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October 11, 2016  
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Revision 0

Indiana-Kentucky Electric Corporation  
3932 U.S. Route 23  
P.O. Box 468  
Piketon, Ohio 45661

**RE: Closure and Post-Closure Plans  
West Boiler Slag Pond  
EPA Final Coal Combustion Residuals (CCR) Rule  
Clifty Creek Station  
Madison, Jefferson County, Indiana**

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## **1.0 PURPOSE**

This letter documents Stantec's certification of the EPA Final CCR Rule closure and post-closure plans for the Indiana-Kentucky (IKEC) Clifty Creek Station's West Boiler Slag Pond.

## **2.0 CLOSURE AND POST-CLOSURE PLAN**

The closure plans describe the steps necessary to close the CCR units at any time during the life of the unit and is subject to the requirements described in 40 CFR 257.102(b). The post-closure plans describe the monitoring and maintenance activities to be performed during the post-closure period of the unit and is subject to the requirements of 40 CFR 257.104(d).

## **3.0 SUMMARY OF FINDINGS**

The EPA Final CCR Rule closure and post-closure plans are conceptual and subject to the completion of all necessary environmental reviews. They are therefore subject to change at any time. The attached closure and post-closure plans demonstrate compliance with the requirements set forth in 40 CFR 257.102(b) and 257.104(d).

## **4.0 QUALIFIED PROFESSIONAL ENGINEER CERTIFICATION**

I, Stan A. Harris, being a Professional Engineer in good standing in the State of Indiana, do hereby certify, to the best of my knowledge, information, and belief:

1. that the information contained in this certification is prepared in accordance with the accepted practice of engineering;
2. that the information contained herein is accurate as of the date of my signature below;



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EPA Final Coal Combustion Residuals (CCR) Rule  
Clifty Creek Station  
Madison, Jefferson County, Indiana**

3. that the closure plan for the IKEC Clifty Creek Station's West Boiler Slag Pond meets the requirements described in 40 CFR 257.102(b); and
4. that the post-closure plan for the IKEC Clifty Creek Station's West Boiler Slag Pond meets the requirements of 40 CFR 257.104(d).

SIGNATURE



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DATE 10/11/16

ADDRESS: Stantec Consulting Services Inc.  
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Cincinnati, OH 45241

TELEPHONE: (513) 842-8200

ATTACHMENT: Clifty Creek West Boiler Slag Pond Closure and Post-Closure Plans



# Closure Plan

**CFR 257.102(b)**

West Boiler Slag Pond

Clifty Creek Station

Madison, Indiana

October 2016

Prepared by: Indiana-Kentucky Electric Corporation

3932 U.S. Route 23

Piketon, OH 45661



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## **1.0 OBJECTIVE**

This report has been prepared to fulfill the requirements of 40 CFR 257.102(b) of the Coal Combustion Residuals (CCR) Rule to develop a Closure Plan for the Clifty Creek Station's West Bottom Slag Pond (WBSP). This closure plan is conceptual and is subject to the completion of all necessary environmental reviews.

## **2.0 DESCRIPTION OF THE CCR UNIT**

The Clifty Creek Station is located on the north bank of the Ohio River near Madison, Indiana, and consists of six coal-fired electric generating units; each nominally rated at 217 megawatts, that began producing electricity in 1955 to support the Department of Energy's (DOE's) Portsmouth Gaseous Diffusion Plant located near Piketon, Ohio. The West Bottom Slag Pond is located immediately west of the Station and south of Clifty Hollow Rd. Upon commencing operation, the Clifty Creek Station began sluicing CCRs into the West Bottom Slag Pond for purposes of storage.

The West Bottom Slag Pond embankment is approximately 2,500 feet long, and encompasses approximately 75 acres, with about 35 acres of surface water. The top of the dike is at elevation 475, and varies in height above the adjacent plant grades, with a maximum height of approximately 41 feet.

## **3.0 DESCRIPTION OF CLOSURE PLAN 257.102(b)(1)(i)**

***[A narrative description of how the CCR unit will be closed in accordance with this section.]***

The Clifty Creek Station West Bottom Slag Pond will be closed by closure in place. The closure will consist of dewatering the unit through an NPDES-permitted outfall. Subsequently, the stored CCR will be stabilized in place and graded in preparation of receiving a flexible geomembrane system, and then covered with a two-foot thick soil fill consisting of an 18" soil infiltration layer and 6" of earthen material capable of growing and sustaining native vegetative growth. The capped surface will be graded to promote surface water runoff, and then seeded and mulched to promote growth of the vegetative cover.

