

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):

HDR Engineering, Inc. of the Carolinas (Consultant)

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

Name: Ian Holdeman Phone: (704) 338-6839

E-mail: ian.holdeman@hdrinc.com

Facility name:	Facility Address:	Facility Permit #	NC Landfill Rule: (.0500 or .1600)	Actual sampling dates (e.g., October 20-24, 2006)
Duke Energy Carolinas, LLC Marshall Steam Station Dry Ash Landfill	8320 East NC Highway 150 Terrel, NC 28682	1804	.0500	August 25, 2015

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 Senior Engineer (828) 891-6296

Facility Representative Name (Print) Title (Area Code) Telephone Number

William M. Miller 10/19/2015
Signature Date

Affix NC Licensed/ Professional Geologist Seal

440 S. Church Street Suite 1000, Charlotte, NC 28202

Facility Representative Address

F-0116

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



William M. Miller 10/19/15

Marshall Steam Station

Semiannual Groundwater Monitoring Report

Dry Ash Landfill, Permit No. 1804

August 2015 Sampling Event

October 19, 2015





Report Verification

**PROJECT: SEMIANNUAL GROUNDWATER MONITORING REPORT
MARSHALL STEAM STATION
DRY ASH LANDFILL
PERMIT NO. 1804**

TITLE: AUGUST 2015 SAMPLING EVENT

This document has been reviewed for accuracy and quality commensurate with the intended application.

Prepared by:  Date: 10/19/15
Checked by:  Date: Oct 19, 2015
Approved by:  Date: 10/19/2015

Project Manager: Brooke Ahrens, PE

Professional Engineer Seal:



 10/19/15

HDR Engineering, Inc. of the Carolinas
440 South Church St., Suite 1000
Charlotte, NC 28202
North Carolina Engineering Firm Number F-0116



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Section 1 - Background

The Marshall Dry Ash Landfill is located at Marshall Steam Station which is owned and operated by Duke Energy Carolinas, LLC (Duke Energy). Marshall Steam Station is a four-unit, coal-fired generating facility located on Lake Norman in Catawba County, North Carolina.

The Marshall Dry Ash Landfill consists of two separate disposal areas permitted in December 1983 under North Carolina Department of Environmental Quality (NCDEQ) Solid Waste Permit No. 1804. Placement of fly-ash began in September 1984 in the area designated as Phase I. Phase I consists of approximately 14.5 acres and approximately 280,000 tons of fly-ash placed between September 1984 and March 1986. Placement of ash in this area was completed around March 1986. Placement of ash in Phase II, approximately 46 acres, began around March 1986 and was completed in 1999.

The location of the landfill and nearby surrounding areas is shown on Figure 1. The landfill is located north of the power plant and south of Island Point Road. The Marshall Steam Station ash basin is located adjacent to the western boundary of the landfill.

The groundwater monitoring system for the Marshall Dry Ash Landfill consists of the following:

Monitoring Wells: MW-1
MW-2
MW-3
MW-4
MW-5

Observation Well: OB-1

The locations of the wells are shown on Figure 2. Monitoring wells MW-2, MW-3, and MW-5 are located adjacent to the 46-acre landfill. Monitoring well MW-1 and observation well OB-1 are located adjacent to the 14.5-acre landfill. Observation well OB-1 is only used to measure groundwater levels.

Monitoring well MW-4 is located upgradient from the 46-acre landfill and is described in the Post-Closure Ground-Water Monitoring Program Sampling and Analysis Plan¹ (SAP) as representing upgradient groundwater quality. All of the groundwater monitoring wells are screened to monitor the shallow aquifer. Table 1 presents well construction information for the landfill monitoring wells.

¹ Groundwater Monitoring Program – Sampling and Analysis Plan, Marshall Steam Station Dry Ash Landfill, Permit No. 1804, October 22, 2012.

Section 2 - Methods

2.1 Sampling and Analysis Methods

Groundwater sampling and documentation of sampling activities were performed by Duke Energy personnel (Field Certification #5193) according to the North Carolina Solid Waste Management Guidelines. Copies of the field sampling forms are included in Appendix A. The parameters and constituents reported were selected by Duke Energy and the North Carolina Department of Environment and Natural Resources (NCDENR) Division of Solid Waste and were analyzed by the Duke Energy Analytical Laboratory (North Carolina Laboratory Certification #248).

The groundwater samples were analyzed for the following constituents and/or parameters:

- Barium, boron, calcium, chromium, copper, iron, manganese, nickel, silver, and zinc using U.S. Environmental Protection Agency (EPA) Method 200.7
- Arsenic, cadmium, lead, and selenium using EPA Method 200.8
- Mercury using EPA Method 245.1
- Total Dissolved Solids using Standard Method (SM) 2540C
- Chloride, fluoride, nitrate as nitrogen, and sulfate using EPA Method 300.0

2.2 Statement of Work

HDR completed the following tasks:

- Received field sampling information provided by Duke Energy for monitoring wells MW-1, MW-2, MW-3, MW-4, and MW-5 and water level information for observation well OB-1. The samples were collected on August 25, 2015, and HDR received the data on September 10, 2015.
- Reviewed the laboratory analytical results for samples. The Electronic Data Deliverable (EDD) provided by Duke Energy was adapted to conform to the format requirements of the NCDEQ EDD template. HDR added an italicized J data qualifier (*J*) to indicate a detected concentration that attains or is greater than the laboratory's method reporting limit (MRL) but less than the Solid Waste Section Limit² (SWSL). A copy of the original EDD is retained in HDR's files.
- Developed a generalized groundwater surface contour map using map data and groundwater elevation data supplied by Duke Energy. Calculated groundwater flow velocities based on groundwater surface contours.

² The Solid Waste Section Limit (SWSL) is defined by NCDEQ as the lowest amount of analyte in a sample that can be quantitatively determined with suitable precision and accuracy. The SWSL is the concentration below which reported results must be qualified as estimated. NCDENR Division of Waste Management Memorandum dated February 23, 2007.



- Prepared and submitted this Semiannual Groundwater Monitoring Report to Duke Energy.

Section 3 - Results

3.1 Site Groundwater Flow

Generalized groundwater surface contours and groundwater flow direction arrows for the site are shown on Figure 3. These contours were developed using the groundwater elevations measured in the wells on the date of sampling and using the approximate surface water elevations for the Marshall Ash Basin and the adjacent Lake Norman. Calculated groundwater flow velocities are presented in Table 2.

The ground surface in the area of the larger landfill slopes from the elevation along Island Point Road (located north of MW-4), approximate elevation 880 feet to 890 feet, downward toward the Marshall Ash Basin which has a surface water elevation of approximately 790 feet. Lake Norman is located to the east of the Marshall Ash Basin. The full pond elevation of Lake Norman is 760 feet.

Groundwater flow at the site is from areas of higher topography toward the ash basin and on toward Lake Norman. Monitoring well MW-4 is located north of the 46-acre landfill and is at the highest topographic elevation. Groundwater flow is generally from MW-4 toward the 46-acre landfill and to the ash basin. It is expected that flow would be from the topographically higher region north of MW-3 and MW-5 toward the 46-acre landfill, or in the case of MW-5, toward the portion of ash basin located to the east of the 46-acre landfill.

Based on an August 6, 2012, survey, monitoring well MW-2 is located approximately 100 feet inside the landfill review boundary and approximately 25 feet to 30 feet outside the limit of waste.

Duke Energy has acquired property north of the 46-acre landfill. The compliance boundary on the north side of the 46-acre landfill was previously coincident with the property boundary. The revised property and compliance boundaries are depicted on Figure 2. Due to the property boundary revision, monitoring well MW-3 is located approximately 50 feet inside the landfill review boundary and approximately 75 feet outside the limit of waste.

The water elevation at monitoring well MW-3 is approximately the same as the pond elevation of two adjacent ponded areas. These ponded areas were part of the original ash basin and were cut off from the main body of the ash basin during construction of the 46-acre landfill. Monitoring well MW-5 is located on the east side of the 46-acre landfill adjacent to an inactive portion of the ash basin. This inactive portion of the ash basin no longer contains appreciable free water and is filled with ash that was sluiced from the ash basin.

The groundwater flow in the region near the 14.5-acre landfill area appears to be from the ash basin (elevation 790 feet) toward the arm of Lake Norman (elevation 760 feet) located east of OB-1 and MW-1.

3.2 Analytical Results

A summary of the field data is presented in Table 3.

The field and laboratory results of groundwater sampling are summarized in Table 4. Concentrations with values that equal or are greater than the SWSLs are noted on Table 4 by



gray cells. Concentrations with values that attain or exceed the Title 15A NCAC 02L .0202 (g) Standards (2L Standards) are noted on Table 4 by bold font.

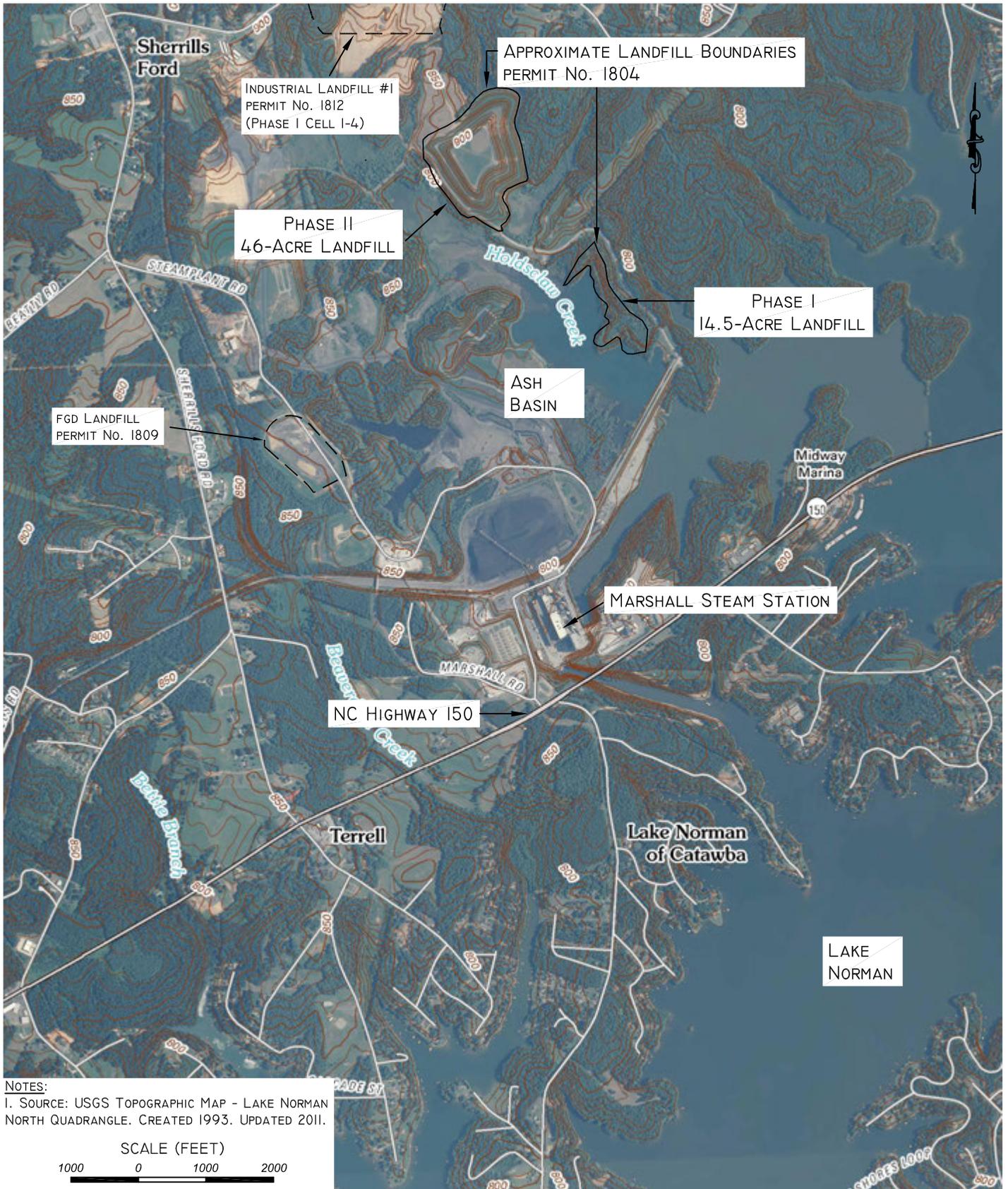
A summary of the field and analytical results that attain or exceed the 2L Standards and a preliminary analysis of the cause and significance of the exceedances are presented in Table 5.

