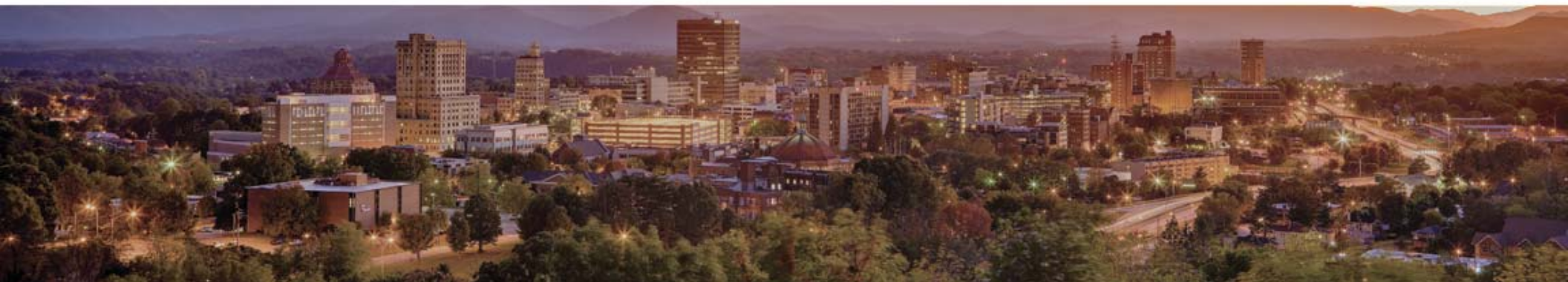




Fall 2016 CCR Update and Impacts of HB-630

October 20, 2016 - NC SWANA

Department of Environmental Quality



*Presented by Ed Mussler, P.E., Permitting Branch Supervisor,
Solid Waste Section, Division of Waste Management*



Department of Environmental Quality



CCR Management and HB630 SL 2016-95

- On July 14, 2016, Session Law 2016-95, Section 3(a) revised the Coal Ash Management Act of 2014
- The session law abolished the Coal Ash Management Commission that had been found unconstitutional
- It (130A-309.213(d)) directed the N.C. Department of Environmental Quality to issue final classification for remaining impoundments no later than October 15, 2018
- It mandated the recycling of ash from three Duke facilities
- Allowed closure under the federal CCR rule, thus making the department write the CCR rule into state code



Low Risk Classification

- The impoundments can receive a low-risk classification if the following conditions are met:
 - the impoundment owner must provide permanent water supplies to each household that has:
 - a drinking water supply well located within a half mile radius from the established compliance boundary of a CCR impoundment and is not separated from the impoundment by the mainstream of a river or any other body of water that would prevent migration of contaminants through groundwater.
 - a drinking water supply well that is expected to be impacted by constituents related to CCR as demonstrated by modeling or site investigations.
 - the impoundment owner must rectify the deficiencies of any dam safety order issued by the N.C. Environmental Management Commission as detailed in 130A-309.213(d)(1)(b)
- Approximately 800 +/- households are being vetted for potential service.



Intermediate Classification

- The legislation designated impoundments at the following facilities as intermediate-risk:
 - H.F. Lee Steam Station (5 impoundments) - Wayne County
 - Cape Fear Steam Station (5 impoundments) - Chatham County
 - Weatherspoon Steam Station (1 impoundment) – Robeson County
- In accordance with Section 3(a) of the law, these three sites are required to close no later than August 1, 2028



