



Duke Energy
410 S. Wilmington Street
Raleigh, NC 27601

October 12, 2017

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Water Quality
Permitting Section

Bob Sledge
NC Division of Water Resources
1617 Mail Service Center
Raleigh, NC 27699-1617

Subject: Submittal of engineering reports
SOC application
Duke Energy Facilities

Dear Mr. Sledge,

Attached please find the third party engineering reports referenced in Duke Energy's application for Special Order by Consent dated September 28, 2017.

If there are any questions about this matter please feel free to contact me at (919) 546-2439 or shannon.langley@duke-energy.com.

Sincerely,

A handwritten signature in blue ink that reads "Shannon Langley".

E. Shannon Langley
Lead Environmental Specialist

Enclosures

**COAL COMBUSTION RESIDUALS (CCR) ANNUAL SURFACE IMPOUNDMENT REPORT
MAY 2017 INSPECTION**

WEATHERSPOON STEAM PLANT

491 Power Plant Road,
Lumberton, Robeson County,
North Carolina

Prepared For:

Duke Energy Carolinas, LLC
400 South Tryon Street
Charlotte, North Carolina 28202

Prepared By:

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June 20, 2017

Amec Foster Wheeler Project No.: 7810-17-0838

**COAL COMBUSTION RESIDUALS (CCR)
ANNUAL SURFACE IMPOUNDMENT REPORT
MAY 2017 ANNUAL INSPECTION**



W.H. WEATHERSPOON STEAM PLANT
1979 Ash Basin Dam (State ID No. ROBES-009)

Duke Energy Carolinas, LLC
491 Power Plant Road
Lumberton, Robeson County, North Carolina

Inspection Date: 05/15/17
Report Date: 06/20/17

Amec Foster Wheeler Project No.: 7810-17-0838

Inspection Team:	William A. Williams, PE, PG	Senior Engineer, Amec Foster Wheeler
	Nick Parks, PE	Senior Engineer, Amec Foster Wheeler
	Tim Russell, PE	Duke Energy System Owner
	Asha Sree, PE	Duke Energy CCP Lead Engineer

Summary

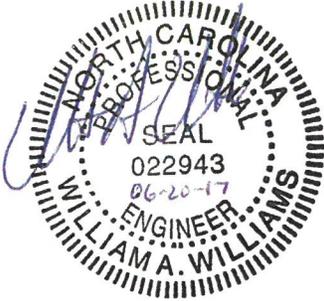
Amec Foster Wheeler has been retained to conduct the 2017 Annual Inspection for the coal combustion residuals (CCR) surface impoundments at the W.H. Weatherspoon Steam Station. *This annual dam/CCR Surface Impoundment Inspection Report is intended to meet the requirements of the North Carolina Coal Ash Management Act (Session Law 2104-122) Part V, Section 10 (amending G.S. 143-215.32) inspection of dams.* This annual inspection focused primarily on an assessment of (i) the structural stability of the CCR surface impoundments; (ii) the integrity of any hydraulic structures passing underneath the CCR surface impoundments or through the dikes of the units; and (iii) verifying that the construction, design, operation, and maintenance of the CCR surface impoundments appear to be in accordance with recognized and generally accepted engineering standards.

The purpose of this inspection and report is to provide an engineering opinion as to whether the impoundment is structurally sound and that the design, operation, and maintenance of the impoundment are in accordance with generally accepted engineering standards.

In summary, no conditions were observed during this field inspection nor identified by existing engineering analyses that represent an unsafe structural stability concern requiring immediate attention. Based on project information provided and results of our inspection, Amec Foster Wheeler concludes that the construction, design, operation, and maintenance of the CCR surface impoundment has been consistent with recognized and generally accepted engineering standards for protection of public safety. Issues concerning the hydraulic structures (risers and pipes) are being addressed by repairs scheduled for the near future. Maintenance in general is being adequately performed.

Sincerely,

Amec Foster Wheeler Environment & Infrastructure, Inc.



William A. Williams, PE, PG
Senior Engineer
Registered, North Carolina PE 22943



J. Allan Tice, PE (Reviewer)
Senior Principal Engineer

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1. Design / Geometry of the Impounding Structure

Based on the data reviewed and the visual inspection, no modifications to the basic geometry of the basin dams and dikes have been made in the last year. The following approximate geometric descriptions were provided by Duke Energy.

a. 1979 Ash Basin (State ID No. ROBES-009)

	Inactive Ash Basin
Dam Length, ft	6,600
Maximum Dam Height, ft	28
Minimum Crest Elevation, ft (msl, NAVD88)	143.0
Crest Width, ft	12
Basin Area, acres	Approx. 56

2. Existing Instrumentation and Maximum Readings

Monitoring instrumentation at the W.H. Weatherspoon includes 30 existing piezometers, as listed in Table 1 below. This table presents the location, number designation, and the highest (maximum) elevation that the water reached from January 2016 through February 2017. Slope indicators, settlement monuments, weirs or flumes to measure seepage, discharge flow gauges, or seismic instrumentation are not located at this site. Station personnel take monthly water level readings and report the readings to Duke Energy CCP Engineering. The data collected are analyzed by CCP Engineering for any changes or anomalies. The following information was provided by Duke Energy:

Table 1: Maximum Water Levels for Weatherspoon Steam Plant piezometers recorded between January 2016 and February 2017

Instrument ID	Location		Type of Existing Instrumentation	Maximum Recorded Reading (feet, msl, NAVD88)
	Longitude	Latitude		
SE-1	-78.96708	34.58935	Piezometer	133.90 ¹
SE-2	-78.96704	34.58930	Piezometer	126.95 ¹
SE-3	-78.96802	34.58879	Piezometer	DRY
SE-4	-78.96800	34.58876	Piezometer	127.33
SE-6	-78.96783	34.58875	Piezometer	114.89
SE-7	-78.96752	34.58891	Piezometer	DRY
SE-7A	-78.96752	34.58891	Piezometer	120.45 ¹
SE-7B	-78.96752	34.58891	Piezometer	129.60
SE-8	-78.96736	34.58901	Piezometer	DRY
SE-9	-78.96721	34.58909	Piezometer	DRY
SE-10	-78.96809	34.58860	Piezometer	DRY
SE-11	-78.96855	34.58845	Piezometer	126.20 ¹
SE-12	-78.96857	34.58849	Piezometer	134.27
SE-13 ³	-78.96653	34.58976	Piezometer	123.64 ¹
SE-14	-78.96713	34.58940	Piezometer	136.80 ¹
SE-15	-78.96753	34.58917	Piezometer	131.83 ¹
SE-16	-78.96810	34.58884	Piezometer	130.10
SE-16A ³	-78.96843	34.58862	Piezometer	124.84
SE-17	-78.96935	34.58819	Piezometer	127.10 ²
SE-18	-78.96702	34.58926	Piezometer	112.13

Instrument ID	Location		Type of Existing Instrumentation	Maximum Recorded Reading (feet, msl, NAVD88)
	Longitude	Latitude		
PZ-1	-78.96985	34.59354	Piezometer	127.03 ¹
PZ-2	-78.96797	34.59175	Piezometer	123.33
PZ-3	-78.96635	34.59018	Piezometer	117.22
S-1 ³	-78.97066	34.58897	Piezometer	128.40
E-1	-78.96720	34.59079	Piezometer	132.84
E-2	-78.96719	34.59080	Piezometer	128.13
E-3	-78.96715	34.59082	Piezometer	121.70
UPPER 1 ³	-78.97276	34.59273	Piezometer	137.76
UPPER 2	-78.97119	34.59140	Piezometer	140.84
UPPER 3	-78.97376	34.59177	Piezometer	136.59

¹ High reading recorded following Hurricane Matthew event.

² Suspect readings from August and September 2016 were omitted.

³ Piezometers identified for continued trend monitoring after February 2017.

A condition assessment of piezometers by CCP Engineering was conducted by Duke Energy (issued February 23, 2017) with recommendations to properly abandon of most of the piezometers located at the site. CCP Engineering recommended to only record water levels in the S-1, SE-13, SE-16A and Upper 1 piezometers for trend monitoring, while abandoning the remaining piezometers. The revised recording list was implemented beginning with the February 2017 monthly readings.

3. Approximate Depth of the Impounded Water and CCR

a. 1979 Ash Basin (State ID No. ROBES-009)

Minimum depth of impounded surface water: Dry

Maximum depth of impounded surface water: Generally, 6 inches or less

Present depth of impounded surface water: Less than 6 inches on May 15, 2017

4. Storage Capacity of Impounding Structure at the Time of the Inspection

a. 1979 Ash Basin (State ID No. ROBES-009)

The estimate of storage capacity was obtained from the 2014 Annual Ash Basin Dam Inspection Report (December 2014). Since the coal-fired plant no longer exists and there are no active ash management activities, remaining life and capacity is not considered applicable.

Storage Capacity: 425 acre feet (mostly filled by ash sediment deposits)

5. Approximate Volume of the Impounded Water and CCR at the Time of the Inspection

a. 1979 Ash Basin (State ID No. ROBES-009)

Approximate Volume of Impounded Water: 4,000 gallons (May 15, 2017)

Approximate Amount of Stored CCR: 2,450,000 tons (taken from March 2, 2017 Duke Energy CCR Inventory Report)

6. Existing Conditions That Are Disrupting or Have Potential to Disrupt the Operation and Safety of the CCR Unit and Appurtenant Structures Based on Inspections

Field Inspection

The field inspection was performed on May 15, 2017 by Bill Williams and Nick Parks of Amec Foster Wheeler. They were accompanied by Tim Russell and Asha Sree of Duke Energy. The weather during the inspection was sunny with an air temperature in the upper-70°F to mid-80°F. Based on data from WeatherUnderground (Lumberton, North Carolina) the last rainfall recorded prior to the inspection was approximately 0.2 inches on May 13, 2017, two days prior to the day of the inspection.

