



Your Touchstone Energy® Cooperative 

Green Station CCR Surface Impoundment

Disposal of Coal Combustion Residuals (CCR) from Electric Utilities Final Rule Structural Integrity Criteria for Existing CCR Surface Impoundments Initial Hazard Potential Classification

October 11, 2016

Prepared By:



Project ID: 160028A

Big Rivers Electric Corporation
Disposal of Coal Combustion Residuals (CCR) from Electric Utilities Final Rule
Structural Integrity Criteria for Existing CCR Surface Impoundments
Initial Hazard Potential Classification

CCR Surface Impoundment Information

Name: Green Station CCR Surface Impoundment
Operator: Sebree Generating Station
Address: 9000 Highway 2096
Robards, Kentucky 42452
CCR Unit Identification Number: Kentucky State Dam Inventory System ID No. 0980

Qualified Professional Engineer

Name: David A. Lamb
Company: Associated Engineers, Inc.
Kentucky P.E. Number: 17822

Regulatory Applicability

As part of the § 257.73 Structural integrity criteria for existing CCR surface impoundments requirements, an owner or operator of an existing CCR surface impoundment must no later than October 17, 2016:

Conduct an initial hazard potential classification assessment per § 257.73(a)(2). The owner or operator must document the hazard potential classification of each CCR unit as either a high hazard potential CCR surface impoundment, a significant hazard potential CCR surface impoundment, or a low hazard potential CCR surface impoundment. The owner or operator must also document the basis for each hazard potential classification.

Description of Impoundment

An aerial photo of the CCR unit is provided as Attachment A and an excerpt from U.S. Geological Survey (USGS) 7.5 minute Robards and Delaware topographic quadrangle maps showing the location of the CCR unit is provided as Attachment B.

The CCR unit is used for the placement of coal combustion residual material; currently slurred bottom ash. The immediate watershed that drains to the CCR unit, and in which the CCR unit is considered to be located, is unnamed and 54.13 acres in size.

The CCR unit is a combined incised/earthen embankment structure. Embankments form the west, south and east sides of the impoundment and the north side is incised. The Green River is located approximately 400 feet east of the structure. Due to surface relief, only the toe area of the south dike is potentially subject to flooding. The predominant features were small stream valleys draining eastward to the Green River. Most of the central portion of the south dike was constructed on a subdued ridge. The toe of the outboard slope intersected a lower drainage area. Underlying preconstruction soils consisted of Loring-Grenada, Loring-Zanesville-Wellston (Henderson County) and Loring-Wellston-Zanesville (Webster County) soil associations which are generally characterized as well drained to moderately well drained soils on nearly level to sloping uplands.

The west dike is generally less than five feet in height and the south dike reaches a maximum height of 19.5 feet. The east dike reaches a maximum height of approximately eight feet and is buttressed with a secondary parallel embankment that serves as a 40-foot wide roadway. The Burns and Roe, Inc. Engineering and Consultants June 30, 1978 site grading plans show the original construction layout and ground contours for the impoundment site. Bottom ash has been placed above the normal pool along the inboard side, essentially creating reclaimed land

Depth of impounded water and CCR is 16 feet and 46 feet (at respective locations of maximum impounded water and CCR depths). Elevation of impounded water and CCR is 394 feet and 408 feet, respectively, above mean sea level. These approximate depths and respective elevations are based on the most recent (December 2015) flight derived topographic contours and bathymetric survey data.

The remaining storage capacity is approximately 172,000 cubic yards (if CCR can be placed to the elevation of the current water surface). This volume was calculated based on the maximum allowable storage volume and the current volume of CCR stored in the facility based on the most recent bathymetric survey.

The approximate volume of impounded water and CCR is 981,000 cubic yards (approximate water volume is 172,000 cubic yards and approximate CCR volume is 809,000 cubic yards). This volume was calculated based on the maximum storage capacity, the current amount of CCR stored in the facility based on the most recent bathymetric survey, and the best available as-built data for the structure construction prior to placement of CCR.

The impoundment discharge consists of two corrugated steel pipes, each 30 inches in diameter. The pipe intakes are through a concrete common headwall collection structure with a variable height steel debris deflector on each pipe intake.

The CCR unit has been in place for 40 plus years. Per Final Rule CCR requirements, the CCR unit is inspected as follows:

Weekly CCR Unit Inspection

The CCR unit must be examined by a qualified person at least once every seven days for any appearance of actual or potential structural weakness or other conditions that

are disrupting or that have the potential to disrupt the operation or safety of the CCR unit.

