COAL COMBUSTION RESIDUALS (CCR) ANNUAL SURFACE IMPOUNDMENT INSPECTION REPORT

2020 INSPECTION

CAPE FEAR STEAM STATION
500 CP&L Road
Moncure, North Carolina

Prepared For:
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Prepared By:

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Engineering and Land Surveying License No. F-1253

May 1, 2020

Wood E&IS Project No.: 7812-20-0381
2020 COAL COMBUSTION RESIDUALS (CCR) SURFACE IMPOUNDMENT INSPECTION REPORT

CAPE FEAR STEAM STATION
1956 Ash Basin Dam (State ID No. CHATH-075)
1963/1970 Ash Basin Dam (State ID No. CHATH-076/077)
1978 Ash Basin Dam (State ID No. CHATH-078)
1985 Ash Basin Dam (State ID No. CHATH-079)

Duke Energy Carolinas LLC
500 CP&L Road
Moncure, Chatham, North Carolina

Inspection Date: 02/26/2020

Summary

Wood Environment & Infrastructure Solutions (Wood E&IS) has been retained to conduct the 2020 Annual Inspection for the coal combustion residuals (CCR) surface impoundments at Cape Fear Steam Station. This annual dam/CCR Surface Impoundment Inspection Report meets the requirements of the North Carolina Coal Ash Management Act (Session Law 2014-122) 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 impoundment; (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 good engineering standards.

In summary, no conditions were observed during the field inspection nor identified by existing engineering analyses that represent an unsafe structural stability concern requiring immediate attention. Wood E&IS concludes that the construction, design, operation, and maintenance of the CCR surface impoundments have been sufficiently consistent with recognized and generally accepted engineering standards for protection of public safety and the environment.

Sincerely,

Wood Environment & Infrastructure Solutions

William A. Williams, PE, PG (Primary Author)  Russell L. Thomas, Jr, PE (Technical Reviewer)
Senior Engineer      Associate Engineer Geotechnical
Registered, North Carolina PE 022943   Registered, North Carolina PE 026914
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1. **Design / Geometry of the Impounding Structure**

Based on the data reviewed and the visual inspection, no modifications to the geometry of impounding structures have been made since the 2019 annual inspection. The following geometry data was obtained from Duke Energy. Values given in the tabulations below should be considered approximate.

### a. 1956 Ash Basin Dam (State ID No. CHATH-075)

<table>
<thead>
<tr>
<th>Ash Basin Dam</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dam Length, ft</td>
</tr>
<tr>
<td>Maximum Dam Height, ft</td>
</tr>
<tr>
<td>Crest Elevation, ft</td>
</tr>
<tr>
<td>Crest Width, ft</td>
</tr>
<tr>
<td>Pond Area, acres</td>
</tr>
</tbody>
</table>

### b. 1963 Ash Basin Dam (State ID No. CHATH-076)\(^1\)

<table>
<thead>
<tr>
<th>Ash Basin Dam</th>
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<tbody>
<tr>
<td>Dam Length, ft</td>
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<td>Crest Elevation, ft</td>
</tr>
<tr>
<td>Crest Width, ft</td>
</tr>
<tr>
<td>Pond Area, acres</td>
</tr>
</tbody>
</table>

### c. 1970 Ash Basin Dam (State ID No. CHATH-077)\(^1\)

<table>
<thead>
<tr>
<th>Ash Basin Dam</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dam Length, ft</td>
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</tr>
<tr>
<td>Crest Elevation, ft</td>
</tr>
<tr>
<td>Crest Width, ft</td>
</tr>
<tr>
<td>Pond Area, acres</td>
</tr>
</tbody>
</table>

### d. 1978 Ash Basin Dam (State ID No. CHATH-078)

<table>
<thead>
<tr>
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<tbody>
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</tr>
<tr>
<td>Crest Elevation, ft</td>
</tr>
<tr>
<td>Crest Width, ft</td>
</tr>
<tr>
<td>Pond Area, acres</td>
</tr>
</tbody>
</table>

### e. 1985 Ash Basin Dam (State ID No. CHATH-079)

<table>
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</thead>
<tbody>
<tr>
<td>Dam Length, ft</td>
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<tr>
<td>Maximum Dam Height, ft</td>
</tr>
<tr>
<td>Crest Elevation, ft</td>
</tr>
<tr>
<td>Crest Width, ft</td>
</tr>
<tr>
<td>Pond Area, acres</td>
</tr>
</tbody>
</table>

\(^1\) The perimeter enclosure dikes for the 1963 Ash Basin were extended and incorporated into the 1970 Ash Basin to form the current combined area. The common separating dike originating from the 1963 Ash Basin was cut down to allow flow to pass into the 1970 Ash Basin.

