MS-13, MS-14, MS-16, and in surface water sample location SW-1. The detected pH values below 6.5 ranged from 4.9 in MS-12 to 6.2 in MS-16. A pH value above 7.6 was measured in monitoring well MS-15.

Monitoring well MS-8 is considered to be a background well and should not be impacted by effects from the landfill. Monitoring well MS-11 is located hydraulically upgradient of the landfill and should not be impacted by effects from the landfill. The lowest pH value observed was at well MS-12, with a pH of 4.9. The pH values at this well have ranged from a high of 5.02 measured in September 2007 to a low of 4.51 measured in March of 2008.

The pH values measured at locations MS-12, MS-13, MS-14, MS-16, and SW-1 fall within, or slightly below, the pH range observed in wells MS-8 and MS-11. Based on this information, the pH values detected at these locations are believed to be reflective of the natural groundwater pH in the area.

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<sup>1</sup> Analytical results were provided by Duke Energy. Reference Pace Lab Report Project 9252581, dated September 21, 2009.

- Iron – Concentrations in excess of the NCAC 2L groundwater quality standard for iron were measured at MS-8, MS-11, MS-14, MS-16 and SW-1. Monitoring wells MS-8 and MS-11 should not be impacted by effects from the landfill. The detected iron concentrations at MS-8 and MS-11 are believed to be reflective of natural iron concentrations in the groundwater.

US EPA recommends that when sampling for contaminants that may be biased by the presence of turbidity, the turbidity reading is desired to stabilize at a value below 10 Nephelometric Turbidity Units (NTUs).<sup>2</sup> As noted in the table below, the values for turbidity at MS-8, MS-11, MS-16, and SW-1 are in excess of 10 NTU's. The iron concentrations at these wells are within the range of historical values observed for these locations. These concentrations are likely biased due to the presence of the turbidity.

Well	Turbidity (NTU)	Iron (ug/L)
MS-8	42.7	1230
MS-11	33.7	1040
MS-14	7.7	437
MS-16	58.4	4400
SW-1	23.1	1260

The concentration of iron observed at well MS-14 (437 ug/L) is in excess of the values previously observed at this well, except for the initial sampling event (105 ug/L). However, given the relative location of this well distant from the landfill, S&ME believes that the measured iron concentration is reflective of natural iron concentrations in the groundwater and does not indicate an impact from the landfill.

- Manganese – Concentrations in excess of the NCAC 2L groundwater quality standard for manganese were measured in monitoring MS-16 (56.4 µg/L) and in surface water sample location SW-1 (271 µg/L). The measured manganese concentration in MS-16 is slightly greater than the previous measured value of 51.5 µg/L measured in March 2009, but less than the value of 57.8 µg/L measured in September 2008. The overall trend of manganese at this location has been a downward trend from an initial high of 775 µg/L measured in September 2006.

The manganese concentration measured at SW-1 was 271 µg/L, which represents an increase over the previously measured values of 22.1 µg/L measured in March 2009 and 105 µg/L measured in September 2008. Although the September 2009 values represents an increase in the previously measured values, review of current

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<sup>2</sup> Ground-Water Sampling Guidelines for Superfund and RCRA Project Managers, Ground Water Forum Issue Paper, EPA 542-S-02-001, May 2002, Yeskis and Zavala.

and historic readings for other constituents (pH, boron, sulfate) do not indicate that there is an impact from the landfill at this location.