Selected samples were diluted as is normal laboratory practice to bring samples to the calibrated range of the analysis. Specifics regarding the samples that were diluted, including the dilution amount, are reported in the EDD.

The laboratory report and chain-of-custody forms can be found in Appendix B.

HDR prepared and submitted an assessment to NCDEQ on historic exceedances of the 2L Standards at this landfill (Groundwater Assessment, Marshall Steam Station, Dry Ash Landfill, December 21, 2012). The report assessed 2L Standard exceedances for manganese at monitoring wells MW-3 and MW-5. The report concluded that for the period of analytical results reviewed, the manganese exceedances at monitoring wells MW-3 and MW-5 were likely the result of naturally-occurring manganese and were not caused by impacts from the landfill.

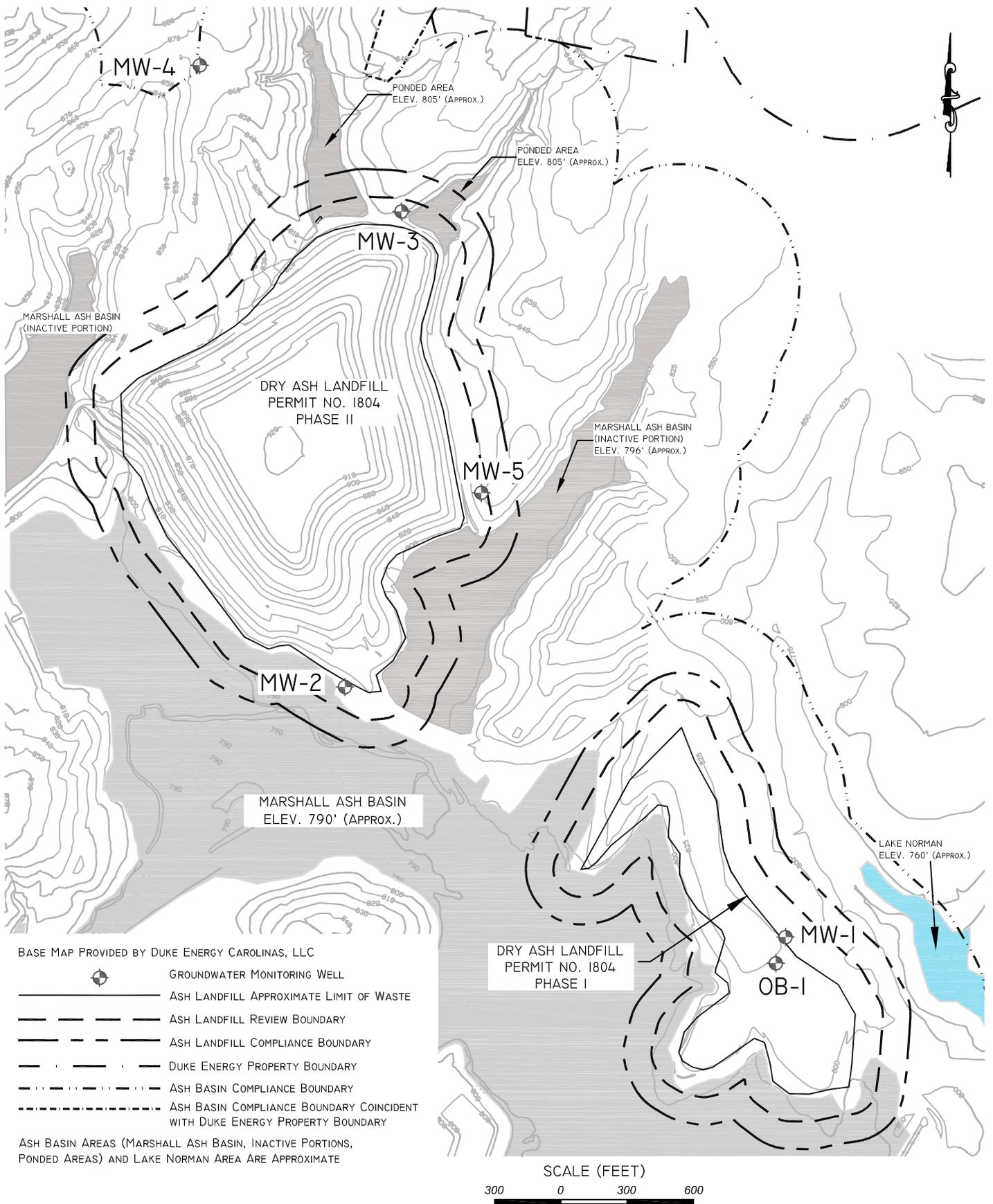
FIGURES



License Number: F-0116
 440 South Church Street Charlotte, NC 28202

**SITE LOCATION MAP
 MARSHALL STEAM STATION
 DRY ASH LANDFILL
 PERMIT NO. 1804**

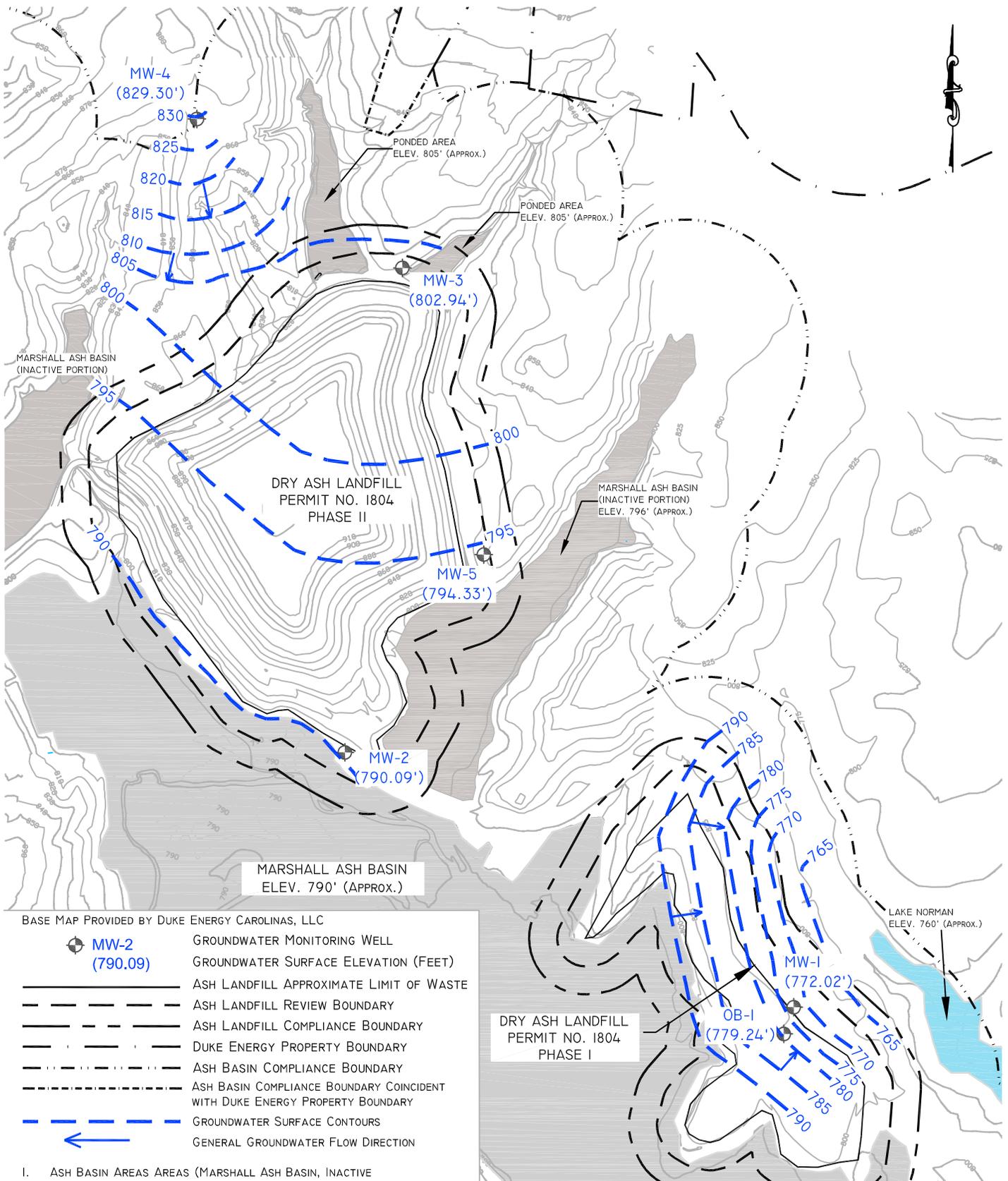
DATE
 NOVEMBER 2015
 FIGURE
1



BASE MAP PROVIDED BY DUKE ENERGY CAROLINAS, LLC

ASH BASIN AREAS (MARSHALL ASH BASIN, INACTIVE PORTIONS, PONDED AREAS) AND LAKE NORMAN AREA ARE APPROXIMATE

**SAMPLE LOCATIONS
MARSHALL STEAM STATION
DRY ASH LANDFILL
PERMIT NO. 1804**



BASE MAP PROVIDED BY DUKE ENERGY CAROLINAS, LLC

- MW-2 (790.09)** GROUNDWATER MONITORING WELL
- GROUNDWATER SURFACE ELEVATION (FEET)**
- ASH LANDFILL APPROXIMATE LIMIT OF WASTE
- ASH LANDFILL REVIEW BOUNDARY
- ASH LANDFILL COMPLIANCE BOUNDARY
- DUKE ENERGY PROPERTY BOUNDARY
- ASH BASIN COMPLIANCE BOUNDARY
- ASH BASIN COMPLIANCE BOUNDARY COINCIDENT WITH DUKE ENERGY PROPERTY BOUNDARY
- GROUNDWATER SURFACE CONTOURS
- GENERAL GROUNDWATER FLOW DIRECTION

1. ASH BASIN AREAS (MARSHALL ASH BASIN, INACTIVE PORTIONS, PONDED AREAS) AND LAKE NORMAN AREA ARE APPROXIMATE
2. GROUNDWATER ELEVATIONS MEASURED ON AUGUST 25, 2015.

DRY ASH LANDFILL PERMIT NO. 1804 PHASE I

SCALE (FEET)
300 0 300 600



GENERALIZED GROUNDWATER SURFACE CONTOURS AUGUST 25, 2015 MARSHALL STEAM STATION DRY ASH LANDFILL PERMIT NO. 1804

DATE
NOVEMBER 2015
FIGURE
3

TABLES

Table 1 - Well Construction Information
Duke Energy Carolinas, LLC/Marshall Steam Station
Dry Ash Landfill - Permit No. 1804

Well ID	Well Installation Date	Coordinates		Well TOC Elevation (ft.)	Ground Surface Elevation (ft.)	Well Stick-up Height Above Ground Surface (ft.)	Groundwater Elevation (ft.)	Depth to Water below TOC (ft.)	Total Well Depth below TOC (ft.)	Depth to Top of Screen from TOC (ft.)	Screened Interval below TOC (ft.)	Geology of Screened Interval	Well Diameter (in.)	Casing Type
		Latitude	Longitude											
MW-1	8/15/1989	35.6103797	-80.9609129	823.70	821.20	2.50	772.02	51.68	78.75	68.75	68.75-78.75	Saprolite	2	PVC
MW-2	8/15/1988	35.6131973	-80.9679753	797.21	794.90	2.31	790.09	7.13	35.10	25.10	25.10-35.10	Saprolite	2	PVC
MW-3	8/15/1989	35.6191355	-80.9672341	813.07	811.00	2.07	802.94	10.13	28.15	18.15	18.15-28.15	Saprolite	2	PVC
MW-4	8/15/1989	35.6209184	-80.9703623	867.15	864.50	2.65	829.30	38.08	50.20	40.20	40.20-50.20	Saprolite	2	PVC
MW-5	8/10/2000	35.6158450	-80.9656901	822.69	820.19	2.50	794.33	28.36	30.71	20.71	20.71-30.71	Saprolite	2	PVC
OB-1	6/28/1989	35.6100507	-80.9610530	825.85	823.60	2.25	779.24	46.61	65.50	55.50	55.50-65.50	Saprolite	2	PVC

Notes:

1. TOC indicates top of casing.
2. ft. indicates feet.
3. in. indicates inches nominal diameter.
4. PVC indicates polyvinyl chloride.
5. PWR indicates partially weathered rock.
6. Horizontal datum NAD83.
7. Vertical datum is NAVD 88.
8. Depth to groundwater gauged on August 25, 2015.
9. Information provided by Duke Energy on September 10, 2015.
10. Screened geology for OB-1 using data from MW-1 as geology at OB-1 not recorded and MW-1 is the closest proxy.