2. **Existing Instrumentation and Maximum Readings**

Monitoring equipment/devices observed at Cape Fear Steam Station include piezometers at all basins, electronic basin water level gauges in the 1978 and 1985 Ash Basins (CHATH-078 and CHATH-079), and a staff gauge in the 1970 Ash Basin (CHATH-077). Duke Energy personnel take monthly piezometer readings and daily electronic basin water level readings and report the readings to
CCP Engineering. Duke Energy personnel collect weekly readings of the staff gauge in the 1970 Ash Basin (since January 2019). Dewatering pumping data is recorded daily (when operating) and is reported to CCP Engineering. The data collected is analyzed by CCP Engineering for any changes or anomalies.

a. **1956 Ash Basin Dam (State ID No. CHATH-075)**

Table 1: Maximum Water Levels for the piezometers associated with the 1956 Ash Basin Recorded Between January 2019 and February 2020

<table>
<thead>
<tr>
<th>Location (Latitude, Longitude)</th>
<th>Piezometers</th>
<th>Maximum Recorded Elevation Reading</th>
</tr>
</thead>
<tbody>
<tr>
<td>35.597354°, -79.050530°</td>
<td>PZ-10</td>
<td>168.02 ft</td>
</tr>
<tr>
<td>35.598410°, -79.049351°</td>
<td>CHATH-075, P100</td>
<td>165.05 ft</td>
</tr>
<tr>
<td>35.597238°, -79.048607°</td>
<td>CHATH-075-P101</td>
<td>166.46 ft</td>
</tr>
<tr>
<td>35.598306°, -79.049419°</td>
<td>CHATH-075-P102</td>
<td>165.58 ft</td>
</tr>
<tr>
<td>35.597275°, -79.048393°</td>
<td>CHATH-075-P103</td>
<td>158.11 ft</td>
</tr>
</tbody>
</table>

1 Instituted quarterly reading starting in July 2018.


Table 2: Maximum Water Levels for the piezometers associated with the 1963/1970 Ash Basin Recorded Between January 2019 and February 2020

<table>
<thead>
<tr>
<th>Location (Latitude, Longitude)</th>
<th>Piezometers</th>
<th>Maximum Recorded Elevation Reading</th>
</tr>
</thead>
<tbody>
<tr>
<td>35.589401°, -79.049627°</td>
<td>PZ-8</td>
<td>183.60 ft</td>
</tr>
<tr>
<td>35.588757°, -79.051349°</td>
<td>CHATH-076-P100</td>
<td>168.32 ft</td>
</tr>
<tr>
<td>35.588810°, -79.051129°</td>
<td>CHATH-076-P101</td>
<td>172.33 ft</td>
</tr>
<tr>
<td>35.587333°, -79.051096°</td>
<td>CHATH-076-P102</td>
<td>169.12 ft</td>
</tr>
<tr>
<td>35.587333°, -79.051256°</td>
<td>CHATH-076-P103</td>
<td>166.72 ft</td>
</tr>
<tr>
<td>35.586398°, -79.048342°</td>
<td>PZ-7</td>
<td>181.66 ft</td>
</tr>
<tr>
<td>35.585300°, -79.050811°</td>
<td>CHATH-077-P100</td>
<td>172.71 ft</td>
</tr>
<tr>
<td>35.582678°, -79.047750°</td>
<td>CHATH-077-P102</td>
<td>167.22 ft</td>
</tr>
<tr>
<td>35.582578°, -79.047802°</td>
<td>CHATH-077-P103</td>
<td>170.49 ft</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>In Pond</th>
<th>Water Level Staff Gauge</th>
<th>5.42 ft</th>
</tr>
</thead>
</table>

1 Instituted quarterly reading starting in July 2018.
2 Maximum reading recorded on April 15, 2019.
c. 1978 Ash Basin Dam (State ID No. CHATH-078)

Table 3: Maximum Water Levels for the piezometers associated with the 1978 Ash Basin Recorded Between January 2019 and February 2020

<table>
<thead>
<tr>
<th>Location (Latitude, Longitude)</th>
<th>Piezometers</th>
<th>Maximum Recorded Elevation Reading</th>
</tr>
</thead>
<tbody>
<tr>
<td>35.587904°, -79.047993°</td>
<td>PZ-9 ¹</td>
<td>187.92 ft</td>
</tr>
<tr>
<td>35.587705°, -79.045477°</td>
<td>78-1</td>
<td>176.32 ft</td>
</tr>
<tr>
<td>In Pond</td>
<td>Water Level Instrumentation ²</td>
<td>181.93 ft</td>
</tr>
</tbody>
</table>

¹ Instituted quarterly reading starting in July 2018.
² Water Level Instrumentation is located within the ponded water area. Maximum reading recorded on April 15, 2019.