The analytical results show concentrations that meet or exceed the SWSL's as follows:

<b>Parameter</b>	<b>Location</b>
Barium	MS-10 MS-13 MS-16
Chromium	MS-15
Iron	MS-11 MS-14 MS-16 MS-8
Manganese	MS-16
Nitrate nitrogen	MS-10 MS-13
Zinc	MS-16

**TABLE 1 - FIELD DATA PARAMETERS  
DUKE ENERGY MARSHALL STEAM STATION  
FGD LANDFILL - PERMIT #18-09  
GROUNDWATER MONITORING REPORT  
S&ME PROJECT 1411-09-047**

DATE	WELL NO.	WELL DEPTH (feet)	DEPTH TO WATER (feet)	WATER ELEV. (feet)	DEPTH TO PRODUCT (feet)	ODOR	Purge Method	AVG * PMP RATE (ml/min)	WELL VOL (gal)	EVAC VOL (gal)	EVAC (yes/no)	TEMP (deg C)	SPECIFIC CONDUCTANCE (umho/cm)	pH (units)	TURBIDITY (NTU)	ORP (mV-NHE)	DO (mg/l)
9/8/2009	MS-8	51.58	45.93	826.41	N/A	NA	CP	N/A	0.92	2.00	YES	16.8	44	5.9	42.7	N/A	N/A
9/8/2009	MS-9	53.00	42.78	825.26	N/A	NA	CP	N/A	1.67	8.75	NO	15.9	123	7.0	4.0	N/A	N/A
9/8/2009	MS-10	23.34	18.13	833.16	N/A	NA	CP	N/A	0.85	3.00	NO	17.1	23	5.0	12.2	N/A	N/A
9/8/2009	MS-11	42.72	33.94	825.84	N/A	NA	CP	N/A	1.43	6.00	NO	15.2	39	5.4	33.7	N/A	N/A
9/8/2009	MS-12	31.09	23.68	811.98	N/A	NA	CP	N/A	1.21	3.75	NO	14.9	22	4.9	7.2	N/A	N/A
9/8/2009	MS-13	41.52	31.02	810.88	N/A	NA	CP	N/A	1.71	5.25	NO	14.8	91	5.1	3.9	N/A	N/A
9/8/2009	MS-14	44.38	36.37	807.70	N/A	NA	CP	N/A	1.31	4.50	NO	16.3	45	6.1	7.7	N/A	N/A
9/8/2009	MS-15	63.08	52.31	809.16	N/A	NA	CP	N/A	1.76	8.75	NO	16.4	140	7.6	4.7	N/A	N/A
9/8/2009	MS-16	37.46	25.47	811.51	N/A	NA	CP	N/A	1.96	4.00	YES	17.7	85	6.2	58.4	N/A	N/A
9/8/2009	SW-1	N/A	N/A	N/A	N/A	NA	NP	NA	N/A	NA	NA	18.7	37	5.5	23.1	NA	NA

Sampling Performed by Duke Energy

Purge Methods

LF = Low Flow

CP = Coventional Purge (3 to 5 well vol)

BP = No Purge (HydraSleeve)

**TABLE 2 - FIELD AND ANALYTICAL RESULTS  
DUKE ENERGY MARSHALL STEAM STATION  
FGD LANDFILL - PERMIT #18-09  
GROUNDWATER MONITORING REPORT  
S&ME PROJECT 1411-09-047**

10/23/2009

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<b>Facility: Marshall Steam Station FGD Landfill #18-09</b>	<b>Laboratory Certificate Codes: Duke Power Field #5193 Pace Lab #12</b>
<b>Sample Date: September 8, 2009 (Field and Geochemistry Data)</b>	
<b>Field sampling performed by Duke Energy</b>	