**Table 2 - Groundwater Flow Velocities - August 2015
Duke Energy Carolinas, LLC/Marshall Steam Station
Dry Ash Landfill - Permit No. 1804**

Well ID	Upgradient Groundwater Contour Elevation (ft)	Downgradient Groundwater Contour Elevation (ft)	Linear Distance Between Contours through Well (ft)	Hydraulic Gradient (ft/ft)	Hydraulic Conductivity (ft/day)	Effective Porosity (%/100)	Groundwater Velocity (ft/day)
MW-1	775	770	110	0.05	0.41	0.259	0.07
MW-2	795	790	774	0.01	0.41	0.259	0.01
MW-3	805	800	972	0.005	0.41	0.259	0.01
MW-4	830	825	152	0.03	0.41	0.259	0.05
MW-5	795	790	774	0.01	0.41	0.259	0.01
OB-1	780	775	80	0.06	0.41	0.259	0.10

Notes:

1. Linear distance measured through monitoring wells is approximately perpendicular to groundwater contours.
2. At monitoring well locations where downgradient contours are not present, the groundwater elevation at the monitoring well is used as the downgradient groundwater elevation.
3. At monitoring well locations where upgradient contours are not present, the groundwater elevation at the monitoring well is used as the upgradient groundwater elevation.
4. Monitoring wells are not listed where insufficient groundwater contour information or well construction data is available to calculate velocity.
5. Hydraulic gradients and groundwater velocities are approximate.
6. Hydraulic conductivity presented is the geometric mean of the conductivity data for the alluvium/soil/saprolite and PWR hydrostratigraphic layer in the HDR Conductivity Database (unpublished data from Piedmont Carolina sites with foliated/layered bedrock).
7. Effective porosity presented is the mean value of the alluvium/soil/saprolite and PWR hydrostratigraphic layer estimated from soil testing using Fetter/Bear Diagrams.

Table 3 - Field Data Parameters
Duke Energy Carolinas, LLC/Marshall Steam Station
Dry Ash Landfill - Permit No. 1804

DATE	SAMPLE ID	WELL DEPTH (feet)	DEPTH TO WATER (feet)	WATER ELEV. (feet)	APPEARANCE	ODOR	PURGE METHOD	PUMP RATE (mL/min)	WELL VOLUME (gal)	EVAC VOLUME (gal)	EVAC (yes/no)	TEMP (deg C)	SPECIFIC CONDUCTANCE (µU/cm)	pH (SU)	TURBIDITY (NTU)	ORP (mV-NHE)	DO (mg/L)
8/25/2015	MW-1	78.75	51.68	772.02	Normal	None	CP	N/A	4.42	13.50	NO	15.79	246	5.7	3.5	349	0.56
8/25/2015	MW-2	35.10	7.13	790.09	Normal	None	CP	N/A	4.56	14.25	NO	15.88	400	5.4	1.0	367	0.50
8/25/2015	MW-3	28.15	10.13	802.94	Normal	None	CP	N/A	2.94	9.00	NO	15.50	87	4.9	1.3	400	2.79
8/25/2015	MW-4	50.20	38.08	829.30	Normal	None	CP	N/A	1.98	4.00	NO	17.07	49	5.9	4.7	358	7.74
8/25/2015	MW-5	30.71	28.36	794.33	Normal	None	CP	N/A	0.38	1.50	NO	17.30	39	5.4	1.7	354	2.18
8/25/2015	OB-1	65.50	46.61	779.24	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Notes:

1. Purge Methods; LF=Low Flow, CP=Conventional Purge (3-5 well volumes), NP=No Purge (HydraSleeve), EOP=Equipment Only Purge. Pump rate applicable to LF purging only.
2. Field sampling performed by Duke Energy Carolinas, LLC personnel.
3. EVAC indicates whether the water level in the well was drawn down to the level of the pump during purging.
4. µU/cm indicates micromhos per centimeter.
5. mL/min indicates milliliters per minute.
6. SU indicates Standard Units.
7. NTU indicates Nephelometric Turbidity Units.
8. mV-NHE indicates millivolts-Normal Hydrogen Electrode.
9. mg/L indicates milligrams per liter.
10. N/A indicates not applicable.
11. Information provided by Tim Hunsucker of Duke Energy Carolinas on September 10, 2015.

**Table 4 - Groundwater Field and Analytical Results
Duke Energy Carolinas, LLC/Marshall Steam Station
Dry Ash Landfill - Permit No. 1804**

Parameter	SWS ID	Units	Certificate Code	Monitoring Wells					Field Blank	MDL	SWSL	15A NCAC 2L Standard	Federal MCL
				1804 MW-1	1804 MW-2	1804 MW-3	1804 MW-4	1804 MW-5					
				Field pH	320	SU	5193	5.7					
Specific Conductance	323	µU/cm	5193	246	400	87	49	39	-	-	NE	NE	NE
Temperature	325	°C	5193	15.79	15.88	15.50	17.07	17.30	-	-	NE	NE	NE
Top of Casing	328	feet	-	823.70	797.22	813.07	867.38	822.69	-	-	NE	NE	NE
Depth to Water	318	feet	-	51.68	7.13	10.13	38.08	28.36	-	-	NE	NE	NE
Water Elevation	427	feet	-	772.02	790.09	802.94	829.30	794.33	-	-	NE	NE	NE
Well Depth	411	feet	-	78.75	35.10	28.15	50.20	30.71	-	-	NE	NE	NE
Arsenic	14	µg/L	248	0.155 J	0.181 J	0.0844 J	0.147 J	0.0973 J	0.078 U	0.078	10	10	10
Barium	15	µg/L	248	135	58.7 J'	289	49.6 J'	53.2 J'	0.1 U	0.1	100	700	2,000
Boron	428	µg/L	248	275	3,190	9.62 J	7.37 J	6.26 J	3.65 J	3.3	NE	700	NE
Cadmium	34	µg/L	248	0.101 U	0.102 J	0.101 U	0.101 U	0.101 U	0.101 U	0.101	1	2	5
Chloride	455	µg/L	248	47,400	4,530	9,070	2,070	2,690	43.5 J	220	NE	250,000	250,000*
Chromium	51	µg/L	248	5.6 J'	0.5 U	0.766 J	1.53 J	0.5 U	0.5 U	0.5	10	10	100
Copper	54	µg/L	248	1.13 J	1 U	1.09 J	1.14 J	1 U	1 U	1	10	1,000	1,000*
Fluoride	312	µg/L	248	106 J'	176 J	84.8 J	107 J'	68.1 J	25.4 J	17	2,000	2,000	2,000*
Iron	340	µg/L	248	229 J'	19.2 J'	331	191 J'	8.38 J	1.3 U	1.3	300	300	300*
Lead	131	µg/L	248	0.105 J	0.076 J	0.639 J	0.126 J	0.065 U	0.065 U	0.065	10	15	15
Manganese	342	µg/L	248	18.9 J'	16.2 J'	54.9	4.95 J	4.41 J	0.2 U	0.2	50	50	50*
Mercury	132	µg/L	248	0.008 J	0.01 J	0.011 J	0.01 J	0.007 J	0.011 J	0.006	0.2	1	2
Nickel	152	µg/L	248	0.961 J	0.5 U	1.57 J	0.5 U	0.5 U	0.5 U	0.5	50	100	NE
Nitrate as Nitrogen	303	µg/L	248	344 J'	578 J'	5,050 J'	26.9 J'	5.4 U	5.4 U	5.4	10,000	10,000	10,000
Selenium	183	µg/L	248	0.99 J	35.7	0.092 U	0.092 U	0.092 U	0.092 U	0.092	10	20	50
Silver	184	µg/L	248	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7	10	20	100*
Sulfate	315	µg/L	248	18,300 J'	174,000 J'	302 J'	110 J'	18 U	18 U	18	250,000	250,000	250,000*
Total Dissolved Solids	311	µg/L	248	208,000	297,000	58,000	42,000	42,000	-	16,700	NE	500,000	500,000*
Zinc	213	µg/L	248	4.46 J	6.71 J'	15.4	2.6 U	2.6 U	2.6 U	2.6	10	1,000	5,000*

Notes:

- Concentrations presented in micrograms per liter (µg/L).
- SU indicates Standard Units.
- µU/cm indicates micromhos per centimeter.
- SWS ID is the Solid Waste Section Identification Number.
- MDL is the laboratory method detection limit. The MDL values presented are for samples not diluted by the laboratory during analysis.
- SWSL is the Solid Waste Section Limit. NCDEQ defines the SWSL as the lowest amount of analyte in a sample that can be quantitatively determined with suitable precision and accuracy.
- 15A NCAC 2L Standard refers to Class GA Standards as found in 15A NCAC 02L .0202 Groundwater Quality Standards, last amended on April 1, 2013.
- MCL is the Federal Maximum Contaminant Level as found in 40 CFR, Subpart G, §141.62.
- * Concentration listed is a secondary maximum contaminant level (SMCL). SMCLs are established by EPA in the National Secondary Drinking Water Regulations as found in 40 CFR §143.3.
- NE indicates not established. NS indicates not analyzed. Blank cells indicate that there is no information relevant to the respective row.
- Grayed values indicate values that equal or are greater than the SWSL.
- Bold values indicate values that attain or exceed the 15A NCAC 2L Standard.
- Qualifiers in non-italicized text are laboratory data qualifiers or "flags". "U" is used to identify results not detected at concentrations which equal the laboratory's MDL. "J" is used to identify estimated concentrations which equal or are greater than the MDL but are less than the laboratory's method reporting limit (MRL). An italicized J'-flag is a data qualifier, added by HDR to indicate concentrations which equal or are greater than the laboratory's MRL but are less than the SWSL.
- Analytical results obtained from Electronic Data Deliverable (EDD) provided by Tim Hunsucker of Duke Energy Carolinas on September 10, 2015.
- According to the Constituent Look-up webpage on the NCDENR Division of Waste Management webpage, there is no SWSL or 2L Standard for chloride associated with CAS number 16887-00-6, which is the CAS reported by the laboratory for the analyses completed. Therefore, the SWSL and 2L Standard listed are for the chloride with CAS number SW301 as specified on the Constituent Look-up webpage (last updated June 13, 2011).

**Table 5 - Field and Analytical Results that Equal or Exceed
15A NCAC 2L Groundwater Quality Standards
Duke Energy Carolinas, LLC/Marshall Steam Station
Dry Ash Landfill - Permit No. 1804**

Sample Date: August 25, 2015

Field sampling performed by Duke Energy Carolinas, LLC

Parameter	Sample ID	Result	Units	15A NCAC 2L Standard	Historical Concentrations	Cause and Significance
pH	MW-1	5.7	SU	6.5 - 8.5	5.2 - 6.2	pH is consistent with historical readings at MW-1.
	MW-2	5.4			5.1 - 6.1	pH is consistent with historical readings at MW-2. MW-2 is located within review boundary.
	MW-3	4.9			4.4 - 5.4	pH is consistent with historical readings at MW-3. MW-3 is located within review boundary.
	MW-4	5.9			5.1 - 6.3	pH is consistent with historical readings at MW-4.
	MW-5	5.4			5.1 - 5.8	pH is consistent with historical readings at MW-5.
Boron	MW-2	3,190	µg/L	700	2,175 - 3,230	Boron concentration is consistent with historical readings at MW-2. MW-2 is located within review boundary.
Iron	MW-3	331	µg/L	300	<10 - 1,794	Iron concentration is consistent with historical readings at MW-3. MW-3 is located within review boundary.
Manganese	MW-3	54.9	µg/L	50	47.1 - 176	Manganese concentration is consistent with historical readings at MW-3. MW-3 is located within review boundary.
Selenium	MW-2	35.7	µg/L	20	<1 - 44.05	Selenium concentration is consistent with historical readings at MW-2. MW-2 is located within review boundary.

Notes:

1. 15A NCAC 2L Standard refers to Class GA Standards as found in 15A NCAC 02L .0202 Groundwater Quality Standards, last amended on April 1, 2013.
2. µg/L indicates micrograms per liter.
3. SU indicates Standard Units.
4. NTU indicates Nephelometric Turbidity Units.
5. < indicates the analytical result is reported as less than the laboratory method reporting limit (<MRL).
6. Historical concentrations based on data in Duke Energy Carolinas, LLC (Duke Energy) analytical results database.
7. Analytical results obtained from Electronic Data Deliverable (EDD) provided by Tim Hunsucker of Duke Energy Carolinas on September 10, 2015.



