Big Rivers
ELECTRIC CORPORATION

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Green CCR Landfill

Disposal of Coal Combustion Residuals (CCR) from Electric Utilities Final Rule
CCR Landfill 2017 Annual Inspection Report

January 11, 2018

Prepared By:

ASSOCIATED ENGINEERS, INC.
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Project ID: 170138B

Big Rivers Electric Corporation
Disposal of Coal Combustion Residuals (CCR) from Electric Utilities Final Rule
CCR Landfill 2017 Annual Inspection Report

CCR Landfill Information

Name:	Green CCR Landfill
Operator:	Sebree Generating Station
Address:	9000 Highway 2096 Robards, KY 42452

Qualified Professional Engineer

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

Regulatory Applicability

Per 40 CFR §257.84(b), annual inspections by a qualified professional engineer must ensure that the design, construction, operation, and maintenance of the CCR landfill is consistent with recognized and generally accepted good engineering standards.

Annual inspections of any CCR landfill must include, at a minimum: (1) a review of available information regarding the status and condition of the CCR unit, including, but not limited to, files available in the operating record (e.g., the results of inspections by a qualified person, and results of previous annual inspections); and (2) a visual inspection of the CCR unit to identify signs of distress or malfunction of the CCR unit.

Additionally, following each annual inspection, the qualified professional engineer must prepare an inspection report which documents the following: (1) any changes in geometry of the structure since the previous annual inspection, (2) the approximate volume of CCR at the time of the inspection, (3) any appearances of an actual or potential structural weakness of the CCR unit, in addition to any existing conditions that are disrupting or have the potential to disrupt the operation and safety of the CCR unit; and (4) any other change(s) which may have affected the stability or operation of the CCR unit since the previous annual inspection.

Inspection Description

This is the third annual inspection report for the Green CCR Landfill pursuant to the Disposal of Coal Combustion Residuals (CCR) from Electric Utilities Final Rule which became

effective April 17, 2015. The inspection was conducted on December 14, 2017 by David Lamb P.E. and Scott McGarvie of Associated Engineers, Inc. of Madisonville, Kentucky. Weekly (7-day) inspections conducted by Big Rivers Electric Corporation are kept in the facility operating record.

The inspection consisted of a visual assessment of the landfill and associated drainage control features; and began on the west side of the landfill adjacent to the vertical expansion combination wall (expansion wall). Initial construction of the expansion wall continued since the 2016 annual inspection, and no ongoing construction activity was observed at the time of inspection. The drainage ditch adjacent to the west access road that parallels the expansion wall and reports to Pond 012 at the south end of the landfill, collects seepage from the base of the expansion wall. The seepage is greatest at the south end of the expansion wall, and ground between the expansion wall and the ditch is very wet and soft. The seepage is dark in color, and emitted a strong sulfurous odor; both characteristic of CCR leachate. The inspection proceeded along the south side of Pond 012 which also emitted a strong sulfurous odor. The west end of Pond 012 exhibited sparse vegetation on the north upstream slope and thick invasive vegetation on the south upstream slope.

The inspection proceeded to the east side of the inactive landfill along the access road adjacent to the embankment toe. Sparse vegetation was observed along the southern third of the lower exterior slope. Proceeding north, standing water was observed in a ditch along the embankment toe, and seepage of discolored water was visible. Tall stands of dormant invasive vegetation were located along and within the ditch and wet areas. Areas of active seepage were observed at several locations along the embankment toe and flowing water was observed in the ditch at these locations. The Inspection of the lower slope continued on the north side of the inactive landfill where an area of seepage and accumulation of discolored water is located centrally along the toe of the north slope and drains east in a ditch to Pond 014.

The inspection proceeded to the first bench on the west side of the landfill which is comprised by the top of Poz-O-Tec fill placed against the expansion wall. The CCR fill material was firm and had been compacted. The inspection proceeded to the south side of the inactive landfill where areas of sparse vegetation and bare soil were observed on the third slope from the bottom and on the fourth bench; in the approximate central portion of the embankment. Repairs to the slope were also observed at this general area. Proceeding east to the southeast corner of the inactive landfill, an isolated low spot holding water was observed on the first bench. Proceeding north on the east side of the inactive landfill, areas of sparse vegetation and bare soil were observed on the first bench, opposite the access road from groundwater monitoring well MW-3A. The inspection proceed to the northeast corner of the inactive landfill; east of the haul road to the active disposal area. The drainage ditch along the haul road to the active area was deeply eroded and contained a nonfunctioning pipe that had been washed out. Significant erosion was observed in this area with some top to bottom

rills/gullies and minor longitudinal rutting/scarping in the upper cover material. The inspection proceeded south on the east side of the inactive landfill where large areas of tall dormant vegetation persist, although adequate ground cover was observed in these areas.