Monthly Instrumentation Inspection

Monitoring of all instrumentation supporting the operation of the CCR unit must be conducted by a qualified person no less than once per month.

Annual CCR Unit Inspection

The CCR unit inspection must be conducted annually throughout its operating life. These annual inspections are focused primarily on the structural stability of the CCR surface impoundment and must ensure that the operation and maintenance of the CCR surface impoundment is in accordance with recognized and generally accepted good engineering standards.

The CCR unit operator has general maintenance and repair procedures in place as they determine necessary. There are no known occurrences of structural instability of the CCR unit.

Kentucky Division of Water Structure Classification

Per the Kentucky Department for Natural Resources and Environmental Protection, Division of Water (now the Department for Environmental Protection, Division of Water) Engineering Memorandum No. 5 (incorporated into 401 KAR 4:030); guidance for applicable impoundment structure potential hazard classification follows:

The following broad classes of structures are established to permit the association of criteria with the damage that might result from a sudden major breach of the structure.

A. Class (A) - Low Hazard

This classification may be applied for structures located such that failure would cause loss of the structure itself but little or no additional damage to other property. Such structures will generally be located in rural or agricultural areas where failure may damage farm buildings other than residences, agricultural lands, or county roads.

B. Class (B) - Moderate Hazard

This classification may be applied for structures located such that failure may cause significant damage to property and project operation, but loss of human life is not envisioned. Such structures will generally be located in predominantly rural agricultural areas where failures may damage isolated homes, main highways or major railroads, or cause interruption of use or service of relatively important public utilities.

C. Class (C) - High Hazard

This classification must be applied for structures located such that failure may cause loss of life, or serious damage to houses, industrial or commercial buildings, important public utilities, main highways or major railroads. This classification must be used if failure would cause probable loss of human life.

Based on the impoundment design information and assessment of the potential to impact downstream structures, environment and public safety, the Kentucky Division of Water has determined that the Green Station CCR Surface impoundment, CCR Unit (Kentucky State Dam Inventory System ID No. 0980), has a potential hazard classification of Moderate (Class B).

Disposal of Coal Combustion Residuals from Electric Utilities Final Rule Structural Integrity Criteria – Initial Hazard Potential Classification

Per 257.73(a)(2) Initial Hazard Potential Classification requirements guidance for potential hazard classification follows:

The following hazard potential classifications are established to assess the potential adverse incremental consequences that would occur if there was a failure of the CCR surface impoundment.

Hazard Potential Classifications

- High hazard potential CCR surface impoundment means a diked surface impoundment where failure or mis-operation will probably cause loss of human life.
- Significant hazard potential CCR surface impoundment means a diked surface impoundment where failure or mis-operation results in no probable loss of human life, but can cause economic loss, environmental damage, disruption of lifeline facilities, or impact other concerns.
- Low hazard potential CCR surface impoundment means a diked surface impoundment where failure or mis-operation results in no probable loss of life and low economic and/or environmental losses. Losses are principally limited to the surface impoundment's owner's property.

Based on the criteria of § 257.73 Structural integrity criteria for existing CCR surface impoundments, the responsible engineer certifying the initial potential hazard classification, has determined that the Green Station CCR Surface impoundment meets the classification of a Significant hazard potential CCR surface impoundment (defined as a diked surface impoundment where failure or mis-operation results in no probable loss of human life, but can cause economic loss, environmental damage, disruption of lifeline facilities, or impact other concerns). This determination by the responsible engineer is based on the high probability that failure of the embankment could result in environmental damage extending beyond the boundaries of the Big Rivers Electric Corporation Sebree Generating Station.

Sources of Information

Geotechnical and other information provided by Associated Engineers, Inc.

Engineering design drawings and other information provided by Big Rivers Electric Corporation

United States Geological Survey U.S. Geological Survey (USGS) 7.5 minute Robards and Delaware topographic quadrangle maps

Kentucky Energy and Environment Cabinet, Department for Environmental Protection, Division of Water (401 KAR 4:030)

**Professional Engineer Certification [Per 40 CFR § 257.73(a)(2)]
Green CCR Impoundment Initial Hazard Potential Classification**

I hereby certify that myself or an agent under my review has prepared this Initial Hazard Potential Classification (Classification), and being familiar with the provisions of the final rule to regulate the disposal of coal combustion residuals (CCR) as solid waste under subtitle D of the Resource Conservation and Recovery Act (RCRA), attest that this Classification has been prepared in accordance with good engineering practices and meets the intent of 40 CFR Part 257.73(a)(2). To the best of my knowledge and belief, the information contained in this Classification is true, complete, and accurate.

