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March 27, 2012

Transmitted by Email  
[Ethan.Brown@ncdenr.gov](mailto:Ethan.Brown@ncdenr.gov)

Mr. Ethan Brown  
North Carolina Department of Environment and Natural Resources  
Division of Waste Management - Solid Waste Section  
217 West Jones Street  
Raleigh, North Carolina 27603

Subject: Ten-Year Solid Waste Management Plan  
Marshall Steam Station, Duke Energy Carolinas, LLC  
Flue Gas Desulfurization (FGD) Residue Landfill, Phase 1, Permit No. 1809  
Catawba County, North Carolina

Dear Mr. Brown,

On behalf of Duke Energy Carolinas, Altamont Environmental, Inc. submits this Ten-Year Solid Waste Management Plan for the Flue Gas Desulfurization (FGD) Residue Landfill, Phase 1, Cell 1, Permit No. 1809, as required by GS 130A-309.09D.

Please feel free to call or respond with any questions or comments related to this project.

Sincerely,

ALTAMONT ENVIRONMENTAL, INC.



William M. Miller, P.E.

Enclosures: Ten-Year Solid Waste Management Plan, Years 2011 to 2021, Marshall Steam Station  
Flue Gas Desulfurization (FGD) Residue Landfill, Phase 1, Permit No. 1809,  
March 27, 2012.

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# ALTAMONT ENVIRONMENTAL, INC.

ENGINEERING & HYDROGEOLOGY



## Ten-Year Solid Waste Management Plan

Years 2011 to 2021

Marshall Steam Station

Flue Gas Desulfurization  
(FGD) Residue Landfill, Phase 1, Cell 1

Permit No. 1809

March 27, 2012

Prepared for



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## Table of Contents

1.0	Background and Period of Waste Management Plan.....	1
2.0	Description of Landfill .....	2
3.0	Expected Annual Waste Quantities for Ten-Year Period .....	3
4.0	Years of Disposal Capacity Remaining—Cell 1.....	4
5.0	Waste Management Strategy—Plans for Waste Reduction .....	5
6.0	Applicability with Pending Regulations.....	6

## 1.0 Background and Period of Waste Management Plan

North Carolina requires each generator of industrial solid waste that owns and operates an industrial solid waste facility to establish a Ten-Year Solid Waste Management Plan and update the plan every three years. This Ten-Year Solid Waste Management Plan pertains to the Marshall Steam Station Flue Gas Desulfurization (FGD) Residue Landfill, Phase 1, Cell 1 (Marshall FGD Landfill).

The Marshall Steam Station (Marshall) is a four-unit, coal-fired electric generating facility located in Terrell, Catawba County, North Carolina. Marshall is owned by Duke Energy Carolinas, LLC (Duke) and has a generating capacity of 2070 megawatts (MW). The Marshall FGD Landfill is located northwest of the Marshall plant.

The permit to operate the Marshall FGD Landfill, Phase 1, Cell 1, Permit No. 1809, was initially issued by the North Carolina Department of Environment and Natural Resources (DENR) Division of Waste Management (DWM) on November 21, 2006. Information for the permit amendment (renewal) of the Permit to Operate was submitted on August 19, 2011. As of the date of this report submittal, collaboration between Duke and DENR concerning the August 19, 2011 renewal is ongoing, and final DENR approval is anticipated shortly.

This Ten-Year Solid Waste Management Plan is for the period of July 1, 2011 until June 30, 2021.

## 2.0 Description of Landfill

The Marshall FGD Landfill is located northwest of the Marshall plant and west of the Marshall ash basin. Phase 1, Cell 1 of the Marshall FGD Landfill has a footprint of approximately 17.9 acres. The Marshall FGD Landfill is permitted to receive the following types of waste: <sup>1</sup>

- Marshall-generated gypsum
- Marshall-generated clarifier sludge
- Marshall-generated fly ash
- Marshall-generated bottom ash
- Marshall-generated construction and demolition (C&D) debris
- Duke Energy Carolinas-generated asbestos
- Allen Steam Station generated gypsum
- Allen-generated clarifier sludge
- Cliffside Steam Station generated gypsum
- Cliffside Steam Station-generated clarifier sludge
- Marshall-generated mill rejects (pyrites)

The landfill was constructed with an engineered liner system consisting of a leachate collection and removal system, underlain by a high-density polyethylene geomembrane, which is underlain by a geosynthetic clay liner. When the landfill reaches final capacity, the landfill will be closed with an engineered geosynthetic cover system.