## **4.0 CLOSURE IN PLACE 257.102(b)(1)(iii)**

***[If closure of the CCR unit will be accomplished by leaving the CCR in place, a description of the final cover system, designed in accordance with paragraph (d) of this section, and the methods and procedures to be used to install the final cover.]***

Prior to installing the final closure system, the CCR unit will be drained of free water and the material within the unit will be stabilized and graded to provide a stable and suitable subgrade upon which to construct the cap. The final closure system will consist of a flexible geomembrane liner, that will have a permeability that is less than or equal to the permeability of the natural subsoils, and is no greater than  $1 \times 10^{-5}$  cm/sec. The geomembrane will be installed directly over the graded CCR

material followed by a two-foot thick soil fill consisting of an 18" soil infiltration layer and 6" of earthen material capable of growing and sustaining native vegetative growth. The capped surface will be graded to promote surface water runoff, and then seeded and mulched to promote growth of the vegetative cover. Stormwater drainage improvements will be implemented during the final closure activities with minor grading of existing channels and construction of new channels to improve drainage of the closed pond. The final cover slope will be a minimum of 2% and will convey surface water to a NPDES-permitted outfall.

## **5.0 CLOSURE PERFORMANCE STANDARDS 257.102(d)(1)**

### **5.1 SECTION 257.102(d)(1)(i),(ii),(iii)**

*[(i) Control, minimize or eliminate, to the maximum extent feasible, post-closure infiltration of liquids into the waste and releases of CCR, leachate, or contaminated run-off to the ground or surface waters or to the atmosphere; (ii) Preclude the probability of future impoundment of water, sediment, or slurry; (iii) Include measures that provide for major slope stability to prevent the sloughing or movement of the final cover system during the closure and post-closure care period]*

Post-closure infiltration of liquids into the waste will be controlled through the design of the site grading plan, construction of an engineered cap system, and establishment of a stormwater management system in accordance with engineering practices. The intent of such a plan is to limit the infiltration of precipitation, cover, control, and prevent the releases of CCRs, and promote positive drainage. Stabilization of the CCR materials prior to cap placement will include placement and compaction in a manner to minimize settling and subsidence that could affect the integrity of the final cover system.

Installation and quality control testing of the geosynthetics will be performed as specified by the manufacturer.

### **5.2 SECTION 257.102(d)(1)(iv)**

*[Minimize the need for further maintenance of the CCR unit.]*

The impoundment will be vegetated to prevent erosion. Maintenance of the final cover system will include regularly scheduled inspections to monitor post-closure conditions and preventative maintenance.

### **5.3 SECTION 257.102(d)(1)(v)**

***[Be completed in the shortest amount of time consistent with recognized and generally accepted good engineering practices.]***

The impoundment will be closed in a time frame consistent with recognized and generally accepted good engineering practices. There is currently no schedule for closure of this CCR unit.

## **6.0 DRAINING AND STABILIZING OF THE SURFACE IMPOUNDMENT**

***[The owner or operator of a CCR surface impoundment or any lateral expansion of a CCR surface impoundment must meet the requirements of paragraph (d)(2)(i) and (ii) of this section prior to installing the final cover system required under paragraph (d)(3) of this section.]***

### **6.1 SECTION 257.102(d)(2)(i)**

***[Free liquids must be eliminated by removing liquid wastes or solidifying the remaining wastes and waste residue.]***

Free liquid will be removed as part of the final closure of the CCR unit.

### **6.2 SECTION 257.102(d)(2)(ii)**

***[Remaining waste must be stabilized sufficient to support the final cover system.]***

The remaining wastes that constitute the subgrade of the final cover system will be stabilized by removal of free liquids and providing bridging material as necessary.