A

Appendix A Field Sampling Forms

FIELD SAMPLING CALIBRATION FORM

STUDY: MARSHALL STEAM STATION - DRY ASH LANDFILL GROUNDWATER MONITORING
DATE (s): August 25, 2015 **SURFACE UNIT READER:** LDC
COLLECTORS: LDC **SURFACE UNIT SERIAL #:** S06479
ANALYZER MODEL#: MS5 **ANALYZER SERIAL #:** 66121
OTHER EQUIPMENT: TURBIDIMETER NO.2 - 3260-GW **WEATHER CONDITIONS:** Clear, slight breeze, 65 to 80 deg F

PROCEDURE #: HYDROLAB 3210.5 **VALIDATED BY:**

WC 8/26/15

Calibration Date / Time		DATE:	25-Aug-15	TIME:	500	DATE:		26-Aug-15	TIME:	525			
		CALIBRATION BP (mmHg)				739.9				CALIBRATION BP (mmHg)		741.4	
Parameter	Calibration Standard	Instrument Value		Standard Value	Calibration Results	Instrument Value		Standard Value	Calibration Results				
SPEC. COND. (uS/cm)	SS	0.0	—/—>	0.0	Instrument Zeroed	0.0	—/—>	0.0	Zero Pass				
	SS	354.8	—>	350	Calibration Accepted	342.7	—/—>	350	Calibration Pass				
	SS	75.2	—/—>	75	Calibration Accepted	73.8	—/—>	75	Calibration Pass				
<i>Specific conductance checkpoint (used if sampled well is outside of initial calibration range).</i>													
SPEC. COND. CHECK (uS/cm)	SS		—/—>				—/—>						
pH (units)	B (7.00)	7.00	—>	7.02	Calibration Accepted	7.11	—/—>	7.02	Calibration Pass				
	B (4.00)	4.00	—>	4.00	Calibration Accepted	4.09	—/—>	4.00	Calibration Pass				
	B (10.00)	10.12	—/—>	10.04	Calibration Accepted	10.19	—/—>	10.04	Calibration Pass				
		Buffer Temp.		20.68		Buffer Temp.		20.60					
pH Check	B (7.00)		—>										
Time:													
<input checked="" type="checkbox"/>	SS (7.00)	296	—>	294	Calibration Accepted	285	—/—>	294	Calibration Pass				
	SS (4.00)	N/A	—/—>	469		N/A	—/—>	469					
		ORP Temp.		20.56		ORP Temp.		20.55					
<input checked="" type="checkbox"/>	DO (mg/L)	W		6.30				6.50					
		W		6.20				6.50					
		AW	6.29	—>	6.25	Calibration Accepted	6.43	—/—>	6.50	Calibration Pass			
<input checked="" type="checkbox"/>	TURB (ntu)	SS	52.7	—/—>	53.3	Calibration Accepted	53.0	—/—>	53.3	Calibration Accepted			
Temp Cert Device #													
TEMP (deg C)	NIST	N/A	—/—>	N/A	Adjustment Not Available	N/A	—/—>	N/A	Adjustment Not Available				

INSTRUMENT MAINTENANCE	DATE / TIME
Conductance Subsystem	
<input type="checkbox"/> Cleaned Electrodes	<input type="checkbox"/> Cleaned Electrodes
<input type="checkbox"/> Tested - OK	<input type="checkbox"/> Replaced ref Electrode KCL
<input type="checkbox"/> See Notes	<input type="checkbox"/> Replaced Ref. Electrode Tip
	<input type="checkbox"/> Tested - OK <input type="checkbox"/> See Notes
Oxidation Reduction Subsystem	
<input type="checkbox"/> Cleaned Electrode	<input type="checkbox"/> Cleaned Electrode
<input type="checkbox"/> Tested - OK <input type="checkbox"/> See Notes	<input type="checkbox"/> Tested - OK <input type="checkbox"/> See Notes
Dissolved Oxygen Subsystem	
<input type="checkbox"/> Replaced Teflon Membrane	<input type="checkbox"/> Cleaned Electrode
<input type="checkbox"/> Replaced DO electrolyte	<input type="checkbox"/> See Notes

Field Barometric Pressure			
Beginning BP	739.9	(mmHg)	
Ending BP	740.6	(mmHg)	

KEY: B = Buffer W = Winkler —> = Adjusted To N/A = Not Applicable
 SS = Standard solution AW = Average Winkler —/—> = Not Adjusted To

NOTES:



DUKE ENERGY

GROUNDWATER MONITORING DATA SHEET FOR CONVENTIONAL SAMPLING

PROCEDURE NO	3175.2
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SITE NAME	MARSHALL STEAM STATION	PERMIT #	18-04	SITE ID	N/A
PROJECT NAME	DRY ASH LANDFILL	FIELD CREW	LDC		
SAMPLING DATE(s)	<input checked="" type="checkbox"/> 25-Aug-2015	WELL/LOCATION NAME	MW-1		

MONITORING WELL INFORMATION					
WELL DIAMETER (in)	2	TOC ELEV (ft msl)	823.70	MIDDLE OF WETTED SCREEN (ft toc)	73.75
WELL DEPTH (ft TOC)	78.75	GS ELEV (ft msl)	821.20	PUMP INTAKE DEPTH (ft TOC)	77.80
SCREEN LENGTH (ft)	10.00	ELEV REF	NAVD 88	SCREEN INTERVAL (ft TOC)	68.75 TO 78.75

EQUIPMENT INFORMATION					
LEVEL METER SERIAL#	28651	SAMPLING EQUIPMENT	QED T1200	PURGE METHOD	
		TUBING DIAMETER (in)	1/2 OD	Conventional	
PUMP CONTROLLER SETTINGS					
PRESSURE	40 (psi)	RECHARGE	11 (sec)	DISCHARGE	9 (sec)

SAMPLING INFORMATION					
INITIAL DEPTH TO WATER (ft TOC)	51.68	WATER COLUMN (ft)	27.07	<i>Well Volume = water column X conversion factor</i> <i>(Conversion factor dependent on well diameter and selected well volume units)</i>	
WATER ELEVATION (ft msl)	772.02	WELL VOLUME (gal)	4.42		
DETECTED ODOR	None	CONVERSION FACTOR	0.1631		
APPEARANCE	Normal				

PURGE VOLUME	WATER LEVEL AFTER PURGE *	COMPLETE EVACUATION	<input checked="" type="checkbox"/> TEMP	<input checked="" type="checkbox"/> SPECIFIC COND.	<input checked="" type="checkbox"/> pH	<input checked="" type="checkbox"/> TURBIDITY	<input type="checkbox"/> ORP	<input type="checkbox"/> DISSOLVED OXYGEN	<input type="checkbox"/> WELL VOL (gal)	
(gal)	(ft)	(YES/NO)	(deg C)	(umho/cm)	(SU)	(NTU)	(mV-NHE)	(mg/L)	(recalculates on current water level)	
4.42										
4.50		NO	15.81	235	5.61	8.2	353	0.89		
4.50		NO	15.78	245	5.65	7.4	350	0.57		
4.50		NO	15.79	246	5.67	3.5	349	0.56		
TOTAL PURGE VOLUME		* Optional measurement to recalculate well volume when purging results in substantial drawdown of water column		COLLECT SAMPLE - SAMPLE CRITERIA SATISFIED						CHLORINE (mg/l)
13.50				SAMPLE COLLECTED BY		DATE		TIME		
				LDC		8/25/2015 @		0735	0	

QC By: WC 8/26/15

Sample preservation verified to pH (units) < 2.0

WELL CONDITION			ADDITIONAL WELL CONDITION NOTES
PROTECTIVE CASING	Good Condition		Needs non potable tag.
WELL PAD	Good Condition		
WELL CASING	Good Condition		
WELL TAG	Good Tag		

SAMPLING NOTES



DUKE ENERGY

GROUNDWATER MONITORING DATA SHEET FOR CONVENTIONAL SAMPLING

PROCEDURE NO	3175.2
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SITE NAME	MARSHALL STEAM STATION	PERMIT #	18-04	SITE ID	N/A
PROJECT NAME	DRY ASH LANDFILL	FIELD CREW	LDC		
SAMPLING DATE(s)	<input checked="" type="checkbox"/> 25-Aug-2015	WELL/LOCATION NAME	MW-2		

MONITORING WELL INFORMATION					
WELL DIAMETER (in)	2	TOC ELEV (ft msl)	797.22	MIDDLE OF WETTED SCREEN (ft toc)	30.10
WELL DEPTH (ft TOC)	35.10	GS ELEV (ft msl)	794.90	PUMP INTAKE DEPTH (ft TOC)	34.10
SCREEN LENGTH (ft)	10.00	ELEV REF	NAVD 88	SCREEN INTERVAL (ft TOC)	25.10 TO 35.10

EQUIPMENT INFORMATION					
LEVEL METER SERIAL#	28651	SAMPLING EQUIPMENT	QED T1200	PURGE METHOD	
		TUBING DIAMETER (in)	1/2 OD	Conventional	
PUMP CONTROLLER SETTINGS					
PRESSURE	20 (psi)	RECHARGE	6 (sec)	DISCHARGE	9 (sec)

SAMPLING INFORMATION					
INITIAL DEPTH TO WATER (ft TOC)	7.13	WATER COLUMN (ft)	27.97	<i>Well Volume = water column X conversion factor</i> <i>(Conversion factor dependent on well diameter and selected well volume units)</i>	
WATER ELEVATION (ft msl)	790.09	WELL VOLUME (gal)	4.56		
DETECTED ODOR	None	CONVERSION FACTOR	0.1631		
APPEARANCE	Normal				

PURGE VOLUME	WATER LEVEL AFTER PURGE *	COMPLETE EVACUATION	<input checked="" type="checkbox"/> TEMP	<input checked="" type="checkbox"/> SPECIFIC COND.	<input checked="" type="checkbox"/> pH	<input checked="" type="checkbox"/> TURBIDITY	<input type="checkbox"/> ORP	<input type="checkbox"/> DISSOLVED OXYGEN	<input type="checkbox"/> WELL VOL (gal)	
(gal)	(ft)	(YES/NO)	(deg C)	(umho/cm)	(SU)	(NTU)	(mV-NHE)	(mg/L)	(recalculates on current water level)	
4.56										
4.75		NO	15.94	400	5.36	1.8	370	0.55		
4.75		NO	15.89	400	5.36	1.2	368	0.51		
4.75		NO	15.88	400	5.36	1.0	367	0.50		
TOTAL PURGE VOLUME		* Optional measurement to recalculate well volume when purging results in substantial drawdown of water column		COLLECT SAMPLE - SAMPLE CRITERIA SATISFIED						CHLORINE (mg/l)
14.25				SAMPLE COLLECTED BY		DATE		TIME		
				LDC		8/25/2015 @		0835		0

QC By: VJC 8/26/15

Sample preservation verified to pH (units) < 2.0

WELL CONDITION	ADDITIONAL WELL CONDITION NOTES
PROTECTIVE CASING	Good Condition
WELL PAD	Good Condition
WELL CASING	Good Condition
WELL TAG	Good Tag

SAMPLING NOTES



DUKE ENERGY

GROUNDWATER MONITORING DATA SHEET FOR CONVENTIONAL SAMPLING

PROCEDURE NO	3175.2
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SITE NAME	MARSHALL STEAM STATION	PERMIT #	18-04	SITE ID	N/A
PROJECT NAME	DRY ASH LANDFILL	FIELD CREW	LDC		
SAMPLING DATE(s)	<input checked="" type="checkbox"/> 25-Aug-2015	WELL/LOCATION NAME	MW-3		

MONITORING WELL INFORMATION					
WELL DIAMETER (in)	2	TOC ELEV (ft msl)	813.07	MIDDLE OF WETTED SCREEN (ft toc)	23.15
WELL DEPTH (ft TOC)	28.15	GS ELEV (ft msl)	811.00	PUMP INTAKE DEPTH (ft TOC)	27.20
SCREEN LENGTH (ft)	10.00	ELEV REF	NAVD 88	SCREEN INTERVAL (ft TOC)	18.15 TO 28.15

EQUIPMENT INFORMATION					
LEVEL METER SERIAL#	28651	SAMPLING EQUIPMENT	QED T1200	PURGE METHOD	
		TUBING DIAMETER (in)	1/2 OD	Conventional	
PUMP CONTROLLER SETTINGS					
PRESSURE	18 (psi)	RECHARGE	8 (sec)	DISCHARGE	7 (sec)

SAMPLING INFORMATION					
INITIAL DEPTH TO WATER (ft TOC)	10.13	WATER COLUMN (ft)	18.02	<i>Well Volume = water column X conversion factor</i> <i>(Conversion factor dependent on well diameter and selected well volume units)</i>	
WATER ELEVATION (ft msl)	802.94	WELL VOLUME (gal)	2.94		
DETECTED ODOR	None	CONVERSION FACTOR	0.1631		
APPEARANCE	Normal				