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David A. Lamb P.E.
State of Kentucky License No. 17822



Date: 10/11/16 _____



 <p>ASSOCIATED ENGINEERS, INC. ENGINEERS • GEOLOGISTS • SURVEYORS</p>	BIG RIVERS ELECTRIC		Job Number: 15-0140D
	SEBREE GENERATING STATION: GREEN CCR SURFACE IMPOUNDMENT		Date: 1/05/2016
			Scale: AS SHOWN
			Drawn By: E.J.A.
2740 North Main St. • Madisonville, KY 42431 1001 Fredonia St. • Owensboro, KY 42301 Phone: (270) 821-7752 • Fax: (270) 821-7789 Phone: (270) 684-8450 • Fax: (270) 684-9449 www.associatedengineers.com			

Attachment A. Aerial Photo of the Green CCR Surface Impoundment



Attachment B. Topographic Map showing the Green CCR Surface Impoundment



Your Touchstone Energy® Cooperative 

Reid/HMPL Station CCR Surface Impoundment

Disposal of Coal Combustion Residuals (CCR) from Electric Utilities Final Rule Structural Integrity Criteria for Existing CCR Surface Impoundments Initial Hazard Potential Classification

October 11, 2016

Prepared By:



Project ID: 160027A

Big Rivers Electric Corporation
Disposal of Coal Combustion Residuals (CCR) from Electric Utilities Final Rule
Structural Integrity Criteria for Existing CCR Surface Impoundments
Initial Hazard Potential Classification

CCR Surface Impoundment Information

Name: Reid/HMPL Station CCR Surface Impoundment
Operator: Sebree Generating Station
Address: 9000 Highway 2096
Robards, Kentucky 42452
CCR Unit Identification Number: Kentucky State Dam Inventory System ID No. 0855

Qualified Professional Engineer

Name: David A. Lamb
Company: Associated Engineers, Inc.
Kentucky P.E. Number: 17822

Regulatory Applicability

As part of the § 257.73 Structural integrity criteria for existing CCR surface impoundments requirements, an owner or operator of an existing CCR surface impoundment must no later than October 17, 2016:

Conduct an initial hazard potential classification assessment per § 257.73(a)(2). The owner or operator must document the hazard potential classification of each CCR unit as either a high hazard potential CCR surface impoundment, a significant hazard potential CCR surface impoundment, or a low hazard potential CCR surface impoundment. The owner or operator must also document the basis for each hazard potential classification.

Description of Impoundment

An aerial photo of the CCR unit is provided as Attachment A and an excerpt from U.S. Geological Survey (USGS) 7.5 minute Robards and Delaware topographic quadrangle maps showing the location of the CCR unit is provided as Attachment B.

The CCR unit is used for the placement of coal combustion residual material; currently slurred bottom ash. The immediate watershed that drains to the CCR unit, and in which the CCR unit is considered to be located, is unnamed and 25.45 acres in size.

The CCR unit is a combined incised/earthen embankment structure. Embankments form the west, south and east sides of the impoundment and the north side is incised. The original terrain on which the pond was constructed generally sloped toward the west. Although the Green River is located less than 0.5 miles from the site, the structure does not extend significantly into the floodplain. Underlying preconstruction soils consisted of Loring-Grenada, Loring-Zanesville-Wellston (Henderson County) and Loring-Wellston-Zanesville (Webster County) soil associations which are generally characterized as well drained to moderately well drained soils on nearly level to sloping uplands.

The embankment reaches its greatest relief of approximately 42 feet on the west side. The Burns & McDonnell Engineering Co. October 8, 1971 design drawings show the inboard slope and central core portion of the dike to be constructed of compacted soil fill and the outboard slope to be consisted of sand fill. A sand blanket drain was designed for the outboard third of the base of the dike for the majority of the length and the plans show a crushed limestone drainage layer with a minimum thickness of 18 inches topped with a minimum six inches thick sand layer which extends across the entire width of the dike cross section in the southwest corner. The plans also show a cut-off trench in the original ground below dike crest and extending for the entire length of the dike.