Parameter	SW ID	Units	Certificate Codes	Monitoring Well Identification						SWSL	15A NCAC 2L*
				1809-MS-8	1809-MS-9	1809-MS-10	1809-MS-11	1809-MS-12	1809-MS-13		
Field pH	320	Std. Units	5193	5.9	7.0	5.0	5.4	4.9	5.1		6.5-8.5
Field Spec. Conductance	323	umho/cm	5193	44	123	23	39	22	91		
Temperature	325	C	5193	16.8	15.9	17.1	15.2	14.9	14.8		
Top Casing	328	msl-feet		872.34	868.04	851.29	859.78	835.66	841.90		
Depth to Water	318	feet		45.93	42.78	18.13	33.94	23.68	31.02		
Water Elevation	319	msl-feet		826.41	825.26	833.16	825.84	811.98	810.88		
Well Depth	41	feet		51.58	53.00	23.34	42.72	31.09	41.52		
Arsenic	14	ug/L	12	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	10	50
Barium	15	ug/L	12	49.7 J	39.0 J	170	76.1 J	77.2 J	123	100	2000
Boron	NE	ug/L	12	31.7	30.2	14.9	15.0	14.5	14.1	NE	315
Cadmium	34	ug/L	12	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.0	1.75
Chloride	301	ug/L	12	5000 U	5000 U	5000 U	5000 U	5000 U	5550	NE	250000
Chromium	51	ug/L	12	8.0 J	1.7 J	0.5 J	3.1 J	0.50 J	0.4 U	10	50
Copper	54	ug/L	12	2.2 J	0.98 J	0.34 J	1.3 J	0.36 J	4.8 J	10	1000
Fluoride	312	ug/L	12	160 J	120 J	100 U	100 U	100 U	100 U	2000	2000
Iron	340	ug/L	12	1230	114 J	169 J	1040	140 J	51.9 J	300	300
Lead	131	ug/L	12	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	10	15
Manganese	342	ug/L	12	17.2 J	16.2 J	34.4 J	23.8 J	18.1 J	17.7 J	50	50
Mercury	132	ug/L	12	0.089 J	0.091 J	0.091 J	0.088 J	0.087 J	0.091 J	0.20	1.05
Nickel	152	ug/L	12	3.3 J	1.7 U	3.7 J	1.7 U	1.7 U	1.7 U	50	100
Nitrate (as Nitrogen)	303	ug-N/L	12	100 U	100 U	1320 J	100 U	100 U	3360 J	10000	10000
Selenium	183	ug/L	12	3.8 U	3.8 U	5.9 J	4.4 J	3.8 U	3.8 U	10	50
Silver	184	ug/L	12	0.23 J	0.35 J	0.10 U	0.24 J	0.10 U	0.74 J	10	17.5
Sulfate	315	ug/L	12	5000 U	5000 U	5000 U	5000 U	5000 U	5000 U	250000	250000
Total Dissolved Solids	311	ug/L	12	66000	82000	26000	34000	20000 U	62000	NE	500000
Zinc	213	ug/L	12	7.2 J	5.5 J	4.9 J	5.0 J	3.5 J	5.3 J	10	1050

\* Maximum Contaminant Level (MCL)

**Notes:**

15A NCAC 2L = 15A NCAC 2L .0200, Groundwater Quality Standards for Class GA groundwater

**BOLD VALUES** indicate a values that attain or exceed the 15A NCAC 2L MCL.

Values in gray cells indicate values that equal or exceed the SWSL.

J = Parameters are values greater than Method Detection Limit (MDL) but less than the SWSL

U = Not detected above the method detection limit, for reporting purposes concentrations have been set equal to the method detection limit

NC SWSL = North Carolina Solid Waste Section Limit

NE = Not established

**TABLE 2 - FIELD AND ANALYTICAL RESULTS  
DUKE ENERGY MARSHALL STEAM STATION  
FGD LANDFILL - PERMIT #18-09  
GROUNDWATER MONITORING REPORT  
S&ME PROJECT 1411-09-047**

10/23/2009

Page 2 of 2

**Facility: Marshall Steam Station FGD Landfill #18-09**  
**Sample Date: September 8, 2009 (Field and Geochemistry Data)**