PURGE VOLUME	WATER LEVEL AFTER PURGE *	COMPLETE EVACUATION	<input checked="" type="checkbox"/> TEMP	<input checked="" type="checkbox"/> SPECIFIC COND.	<input checked="" type="checkbox"/> pH	<input checked="" type="checkbox"/> TURBIDITY	<input type="checkbox"/> ORP	<input type="checkbox"/> DISSOLVED OXYGEN	<input type="checkbox"/> WELL VOL (gal)	
(gal)	(ft)	(YES/NO)	(deg C)	(umho/cm)	(SU)	(NTU)	(mV-NHE)	(mg/L)	(recalculates on current water level)	
2.94										
3.00		NO	15.46	90	4.91	7.9	399	3.07		
3.00		NO	15.48	87	4.92	12.1	401	2.86		
3.00		NO	15.50	87	4.93	1.3	400	2.79		
TOTAL PURGE VOLUME		* Optional measurement to recalculate well volume when purging results in substantial drawdown of water column		COLLECT SAMPLE - SAMPLE CRITERIA SATISFIED						CHLORINE (mg/l)
9.00				SAMPLE COLLECTED BY		DATE		TIME		
				LDC		8/25/2015 @		1105		0

QC By: LDC 8/26/15

Sample preservation verified to pH (units) < 2.0

WELL CONDITION			ADDITIONAL WELL CONDITION NOTES
PROTECTIVE CASING	Damaged / Repair Required		Access into well needs clearing particularly around the ditch. Hinge on protective casing has shifted and does not allow lid to close completely (wasps tend to build nests inside when this happens).
WELL PAD	Good Condition		
WELL CASING	Good Condition		
WELL TAG	Good Tag		

SAMPLING NOTES



DUKE ENERGY

GROUNDWATER MONITORING DATA SHEET FOR CONVENTIONAL SAMPLING

PROCEDURE NO	3175.2
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SITE NAME	MARSHALL STEAM STATION	PERMIT #	18-04	SITE ID	N/A
PROJECT NAME	DRY ASH LANDFILL	FIELD CREW	LDC		
SAMPLING DATE(s)	<input checked="" type="checkbox"/> 25-Aug-2015	WELL/LOCATION NAME	MW-4		

MONITORING WELL INFORMATION					
WELL DIAMETER (in)	2	TOC ELEV (ft msl)	867.38	MIDDLE OF WETTED SCREEN (ft toc)	45.20
WELL DEPTH (ft TOC)	50.20	GS ELEV (ft msl)	864.50	PUMP INTAKE DEPTH (ft TOC)	49.20
SCREEN LENGTH (ft)	10.00	ELEV REF	NAVD 88	SCREEN INTERVAL (ft TOC)	40.20 TO 50.20

EQUIPMENT INFORMATION					
LEVEL METER SERIAL#	28651	SAMPLING EQUIPMENT	QED T1200	PURGE METHOD	
		TUBING DIAMETER (in)	1/2 OD	Conventional	
PUMP CONTROLLER SETTINGS					
PRESSURE	25 (psi)	RECHARGE	14 (sec)	DISCHARGE	6 (sec)

SAMPLING INFORMATION					
INITIAL DEPTH TO WATER (ft TOC)	38.08	WATER COLUMN (ft)	12.12	<i>Well Volume = water column X conversion factor</i> <i>(Conversion factor dependent on well diameter and selected well volume units)</i>	
WATER ELEVATION (ft msl)	829.30	WELL VOLUME (gal)	1.98		
DETECTED ODOR	None	CONVERSION FACTOR	0.1631		
APPEARANCE	Normal				

PURGE VOLUME	WATER LEVEL AFTER PURGE *	COMPLETE EVACUATION	<input checked="" type="checkbox"/> TEMP	<input checked="" type="checkbox"/> SPECIFIC COND.	<input checked="" type="checkbox"/> pH	<input checked="" type="checkbox"/> TURBIDITY	<input type="checkbox"/> ORP	<input type="checkbox"/> DISSOLVED OXYGEN	<input checked="" type="checkbox"/> WELL VOL (gal)	
(gal)	(ft)	(YES/NO)	(deg C)	(umho/cm)	(SU)	(NTU)	(mV-NHE)	(mg/L)	(recalculates on current water level)	
1.98										
2.00	45.48	NO	16.71	49	5.86	38.4	359	6.69	0.77	
1.00		NO	17.06	49	5.93	23.8	355	7.76		
1.00		NO	17.07	49	5.86	4.7	358	7.74		
TOTAL PURGE VOLUME		* Optional measurement to recalculate well volume when purging results in substantial drawdown of water column		COLLECT SAMPLE - SAMPLE CRITERIA SATISFIED						CHLORINE (mg/l)
4.00				SAMPLE COLLECTED BY		DATE		TIME		
				LDC		8/25/2015 @		1220		0

QC By: WC 8/26/15

Sample preservation verified to pH (units) < 2.0

WELL CONDITION	ADDITIONAL WELL CONDITION NOTES
PROTECTIVE CASING	Good Condition
WELL PAD	Good Condition
WELL CASING	Good Condition
WELL TAG	Good Tag

SAMPLING NOTES



DUKE ENERGY

GROUNDWATER MONITORING DATA SHEET FOR CONVENTIONAL SAMPLING

PROCEDURE NO	3175.2
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SITE NAME	MARSHALL STEAM STATION	PERMIT #	18-04	SITE ID	N/A
PROJECT NAME	DRY ASH LANDFILL	FIELD CREW	LDC		
SAMPLING DATE(s)	<input checked="" type="checkbox"/> 25-Aug-2015	WELL/LOCATION NAME	MW-5		

MONITORING WELL INFORMATION					
WELL DIAMETER (in)	2	TOC ELEV (ft msl)	822.69	MIDDLE OF WETTED SCREEN (ft toc)	29.54
WELL DEPTH (ft TOC)	30.71	GS ELEV (ft msl)	820.19	PUMP INTAKE DEPTH (ft TOC)	29.70
SCREEN LENGTH (ft)	10.00	ELEV REF	NAVD 88	SCREEN INTERVAL (ft TOC)	20.71 TO 30.71

EQUIPMENT INFORMATION					
LEVEL METER SERIAL#	28651	SAMPLING EQUIPMENT	QED T1200	PURGE METHOD	
		TUBING DIAMETER (in)	1/2 OD	Conventional	
PUMP CONTROLLER SETTINGS					
PRESSURE	20 (psi)	RECHARGE	7 (sec)	DISCHARGE	3 (sec)

SAMPLING INFORMATION					
INITIAL DEPTH TO WATER (ft TOC)	28.36	WATER COLUMN (ft)	2.35	<i>Well Volume = water column X conversion factor</i> <i>(Conversion factor dependent on well diameter and selected well volume units)</i>	
WATER ELEVATION (ft msl)	794.33	WELL VOLUME (gal)	0.38		
DETECTED ODOR	None	CONVERSION FACTOR	0.1631		
APPEARANCE	Normal				

PURGE VOLUME	WATER LEVEL AFTER PURGE *	COMPLETE EVACUATION	<input checked="" type="checkbox"/> TEMP	<input checked="" type="checkbox"/> SPECIFIC COND.	<input checked="" type="checkbox"/> pH	<input checked="" type="checkbox"/> TURBIDITY	<input type="checkbox"/> ORP	<input type="checkbox"/> DISSOLVED OXYGEN	<input type="checkbox"/> WELL VOL
(gal)	(ft)	(YES/NO)	(deg C)	(umho/cm)	(SU)	(NTU)	(mV-NHE)	(mg/L)	(gal) <small>(recalculates on current water level)</small>
0.38		NO	16.54	39	5.42	2.8	359	1.94	
0.50		NO	16.84	39	5.43	1.4	356	2.14	
0.50		NO	17.30	39	5.43	1.7	354	2.18	
TOTAL PURGE VOLUME		* Optional measurement to recalculate well volume when purging results in substantial drawdown of water column		COLLECT SAMPLE - SAMPLE CRITERIA SATISFIED					CHLORINE (mg/l)
1.50				SAMPLE COLLECTED BY		DATE		TIME	
				LDC	8/25/2015	@	0950	0	

QC By: UC 8/26/15

Sample preservation verified to pH (units) < 2.0

WELL CONDITION	ADDITIONAL WELL CONDITION NOTES
PROTECTIVE CASING	Good Condition
WELL PAD	Good Condition
WELL CASING	Good Condition
WELL TAG	Good Tag

SAMPLING NOTES

WL verified.



DUKE ENERGY

GROUNDWATER MONITORING DATA SHEET FOR LEVEL ONLY

PROCEDURE NO	3175.2
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SITE NAME	MARSHALL STEAM STATION	PERMIT #	18-04	SITE ID	N/A
PROJECT NAME	DRY ASH LANDFILL	FIELD CREW	LDC		
SAMPLING DATE(s)	<input checked="" type="checkbox"/> 25-Aug-2015	WELL/LOCATION NAME	OB-1		

MONITORING WELL INFORMATION					
WELL DIAMETER (in)	2	TOC ELEV (ft msl)	825.85	MIDDLE OF WETTED SCREEN (ft toc)	60.50
WELL DEPTH (ft TOC)	65.50	GS ELEV (ft msl)		PUMP INTAKE DEPTH (ft TOC)	N/A
SCREEN LENGTH (ft)	10.00	ELEV REF	NAVD 88	SCREEN INTERVAL (ft TOC)	55.50 TO 65.50

EQUIPMENT INFORMATION					
LEVEL METER SERIAL#	28651	SAMPLING EQUIPMENT		PURGE METHOD	
WATER LEVEL ONLY		TUBING DIAMETER (in)		Level Only	
		PUMP CONTROLLER SETTINGS			
PRESSURE	(psi)	RECHARGE	(sec)	DISCHARGE	(sec)

SAMPLING INFORMATION					
INITIAL DEPTH TO WATER (ft TOC)	46.61	WATER COLUMN (ft)	18.89	<i>Well Volume = water column X conversion factor</i> <i>(Conversion factor dependent on well diameter and selected well volume units)</i>	
WATER ELEVATION (ft msl)	779.24	WELL VOLUME (gal)	3.08		
DETECTED ODOR	None	CONVERSION FACTOR	0.1631		
APPEARANCE					

PURGE VOLUME	WATER LEVEL AFTER PURGE *	COMPLETE EVACUATION	<input checked="" type="checkbox"/> TEMP	<input checked="" type="checkbox"/> SPECIFIC COND.	<input checked="" type="checkbox"/> pH	<input checked="" type="checkbox"/> TURBIDITY	<input type="checkbox"/> ORP	<input type="checkbox"/> DISSOLVED OXYGEN	<input type="checkbox"/> WELL VOL
(gal)	(ft)	(YES/NO)	(deg C)	(umho/cm)	(SU)	(NTU)	(mV-NHE)	(mg/L)	(recalculates on current water level)
3.08		N/A	N/A	N/A	N/A	N/A	N/A	N/A	
N/A									
TOTAL PURGE VOLUME	* Optional measurement to recalculate well volume when purging results in substantial drawdown of water column			SAMPLE COLLECTED BY		DATE	TIME	CHLORINE (mg/l)	
0.00				LDC	8/25/2015	@	0710	N/A	

QC By: WJC 8/26/15

Sample preservation verified to pH (units) N/A

WELL CONDITION	ADDITIONAL WELL CONDITION NOTES
PROTECTIVE CASING	Good Condition
WELL PAD	Good Condition
WELL CASING	Good Condition
WELL TAG	Good Tag

SAMPLING NOTES

NORTH CAROLINA GROUNDWATER SAMPLING SITE CHECKLIST

LOCATION / SITE
SITE CONTACT
WEATHER
PAGE 1 OF 1

MARSHALL STEAM STATION - DRY ASH LANDFILL GROUNDWATER MONITORING
 Joseph La Sala, Chris Randazzo
 Clear, slight breeze, 65 to 80 deg F

PERMIT #

18-04

SAMPLE DATE
FIELD CREW

August 25, 2015
 LDC

	MW-1	MW-2	MW-3	MW-4	MW-5	OB-1										
ACCESS TO WELLS																
Access cleared into well	YES	YES	SEE NOTE	YES	YES	YES										
Access cleared around well	YES	YES	SEE NOTE	YES	YES	YES										
Tall grass or weeds - needs mowing																
Road washing out / muddy / needs grading																
Fallen tree blocking access																
WELL SECURITY																
Well found locked	YES	YES	YES	YES	YES	YES										
Well found unlocked																
WELL LOCK CONDITION																
Lock in good condition	YES	YES	YES	YES	YES	YES										
Lock rusted, difficult to open / needs replacing																
Replaced damaged lock																
WELL CASINGS																
Casing in good condition	YES	YES	YES	YES	YES	YES										
Damaged casing / still functional																
Damaged casing / repair required																
CONCRETE PADS																
Pad in good condition	YES	YES	YES	YES	YES	YES										
Minor cracks																
Major cracks / broken / repair required																
Undermined / washing out																
Fire ants around concrete pad																
WELL PROTECTIVE CASINGS																
Casing in good condition	YES	YES		YES	YES	YES										
Damaged casing / still functional																
Damaged casing / repair required			SEE NOTE													
Broken hinge on protective lid			SEE NOTE													
Wasp nest inside protective casing																
Ants inside protective casing																
WELL CAPS																
Well cap in good conditon	YES	YES	YES	YES	YES	YES										
Damaged / needs replacement																
Replaced damaged well cap																
FLUSH MOUNT WELLS																
Vault in good condition	N/A	N/A	N/A	N/A	N/A	N/A										
Water inside vault																
Vault bolt holes broken or stripped																
Bolts stripped																
Vault lid cracked or broken																
WELL ID TAGS																
Well tag in good condition	YES	YES	YES	YES	YES	YES										
Well tag missing																
Well tag damaged / illegible																
Lacks required information - Driller Reg #																
Lacks required information - Completion date																
Lacks required information - Total well depth																
Lacks required information - Depth to screen																
Lacks required information - Non potable tag	SEE NOTE															

NOTE: MW-1 needs non potable tag. MW-3 needs weeds cleared away from well and road leading into well particularly at the ditch. Also at MW-3 the hinge has shifted and doesn't allow protective lid to close properly providing an opening for wasps to build nests.