Depth of impounded water and CCR is 16 feet and 39 feet (at respective locations of maximum impounded water and CCR depths). Elevation of impounded water and CCR is 426 feet and 440 feet, respectively, above mean sea level. These approximate depths and respective elevations are based on the most recent (December 2015) flight derived topographic contours and bathymetric survey data.

The remaining storage capacity is approximately 85,000 cubic yards (if CCR can be placed to the elevation of the current water surface). This volume was calculated based on the maximum allowable storage volume and the current volume of CCR stored in the facility based on the most recent bathymetric survey.

The approximate volume of impounded water and CCR is 767,000 cubic yards (approximate water volume is 85,000 cubic yards and approximate CCR volume is 682,000 cubic yards). This volume was calculated based on the maximum storage capacity, the current amount of CCR stored in the facility based on the most recent bathymetric survey, and the best available as-built data for the structure construction prior to placement of CCR.

The impoundment discharge consists of a rectangular concrete drop structure with a variable height steel debris skimmer. The pool elevation can be controlled by adding or removing stop logs. The discharge structure connects to a 24-inch diameter smooth walled metal pipe underground conveyance.

The CCR unit has been in place for 40 plus years. Per Final Rule CCR requirements, the CCR unit is inspected as follows:

Weekly CCR Unit Inspection

The CCR unit must be examined by a qualified person at least once every seven days

for any appearance of actual or potential structural weakness or other conditions that are disrupting or that have the potential to disrupt the operation or safety of the CCR unit.

Monthly Instrumentation Inspection

Monitoring of all instrumentation supporting the operation of the CCR unit must be conducted by a qualified person no less than once per month.

Annual CCR Unit Inspection

The CCR unit inspection must be conducted annually throughout its operating life. These annual inspections are focused primarily on the structural stability of the CCR surface impoundment and must ensure that the operation and maintenance of the CCR surface impoundment is in accordance with recognized and generally accepted good engineering standards.

The CCR unit operator has general maintenance and repair procedures in place as they determine necessary. There are no known occurrences of structural instability of the CCR unit.

Kentucky Division of Water Structure Classification

Per the Kentucky Department for Natural Resources and Environmental Protection, Division of Water (now the Department for Environmental Protection, Division of Water) Engineering Memorandum No. 5 (incorporated into 401 KAR 4:030); guidance for applicable impoundment structure potential hazard classification follows:

The following broad classes of structures are established to permit the association of criteria with the damage that might result from a sudden major breach of the structure.

A. Class (A) - Low Hazard

This classification may be applied for structures located such that failure would cause loss of the structure itself but little or no additional damage to other property. Such structures will generally be located in rural or agricultural areas where failure may damage farm buildings other than residences, agricultural lands, or county roads.

B. Class (B) - Moderate Hazard

This classification may be applied for structures located such that failure may cause significant damage to property and project operation, but loss of human life is not envisioned. Such structures will generally be located in predominantly rural agricultural areas where failures may damage isolated homes, main highways or major railroads, or cause interruption of use or service of relatively important public utilities.

C. Class (C) - High Hazard

This classification must be applied for structures located such that failure may cause loss of life, or serious damage to houses, industrial or commercial buildings, important

public utilities, main highways or major railroads. This classification must be used if failure would cause probable loss of human life.

Based on the impoundment design information and assessment of the potential to impact downstream structures, environment and public safety, the Kentucky Division of Water has determined that the Reid/HMPL Station CCR Surface impoundment, CCR Unit (Kentucky State Dam Inventory System ID No. 0855), has a potential hazard classification of Moderate (Class B).

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Based on the criteria of § 257.73 Structural integrity criteria for existing CCR surface impoundments, the responsible engineer certifying the initial potential hazard classification, has determined that the Reid/HMPL Station CCR Surface impoundment meets the classification of a Significant hazard potential CCR surface impoundment (defined as a diked surface impoundment where failure or mis-operation results in no probable loss of human life, but can cause economic loss, environmental damage, disruption of lifeline facilities, or impact other concerns). This determination by the responsible engineer is based on the high probability that failure of the embankment could result in environmental damage extending beyond the boundaries of the Big Rivers Electric Corporation Sebree Generating Station.

