15A NCAC 02K.0224 IS PROPOSED FOR ADOPTION AS FOLLOWS:

~~Crossed-out words~~ indicate changes made from the version given to the GWWM Committee on May 9, 2018

15A NCAC 02K .0224 ADDITIONAL REQUIREMENTS FOR DAMS THAT IMPOUND COAL COMBUSTION RESIDUALS

a) For the purposes of this Rule:

(1) "CCR" means Coal Combustion Residuals.

(2) "CCR unit" means any CCR landfill, CCR surface impoundment, dam, or lateral expansion of a CCR unit, or a combination of more than one of these units, based on the context of the paragraph(s) in which it is used. This term includes both new and existing units, unless otherwise specified. For the purpose of this Rule, the term only applies to CCR dams and surface impoundments.

(3) "Dam" means a structure and appurtenant works erected to impound or divert water.

(4) "Design flood" means the flood hydrograph that is used during an engineering assessment of the CCR unit.

(5) "Liquefaction" means a phenomenon whereby a saturated or partially saturated soil ~~substantially~~ loses strength and stiffness in response to an applied stress, usually earthquake shaking or other sudden change in stress condition, causing it to behave like a liquid.

(6) "PMF" means Probable Maximum Flood.

(7) "Probable Maximum Flood" means the flood that may be expected from the most severe combination of critical meteorological and hydrological conditions that are reasonably possible in the drainage basin. Rainfall associated with the PMF can be found at the following locations: http://www.nws.noaa.gov/oh/hdsc/PMP_documents/HMR51.pdf and http://www.nws.noaa.gov/oh/hdsc/PMP_documents/HMR52.pdf

(8) "Toe" means the point of intersection between the upstream or downstream face of a dam and the natural ground.

(9) "100-year flood" means a flood that has a 1-percent ~~or greater~~ chance of recurring in any given year. ~~or a flood of a magnitude equaled or exceeded once in 100 years on the average over a significantly long period.~~ Rainfall amounts for the 100-year flood can be found at: https://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html and https://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html .

(b) This Rule shall apply to a CCR unit that meets one or more of the following:

(1) has a dam height of 25 feet or more above the downstream toe of the structure and has a storage volume of 50 acre-feet or more, unless the unit is exempt by G.S. 143-215.25A; or

(2) contains residuals to an elevation of five feet or more above the downstream toe of the structure and that has a storage volume of 20 acre-feet or more; or

(3) contains residuals to an elevation of greater than or equal to 20 feet above the downstream toe of the structure; or

(4) has been classified as high hazard.

(c) Inspections and Structural Stability Assessments of CCR units shall be completed as follows:

(1) At intervals not exceeding seven days, a qualified engineer, or a person under his or her responsible charge, shall inspect the discharge of all outlets of hydraulic structures that pass underneath the base of the CCR unit for discoloration of discharge or changes in flow.

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

(3) During the annual inspections of all CCR units, a qualified engineer, or a person under his or her responsible charge, shall conduct a visual inspection of hydraulic structures underlying the base of the CCR unit in order to maintain structural integrity by being kept free of deterioration, deformation, distortion, bedding deficiencies, sedimentation, and debris.

(4) A qualified engineer, or a person under his or her responsible charge, shall conduct structural stability assessments and shall document whether the design, construction, operation, and maintenance of the CCR unit is consistent with the provisions of 40 CFR 257.73(d) and 257.74(d), which is hereby incorporated by reference, including subsequent amendments and additions, the NC Dam Safety Law of 1967, and the rules of this Subchapter. The structural stability assessment shall be completed by a qualified engineer once every five years and submitted to the Department for review.

(d) All CCR dams described in Paragraph (b) of this Rule shall have a spillway system with capacity to pass a flow resulting from a design flood-as specified in the Minimum Spillway Design Flood for CCR Units table provided in this Item. These requirements shall apply in place of the Minimum Spillway Design Flood table under Rule .0205(e) of this Section, unless the applicant provides calculations, designs, and plans to show, to the satisfaction of the Director, that the design flow can be stored, passed through, or passed over the CCR unit 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 following table.