Location of Coal Fired Power Plants



Coal Ash Landfill Locations



Plant	Location	Plant status	Current ash management ³	Number of active basins ¹	Number of semi-active ash basins ¹	Number of inactive ash basins ¹	Total number of ash basins	Size (acreage of all basins)	Ash inventory in basins (tons)	Number of landfills ¹	Inventory in landfills (tons)	Number of ash fills ¹	Inventory in fills (tons)	Total inventory of ash (tons)	Ash excavated from site (tons)
Allen	North Carolina Ash Basins, Landfills and Fills	Operating	Dry fly ash beneficially reused or managed in a lined landfill; basin receives bottom ash. ³	1	0	1	2	293	16,540,000	1	1,140,000	3	1,590,000	19,270,000	0
Asheville ²		Operating	Production ash managed in basin; past ash being excavated and transported to fully lined storage solutions. Plant to retire in 2020.	1	0	1	2	78	6,280,000	0	0	0	0	6,280,000	4,530,000
Belews Creek		Operating	Dry fly ash beneficially reused or managed in a lined landfill; basin receives bottom ash. ³	1	0	0	1	283	12,090,000	3	6,680,000	1	990,000	19,760,000	0
Buck	Salisbury	Retired	Ash no longer generated at site.	0	3	0	3	134	5,060,000	0	0	1	250,000	5,310,000	0
Cape Fear	Moncure	Retired	Ash no longer generated at site.	0	1	4	5	173	5,730,000	0	0	0	0	5,730,000	0
Cliffside ²	Mooresboro	Operating	Unit 6 dry fly and bottom ash managed in a lined landfill; unit 5 directs ash to basins. ³	1	1	1	3	144	7,810,000	1	1,880,000	1	200,000	9,890,000	120,000
Dan River ²	Eden	Retired	Ash no longer generated at site.	0	1	1	2	43	1,600,000	0	0	2	1,360,000	2,960,000	320,000
H.F. Lee	Goldsboro	Retired	Ash no longer generated at site.	0	1	4	5	314	5,900,000	0	0	1	60,000	5,960,000	0
Marshall	Terrell	Operating	Dry fly ash beneficially reused or managed in a lined landfill; basin receives bottom ash. ³	1	0	0	1	382	16,020,000	3	7,510,000	2	7,360,000	30,890,000	0
Mayo	Roxboro	Operating	Dry fly ash beneficially reused or managed in a lined landfill; bottom ash managed in a lined landfill.	1	0	0	1	144	6,600,000	1	380,000	0	0	6,980,000	0
Riverbend ²	Mount Holly	Retired	Ash no longer generated at site.	0	2	0	2	69	3,620,000	0	0	2	1,560,000	5,180,000	540,000
Roxboro	Semora	Operating	Dry fly ash beneficially reused or managed in a lined landfill; basin receives bottom ash. ³	1	0	1	2	220	19,500,000	1	7,320,000	2	7,800,000	34,620,000	0
Sutton ²	Wilmington	Retired	Ash no longer generated at site.	0	1	1	2	137	6,650,000	0	0	1	690,000	7,340,000	400,000
Weatherspoon	Lumberton	Retired	Ash no longer generated at site.	0	0	1	1	36	2,450,000	0	0	0	0	2,450,000	0
TOTAL				7	10	15	32	2,450	115,850,000	10	24,910,000	15	21,860,000	162,620,000	5,910,000

Lets Look at the Numbers

- As of June 2016 Duke is reporting on their web site that:
 - Ash inventory in ash basins (32) = 115,850,000 tons
 - Ash inventory in ash fills (15) = 21,860,000 tons
 - Ash inventory in ash landfills (10) = 24,910,000 tons
- Total Ash Inventory = 162,620,000 tons
- Total Ash to Move (not counting landfills) = 137,710,000

- The ash in the landfills is not expected to be moved. However, final determination has not been made on the overfills at Roxboro, Allen and Marshall.
- The ash fills are moving:
 - Dan River – fill in the footprint of the proposed industrial landfill
 - Riverbend – fill being moved to gain access to the ash basins
- The numbers are changing constantly:
 - ash is leaving
 - ash is being discovered
 - ash is being generated from current operations

Ash Excavated and Removed as of October 9th, 2016

State	Site	Type	Facility Name	Tons of CCR Removed
NC	Asheville	Pond	1982 Basin/Generation Ash	4,882,328
NC	Cliffside	Pond	Unit 1-4 Inactive Basin	186,212
NC	Dan River	Fill	Ash Fill 1	715,155
NC	Sutton	Pond	1971 Basin	923,213
NC	Riverbend	Fill	Ash Stack	1,164,152

What's Left?