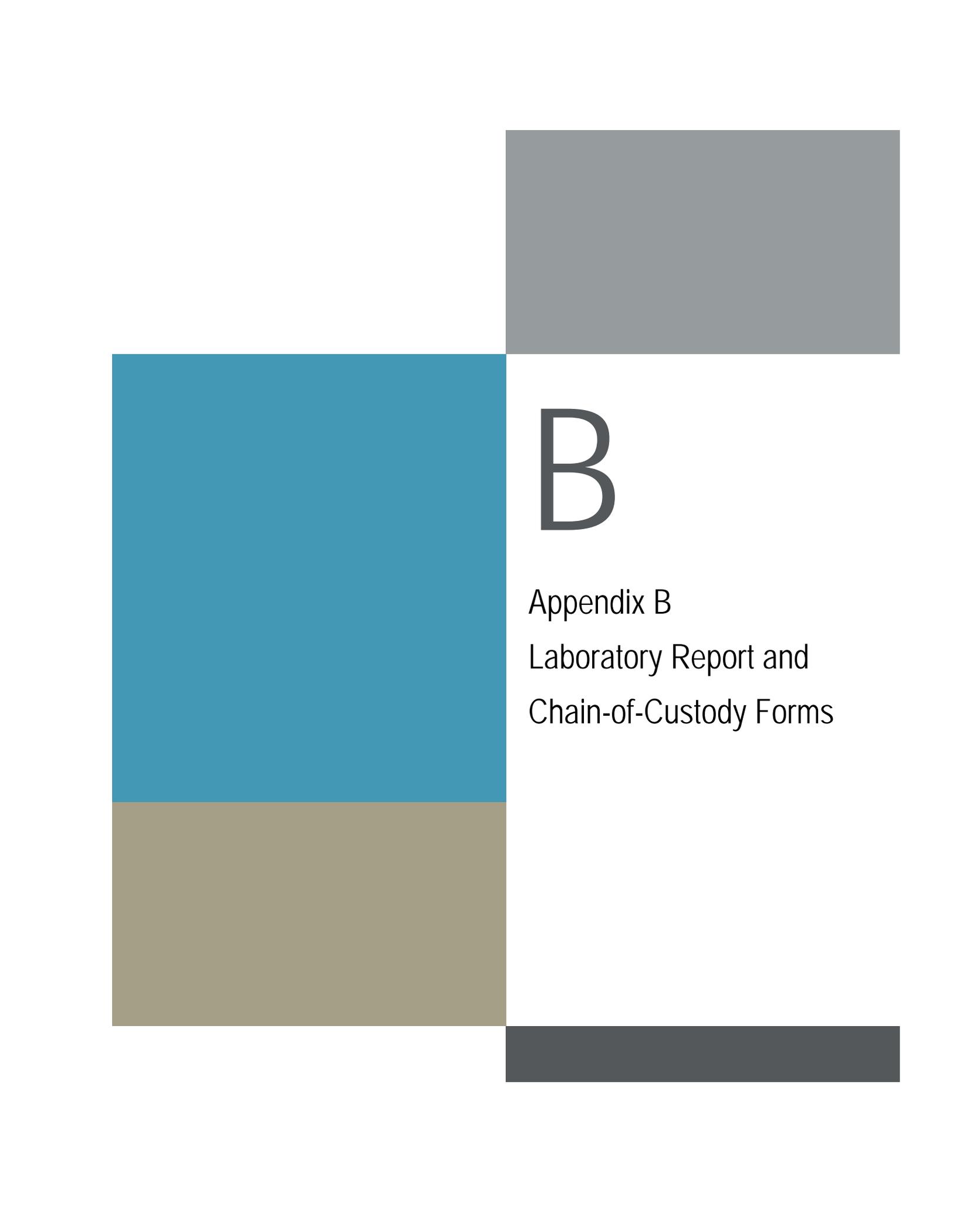
**MARSHALL STEAM STATION
 DRY ASH LANDFILL
 GROUNDWATER MONITORING FIELD DATA
 PERMIT # 18-04**

DATE	WELL NO.	WELL DEPTH (feet-toc)	DEPTH TO WATER (feet-toc)	WATER ELEV. (feet)	APPEARANCE	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)
8/25/2015	MW-1	78.75	51.68	772.02	Normal	None	C	N/A	4.42	13.50	NO	15.79	246	5.7	3.5	349	0.56
8/25/2015	MW-2	35.10	7.13	790.09	Normal	None	C	N/A	4.56	14.25	NO	15.88	400	5.4	1.0	367	0.50
8/25/2015	MW-3	28.15	10.13	802.94	Normal	None	C	N/A	2.94	9.00	NO	15.50	87	4.9	1.3	400	2.79
8/25/2015	MW-4	50.20	38.08	829.30	Normal	None	C	N/A	1.98	4.00	NO	17.07	49	5.9	4.7	358	7.74
8/25/2015	MW-5	30.71	28.36	794.33	Normal	None	C	N/A	0.38	1.50	NO	17.30	39	5.4	1.7	354	2.18
8/25/2015	OB-1	65.50	46.61	779.24	N/A	N/A	LO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
8/25/2015	MW-6	122.14	108.57	811.08	N/A	N/A	LO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
8/25/2015	MW-7	57.25	45.87	813.29	N/A	N/A	LO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Purge Methods

LF = Low Flow
 LF(M) = Low Flow (Mod.)
 C = Conventional
 NP = No Purge
 EOP = Equip. Only Purge
 LO = Level Only

* = Applicable to LF & LF(M) Purging Only



B

Appendix B

Laboratory Report and
Chain-of-Custody Forms



Analytical Laboratory

13339 Hagers Ferry Road
Huntersville, NC 28078-7929
McGuire Nuclear Complex - MG03A2
Phone: 980-875-5245 Fax: 980-875-4349

Order Summary Report

Order Number: J15080158

Project Name: MARSHALL - GW DRY ASH LANDFILL

Customer Name(s): Chuck Campbell, Ed Sullivan, Tim Hunsucker

Customer Address: 8320 NC Hwy 150 East
Mail Code: Marshall Steam Station
Terrell, NC 28682

Lab Contact: Jason C Perkins Phone: 980-875-5348

Report Authorized By:  **Date:** 9/9/2015
(Signature) Jason C Perkins

Program Comments:

Please contact the Program Manager (Jason C Perkins) with any questions regarding this report.

Data Flags & Calculations:

Any analytical tests or individual analytes within a test flagged with a Qualifier indicate a deviation from the method quality system or quality control requirement. The qualifier description is found at the end of the Certificate of Analysis (sample results) under the qualifiers heading. All results are reported on a dry weight basis unless otherwise noted. Subcontracted data included on the Duke Certificate of Analysis is to be used as information only. Certified vendor results can be found in the subcontracted lab final report. Duke Energy Analytical Laboratory subcontracts analyses to other vendor laboratories that have been qualified by Duke Energy to perform these analyses except where noted.

Data Package:

This data package includes analytical results that are applicable only to the samples described in this narrative. An estimation of the uncertainty of measurement for the results in the report is available upon request. This report shall not be reproduced, except in full, without the written consent of the Analytical Laboratory. Please contact the Analytical laboratory with any questions. The order of individual sections within this report is as follows:

Job Summary Report, Sample Identification, Technical Validation of Data Package, Analytical Laboratory Certificate of Analysis, Analytical Laboratory QC Reports, Sub-contracted Laboratory Results, Customer Specific Data Sheets, Reports & Documentation, Customer Database Entries, Test Case Narratives, Chain of Custody (COC)

Certification:

The Analytical Laboratory holds the following State Certifications : North Carolina (DENR) Certificate #248, South Carolina (DHEC) Laboratory ID # 99005. Contact the Analytical Laboratory for definitive information about the certification status of specific methods.

Sample ID's & Descriptions:

Sample ID	Plant/Station	Collection Date and Time	Collected By	Sample Description
2015026227	MARSHALL	25-Aug-15 7:35 AM	LDC	MW-1
2015026228	MARSHALL	25-Aug-15 8:35 AM	LDC	MW-2
2015026229	MARSHALL	25-Aug-15 11:05 AM	LDC	MW-3
2015026230	MARSHALL	25-Aug-15 12:20 PM	LDC	MW-4
2015026231	MARSHALL	25-Aug-15 9:50 AM	LDC	MW-5
2015026233	MARSHALL	25-Aug-15 12:30 PM	LDC	FIELD BLANK
6 Total Samples				

Technical Validation Review

Checklist:

- COC and .pdf report are in agreement with sample totals and analyses (compliance programs and procedures). Yes No
- All Results are less than the laboratory reporting limits. Yes No
- All laboratory QA/QC requirements are acceptable. Yes No

Report Sections Included:

- | | |
|---|---|
| <input checked="" type="checkbox"/> Job Summary Report | <input type="checkbox"/> Sub-contracted Laboratory Results |
| <input checked="" type="checkbox"/> Sample Identification | <input type="checkbox"/> Customer Specific Data Sheets, Reports, & Documentation |
| <input checked="" type="checkbox"/> Technical Validation of Data Package | <input type="checkbox"/> Customer Database Entries |
| <input checked="" type="checkbox"/> Analytical Laboratory Certificate of Analysis | <input checked="" type="checkbox"/> Chain of Custody |
| <input type="checkbox"/> Analytical Laboratory QC Report | <input checked="" type="checkbox"/> Electronic Data Deliverable (EDD) Sent Separately |

Reviewed By: DBA Account

Date: 9/9/2015

Certificate of Laboratory Analysis

This report shall not be reproduced, except in full.