A significant gulley has developed on the inside of the third bench adjacent to the toe of the fourth slope on the southwest corner of the inactive landfill where an inlet to the runoff system is being bypassed by up-slope drainage. Large areas of tall dormant vegetation persist on the west side of the inactive landfill, and although adequate ground cover was observed in these areas, some isolated bare areas occur. The gulley continues upslope (north) on the third bench of the west side of the inactive landfill to the transition with graded but uncovered CCR material. The northwest corner of the landfill consists of both covered and vegetated CCR material and uncovered CCR material that has been placed adjacent to a haul road that accesses the Poz-O-Tec bench adjacent to the expansion wall. Active working of the uncovered CCR material is ongoing upslope and south where the active area transitions to the recently covered and vegetated fourth bench and fifth slope on the west side of the inactive area. Vegetation is sparse where CCR material has been recently covered, most likely because of late summer or fall seeding. A significant gulley has developed along the length of the inside of the fourth bench adjacent to the toe of the fifth slope to the southwest corner of the inactive landfill. Two inlets to the runoff system are located on this section of the fourth bench and appear to be functioning properly.

Inspection of the inactive landfill proceeded along the fourth bench of the south and east sides of the landfill to the northeast corner. The erosion that was observed on the lower slopes and benches of the northeast corner persisted on the upper slopes and benches. Proceeding south on the east side of the inactive landfill, a depression or large animal borrow approximately two feet deep was observed on the toe of the sixth slope. The inspection of the fifth bench and sixth slope of the inactive landfill continued on the south side of the landfill and then on the sixth bench and seventh slope proceeding from the south side to the east and north sides of the landfill. Significant erosion and an area of thin cover soil was observed at the northeast corner and erosion continued on the sixth bench proceeding south along the base of the topsoil stockpile located at the top of the landfill. The east slope of the topsoil stockpile was sporadically eroded and sparsely vegetated. The majority of ongoing CCR material placement was visible on the center and upper north side of the landfill

Inspection Report Specifications

(i) CCR Landfill Geometry

The Green CCR Landfill is used for the placement of coal combustion residual material; currently fly ash, bottom ash and related material. The landfill is raised above adjacent ground to a maximum elevation of approximately 608 feet above mean sea level. The original ground surface within the landfill footprint was irregular and the predominant features were small stream valleys draining towards the Green River which is located just east

of the landfill; and towards Groves Creek which is located just south of the landfill.

Changes to the landfill geometry since the previous (2016) annual inspection include continued placement of CCR material behind the constructed vertical expansion wall on the west exterior slope; and the placement of additional CCR and cover material on the landfill.

(ii) CCR Landfill Volume

The total volume of CCR material contained in the Green CCR Landfill was estimated to be 21.3 million cubic yards. This volume was calculated from available baseline topography compared to October 2017 flight derived topographic contours.

(iii) CCR Landfill Structural, Operational, and Safety Items

No deficiencies or disrupting conditions that would require immediate measures to remedy were identified in the inspection. The inspection findings consisted of maintenance items that were not observed to be signs or potential signs of significant structural weakness.

(iv) CCR Landfill Changes

A change to the Green CCR Landfill since the previous (2016) annual inspection that may have the potential to affect the stability or operation of the CCR unit is placement of CCR material behind the constructed vertical expansion wall on the west exterior slope. The expansion wall was designed per accepted engineering standards and if constructed as designed, should achieve required factors of safety. Additional CCR material and soil cover have been placed since the 2016 CCR Rule Annual Landfill Inspection Report.

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Green CCR Landfill
2017 Annual Inspection Aerial Photo

Project Number:	17-0138B
Date:	12/12/2017
Scale:	1" = 500'
Drawn By:	A.E.I.

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BREC Final Rule CCR Landfill 2017 Annual Inspection Checklist

Operator:	Sebree Generating Station	Weather:	Overcast
CCR Landfill:	Green	Temperature (Degrees F):	39 (high)
Date:	December 14, 2017	Inspector/Qualified Person:	David Lamb P.E., Scott McGarvie (AEI)