Plans to Remove CCR				CCR Might Stay in Place		
Asheville	6,280,000			Allen	19,270,000	
Dan River	2,960,000			Belews Creek	19,760,000	
Riverbend	5,180,000			Cliffside	9,890,000	
Sutton	7,340,000			Marshall	30,890,000	
Cape Fear	5,730,000			Mayo	6,980,000	
Weatherspoon	2,450,000			Roxboro	34,620,000	
H.F. Lee	5,960,000			Buck	5,310,000	
	35,900,000				126,720,000	

Coal Ash Landfills in NC

- 12 permitted landfills
 - 11 associated with Duke Energy Progress
 - 1 associated with Roanoke Valley Energy
- 2 closed and unlined
- 9 active
 - 6 single composite lined
 - 3 double composite lined
 - 3 overtop of retired ash ponds
 - 1 Newly permitted - Sutton
 - 1 Pending permit - Dan River



- Marshall Steam Station – Stokes County
 - 1804 – Dry Ash Landfill (closed, unlined)
 - 1809 – FGD Landfill (active, lined)
 - 1812 – Industrial Landfill #1 (active, double lined)
- Allen Steam Station – Gaston County
 - 3612 – Retired Ash Basin Landfill (active, double lined)
- Roanoke Valley Energy Plant – Halifax County
 - 4204 – Halifax County Coal Ash Landfill (inactive, lined)
- Roxboro Steam Plant – Person County
 - 7302 – CCB Landfill (active, lined)
- Mayo Steam Plant – Person County
 - 7305 – CCP Monofill (active, double lined)
- Rogers Steam Station – Rutherford County
 - 8106 – CCP Landfill (active, lined)
- Belews Creek Steam Station – Stokes County
 - 8503 – Pine Hall Rd Landfill (closed, unlined)
 - 8504 – Craig Rd Landfill (active, lined)
 - 8505 – FGD Landfill (active, lined)



Brickhaven Mine Tract “A” Structural Fill

- **Moncure, NC (Chatham County)**
- **Mine Permit No. 19-25**
 - 301 acres
- **Proposing to place 12.5 million tons (10 million yd³) as structural fill (1.7 million yd³/yr)**
- **145 acres for the lined fill area**
 - Phase 1 – 60.6 acres in two cells
 - Phase 2 – 55.2 acres in two cells
 - Phase 3 – 29 acres in one cell
- **7.5-8 years to complete**











Leachate Handling at Coal Ash Landfills

- Direct discharge to a settling basin and covered by NPDES Permit issued by the Division of Water Resources
- 100% Recycle and Evaporation
- Discharge to public utility