3. Approximate Depth & Elevation of the Impounded Water and CCR

The data presented is based on water level readings obtained from Duke Energy on February 26, 2020.

a. 1956 Ash Basin Dam (State ID No. CHATH-075)

Minimum Depth of Water: Dry
Maximum Depth of Water: Dry
Present Depth of Water: Dry
Depth of CCR: Approximately 20 feet¹

¹ Based on Geologic Cross-Sections by SynTerra, Comprehensive Site Assessment Report, 2015.

   Minimum Depth of Water: 0 ft.
   Maximum Depth of Water: Approximately 5.42 feet (Staff Gauge reading on April 15, 2019)
   Present Depth of Water: Approximately 3.63 feet on February 21, 2020 (staff gauge reading)
   Depth of CCR: Approximately 25 feet

   1 Based on Geologic Cross-Sections by SynTerra, Comprehensive Site Assessment Report, 2015.

   c. **1978 Ash Basin Dam (State ID No. CHATH-078)**

   Minimum Elevation of Water: 171.88 ft., December 9, 2019 (water level instrumentation)
   Maximum Elevation of Water: 181.93 ft., April 15, 2019 (water level instrumentation)
   Present Elevation of Water: 175.36 ft. as recorded on February 25, 2020 (water level instrumentation)
   Depth of CCR: Approximately 25 feet

   1 As recorded between January 1, 2019 and February 25, 2020
   2 Based on Geologic Cross-Sections by SynTerra, Comprehensive Site Assessment Report, 2015.

   d. **1985 Ash Basin Dam (State ID No. CHATH-079)**

   Minimum Elevation of Water: 161.55 ft., December 5, 2019 (water level instrumentation)
   Maximum Elevation of Water: 170.71 ft., April 15 & 22, 2019 (water level instrumentation)
   Present Elevation of Water: 162.96 ft. as recorded on February 25, 2020 (water level instrumentation)
   Depth of CCR: Approximately 40 feet

   1 As recorded between January 1, 2019 and February 25, 2020
   2 Based on Geologic Cross-Sections by SynTerra, Comprehensive Site Assessment Report, 2015.

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

   Since the Cape Fear Steam Station has been decommissioned and demolished, and there is no active ash management; storage capacity and remaining life is not applicable to this report. See Section 5 of this report for approximate volume of impounded water at the time of the inspection and CCR as of last inventory.

   a. **1956 Ash Basin Dam (State ID No. CHATH-075)**

   Remaining storage capacity of the surface impoundment is not applicable as ash is no longer being deposited in the basin.


   Remaining storage capacity of the surface impoundment is not applicable as ash is no longer being deposited in the basin.

   c. **1978 Ash Basin Dam (State ID No. CHATH-078)**

   Remaining storage capacity of the surface impoundment is not applicable as ash is no longer being deposited in the basin.

   d. **1985 Ash Basin Dam (State ID No. CHATH-079)**

   Remaining storage capacity of the surface impoundment is not applicable as ash is no longer being deposited in the basin.

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

   Basin volumes of ash presented are based on the data summary sheet provided by Duke Energy dated February 29, 2020. Basin volumes of free water presented are based on the data summary sheet provided by Duke Energy dated March 8, 2020. Plant operations ceased in 2012, and there has been no additional inclusion of ash into any of the basins within the last year.
a. **1956 Ash Basin (State ID No. CHATH-075)**

Approximate Weight CCR: 420,000 tons  
Approximate Volume Water: Dry


Approximate Weight CCR: 1,700,000 tons  
Approximate Volume Water: No Free Water

c. **1978 Ash Basin (State ID No. CHATH-078)**

Approximate Weight CCR: 830,000 tons  
Approximate Volume Water: No Free Water

d. **1985 Ash Basin (State ID No. CHATH-079)**

Approximate Weight CCR: 2,820,000 tons  
Approximate Volume Water: No Free Water

6. **Appearances of an Actual or Potential Structural Weakness, as well as Existing Conditions That Are Disrupting or Have Potential to Disrupt the Operation and Safety of the CCR Unit and Appurtenant Structures**

