

# DRAFT CCR RULE

## 15A NCAC 02K .0224 COAL COMBUSTION RESIDUALS DAMS – ADDITIONAL DESIGN REQUIREMENTS

The purpose of this Rule is to adopt aspects of the Federal Coal Combustion Residuals (CCR) Rules that are not covered under the current Dam Safety Law and Rules.

- (1) **APPLICABILITY OF THIS RULE.** This Rule shall apply only to CCR dams.
- (2) **GENERAL REQUIREMENTS FOR ALL CCR DAMS.** In addition to the requirements of this Rule, CCR dams and associated impoundments shall also comply with all other rules within this Subchapter unless otherwise noted.
- (3) **REQUIREMENTS FOR CLASSIFICATION OF CCR DAMS.**
  - (a) In addition to the requirements of Rule .0105 of this Subchapter, a CCR dam may be classified as A, B, or C based on potential risks to public health, safety or welfare.
  - (b) Owners of existing CCR impoundments that impound CCR residuals to an elevation of five feet or more above the upstream toe of the structure and have a storage volume of 20 acre-feet or more, or that impound CCR residuals to an elevation of 20 feet or more above the upstream toe of the structure, shall be required to provide detailed information on the history of construction of the existing CCR impoundment and an analysis of the hazard potential for the impoundment. This information, along with a proposed classification of the dam by a qualified engineer and a determination of whether or not it should be exempt under the Dam Safety Law of 1967, shall be submitted to the Director for review and approval.
- (4) **SPILLWAY DESIGN REQUIREMENTS.** All CCR dams shall have a spillway system with capacity to pass a flow resulting from a design storm for a hazard classification appropriate for the CCR dam as specified in the table below. These requirements supersede the Minimum Spillway Design Storms table under Rule .0205(e) of this Subchapter, unless the applicant provides calculations, designs, and plans to show that the design flow can be stored, passed through, or passed over the CCR dam without failure occurring. The combined capacity of all spillways shall be designed, constructed, operated and maintained to adequately manage flow during and following the peak discharge as provided in the Maximum Spillway table below.

Maximum Spillway Design Storms for CCR Dams		
Hazard	Size	Spillway Design Flood
Low	Small	100 YR
	Medium	100 YR
	Large	1/3 PMP (Probable Maximum Precipitation)
	Very Large	½ PMP
Intermediate	Small	1000 YR
	Medium	1/3 PMP or 1000 YR whichever is larger
	Large	½ PMP
	Very Large	¾ PMP
High	Small	PMF (Probable Maximum Flood)
	Medium	PMF
	Large	PMF
	Very Large	PMF

- (5) **CONDUITS REQUIREMENTS.** Hydraulic structures underlying the base of the CCR surface impoundment or passing through CCR dams shall maintain structural integrity and are free of significant deterioration, deformation, distortion, bedding deficiencies, sedimentation, and debris which may negatively affect the operation of the hydraulic structure and may remain in place but shall be evaluated annually by a qualified engineer and said evaluation provided to the Department each year.
- (6) **STRUCTURAL STABILITY AND SLOPE PROTECTION REQUIREMENTS.**
  - (a) The owner or operator shall conduct initial and periodic safety factor assessments for each CCR dam and document whether the calculated factors of safety for each CCR

# DRAFT CCR RULE

1 dam achieve the minimum safety factors specified in this Section for the critical  
2 cross sections of the embankment. The critical cross sections are the cross sections  
3 anticipated to be the most susceptible of all cross sections to structural failure based  
4 on engineering considerations, including loading conditions. The safety factor  
5 assessments shall be supported by engineering calculations as follows:

- 6 (i) The calculated static factor of safety for the end-of-construction loading  
7 condition shall equal or exceed 1.30. The assessment of this loading  
8 condition is only required for the initial safety factor assessment and is not  
9 required for subsequent assessments.
- 10 (ii) The calculated static factor of safety for the long-term, maximum storage  
11 pool loading condition shall equal or exceed 1.50.
- 12 (iii) The calculated static factor of safety under the maximum surcharge pool  
13 loading condition shall equal or exceed 1.40.
- 14 (iv) The calculated seismic factor of safety shall equal or exceed 1.00.
- 15 (v) For dams constructed of soils that have susceptibility to liquefaction, the  
16 calculated liquefaction factor of safety shall equal or exceed 1.20.
- 17 (b) To further support the location criteria established in this rule, CCR surface  
18 impoundments shall be assessed under seismic loading conditions for a seismic  
19 loading event with a 2% probability of exceedance in 50 years, equivalent to a return  
20 period of approximately 2,500 years, based on the USGS Seismic Hazard Maps for  
21 seismic events with this return period for the region where it is located. The Seismic  
22 Hazard Maps can be found at: <https://earthquake.usgs.gov/hazards/hazmaps/>
- 23 (c) Under standard engineering methodologies, liquefaction potential analysis and post-  
24 liquefaction stability analysis includes several procedures to adequately analyze the  
25 structural strength of a CCR surface impoundment. Because only certain soils, such as  
26 loose sands, are susceptible to liquefaction, this Rule only requires CCR dams  
27 constructed of such soils, identified through liquefaction potential analysis, to meet  
28 liquefaction factors of safety. Such liquefaction potential analysis would need to  
29 include proper soil characterization of the embankment soils for soil age and origin,  
30 fines content and plasticity index, water content, saturation, and maximum current,  
31 past, and anticipated future phreatic surface levels within the embankment, foundation,  
32 or abutments, location beneath the natural ground surface, and penetration resistance  
33 through cone penetration testing (CPT). Post-liquefaction stability analysis would need  
34 to include detailed characterization of the site conditions, identification of the  
35 minimum liquefaction-inducing forces based on soil characterization, determination  
36 of seismic effect on liquefied layers of the embankment, and calculation of factors of  
37 safety against each liquefied layer of the embankment.
- 38 (d) Stability assessments are required for CCR dams with downstream slopes which can  
39 be inundated by the pool of an adjacent water body. These assessments shall include  
40 at a minimum, conditions for maximum pool loading, minimum pool loading and rapid  
41 or sudden drawdown of the adjacent waterbody.
- 42 (e) CCR dams and surrounding areas, that are constructed of earthen material, shall be  
43 designed, constructed, operated, and maintained such that the vegetation meets the  
44 conditions outlined in the FEMA 534 guidance document entitled, "Technical Manual  
45 for Dam Owners: Impacts of Plants on Earthen Dams" issued on September 2005.  
46 This document is hereby incorporated by reference, including subsequent amendments  
47 and editions. A copy may be obtained at no cost at [https://www.fema.gov/media-  
48 library/assets/documents/1027](https://www.fema.gov/media-library/assets/documents/1027) . However, alternative forms of slope protection may  
49 be approved by the Director if shown to provide equal or better protection from erosion  
50 as would be achieved with vegetation.
- 51  
52  
53

# DRAFT CCR RULE

1 (f) The owner or operator of the CCR dam shall conduct initial and periodic structural  
2 stability assessments and shall document whether the design, construction, operation,  
3 and maintenance of the CCR dam is consistent with the provisions of 40 CFR  
4 257.73(d) and 257.74(d), the NC Dam Safety Law of 1967 as amended, and the rules  
5 of this Subchapter. The structural stability assessment shall be completed by a  
6 qualified engineer once every five years and submitted to the Department for review.

7 (7) INSPECTION REQUIREMENTS.

8 (a) A qualified engineer, or a person under his or her responsible charge, shall conduct  
9 monitoring of all instrumentation supporting the operation of the CCR dam no less  
10 than once per month according to the standards listed under 40 CFR 257.83(a) which  
11 are hereby incorporated by reference including subsequent amendments and additions.  
12 A copy of this document may be obtained at no cost at [https://www.ecfr.gov/cgi-  
13 bin/text-idx?tpl=/ecfrbrowse/Title40/40cfr257\\_main\\_02.tpl](https://www.ecfr.gov/cgi-bin/text-idx?tpl=/ecfrbrowse/Title40/40cfr257_main_02.tpl)

14 (b) Annual inspections of all CCR surface impoundments shall include a thorough visual  
15 inspection of hydraulic structures underlying the base of the CCR surface  
16 impoundments or passing through CCR dams that maintain structural integrity and are  
17 free of significant deterioration, deformation, distortion, bedding deficiencies,  
18 sedimentation, and debris which may negatively affect the operation of the hydraulic  
19 structures.

20 (c) At intervals not exceeding seven days, inspect the discharge of all outlets of hydraulic  
21 structures which pass underneath the base of the surface impoundment for abnormal  
22 discoloration, flow or discharge of debris or sediment.  
23

24 *History Note:* Authority G.S. 143-215.26; 143-215.27; 143-215.31; 143-215.32; 143-215.34;  
25 Eff. June 15, 1980  
26  
27  
28  
29  
30