Coal Ash Residuals (CCR) Landfill

	Result (ug/L)											
	<i>Rogers</i>	<i>Allen</i>		<i>Mayo</i>	<i>Marshall</i>		<i>Roxboro</i>					
<i>Constituent</i>	<i>One Port</i>	<i>Cell 1</i>	<i>Cell 2</i>	<i>One Port</i>	<i>Cell 1</i>	<i>Cell 2</i>	<i>Port 1</i>	<i>Port 2</i>	<i>Port 3</i>	<i>Port 4</i>	<i>Port 5</i>	<i>Port 6</i>
Arsenic	50.2	400	420	14.7	109	112	7.23	4.37	2.44	2.63	1.24	
Barium	853			60.7			36.9	32.3	32.3	32.4	62	65.7
Boron	9560			1270		41,000	43,400	50,500	49,600	51,000		15,500
Cadmium	3.84	12.1				4.27		1.11	1.33	1.47	1.64	1.28
Calcium	6,450,000					286,000						
Chloride	15,000,000			39,200		29,200	43,300	149,000	332,000	229,000	645,000	633,000
Chromium				26							109	137
Copper		274	175		58.8	75.8						
Fluoride		5090	6260	178	3550	3810						
Iron	8930			416	360		369	2090	1540	72.7	315	224
Lead	251											
Magnesium	60,900				126,000	118,000						
Manganese	56,500	31,500	40,200	8.2	43,000	32,500	1740	1110	1160	2160	1050	1860
Nickel	248	1000	280	34	165	212	121	107	34	133	15.4	12.5
Nitrate		21,700	71,600	630	10,600	20,500	11,400	15,800	11,100	11,600	582	598
Potassium	424,000				84,600	71,000						
Selenium	96.9	127	268	1.7	128	153	796	639	561	373	126	54.1
Sodium	348,000				160,000	181,000						
Sulfate	928,000	4,830,000	5,680,000	130,000	1,750,000	1,810,000	2,220,000	2,480,000	2,560,000	2,890,000	1,790,000	1,930,000
Sulfur											596,000	
TDS	29,400,000			329,000	2,740,000	2,770,000	3,650,000	4,120,000	4,590,000	4,470,000	4,030,000	4,220,000
Thallium							0.625	0.289	0.355	0.648		0.249
Zinc	409	1450	525	204	348	370	19	34.4	34.1	125	9.14	6.78

Flue Gas Desulfurization (FGD) Landfill		
	Result (ug/L)	
<i>Constituent</i>	<i>Marshall</i>	<i>Belews Creek</i>
Alkalinity		244,000
Boron	35,100	6500
Calcium	552,000	657,000
Chloride	389,000	104,000
Fluoride	3970	
Iron	148,000	
Magnesium	188,000	82,300
Manganese	4780	7650
Nickel	127	
Potassium	62,900	8180
Selenium	478	2250
Sodium	106,000	6760
Sulfate	2,500,000	1,620,000
TDS	4,120,000	2,250,000
Zinc	182	



Coal Combustion Products (CCPs)

- **Fly Ash** ~ powdery material composed mostly of silica with nearly all particles being spherical captured in air pollution control systems
- **Bottom Ash** ~ large particles such as sand and small rocks from pulverizing coal and collected in the bottom of the boilers/furnace
- **Flue Gas Desulfurization (FGD) Material** ~ powdery material with a mixture of sulfites & sulfates (aka gypsum) produced when reducing SO₂ emissions
- **Boiler Slag** ~ molten bottom ash which fractures and crystallizes to form hard black pellets when quenched with water



Recycling of Coal Ash

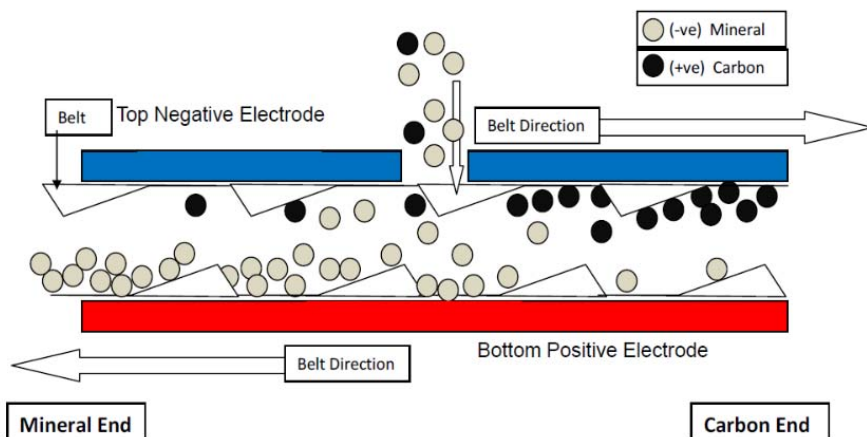
- 3 sites mandated under 130A-309.216 (Ash Beneficiation Projects)
- By January 1, 2017, Duke must designate two facilities for the beneficiation project
- A third site must be designated by July 1, 2017
- Each site must produce 300,000 tons per year
- Beneficiation expected to supply product to the cement industry
- Carbon content too high in ash basins, must be further processed
- The sites must be operational within two years of permit issuance
- Sites must be cleaned by December 31, 2029
- Duke announced on October 5, 2016 that Buck Steam Station be the first site slated for beneficiation