Order # J15080158

Site: MW-1

Collection Date: 25-Aug-15 7:35 AM

Sample #: 2015026227

Matrix: GW_RCRA

Analyte	Result	Units	Qualifiers	RDL	DF	Method	Analysis Date/Time	Analyst
<u>LOW LEVEL ALKALINITY (FIXED END POINT)</u>								
Alkalinity (mg/L CaCO ₃)	11	mg/L (CaCO ₃)		5	1	SM 2320B4d	08/28/2015 12:43	GHUTCHI
<u>INORGANIC IONS BY IC</u>								
Chloride	47	mg/L		1	10	EPA 300.0	08/26/2015 16:27	BGN9034
Fluoride	0.11	mg/L		0.1	1	EPA 300.0	08/26/2015 16:27	BGN9034
Nitrate	1.5	mg/L		0.1	1	EPA 300.0	08/26/2015 16:27	BGN9034
Nitrate as N	0.34	mg-N/L		0.023	1	EPA 300.0	08/26/2015 16:27	BGN9034
Sulfate	18	mg/L	N1	1	10	EPA 300.0	08/26/2015 16:27	BGN9034
<u>MERCURY (COLD VAPOR) IN WATER</u>								
Mercury (Hg)	< 0.05	ug/L		0.05	1	EPA 245.1	08/28/2015 10:43	ACPAYNE
<u>TOTAL RECOVERABLE METALS BY ICP</u>								
Barium (Ba)	0.135	mg/L		0.005	1	EPA 200.7	09/01/2015 09:56	FCJORDA
Boron (B)	0.275	mg/L		0.05	1	EPA 200.7	09/01/2015 09:56	FCJORDA
Calcium (Ca)	20.9	mg/L		0.01	1	EPA 200.7	09/01/2015 09:56	FCJORDA
Chromium (Cr)	0.006	mg/L		0.005	1	EPA 200.7	09/01/2015 09:56	FCJORDA
Copper (Cu)	< 0.005	mg/L		0.005	1	EPA 200.7	09/01/2015 09:56	FCJORDA
Iron (Fe)	0.229	mg/L		0.01	1	EPA 200.7	09/01/2015 09:56	FCJORDA
Magnesium (Mg)	5.60	mg/L		0.005	1	EPA 200.7	09/01/2015 09:56	FCJORDA
Manganese (Mn)	0.019	mg/L		0.005	1	EPA 200.7	09/01/2015 09:56	FCJORDA
Nickel (Ni)	< 0.005	mg/L		0.005	1	EPA 200.7	09/01/2015 09:56	FCJORDA
Potassium (K)	4.15	mg/L		0.1	1	EPA 200.7	09/01/2015 09:56	FCJORDA
Silver (Ag)	< 0.005	mg/L		0.005	1	EPA 200.7	09/01/2015 09:56	FCJORDA
Sodium (Na)	9.92	mg/L		0.05	1	EPA 200.7	09/01/2015 09:56	FCJORDA
Zinc (Zn)	< 0.005	mg/L		0.005	1	EPA 200.7	09/01/2015 09:56	FCJORDA
<u>TOTAL RECOVERABLE METALS BY ICP-MS</u>								
Arsenic (As)	< 1	ug/L		1	1	EPA 200.8	09/02/2015 15:33	JAHERMA
Cadmium (Cd)	< 1	ug/L		1	1	EPA 200.8	09/02/2015 15:33	JAHERMA
Lead (Pb)	< 1	ug/L		1	1	EPA 200.8	09/02/2015 15:33	JAHERMA
Selenium (Se)	< 1	ug/L		1	1	EPA 200.8	09/02/2015 15:33	JAHERMA
<u>TOTAL DISSOLVED SOLIDS</u>								
TDS	210	mg/L		25	1	SM2540C	08/26/2015 15:19	GHUTCHI

Certificate of Laboratory Analysis

This report shall not be reproduced, except in full.

Order # J15080158

Site: MW-2

Collection Date: 25-Aug-15 8:35 AM

Sample #: 2015026228

Matrix: GW_RCRA

Analyte	Result	Units	Qualifiers	RDL	DF	Method	Analysis Date/Time	Analyst
<u>ALKALINITY (FIXED END POINT 4.5)</u>								
Alkalinity (mg/L CaCO ₃)	20	mg/L (CaCO ₃)		20	1	SM2320B	08/28/2015 10:12	GHUTCHI
<u>INORGANIC IONS BY IC</u>								
Chloride	4.5	mg/L		0.5	5	EPA 300.0	08/26/2015 16:44	BGN9034
Fluoride	< 0.5	mg/L		0.5	5	EPA 300.0	08/26/2015 16:44	BGN9034
Nitrate	2.6	mg/L		0.5	5	EPA 300.0	08/26/2015 16:44	BGN9034
Nitrate as N	0.58	mg-N/L		0.023	1	EPA 300.0	08/26/2015 16:44	BGN9034
Sulfate	170	mg/L	N1	5	50	EPA 300.0	08/26/2015 16:44	BGN9034
<u>MERCURY (COLD VAPOR) IN WATER</u>								
Mercury (Hg)	< 0.05	ug/L		0.05	1	EPA 245.1	08/28/2015 10:46	ACPAYNE
<u>TOTAL RECOVERABLE METALS BY ICP</u>								
Barium (Ba)	0.059	mg/L		0.005	1	EPA 200.7	09/01/2015 10:08	FCJORDA
Boron (B)	3.19	mg/L		0.05	1	EPA 200.7	09/01/2015 10:08	FCJORDA
Calcium (Ca)	29.5	mg/L		0.01	1	EPA 200.7	09/01/2015 10:08	FCJORDA
Chromium (Cr)	< 0.005	mg/L		0.005	1	EPA 200.7	09/01/2015 10:08	FCJORDA
Copper (Cu)	< 0.005	mg/L		0.005	1	EPA 200.7	09/01/2015 10:08	FCJORDA
Iron (Fe)	0.019	mg/L		0.01	1	EPA 200.7	09/01/2015 10:08	FCJORDA
Magnesium (Mg)	12.0	mg/L		0.005	1	EPA 200.7	09/01/2015 10:08	FCJORDA
Manganese (Mn)	0.016	mg/L		0.005	1	EPA 200.7	09/01/2015 10:08	FCJORDA
Nickel (Ni)	< 0.005	mg/L		0.005	1	EPA 200.7	09/01/2015 10:08	FCJORDA
Potassium (K)	2.80	mg/L		0.1	1	EPA 200.7	09/01/2015 10:08	FCJORDA
Silver (Ag)	< 0.005	mg/L		0.005	1	EPA 200.7	09/01/2015 10:08	FCJORDA
Sodium (Na)	30.4	mg/L		0.05	1	EPA 200.7	09/01/2015 10:08	FCJORDA
Zinc (Zn)	0.007	mg/L		0.005	1	EPA 200.7	09/01/2015 10:08	FCJORDA
<u>TOTAL RECOVERABLE METALS BY ICP-MS</u>								
Arsenic (As)	< 1	ug/L		1	1	EPA 200.8	09/02/2015 15:12	JAHERMA
Cadmium (Cd)	< 1	ug/L		1	1	EPA 200.8	09/02/2015 15:12	JAHERMA
Lead (Pb)	< 1	ug/L		1	1	EPA 200.8	09/02/2015 15:12	JAHERMA
Selenium (Se)	35.7	ug/L		1	1	EPA 200.8	09/02/2015 15:12	JAHERMA
<u>TOTAL DISSOLVED SOLIDS</u>								
TDS	300	mg/L		25	1	SM2540C	08/26/2015 15:19	GHUTCHI

Certificate of Laboratory Analysis

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Order # J15080158

Site: MW-3

Collection Date: 25-Aug-15 11:05 AM

Sample #: 2015026229

Matrix: GW_RCRA

Analyte	Result	Units	Qualifiers	RDL	DF	Method	Analysis Date/Time	Analyst
<u>LOW LEVEL ALKALINITY (FIXED END POINT)</u>								
Alkalinity (mg/L CaCO ₃)	< 5	mg/L (CaCO ₃)		5	1	SM 2320B4d	08/28/2015 12:43	GHUTCHI
<u>INORGANIC IONS BY IC</u>								
Chloride	9.1	mg/L		0.1	1	EPA 300.0	08/26/2015 16:10	BGN9034
Fluoride	< 0.1	mg/L		0.1	1	EPA 300.0	08/26/2015 16:10	BGN9034
Nitrate	22	mg/L		0.5	5	EPA 300.0	08/26/2015 16:10	BGN9034
Nitrate as N	5.0	mg-N/L		0.023	1	EPA 300.0	08/26/2015 16:10	BGN9034
Sulfate	0.30	mg/L	N1	0.1	1	EPA 300.0	08/26/2015 16:10	BGN9034
<u>MERCURY (COLD VAPOR) IN WATER</u>								
Mercury (Hg)	< 0.05	ug/L		0.05	1	EPA 245.1	08/28/2015 10:48	ACPAYNE
<u>TOTAL RECOVERABLE METALS BY ICP</u>								
Barium (Ba)	0.289	mg/L		0.005	1	EPA 200.7	09/01/2015 10:11	FCJORDA
Boron (B)	< 0.05	mg/L		0.05	1	EPA 200.7	09/01/2015 10:11	FCJORDA
Calcium (Ca)	0.732	mg/L		0.01	1	EPA 200.7	09/01/2015 10:11	FCJORDA
Chromium (Cr)	< 0.005	mg/L		0.005	1	EPA 200.7	09/01/2015 10:11	FCJORDA
Copper (Cu)	< 0.005	mg/L		0.005	1	EPA 200.7	09/01/2015 10:11	FCJORDA
Iron (Fe)	0.331	mg/L		0.01	1	EPA 200.7	09/01/2015 10:11	FCJORDA
Magnesium (Mg)	4.06	mg/L		0.005	1	EPA 200.7	09/01/2015 10:11	FCJORDA
Manganese (Mn)	0.055	mg/L		0.005	1	EPA 200.7	09/01/2015 10:11	FCJORDA
Nickel (Ni)	< 0.005	mg/L		0.005	1	EPA 200.7	09/01/2015 10:11	FCJORDA
Potassium (K)	2.41	mg/L		0.1	1	EPA 200.7	09/01/2015 10:11	FCJORDA
Silver (Ag)	< 0.005	mg/L		0.005	1	EPA 200.7	09/01/2015 10:11	FCJORDA
Sodium (Na)	5.84	mg/L		0.05	1	EPA 200.7	09/01/2015 10:11	FCJORDA
Zinc (Zn)	0.015	mg/L		0.005	1	EPA 200.7	09/01/2015 10:11	FCJORDA
<u>TOTAL RECOVERABLE METALS BY ICP-MS</u>								
Arsenic (As)	< 1	ug/L		1	1	EPA 200.8	09/02/2015 15:40	JAHERMA
Cadmium (Cd)	< 1	ug/L		1	1	EPA 200.8	09/02/2015 15:40	JAHERMA
Lead (Pb)	< 1	ug/L		1	1	EPA 200.8	09/02/2015 15:40	JAHERMA
Selenium (Se)	< 1	ug/L		1	1	EPA 200.8	09/02/2015 15:40	JAHERMA
<u>TOTAL DISSOLVED SOLIDS</u>								
TDS	58	mg/L		25	1	SM2540C	08/26/2015 15:19	GHUTCHI

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Order # J15080158

Site: MW-4

Collection Date: 25-Aug-15 12:20 PM

Sample #: 2015026230

Matrix: GW_RCRA

Analyte	Result	Units	Qualifiers	RDL	DF	Method	Analysis Date/Time	Analyst
<u>LOW LEVEL ALKALINITY (FIXED END POINT)</u>								
Alkalinity (mg/L CaCO ₃)	18	mg/L (CaCO ₃)		5	1	SM 2320B4d	08/28/2015 12:43	GHUTCHI
<u>INORGANIC IONS BY IC</u>								
Chloride	2.1	mg/L		0.1	1	EPA 300.0	08/26/2015 13:38	BGN9034
Fluoride	0.11	mg/L		0.1	1	EPA 300.0	08/26/2015 13:38	BGN9034
Nitrate	0.12	mg/L		0.1	1	EPA 300.0	08/26/2015 13:38	BGN9034
Nitrate as N	0.03	mg-N/L		0.023	1	EPA 300.0	08/26/2015 13:38	BGN9034
Sulfate	0.11	mg/L	N1	0.1	1	EPA 300.0	08/26/2015 13:38	BGN9034
<u>MERCURY (COLD VAPOR) IN WATER</u>								
Mercury (Hg)	< 0.05	ug/L		0.05	1	EPA 245.1	08/28/2015 10:51	ACPAYNE
<u>TOTAL RECOVERABLE METALS BY ICP</u>								
Barium (Ba)	0.050	mg/L		0.005	1	EPA 200.7	09/01/2015 10:15	FCJORDA
Boron (B)	< 0.05	mg/L		0.05	1	EPA 200.7	09/01/2015 10:15	FCJORDA
Calcium (Ca)	3.37	mg/L		0.01	1	EPA 200.7	09/01/2015 10:15	FCJORDA
Chromium (Cr)	< 0.005	mg/L		0.005	1	EPA 200.7	09/01/2015 10:15	FCJORDA
Copper (Cu)	< 0.005	mg/L		0.005	1	EPA 200.7	09/01/2015 10:15	FCJORDA
Iron (Fe)	0.191	mg/L		0.01	1	EPA 200.7	09/01/2015 10:15	FCJORDA
Magnesium (Mg)	0.778	mg/L		0.005	1	EPA 200.7	09/01/2015 10:15	FCJORDA
Manganese (Mn)	< 0.005	mg/L		0.005	1	EPA 200.7	09/01/2015 10:15	FCJORDA
Nickel (Ni)	< 0.005	mg/L		0.005	1	EPA 200.7	09/01/2015 10:15	FCJORDA
Potassium (K)	2.03	mg/L		0.1	1	EPA 200.7	09/01/2015 10:15	FCJORDA
Silver (Ag)	< 0.005	mg/L		0.005	1	EPA 200.7	09/01/2015 10:15	FCJORDA
Sodium (Na)	4.18	mg/L		0.05	1	EPA 200.7	09/01/2015 10:15	FCJORDA
Zinc (Zn)	< 0.005	mg/L		0.005	1	EPA 200.7	09/01/2015 10:15	FCJORDA
<u>TOTAL RECOVERABLE METALS BY ICP-MS</u>								
Arsenic (As)	< 1	ug/L		1	1	EPA 200.8	09/02/2015 15:47	JAHERMA
Cadmium (Cd)	< 1	ug/L		1	1	EPA 200.8	09/02/2015 15:47	JAHERMA
Lead (Pb)	< 1	ug/L		1	1	EPA 200.8	09/02/2015 15:47	JAHERMA
Selenium (Se)	< 1	ug/L		1	1	EPA 200.8	09/02/2015 15:47	JAHERMA
<u>TOTAL DISSOLVED SOLIDS</u>								
TDS	42	mg/L		25	1	SM2540C	08/26/2015 15:19	GHUTCHI

Certificate of Laboratory Analysis

This report shall not be reproduced, except in full.