Field sampling performed by Duke Energy

*Laboratory Certificate Codes:*  
 Duke Power Field #5193  
 Pace Lab #12

Parameter	SW ID	Units	Certificate Codes	Monitoring Well Identification				FIELD BLANK	SWSL	15A NCAC 2L*
				1809-MS-14	1809-MS-15	1809-MS-16	1809-SW-1			
Field pH	320	Std. Units	5193	6.1	7.6	6.2	5.5			6.5-8.5
Field Spec. Conductance	323	umho/cm	5193	45	140	85	37			
Temperature	325	C	5193	16.3	16.4	17.7	18.7			
Top Casing	328	msl-feet		844.07	861.47	836.98				
Depth to Water	318	feet		36.37	52.31	25.47				
Water Elevation	319	msl-feet		807.70	809.16	811.51				
Well Depth	41	feet		44.38	63.08	37.46				
Arsenic	14	ug/L	12	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	10	50
Barium	15	ug/L	12	41.8 J	70.3 J	118	78.2 J	0.63 J	100	2000
Boron	NE	ug/L	12	14.3	19.2	10.6	26.2	8.4	NE	315
Cadmium	34	ug/L	12	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.0	1.75
Chloride	301	ug/L	12	5000 U	5000 U	5000 U	5000 U	5000 U	NE	250000
Chromium	51	ug/L	12	0.40 U	16.4	4.8 J	0.57 J	0.4 U	10	50
Copper	54	ug/L	12	0.6 J	0.3 U	2.2 J	1.2 J	0.3 U	10	1000
Fluoride	312	ug/L	12	110 J	120 J	220 J	100 U	100 U	2000	2000
Iron	340	ug/L	12	437	172 J	4400	1260	14.0 U	300	300
Lead	131	ug/L	12	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	10	15
Manganese	342	ug/L	12	5.7 J	2.5 J	56.4	271	2.4 J	50	50
Mercury	132	ug/L	12	0.095 J	0.07 U	0.07 U	0.07 U	0.07 U	0.20	1.05
Nickel	152	ug/L	12	1.7 U	1.7 U	2.8 J	1.8 J	1.7 U	50	100
Nitrate (as Nitrogen)	303	ug-N/L	12	100 U	477 J	337 J	100 U	100 U	10000	10000
Selenium	183	ug/L	12	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	10	50
Silver	184	ug/L	12	0.40 J	0.62 J	0.36 J	0.18 J	0.10 U	10	17.5
Sulfate	315	ug/L	12	5000 U	5000 U	5000 U	5000 U	5000 U	250000	250000
Total Dissolved Solids	311	ug/L	12	66000	130000	112000	66000		NE	500000
Zinc	213	ug/L	12	2.2 J	1.0 J	11.8	8.0 J	0.4 U	10	1050

\* Maximum Contaminant Level (MCL)

**Notes:**

15A NCAC 2L = 15A NCAC 2L .0200, Groundwater Quality Standards for Class GA groundwater