Thermal Beneficiation Technology Options

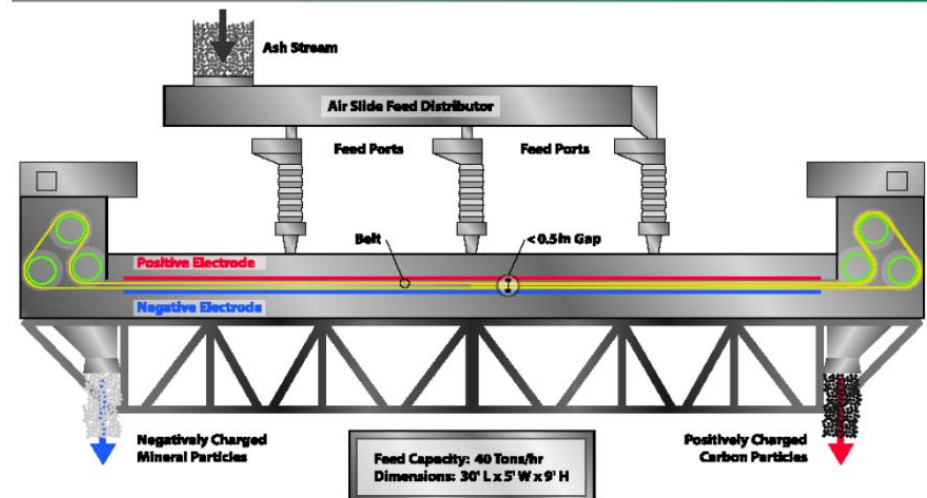
Electrostatic Separator Technology

Triboelectrostatic Separation



Separation Technologies LLC
A Titan America Business

ST Triboelectrostatic Separator



Separation Technologies LLC
A Titan America Business













EPA Coal Combustion Residual Rules

- Two regulatory options published in the Federal Register on June 21, 2010
 - regulate CCR as non-hazardous (subtitle D of RCRA) or
 - as a special waste (subtitle C of RCRA)
- EPA received over 450,000 comments, conducted eight public hearings and published three Notices of Data Availability (NODAs)
- EPA finalized rule under a subtitle D, the solid waste or non-hazardous waste provisions of RCRA December 14, 2014
- The rule provides a definition of beneficial use to clarify the distinction between beneficial use and disposal



Benefits of CCR Rules

- Closure of CCR Surface Impoundments must “Comply with the closure requirements established by the United States Environmental Protection Agency as provided in 40 CFR Parts 257 and 261, Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals From Electric Utilities.”
- SL 2016-95 “The EMC shall adopt rules as necessary to implement the provisions of the Part” (2I Coal Ash Management in Article 9 of GS)
- Rules would be consolidated into one location adding clarity for operating facility, DEQ staff and the public
- Monitoring and inspection data available to the public on a website
- Defines large CCR fills and piles as CCR units, which are covered by rule
- Identifies contaminants specific to coal burning industry



Location Restrictions

- The CCR Rule establishes five location restrictions to ensure CCR disposal units are appropriately sited:
 - Placement above the uppermost aquifer
 - Wetlands
 - Fault areas
 - Seismic impact zones
 - Unstable areas
- Units are prohibited from being sited in these areas unless specific demonstrations can be made
- Demonstrations must be certified by a qualified PE



Design Standards

- Composite liner design
- Comply with the technical requirements addressing:
 - Foundation settlement
 - Overall and slide slope stability
 - Side slope and subgrade reinforcement
 - Leachate collection and removal system maintains minimal leachate over liner
 - Groundwater monitoring system requirements
- Overfills cannot be constructed unless the underlying unit has been dewatered, capped and completely closed in accordance with the requirements of the rule