	ITEM	STATUS			OBSERVATIONS
		YES	NO	N/A	
1	**CONDITION OF INACTIVE AREA**				
	Access road deterioration (potholes, rutting, etc.)	☒	☐	☐	
	Any erosion	☒	☐	☐	Some surficial erosion/rills in cover material; particularly northeast corner
	Longitudinal cracks	☐	☒	☐	
	Transverse cracks	☐	☒	☐	
	Visual depressions	☒	☐	☐	Some low areas in bench flowlines and longitudinal tracking from tractor/mower tires
	Visual settlement	☐	☒	☐	
	Bulging or slumping	☐	☒	☐	
	Any drainage features obstructed or damaged	☒	☐	☐	Runoff ditches are eroded/contain sediment in areas
	Are drainage features flowing	☒	☐	☐	
	Is seepage present	☒	☐	☐	Some seepage present on west side at base of expansion wall and on east side toe and lower slope
	Is seepage or discharge carrying sediment	☐	☒	☐	
	Adequate vegetative cover	☐	☒	☐	Isolated bare areas and invasive species monocultures
	Are trees growing on the slope	☐	☒	☐	
	Are there any animal burrows	☒	☐	☐	Sporadic small to large animal burrows; primarily rodent to larger mammal
	Any stone deterioration	☐	☐	☒	
	Adequate riprap/slope protection	☐	☐	☒	
	Debris or trash present	☐	☒	☐	
	Is there exposed CCR material	☒	☐	☐	Isolated areas
2	**CONDITION OF ACTIVE AREA**				
	Access road deterioration (potholes, rutting, etc.)	☐	☒	☐	
	Any erosion	☒	☐	☐	Minor to moderate erosion on active disposal areas and haul roads
	Any cracks	☐	☒	☐	
	Any slides	☐	☒	☐	
	Visual depressions	☐	☒	☐	

		STATUS			OBSERVATIONS
		YES	NO	N/A	
	Visual settlement	☐	☒	☐	
	Bulging or slumping	☐	☒	☐	
	Any drainage features obstructed or damaged	☐	☒	☐	
	Is seepage present	☒	☐	☐	Along base of wall construction and toe of east slope
	Is seepage or discharge carrying sediment	☐	☒	☐	
	Debris or trash present	☐	☒	☐	
3	**LINER AND LEACHATE COLLECTION SYSTEM**				
	Are liners intact and being installed correctly	☐	☐	☒	
	Is the leachate collection operating correctly	☐	☐	☒	
	Is the leachate collection pond/storage functioning correctly	☐	☐	☒	
	Is there any slope/bank erosion on pond	☐	☐	☒	
	Are there any animal burrows on pond	☐	☐	☒	
	Is the spillway functioning and discharging correctly	☐	☐	☒	
4	**RUN-ON/RUNOFF-CONTROLS**				
	Are run-on/runoff controls in place	☒	☐	☐	
	Are run-on/runoff controls functioning	☒	☐	☐	
	Are run-on/runoff controls effective	☒	☐	☐	
	Are run-on runoff controls being maintained	☒	☐	☐	
	Signs of seepage or wetness	☒	☐	☐	
	Sediment transport or deposition	☐	☒	☐	

DEFICIENCIES AND MAINTENANCE ITEMS

No deficiencies or disrupting conditions that would require immediate measures to remedy were identified in the inspection. The inspection findings consisted of maintenance items that were not observed to be signs or potential signs of significant structural weakness.

Professional Engineer Certification [Per 40 CFR §257.84(b)]
Green CCR Landfill
Annual Inspections by a Qualified Professional Engineer

I hereby certify that myself or an agent under my review has prepared this Annual Inspection Report (Report), 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 Report has been prepared in accordance with good engineering practices and meets the intent of 40 CFR Part 257.84(b). To the best of my knowledge and belief, the information contained in this Report is true, complete, and accurate.

David A. Lamb P.E.

State of Kentucky License No. 17822

Date: 1-11-18

Big Rivers
ELECTRIC CORPORATION

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February 2, 2018

Re: *Corrective Actions at Big Rivers Electric Corporation's Green Station CCR Landfill Resulting from the "CCR Landfill Annual Inspection Report" for the year 2017*

Associated Engineers Inc. prepared a "CCR Landfill Annual Inspection Report" for Big Rivers Electric Corporation's Green Station landfill. The report is available for full review on Big Rivers Electric Corporation's CCR website.

In the report, Associated Engineers Inc. did not identify any deficiencies. However, they identified some items that need to be addressed. Therefore, Big Rivers Electric Corporation has taken the following steps to address some of the noted items in the report:

- The report noted a small depression on the 6th slope east side. The depression has been repaired.
- The documented nonfunctioning drain pipe to the east of the haul road has been removed.
- All other areas of minor erosion in the temporary cover will be addressed as the haul road and the Mechanically Stabilized Poz-O-Tec (MSP) wall continue to develop.

Big Rivers Electric Corporation will continue to conduct the weekly required CCR inspections in the landfill and address items as needed.