Minimum Spillway Design Flood for CCR Units

Hazard[1]	**Size**[2]	**Spillway Design Flood**[3]
Low (Class A)	Small	100 YR
	Medium	100 YR
	Large	1/3 PMF (Probable Maximum Flood)
	Very Large	½ PMF
Intermediate (Class B)	Small	1000 YR
	Medium	1/3 PMF or 1000 YR whichever is larger

	Large	½ PMF
	Very Large	¾ PMF
High (Class C)	Small	PMF (Probable Maximum Flood)
	Medium	PMF
	Large	PMF
	Very Large	PMF

[1] The "Hazard" categories in this table for CCR units are based on 15A NCAC 02K.0105 Classification of Dams and are the same "Hazard" categories shown in the "Minimum Spillway Design Storms" table for non-CCR dams contained in Rule .0205(e) of this Section.
[2] The "Size" categories are the same as described in the "Criteria for Spillway Design Storm Size Classification" table found in Rule .0205(e) of this Section.
[3] The "Spillway Design Flood" specifications were derived from the combination of the more-stringent criterion from the spillway design-flood elements of the federal CCR regulations and the existing spillway design elements of Rule .0205(e) of this Section.

(e) Structural stability assessments shall be evaluated as follows:

(1) For purposes of this Rule, the critical cross sections utilized for the required structural stability assessments, are the cross sections anticipated by the design engineer to be the most susceptible to structural failure.

(2) CCR surface impoundments shall be assessed under seismic loading conditions for a seismic loading event with a 2% probability of exceedance in 50 years, equivalent to a return period of approximately 2,500 years, based on the USGS Seismic Hazard Maps for seismic events with this return period for the region where the CCR unit is located. This document is hereby incorporated by reference, including subsequent amendments and editions. A copy may be obtained at no cost at https://earthquake.usgs.gov/hazards/hazmaps .

(3) CCR units constructed of soils that are susceptible to liquefaction, as identified by a liquefaction potential analysis, shall meet liquefaction factors of safety. The liquefaction potential analysis shall include:

(4) Stability assessments shall be required for CCR units with downstream slopes that may be inundated by the pool of an adjacent water body. These assessments shall include conditions for maximum pool loading, minimum pool loading, and rapid drawdown of the adjacent waterbody.

(5) The safety factor assessments shall be supported by the following engineering calculations:

(A) The calculated static factor of safety for the end-of-construction loading condition shall equal or exceed 1.30. The assessment of this loading condition is only required for the initial safety factor assessment and is not required for subsequent assessments;

(B) the calculated static factor of safety for the long-term, maximum storage pool loading condition shall equal or exceed 1.50;

(C) the calculated static factor of safety under the maximum surcharge pool loading condition shall equal or exceed 1.40;

(D) the calculated seismic factor of safety shall equal or exceed 1.00; and

(E) for dams constructed of soils that have susceptibility to liquefaction, the calculated liquefaction factor of safety shall equal or exceed 1.20. Post-liquefaction stability analyses shall include characterization of the site conditions, identification of the

minimum liquefaction-inducing forces based on soil characterization, determination of seismic effect on liquefied layers of the embankment, and calculation of factors of safety against each liquefied layer of the embankment.

(f) CCR units and surrounding areas that are constructed of earthen material shall be designed, constructed, operated, and maintained so that the vegetation meets the conditions outlined in the FEMA 534 guidance document entitled, "Technical Manual for Dam Owners: Impacts of Plants on Earthen Dams" issued on September 2005. This document is hereby incorporated by reference, including subsequent amendments and editions. A copy may be obtained at no cost at https://www.fema.gov/media-library/assets/documents/1027 . However, alternative forms of slope protection may be approved by the Director, upon request by a qualified engineer through a plan submittal, which is shown to provide equal or better protection from erosion as would be achieved with vegetation.

History Note: *Authority G.S. 143-215.26; 143-215.27; 143-215.31; 143-215.32; 143-215.34; GS 143-215.25A (6)*
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