The Marshall site has two landfills currently in use: the FGD Landfill (Permit No. 1809) and the Industrial Landfill No. 1. (Permit No. 1812). This plan applies only to the FGD Landfill. The Marshall FGD Landfill was originally designed for two cells, Cell 1 and Cell 2. Cell 2 was designed to be located adjacent to and southwest of Cell 1. Cell 1 is projected to reach final capacity in 2014-2015. Duke has not decided if an application for a permit to construct Cell 2 will be submitted.

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<sup>1</sup> *Landfill Operations Plan—Duke Energy Carolinas, LLC—Marshall Steam Station Flue Gas Desulfurization (FGD) Residue Landfill Phase 1, Cell 1.* Permit No. 1809. August 19, 2011.

### 3.0 Expected Annual Waste Quantities for Ten-Year Period

The expected annual quantity of waste to be placed in the Marshall FGD Landfill is projected to be 288,800 tons per year, based on design waste receipts of 950 tons per day for 304 operating days per year.<sup>2</sup> The total available airspace volume of the FGD Landfill Phase 1, Cell 1, is approximately 1,170,000 cubic yards.<sup>3</sup> This volume corresponds to approximately 1,326,780 tons of capacity based on an average unit weight of 84 pounds per cubic foot.<sup>4</sup>

The landfill first received waste in February 2007. As of June 30, 2011, the Marshall FGD Landfill had received approximately 274,576 tons of waste material.

The information below presents the annual quantities of waste that are expected to be placed in the Marshall FGD Landfill each year.

#### Expected Annual Waste Quantities for Ten-Year Period

Year	Period <sup>5</sup>	Expected Annual Quantity (tons)
Year 1	2011-2012	288,800
Year 2	2012-2013	288,800
Year 3	2013-2014	288,800
Year 4	2014-2015	185,804
Year 5	2015-2016	See Note 1
Year 6	2016-2017	See Note 1
Year 7	2017-2018	See Note 1
Year 8	2018-2019	See Note 1
Year 9	2019-2020	See Note 1
Year 10	2020-2021	See Note 1

Note 1 - Prior to Cell 1 achieving final capacity, Duke will determine if a permit application to construct Cell 2 will be submitted. If Cell 2 is not permitted, then the wastes generated at Marshall that are currently placed in the FGD Landfill will be placed in the Marshall Industrial Landfill No. 1. Cell 1 of the Marshall FGD Landfill will be closed when its final capacity is reached.

<sup>2</sup> Permit to Operate. Duke Energy Corporation. Marshall Steam Station Flue Gas Desulfurization (FGD) Residue Landfill Phase 1, Cell 1. Facility Permit No: 18-09. November 21, 2006.

<sup>3</sup> Drawing MM6451.00-0005.001, Revision 1 (Referenced in Landfill Operations Plan).

<sup>4</sup> Landfill Operations Plan—Duke Energy Carolinas, LLC—Marshall Steam Station Flue Gas Desulfurization (FGD) Residue Landfill Phase 1, Cell 1. Permit No. 18-09. August 19, 2011.

<sup>5</sup> The period is from July 1 to June 30 of the following year.

## 4.0 Years of Disposal Capacity Remaining—Cell 1

As of June 30, 2011, Cell 1 had received approximately 274,576 tons of material. The remaining capacity of Cell 1 is calculated below:

1,326,780 tons	Cell 1 Initial Capacity
<u>- 274,576 tons</u>	Waste Placed through June 30, 2011
<b>1,052,204 tons</b>	<b>Cell 1 Remaining Capacity</b>

Based on the approximate tons of waste placed through June 30, 2011 and the design disposal rate, the estimated years of disposal capacity remaining are calculated:

$$\frac{\mathbf{1,052,204 \text{ Tons Remaining Capacity}}}{\mathbf{288,800 \text{ Tons/Year Expected Annual Quantity}}} = \mathbf{3.64 \text{ Years of Disposal Capacity Remaining in Cell 1}}$$

## 5.0 Waste Management Strategy—Plans for Waste Reduction

Marshall generates electric power by combustion of coal and produces fly ash, FGD residue, and other coal combustion residuals (CCR) on a continual basis. Marshall provides electricity to the Duke electric system, along with other electrical-generating stations. Since Marshall is part of a system, the operation of the station and the quantity of CCR produced depends on the operation of the Duke electric system as a whole.

The quantity of FGD residue generated at Marshall depends on factors such as the heat content (British Thermal Units [BTUs]) of the coal, the sulfur content of the coal, and the quantity of coal burned. These factors typically will vary over the course of a single year, causing the quantity of FGD residue produced to vary.

