



Duke Energy
410 S. Wilmington Street
Raleigh, NC 27601

May 24, 2018

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

Subject: Submittal of engineering report
SOC application
Belews Creek Steam station
NC0024406

Dear Mr. Sledge,

Attached please find the third party engineering reports referenced in Duke Energy's application for Special Order by Consent for the subject facility dated May 22, 2018.

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
Principal Environmental Specialist

Enclosures

Cc: Jim Wells - via email
Richard Baker - via email
Matt Hanchey - via email
Joyce Dishmon/Filenet - via email
Toya Ogallo - via email

ERM NC, Inc.

15720 Brixham Hill Ave.
Suite 120
Charlotte, NC 28277
(704) 541-8345
www.erm.com



May 24, 2018

Richard E. Baker Jr.
Duke Energy
526 S. Church Street
Charlotte, NC 28202

**Subject: Evaluation of Duke Energy Belews Creek Coal
Ash Basin**

Dear Mr. Baker:

ERM NC, Inc. (ERM) has prepared this letter report to summarize the evaluation of the Duke Energy Belews Creek Ash Basin operations and capability to meet National Pollutant Discharge Elimination System (NPDES) effluent limits at Outfall 003. Based on ERM's review of the treatment units and operations, ERM has concluded that the system cannot meet projected 2018 NPDES limits even at maximum efficiency of operation. The details of the evaluation are presented in this letter report.

Background

The Belews Creek Steam Station (BCSS) is a coal-fired steam electric generating facility, with wastewater discharges governed by NPDES Permit NC0024406. Operations at BCSS are undergoing modifications to comply with the revised Effluent Limit Guidelines for the Steam Electric Generating categorical dischargers, Federal Coal Combustion Residual (CCR) rules, as well as the North Carolina Coal Ash Management Act.

The NPDES permit renewal application (August 2016), Duke Energy Carolinas, LLC (Duke) outlines the planned changes to coal ash handling operations as shown by the Attachment 2 flow diagram figures (in permit application) representing current and future water flows. In particular, a new retention basin will be constructed, while the flow to the current active Ash Basin will be ceased, and the only flow discharging from the Ash Basin will be from the closure activities. These activities will include decanting of the surface water and dewatering of the ash. Seepage from the basin will reduce in proportion to the basin water level, and ultimately cease as the basin is closed.

Evaluation

The evaluation of the Ash Basin considers four topics, each of which is addressed as follows:

- *An evaluation of existing treatment units, operational procedures and recommendations as to how the efficiencies of these facilities can be maximized. The person in charge of such evaluation must sign this document.*

The Ash Basin is a surface impoundment with a surface area of approximately 350 acres, and a discharge flow of approximately 9 MGD. The principal use for this treatment unit has been the storage of coal combustion residuals from the electrical generating plant. The treatment unit is a gravity settling basin, which operates by allowing for sufficient hydraulic residence time for suspended solids to settle in the basin, whereas the clarified effluent is discharged via an outlet tower outfitted with stop log weirs to control the decant water level. The surface loading rate for the basin is less than 0.001 GPM/ft², which is a conservative hydraulic loading rate for gravity settling.

The operation and maintenance of the Ash Basin is described in the BCSS O&M Manual (CCP-PRG-BLC-OM-001, Rev 003). Operational activities pertinent to this evaluation include weekly and annual inspections of the basin, monthly reading and review of instrument data, annual CCTV video inspection of decant pipes and risers, and annual seepage collection video inspection.

The operational performance of the Ash Basin, and specifically the solids settling, is directly related to the flow into and out of the basin, and secondarily the water level maintained by the outlet tower. Day to day fluctuations in flow due to the electrical generating plant operations and rain events will have minor impact on the variation in water level due to the large surface area. The stop logs are the primary means of setting and maintaining water level. The weekly inspection activities will provide visual indication of problems with the outlet structure, for example, if the water level is significantly below the weir, indicating significant leakage or mis-aligned stop logs. The total suspended solids (TSS) recorded at Outfall 003 are typically less than 5 mg/l, as further indication of the efficient performance of the settling operations.

- *A certification that these facilities could not be operated in a manner that would achieve compliance with final permit limits. The person making such determination must sign this certification.*

The 2012 NPDES Permit NC0024406 effluent limitations for Outfall 003 are consistent with the Steam Electric Power Generating Point Source Category Best Practicable Control Technology (BPT) for ash transport water [40 CFR 423.12(b)(4)]. The projected 2018 NPDES Permit expands the number of parameters with effluent limitations and differentiates between decanting operations and the ash pond closure dewatering operations. The effluent parameter limit comparison between permits is shown in Table 1, below:

Table 1 – NPDES Permit NC0024406 Effluent Limits – Outfall 003

Parameter	Units	2012 Current Limits		Projected 2018 Limits			
		Mon. Avg	Daily Max	Decanting		Dewatering	
				Mon. Avg	Daily Max	Mon. Avg	Daily Max
Oil and Grease Total	mg/l	15	20	15.0	20.0	15.0	20.0
Suspend Solids	mg/l	30	50	30.0	50.0	30.0	50.0
Total Iron	mg/l		1.0	1.0	1.0	1.0	1.0
Total Copper	mg/l		1.0	0.00788	0.01047	0.00788	0.01047
Sulfates	mg/l	1502.4	1502.4	250.0	250.0	250.0	250.0
Chronic Toxicity		P/F @ 19%		P/F @ 90%		P/F @ 90%	
pH	s.u.	6 - 9		6 - 9		6 - 9	
Chlorides Total				250.0	250.0	250.0	250.0
Aluminum Total	mg/l			6.5	6.5	6.5	6.5
Cadmium Total	mg/l			0.00059	0.00324		
Selenium Total	mg/l			0.0050	0.0560	0.0050	0.0560
Lead Total	mg/l			0.00294	0.07548	0.00294	0.07548
Thallium Total	mg/l			0.0020	0.0020	0.0020	0.0020
Turbidity	NTU				50		50
Ammonia	mg/l			1.0	5.0	1.0	5.0
Arsenic Total	mg/l					0.010	0.340
Molybdenum	mg/l					0.160	0.160
Fluoride	mg/l					1.8	1.8
Chromium III	mg/l					0.1177	0.9051
Chromium IV	mg/l					0.0110	0.0160
Total Zinc	mg/l					0.1257	0.1257
Total Nickel	mg/l					0.0250	0.3352
Total Barium	mg/l					1.0	1.0
Antimony	mg/l					0.0056	0.0056

Note: Yellow = reduced limits; Red = additional parameters with limits

The projected 2018 NPDES permit reduces effluent limitations for total copper and sulfate, increases the chronic toxicity percentage, and adds effluent limitations for (17) additional parameters. Of these additional parameters, the majority (13) are for metals.

As previously discussed, the Ash Basin was designed for and operates simply to remove suspended solids by gravity settling. Surface impoundments, such as the Ash Basin, are ineffective at removing dissolved solids, including metals in dissolved form. As noted in EPA’s Technical Development Document for the Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category (EPA-821-R-15-007, p.157):

“Surface impoundments can reduce the amount of TSS in the wastewater discharge provided there is sufficient residence time. In addition to TSS, surface impoundments can also reduce specific pollutants in the particulate form to varying degrees in the wastewater discharge. **However, surface impoundments are not designed to reduce the amount of dissolved metals in the wastewater.**”[emphasis added]

The gravity settling operation of the Ash Basin has no ability to actively remove the dissolved fractions of copper and the additional metals listed in the draft NPDES permit, and similarly for chlorides and ammonia.

- *The effluent limits that the facility could be expected to meet if operated at their maximum efficiency during the term of the requested SOC (be sure to consider interim construction phases).*

Duke Energy expects to be able to meet the following limits during the term of the requested Special Order by Consent (SOC) for Belews Creek Steam Station. Upstream and downstream monitoring of the Dan River and monitoring of Belews Lake upstream and downstream of the power plant are expected to meet the 15A NCAC 02B Water Quality Standards for Surface Waters (2B Standards). Instream monitoring of the Unnamed Tributary (UT) evaluating the potential impacts from S-10 and S-11 seeps are expected to meet the limits shown in the table below:

pH	5-10
Cadmium	2 ug/l
Chlorides	700 mg/l
Mercury	0.1 ug/l
Hardness	800 mg/l
TDS	1500 mg/l

Duke Energy expects the discharge from Outfall 003 could meet the “phased interim” limits that were in the April 16, 2018 draft NPDES permit **A.(3) EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS (Outfall 003 – normal operations/decanting)** and **A.(4). EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS (Outfall 003 – dewatering)** The numeric limits proposed in the April 16, 2018 draft were developed based on the dilution of the Dan River as the receiving water (current 003 outfall location in 2012 NPDES permit) compared to the 2018 location of Outfall 003 at the UT to the Dan River and zero dilution. The April 16, 2018 draft allowed a 4.5 year compliance schedule to meet the more restrictive limits that are the same as the April 30, 2018 NPDES permit draft.

Considering the decanting and future dewatering activities, these interim actions levels should be achievable.

- *Any other actions taken to correct problems prior to requesting the SOC.*

The station has attempted to operate the ash basin as efficiently as possible, and has completed construction of the dry flyash system, which diverts a substantial portion of the material from the Ash Basin, and reduces pollutant loading.

Conclusion

Based on my review of the available design and operating data for the BCSS Ash Basin, I have determined that this treatment unit cannot be operated in a manner that would achieve compliance with the final NPDES permit limits.

A handwritten signature in blue ink, appearing to read "Peter A. Flaherty". The signature is stylized and cursive.

Peter A. Flaherty, PE (NC #032922)