Operational Standards

- Fugitive Dust Control
- Run-on/Run-off for Landfills
- Hydrologic and Hydraulic Capacity Requirements for Surface Impoundments
- Inspections for Surface Impoundments and Landfills



Structural Integrity of Surface Impoundments

- Conduct periodic hazard potential classification assessment
- Develop an Emergency Action Plan if unit is designated as a “high” or “significant” hazard
- Cover embankment or dike slopes with either vegetation or an alternative form of slope protection
- CCR surface impoundments that exceed a height of five feet or more and a storage volume of 20 acre feet or more; or a height of 20 feet or more must:
 - Compile a history of construction
 - Conduct structural stability assessments every five years
 - Remedy situation as soon as feasible
- Conduct periodic assessments of safety factor:
 - end of construction loading
 - long term maximum storage pool condition
 - maximum surcharge pool loading condition
 - Seismic
 - liquefaction



Groundwater Monitoring and Corrective Action

- All CCR units must install a groundwater monitoring system and conduct groundwater monitoring
 - Sampling is representative of background quality and the groundwater passing the waste boundary
 - Minimum of one up-gradient and three down-gradient wells. Must justify using the minimum
 - PE must certify system is equally as capable of detecting monitored constituents at the waste boundary of the CCR unit as the individual groundwater monitoring system
- Annual report certifying compliance, including data, must be posted on facility's website
- Detection monitoring (Appendix III)
- Assessment monitoring (Appendix IV) within 90 days if there is a statistically significant increase over background
- Public meetings to discuss remedy



Closure and Post-Closure Care

Closure of a CCR unit

- When the unit fails to meet one or more specific technical criteria:
 - Location restrictions
 - Leaking, unlined CCR surface impoundments
 - Fails to demonstrate or meet factors of safety
- When the known final waste shipment or when the last known volume of CCR for beneficial use is removed
- When a unit is “idle” for more than two years (no receipt of CCR or removal of CCR for beneficial use)

Post-Closure

- Maintain integrity and effectiveness of final cover system
- If applicable, maintain integrity and effectiveness of leachate collection and removal system
- Maintain groundwater monitoring system and continue monitoring groundwater
- Owners or operators must continue post-closure care for 30 years



Recordkeeping and Public Notification

- Owners or operators are required to document how the provisions of the rule are being met by placing information in an operating record and providing notification of these actions to the State Director
- Owners or operators must also establish and maintain a publicly accessible internet site that posts documentation that has in many instances also been entered into the operating record
- Most files must be maintained in the operating record and on the internet site for five years
- As long as the facility remains active, the following documents must be maintained:
 - Emergency Action Plan
 - Fugitive Dust Control Plan
 - Closure Plan



Schedule for CCR Rules

September 7, 2016	GWWMC Meeting: Action item - Approval of proposed text to go before EMC.
October 11, 2016	Submit final agenda item and attachments (rule text, fiscal note, presentation) for EMC meeting.
November 10, 2016	EMC Meeting: Action item - Approval of text and fiscal note to proceed to public comment/hearing (also assign Hearing Officer and get certification from Commission chair).
November 22, 2016	Submit rule text to OAH for publication in NC Register.
December 15, 2016	Rule published in NC Register and Agency website (with fiscal note); Comment Period Begins.
December 30, 2016	Earliest date for public hearing.
February 13, 2017	Comment Period Ends, Finalize Hearing Officer's Report.
February 16, 2017	Submit attachments (hearing officer's report, final rule text) for EMC meeting.
March 9, 2017	EMC Meeting: Action items - Approval of Hearing Officer's Report and Adoption of Rule.
March 20, 2017	Submit text and forms to RRC.
April 20, 2017	RRC meeting: Action item - Approval by RRC.
May 1, 2017	Earliest effective date for rule.
May 1, 2017	Submit Solid Waste Management Plan to EPA for Approval



Ed Mussler, P.E. Solid Waste Permitting Branch Head

Division of Waste Management

(919) 707-8281

Ed.Mussler@ncdenr.gov

Department of Environmental Quality