Order # J15080158

Site: MW-5

Collection Date: 25-Aug-15 9:50 AM

Sample #: 2015026231

Matrix: GW_RCRA

Analyte	Result	Units	Qualifiers	RDL	DF	Method	Analysis Date/Time	Analyst
<u>LOW LEVEL ALKALINITY (FIXED END POINT)</u>								
Alkalinity (mg/L CaCO ₃)	11	mg/L (CaCO ₃)		5	1	SM 2320B4d	08/28/2015 12:43	GHUTCHI
<u>INORGANIC IONS BY IC</u>								
Chloride	2.7	mg/L		0.1	1	EPA 300.0	08/26/2015 14:28	BGN9034
Fluoride	< 0.1	mg/L		0.1	1	EPA 300.0	08/26/2015 14:28	BGN9034
Nitrate	< 0.1	mg/L		0.1	1	EPA 300.0	08/26/2015 14:28	BGN9034
Nitrate as N	< 0.023	mg-N/L		0.023	1	EPA 300.0	08/26/2015 14:28	BGN9034
Sulfate	< 0.1	mg/L	N1	0.1	1	EPA 300.0	08/26/2015 14:28	BGN9034
<u>MERCURY (COLD VAPOR) IN WATER</u>								
Mercury (Hg)	< 0.05	ug/L		0.05	1	EPA 245.1	08/28/2015 11:00	ACPAYNE
<u>TOTAL RECOVERABLE METALS BY ICP</u>								
Barium (Ba)	0.053	mg/L		0.005	1	EPA 200.7	09/01/2015 10:19	FCJORDA
Boron (B)	< 0.05	mg/L		0.05	1	EPA 200.7	09/01/2015 10:19	FCJORDA
Calcium (Ca)	1.40	mg/L		0.01	1	EPA 200.7	09/01/2015 10:19	FCJORDA
Chromium (Cr)	< 0.005	mg/L		0.005	1	EPA 200.7	09/01/2015 10:19	FCJORDA
Copper (Cu)	< 0.005	mg/L		0.005	1	EPA 200.7	09/01/2015 10:19	FCJORDA
Iron (Fe)	< 0.01	mg/L		0.01	1	EPA 200.7	09/01/2015 10:19	FCJORDA
Magnesium (Mg)	0.717	mg/L		0.005	1	EPA 200.7	09/01/2015 10:19	FCJORDA
Manganese (Mn)	< 0.005	mg/L		0.005	1	EPA 200.7	09/01/2015 10:19	FCJORDA
Nickel (Ni)	< 0.005	mg/L		0.005	1	EPA 200.7	09/01/2015 10:19	FCJORDA
Potassium (K)	0.842	mg/L		0.1	1	EPA 200.7	09/01/2015 10:19	FCJORDA
Silver (Ag)	< 0.005	mg/L		0.005	1	EPA 200.7	09/01/2015 10:19	FCJORDA
Sodium (Na)	4.64	mg/L		0.05	1	EPA 200.7	09/01/2015 10:19	FCJORDA
Zinc (Zn)	< 0.005	mg/L		0.005	1	EPA 200.7	09/01/2015 10:19	FCJORDA
<u>TOTAL RECOVERABLE METALS BY ICP-MS</u>								
Arsenic (As)	< 1	ug/L		1	1	EPA 200.8	09/02/2015 15:54	JAHERMA
Cadmium (Cd)	< 1	ug/L		1	1	EPA 200.8	09/02/2015 15:54	JAHERMA
Lead (Pb)	< 1	ug/L		1	1	EPA 200.8	09/02/2015 15:54	JAHERMA
Selenium (Se)	< 1	ug/L		1	1	EPA 200.8	09/02/2015 15:54	JAHERMA
<u>TOTAL DISSOLVED SOLIDS</u>								
TDS	42	mg/L		25	1	SM2540C	08/26/2015 15:19	GHUTCHI

Certificate of Laboratory Analysis

This report shall not be reproduced, except in full.

Order # J15080158

Site: FIELD BLANK

Collection Date: 25-Aug-15 12:30 PM

Sample #: 2015026233

Matrix: GW_RCRA

Analyte	Result	Units	Qualifiers	RDL	DF	Method	Analysis Date/Time	Analyst
<u>LOW LEVEL ALKALINITY (FIXED END POINT)</u>								
Alkalinity (mg/L CaCO ₃)	< 5	mg/L (CaCO ₃)		5	1	SM 2320B4d	08/28/2015 12:43	GHUTCHI
<u>INORGANIC IONS BY IC</u>								
Chloride	< 0.1	mg/L		0.1	1	EPA 300.0	08/26/2015 13:04	BGN9034
Fluoride	< 0.1	mg/L		0.1	1	EPA 300.0	08/26/2015 13:04	BGN9034
Nitrate	< 0.1	mg/L		0.1	1	EPA 300.0	08/26/2015 13:04	BGN9034
Nitrate as N	< 0.023	mg-N/L		0.023	1	EPA 300.0	08/26/2015 13:04	BGN9034
Sulfate	< 0.1	mg/L	N1	0.1	1	EPA 300.0	08/26/2015 13:04	BGN9034
<u>MERCURY (COLD VAPOR) IN WATER</u>								
Mercury (Hg)	< 0.05	ug/L		0.05	1	EPA 245.1	08/28/2015 10:53	ACPAYNE
<u>TOTAL RECOVERABLE METALS BY ICP</u>								
Barium (Ba)	< 0.005	mg/L		0.005	1	EPA 200.7	09/01/2015 10:23	FCJORDA
Boron (B)	< 0.05	mg/L		0.05	1	EPA 200.7	09/01/2015 10:23	FCJORDA
Calcium (Ca)	0.011	mg/L		0.01	1	EPA 200.7	09/01/2015 10:23	FCJORDA
Chromium (Cr)	< 0.005	mg/L		0.005	1	EPA 200.7	09/01/2015 10:23	FCJORDA
Copper (Cu)	< 0.005	mg/L		0.005	1	EPA 200.7	09/01/2015 10:23	FCJORDA
Iron (Fe)	< 0.01	mg/L		0.01	1	EPA 200.7	09/01/2015 10:23	FCJORDA
Magnesium (Mg)	< 0.005	mg/L		0.005	1	EPA 200.7	09/01/2015 10:23	FCJORDA
Manganese (Mn)	< 0.005	mg/L		0.005	1	EPA 200.7	09/01/2015 10:23	FCJORDA
Nickel (Ni)	< 0.005	mg/L		0.005	1	EPA 200.7	09/01/2015 10:23	FCJORDA
Potassium (K)	< 0.1	mg/L		0.1	1	EPA 200.7	09/01/2015 10:23	FCJORDA
Silver (Ag)	< 0.005	mg/L		0.005	1	EPA 200.7	09/01/2015 10:23	FCJORDA
Sodium (Na)	< 0.05	mg/L		0.05	1	EPA 200.7	09/01/2015 10:23	FCJORDA
Zinc (Zn)	< 0.005	mg/L		0.005	1	EPA 200.7	09/01/2015 10:23	FCJORDA
<u>TOTAL RECOVERABLE METALS BY ICP-MS</u>								
Arsenic (As)	< 1	ug/L		1	1	EPA 200.8	09/02/2015 16:01	JAHERMA
Cadmium (Cd)	< 1	ug/L		1	1	EPA 200.8	09/02/2015 16:01	JAHERMA
Lead (Pb)	< 1	ug/L		1	1	EPA 200.8	09/02/2015 16:01	JAHERMA
Selenium (Se)	< 1	ug/L		1	1	EPA 200.8	09/02/2015 16:01	JAHERMA

Qualifiers:

N1 See additional information listed below.

-- Additional Information --

N1: Sulfate was detected in final CCB at a concentration greater than ½ the reporting limit but less than the reporting limit. Analyte concentration in samples is valid and may be used for compliance purposes. BNY



CHAIN OF CUSTODY RECORD AND ANALYSIS REQUEST FORM

Duke Energy Analytical Laboratories
 Mail Code MG03A2 (Building 7405)
 13339 Hagers Ferry Rd
 Huntersville, N. C. 28078
 (980) 875-5245
 Fax: (980) 875-5038

Analytical Laboratory Use Only

LIMS # **J15080158**
 Logged By **DM**
 Date & Time **8/26/15 7:30**
 Vendor: **1.8**
 PO #
 MR #

MATRIX: GW_RCRA
 Samples Originating From
 NC SC
 SAMPLE PROGRAM
 Ground Water NPDES
 Drinking Water UST
 RCRA Waste

19 Page 1 of 1
 DISTRIBUTION
 ORIGINAL to LAB, CLIENT
 COPY to

1) Project Name: **MARSHALL DRY ASH LANDFILL**
 Permit #18-04
 3) Client: **C CAMPBELL, T HUNSUCKER, ED SULLIVIAN**
 5) Business Unit: **20035**
 6) Process: **BENVWT**
 7) Resp. To: **MS00**
 8) Task ID:
 9) Activity ID:
 10) Mail Code: **MG03A3**
 2) Phone No: **980-875-5257**
 4) Fax No: **980-875-4349**

15 Analyze
 16 Grab
 17 Tests
 18 Required

11 Lab ID
 2015026227
 2015026228
 2015026229
 2015026230
 2015026231
 2015026233

11 Lab ID	12 Sample Description or ID	Date	Time	Signature	15 Analyze	16 Grab	17 Tests	18 Required
2015026227	MW-1	8/25/15	0735	VDC		X		
2015026228	MW-2	8/25/15	0835	VDC		X		
2015026229	MW-3	8/25/15	1125	VDC		X		
2015026230	MW-4	8/25/15	1220	VDC		X		
2015026231	MW-5	8/25/15	0950	VDC		X		
2015026233	FIELD BLANK	8/25/15	1230	VDC		X		

19 Project Name	20 Business Unit	21 Process	22 Activity ID	23 Mail Code	24 Phone No	25 Fax No	26 Resp To	27 Task ID	28 Activity ID	29 Mail Code	30 Date & Time	31 Vendor	32 PO #	33 MR #	34 LIMS #	35 Logged By	36 Date & Time	37 Matrix	38 Samples Originating From	39 NC	40 SC	41 Sample Program	42 Ground Water	43 Drinking Water	44 UST	45 RCRA Waste	46 Original to Lab	47 Client	48 Copy to
MARSHALL DRY ASH LANDFILL	20035	BENVWT		MG03A3	980-875-5257	980-875-4349	MS00				8/26/15 7:30	DM			J15080158	DM	8/26/15 7:30	GW_RCRA	From	<input checked="" type="checkbox"/>	<input type="checkbox"/>	NPDES	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	ORIGINAL to LAB, CLIENT	CLIENT	COPY to

Customer to sign & date below
 21) Reinquished By: **LD** Date/Time: **8/26/15 0720**
 21) Reinquished By: **mm amawby** Date/Time: **8/26/15 720**
 21) Reinquished By: Date/Time:
 22) Seal/Locked By: Date/Time:
 24) Comments: **Regulatory Agency : NCDENR/DWM -SW Section - State EDD Fomat Required NOTE: As, Cd, Pb, Se - analyzed by IMS - All other metals analyzed by ICP.**

22 Requested Turnaround	Customer, Important please indicate desired turnaround
14 Days <input checked="" type="checkbox"/>	
*7 Days <input type="checkbox"/>	
*48 Hr <input type="checkbox"/>	
*Other <input type="checkbox"/>	Apply
*Add. Cost Will	

20 Total # of Containers