**BOLD VALUES** indicate a values that attain or exceed the 15A NCAC 2L MCL.

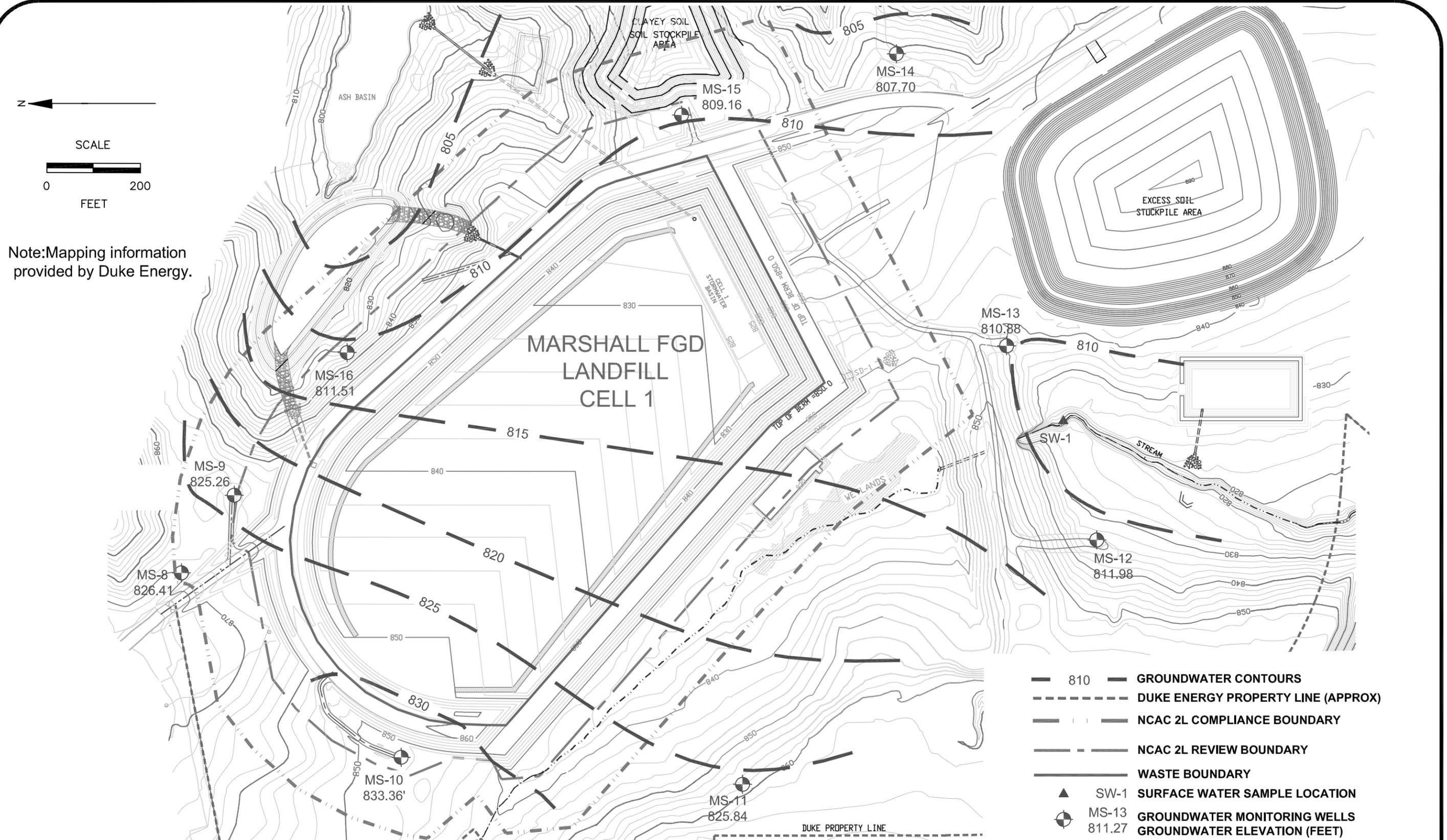
Values in gray cells indicate values that equal or exceed the SWSL.

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NC SWSL = North Carolina Solid Waste Section Limit

NE = Not established



Note: Mapping information provided by Duke Energy.

SCALE:	AS SHOWN
PROJECT NO.	1411-09-047

DATE:	October 23, 2009
DRAWN BY:	W. Miller
CHECKED BY:	L. Armstrong



44 Buck Shoals Rd Suite C-3  
 Arden, NC 29704  
 PH. (828) 687-9080  
 FAX. (828) 687-8003  
 WWW.SMEINC.COM

**DUKE ENERGY MARSHALL STEAM STATION  
 FLUE GAS DESUPHURIZATION (FGD) LANDFILL - PERMIT #18-09  
 GROUNDWATER CONTOURS  
 SEPTEMBER 2009**

FIGURE NO.	1
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For Detailed Instructions, see:  
http://dewwww.lessserv/cocl