Duke's Byproducts Management Group was developed to seek markets and applications for the beneficial use of coal combustion byproducts. This group continuously works toward maximizing the use of coal combustion byproducts. The marketing of combustion byproducts for beneficial use is the primary waste-reduction effort.

The FGD system at Marshall was designed to produce wallboard-quality gypsum so that the material could be beneficially used as a byproduct. As with other materials typically utilized in construction applications, the regional economic downturn led to a decrease in beneficial use of FGD residue during the 2009-2010 period. During the 2010-2011 period, approximately 335,355 tons of gypsum were produced at Marshall. Approximately 251,324 tons were beneficially used in the manufacturing of gypsum wallboard. In addition to the gypsum beneficially used as wallboard, approximately 2,629 tons of gypsum was beneficially used in agricultural applications.

The Duke Byproducts Management Group is continuing to pursue the beneficial use of gypsum produced at Marshall. Duke believes that an improving regional economy will increase the demand for beneficial reuse of gypsum, resulting in a decrease in the quantity of material disposed in the landfill.

Duke's goal is to increase beneficial use by two percent each year, which would reduce the amount of waste going to the landfill, assuming production rates remain stable. Duke believes that this goal is attainable at Marshall, but recognizes that uncertainties exist both with beneficial use markets and with generation rates.

Duke continues to diversify the mix of fuels used to generate electricity in its system by making significant investments in renewable energy projects. As part of this diversification, Duke Energy launched its solar power initiative in North Carolina during 2009. The \$42 million, 10-megawatt (MW) program is now among the nation's largest distributed generation demonstrations. With distributed generation, electricity is produced at many micro-generating sites rather than at a large, centralized, traditional power plant.

In December 2010, Duke began operation of a 950 kilowatts solar photo-voltaic system at Marshall. The annual generation capacity of the 3,535 solar panels is 1,557,171 kilowatt-hours. In addition to solar, wind, and other renewable energy sources, Duke is testing the use of biomass mixed with coal at some of its traditional coal-fired power plants. Duke's increased use of renewable energy helps decrease CCR generation resulting from coal-fired generation.

## 6.0 Applicability with Pending Regulations

In June 2010, the US Environmental Protection Agency (EPA) issued a draft rule<sup>6</sup> that considers two possible regulatory options for the management of CCR. The EPA definition of CCR includes fly ash, bottom ash, FGD materials (including synthetic gypsum), and boiler slag. Both regulatory options fall under the Resource Conservation and Recovery Act (RCRA). Under the first option, EPA would list these residuals as special wastes subject to regulation under Subtitle C of RCRA when destined for disposal in landfills or surface impoundments. Under the second option, EPA would regulate coal ash under Subtitle D of RCRA, the section for non-hazardous wastes.

The EPA has solicited public comments on the proposed rule and is in the process of developing a final rule. The EPA issued a Notice of Data Availability (NODA) for the proposed rule on October 12, 2011. The NODA announced additional information and invited comment on additional information obtained by EPA in conjunction with the June 21, 2010 proposed rule.

It is uncertain when a final rule will be issued. The effective dates for the rules will vary from six months after the rule is finalized for the Subtitle D option to one to two years after the rule is finalized for the Subtitle C option.

As part of this rulemaking process, the EPA is soliciting comment on uses of CCR and whether they should continue to be exempted from RCRA regulations for the purpose of beneficial uses under the Bevill exemption.<sup>7</sup> EPA will decide on appropriate regulations for beneficial uses after completion of the rule making. At this time, the proposed rule does not appear to affect the disposal of gypsum in a permitted landfill nor does the proposed rule seem likely to affect the beneficial uses of gypsum. On the EPA webpage entitled *Frequent Questions: Coal Combustion Residues (CCR) - Proposed Rule- Additional Qs & As on Beneficial Uses*,<sup>8</sup> the EPA states that: “EPA strongly supports the use of FGD gypsum in wallboard. The proposed rule does not affect this use.”

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<sup>6</sup> Federal Register: June 21, 2010, Volume 75, Number 118, Proposed Rules Page 35127-35264.

<sup>7</sup> Section 3001(b)(3)(A)(i) of Resource Conservation and Recovery Act (known as the Bevill exclusion or exemption) excluded certain large-volume wastes generated primarily from the combustion of coal or other fossil fuels from being regulated as hazardous waste under subtitle C of RCRA. This amendment also allowed certain beneficial uses of CCRs.

<sup>8</sup> <http://www.epa.gov/wastes/nonhaz/industrial/special/fossil/ccr-rule/ccrfaq.htm#28>