   The observations made during the February 26, 2020 annual inspection indicate that the dam structures are generally well maintained and appear to comply with regulatory standards and requirements. Based upon data from the WeatherUnderground.com, approximately 0.32 inches of rainfall occurred in the 24 hours prior to the inspection, with approximately 1.04 inches of rainfall during the two weeks prior to the inspection.

   a. **1956 Ash Basin (State ID No. CHATH-075)**

   At the time of our inspection, Wood E&IS did not observe items that indicate a potential structural weakness of the ash pond dam. The ash pond dam appears to be in the same general condition as in the 2019 inspection. The western interior portion of the ash pond dam is cleared and graded as a retention basin. No water was observed in the retention basin at the time of the inspection.


   At the time of our inspection, Wood E&IS did not observe items that indicate a potential structural weakness of the ash pond dam. The ash pond dam appears to be in the same general condition as in the 2019 inspection, except that water level within the ponded area of the basin was slightly lower (approximately 1-foot depth lower). A CCTV inspection of the drainage pipe was completed on March 1, 2019. The pipe was found to be in excellent condition, with no repairs or modifications warranted.

   c. **1978 Ash Basin (State ID No: CHATH-078)**

   At the time of our inspection, Wood E&IS did not observe items that indicate a potential structural weakness of the ash pond dam. The ash pond dam appears to be in the same general condition as in the 2019 inspection, except that water level within the ponded area of the basin was lower (approximately 5.5-foot decrease in depth).

   d. **1985 Ash Basin (State ID No: CHATH-079)**

   At the time of our inspection, Wood E&IS did not observe items that indicate a potential structural weakness of the ash pond dam. The ash pond dam appears to be in the same general condition as in the 2019 inspection, except that water level within the ponded area of the basin was lower (approximately 7-foot decrease in depth). A CCTV inspection of the outlet pipe and riser was completed on March 1, 2019. The pipes were found to be in fair to good condition, with no repairs or modifications recommended.
7. Changes Since the Previous Annual Inspection

a. **1956 Ash Basin (State ID No. CHATH-075)**
   
   A section of the downstream slope on the northwest side of the basin had been regraded to a 2:1 (horizontal: vertical) slope in January/February 2020 per the request of NC Dam Safety. The area had been seeded and grass was growing. There were no other observed changes to the 1956 Ash Basin other than routine maintenance.

   
   There have been no significant changes to the 1963/1970 Ash Basin other than routine maintenance. Erosion rills on the downstream slope along the western side of the basin have become more pronounced since the inspection of 2019 due to clearing of trees and brush on the slope. Two animal burrows were identified on the western downstream slope: one on the 1970 portion of the basin, and one on the 1963 portion of the basin. Both animal burrows were repaired on the day of the inspection.

c. **1978 Ash Basin (State ID No: CHATH-078)**
   
   A dewatering/pumping plan is under implementation (on an as-needed basis), with basin water pumped to an on-site water treatment system. Following treatment, the water is discharged into the Cape Fear River at Outfall 008, installed near the north end of the 1963 Ash Basin. The water level in the basin had been lowered by approximately 5.5 feet since the 2019 inspection from the basin dewatering operations.

d. **1985 Ash Basin (State ID No: CHATH-079)**
   
   A dewatering/pumping plan is under implementation (on an as-needed basis), with basin water pumped to an on-site water treatment system. Following treatment, the water is discharged into the Cape Fear River at Outfall 008, installed near the north end of the 1963 Ash Basin. The water level in the basin had been lowered by approximately 7 feet since the 2019 inspection from the basin dewatering operations. One animal burrow was identified on the downstream slope along the north side of the basin. The burrow was repaired on the day of the inspection. Reseeding and straw matting were applied to a section of the downstream slope on the east side of the basin (where the bridge crossing a creek had been installed), and at the outfall structure (where the basin pumping pipes had been removed and relocated to the north end of the basin). Several small (<1 sf) bare areas were observed on the downstream slope along the south side of the basin.

8. Maintenance

Duke Energy has developed an Operations and Maintenance (O&M) Manual to instruct operation and engineering personnel the proper procedures for operating and maintaining the Ash Basin System. The Station 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. 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 this 2020 inspection indicate that Duke Energy is properly maintaining the facility.