# CHAIN OF CUSTODY RECORD AND ANALYSIS REQUEST FORM

Duke Energy Analytical Lab Services

Mail Code MGO3A2 (Building 7406)  
13339 Hagers Ferry Rd  
Huntersville, N. C. 28078  
(704) 875-5245  
Fax: (704) 875-5038

## Analytical Laboratory Use Only

ILIMS #09-AUG-0264 Sample Class: **GWATER** Samples Originating From: NC SC

Logged By: **EBC** Date & Time: **8/13/09 11:05**

VENDOR: **PAGE - All** Cooler Temp (C): **18°C**

SAMPLE PROGRAM: Ground Water NPDES Drinking Water UST RCRA Waste

PO # **ISW01.341** 15 Preserv.: 1=HCl 2=H<sub>2</sub>SO<sub>4</sub> 3=HNO<sub>3</sub> 4=Ice 5=None

19 Page 1 of 1  
**DISTRIBUTION ORIGINAL to LAB. COPY to CLIENT**

9252581

1) Project Name: **MARSHALL FGD LANDFILL** 2) Phone No: 875-5257

3) Client: **LDC / TSH / Chris Hallman** 4) Fax No: 875-4349

5) Business Unit: 20035 6) Process: 7) Resp. To: **MS00**

8) Project ID: **C423LFL** 9) Activity ID: **C** 10) Mail Code: **MGO3A3**

LAB USE ONLY
11 Lab ID
29020584
29020585
29020586
29020857
29020588
29020589
29020590
29020591
29020592
29020593
29020594

Customer to complete appropriate columns to right

12 Chem Desktop No.	13 Sample Description or ID	14 Collection Information			17 Comp.	18 Grab	Alk, SO <sub>4</sub> , NO <sub>3</sub> , Cl, Fluoride	Hg	METALS (Ag, As, B, Ba, Ca, Cd, Cr, K, Mg, Na, Ni, Pb, Se, Cu, Fe, Mn, Zn)	TDS	20 Total # of Containers
		Date	Time	Signature							
	MS-8	001	9/8/09 0750	[Signature]	X	X	1	1	1	1	4
	MS-9	002	9/8/09 0840	[Signature]	X	X	1	1	1	1	4
	MS-10	003	9/8/09 1100	[Signature]	X	X	1	1	1	1	4
	MS-11	004	9/8/09 0855	[Signature]	X	X	1	1	1	1	4
	MS-12	005	9/8/09 0820	[Signature]	X	X	1	1	1	1	4
	MS-13	006	9/8/09 0745	[Signature]	X	X	1	1	1	1	4
	MS-14	007	9/8/09 1010	[Signature]	X	X	1	1	1	1	4
	MS-15	008	9/8/09 0930	[Signature]	X	X	1	1	1	1	4
	MS-16	009	9/8/09 0955	[Signature]	X	X	1	1	1	1	4
	SW-1	010	9/8/09 0915	[Signature]	X	X	1	1	1	1	4
	FIELD BLANK	011	9/8/09 1115	[Signature]	X	X	1	1	1	1	3

Customer to complete all appropriate NON-SHADED areas.

15 Analyses Required

Customer to sign & date below

21) Requisitioned By: [Signature] 9-8-09 12:45	Accepted By: [Signature] 9-8-09 12:45	22) Requested Turnaround <b>9-21</b>
Requisitioned By: [Signature] 9-8-09 14:30	Accepted By: [Signature] 9-8-09 14:30	
Requisitioned By: [Signature] 9-8-09 15:00	Accepted By: [Signature] 9-8-09 15:00	
23) Sealed/Locked By: [Signature] 9-8-09 12:59	Sealed/Lock Opened By: [Signature] 9-8-09 15:00	

24) Comments: **Regulatory Agency : NCDENR/DWM -SW Section - State EDD Format Required**

Important - please indicate requested turnaround

PLEASE!  
Send pdf and excel spreadsheet of vendor results to:  
labcustomer@duke-energy.com