The 1979 Ash Basin containment dikes appeared to be in good condition at the time of the inspection. There were no features or conditions of the inspected ash basin dams or their outlet structures that indicate a threat of impending hazard. The crests and slopes of the 1979 Ash Basin were dry at the time of the inspection. The downstream slopes generally have good vegetative cover (except the sparse covered areas noted below), and no slumps, cracks, or other indications of stability concerns were seen during the site observations.

The vegetation was mowed and appeared to be well-maintained throughout most of the exterior dike grassed areas although there were a few areas where vegetation was sparse, particularly along the slopes where the tree and brush removal project had been conducted (WSPN-113, Work Order 9110030). Final approval of that work was issued by NC DEQ on January 20, 2017. Permanent slope stabilization and erosion control is in progress. Some of the repaired areas had been over-seeded and erosion control matting and/or straw installed where grass growth remained sparse. Due to the vegetation removal along the eastern slope, which resulted in irregular contours and stumps that would hamper mowing operations, a Posi-Shell® covering was applied along a portion of the eastern slope in December 2016 (Work Orders 7073939-2 and 7073939-3). The covering appeared to be in good condition, with no erosion observed.

Perimeter drainage swales exist on the east, south, and west sides of the ash basin. The swales are graded to drain to the drainage ditch leading to the cooling pond. Standing water was observed in the swales, with slight flow that was clear at the time of the inspection. The previously documented toe seepage near the southern end of the western dike empties into the perimeter drainage swale, with no apparent change in flow rate based on previous observations. Eight toe drains exit below the toe at the base of the southern dike; four additional drains were installed in September 2016 under WSPN-110 (Work Order 7565609). These drains empty into the perimeter drainage swale along the south side of the ash basin. Final approval of the repair was issued by NC DEQ on December 20, 2016. The toe drains were clear of obstructions, and five appeared to be slightly discharging water to the perimeter ditch at the time of the inspection. The seepage area previously observed at the toe on the southeast corner of the basin was soft and wet, but no flow was observed. The drainage along the east side of the basin had been re-routed to comeingle with the flow from west and south perimeter swale under WSPN-111 (Work Order 7565973) with field work completed in December 2016.

Little standing water was observed within the ash basin area including the secondary settling basin located in the extreme southeastern corner of the pond (less than 6 inches in each). A controlled overflow spillway had been constructed on the separator dike between the ash basin and the settling basin. The 1979 Ash basin dam is inactive; therefore, there are no operational issues regarding spillage. Review of critical analyses and operating procedures suggest that no immediate actions are required other than the recent and ongoing surveillance, monitoring, and maintenance activities already being performed.

Our inspection included observations of only the outlet pipe from the secondary settling pond and the related discharge pipe leading to the cooling pond. Other interior risers and discharge piping were not included in our inspection. The principal spillway outlet pipe was slip-lined in October/November 2015

with cured-in-place pipe (CIPP), and with the riser repaired with centrifugally cast concrete pipe (CCCP) under the WSPN-05 project (Work Order 5797320). A reverse filter was also installed around the outlet. Flow was observed exiting the discharge pipe, which was reported in March 2017 as having leakage and a lining defect at the junction of the CCCP in the riser and the CIPP in the horizontal pipe. A CCTV inspection of the riser and outlet pipe was performed on March 14, 2017. The riser and associated CCCP appeared to be structurally sound and in good condition. The CCTV inspection of the discharge pipe showed deposits, active infiltration and a CIPP liner defect. A repair plan is being developed with repairs to be completed in mid-July 2017.

The March 2017 CCTV inspection of the riser and discharge pipe on Pond 1 observed deposits, infiltration and several types of structural defects. Duke Energy has recommended the construction of a new open channel hydraulic connection between Pond 1 and Pond 3 under Work Order 20997818.

All riser and discharge pipes at the inactive ash basin will be inspected annually.

The observations made during the May 15, 2017 inspection indicate that the dike structure is generally well maintained, and appears to comply with regulatory standards and requirements.

The Phase 2 Reconstitution of Ash Basin Designs prepared by Amec Foster Wheeler in 2015 in compliance with Duke Energy Programmatic Documents (Final Report submitted September 10, 2015) identified that a section of the west perimeter embankment would be overtopped during the design storm event, when wave runup and setup is considered, thus bypassing the secondary pond and design discharge location. The internal configuration of the ash basin was regraded (completed in July 2016) to eliminate this issue under WSPN-205 (Work Order 7261624). The Phase 2 (under Duke Programmatic Documents) study did not identify any other civil or stormwater issues that impact dam safety at the 1979 Ash basin.

7. Maintenance

Duke Energy has developed an Operations and Maintenance (O&M) Manual to instruct operation and engineering personnel regarding the proper procedures for operating and maintaining the Ash Basin System. The System Owners and Station Environmental Coordinators operate and maintain the impoundment facility in a safe and regulatory-compliant manner such as meeting State and Federal laws along with company guidelines without interruption to the station's generation of electricity. The O&M manual provides the necessary information in a concise and comprehensive manner and assists those responsible for operating and maintaining the ash impoundment facility and associated support features.

Observations during the 2017 inspection indicate that Duke is satisfactorily maintaining the inactive ash basin.