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David A. Lamb, P.E.
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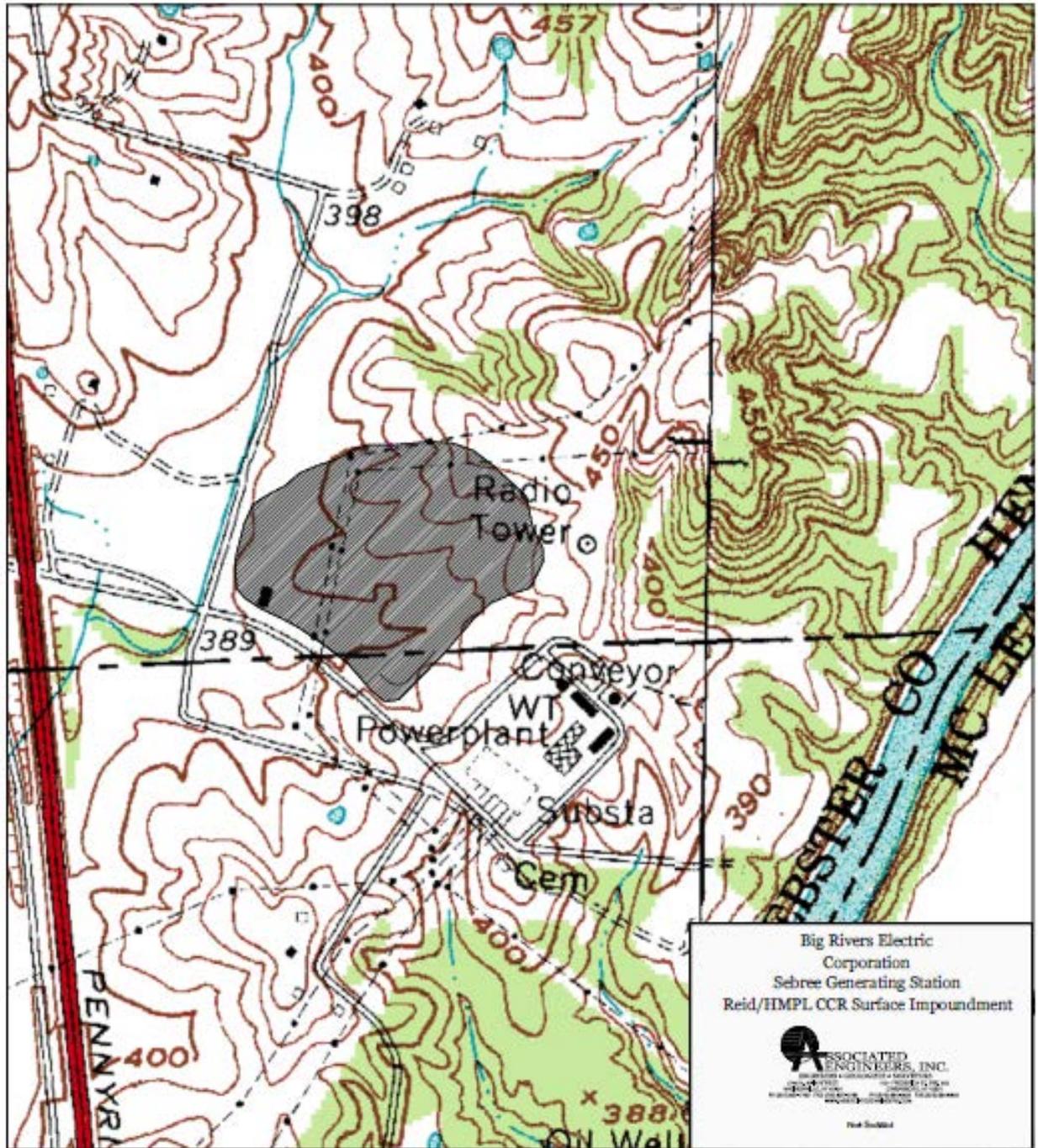


Date: 10/11/16



 <p>ASSOCIATED ENGINEERS, INC. ENGINEERS • GEOLOGISTS • SURVEYORS</p>	BIG RIVERS ELECTRIC		Job Number: 14-0140D
	SEBREE GENERATING STATION: REID/HMPL CCR SURFACE IMPOUNDMENT		Date: 1/05/2016
			Scale: AS SHOWN
			Drawn By: E.J.A.
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Attachment A. Aerial Photo of the Reid/HMPL CCR Surface Impoundment



Attachment B. Topographic Map showing the Reid/HMPL CCR Surface Impoundment