## **7.0 FINAL COVER SYSTEM 257.102(d)(3)**

***[If a CCR unit is closed by leaving the CCR in place, the owner or operator must install a final cover system that is designed to minimize infiltration and erosion, and at a minimum, meets the requirements of paragraph (d)(3)(i) of this section, or the requirements of the alternative final cover system specified in paragraph (d)(3)(ii) of this section.***

***The final cover system must be designed and constructed to meet the criteria in paragraphs (d)(3)(i)(A) through (D) of this section. The design of the final cover system must be included in the written closure plan.]***

The final closure system will consist of a flexible geomembrane liner, that will have a permeability that is less than or equal to the permeability of the natural subsoils, and is no greater than  $1 \times 10^{-5}$  cm/sec. The geomembrane will be installed directly over the graded CCR material followed by a two-foot thick soil fill consisting of an 18" soil infiltration layer and 6" of earthen material capable of growing and sustaining native vegetative growth. The capped surface will be graded to promote surface water runoff, and then seeded and

mulched to promote growth of the vegetative cover. The final cover slope will be a minimum of 2%. A stormwater management system will convey surface water to a NPDES-permitted outfall.

**8.0 ESTIMATE OF MAXIMUM CCR VOLUME 257.102(b)(1)(iv)**

*[An estimate of the maximum inventory of CCR ever on-site over the active life of the CCR unit.]*

The estimated maximum amount of CCR to ever be on-site is approximately 3,600 acre-feet.

**9.0 ESTIMATE OF LARGEST AREA OF CCR REQUIRING COVER 257.102(b)(1)(v)**

*[An estimate of the largest area of CCR unit ever requiring a final cover.]*

The largest area of the CCR unit ever requiring a final cover is approximately 75 acres.

**10.0 CLOSURE SCHEDULE 257.102(b)(1)(vi)**

*[A schedule for collecting all activities necessary to satisfy the closure criteria in the section, including an estimate of the year in which all closure activities for the CCR unit will be completed. The schedule should provide sufficient information to describe the steps that will be taken to close the CCR unit, including identification of major milestones such as coordinating with and obtaining necessary approvals and permits from other agencies, the dewatering and stabilization of the CCR surface impoundment closure, or installation of the final cover system, and the estimated timeframes to complete each step or phase of the CCR unit closure.]*

There are currently no plans to close this CCR unit. A schedule meeting the requirements of this section will be developed and followed once the CCR unit requires closure.





# Post-closure Plan

CFR 257.104(d)

West Boiler Slag Pond

Clifty Creek Station

Madison, Indiana

October 2016

Prepared by: Indiana-Kentucky Electric Corporation

3932 U.S. Route 23

Piketon, OH 45661



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## **1.0 OBJECTIVE**

This report has been prepared to fulfill the requirements of 40 CFR 257.102(b) of the Coal Combustion Residuals (CCR) Rule to develop a Closure Plan for the Clifty Creek Station's West Boiler Slag Pond.

## **2.0 DESCRIPTION OF THE CCR UNIT**

The Clifty Creek Station is located on the shore of the Ohio River near Madison, Indiana and consists of six coal-fired electric generating units; each nominally rated at 217 megawatts, that began producing electricity in 1955 to support the Department of Energy's (DOE's) Portsmouth Gaseous Diffusion Plant located near Piketon, Ohio. The West Bottom Slag Pond is located immediately west of the Station and south of Clifty Hollow Rd. Upon commencing operation, the Clifty Creek Station began sluicing CCRs into the West Bottom Slag Pond for purposes of storage.

The West Bottom Slag Pond embankment is approximately 2,500 feet long, and encompasses approximately 75 acres, with about 35 acres of surface water. The top of the dike is located at elevation 475 feet, and varies in height above the adjacent plant grades, with a maximum height of approximately 41 feet.

## **3.0 DESCRIPTION OF THE POST-CLOSURE PLAN 257.102(b)(1)(i)**

**[A description of the monitoring and maintenance activities required in paragraph (b) of this section for the CCR unit, and the frequency at which these activities will be performed]**

### **3.1 Section 257.104(b)(1)**

***[Maintaining the integrity and effectiveness of the final cover system including making repairs to the final cover as necessary to correct the effects of the settlement, subsidence, erosion, or other events and preventing run-on and run-off from eroding or otherwise damaging the final cover.]***

Inspections are performed for the items noted below. The inspection frequencies are scheduled to properly detect any issues so that repairs can be performed before significant harm occurs.

- **Embankment**: The waste embankment will be inspected for slides, settlement, subsidence, displacement, and cover condition (see below).
- **Final Cover Surface**: The Final Cover surface will be inspected for any ponding of water or flat areas. Due to the design contours required to achieve the final cap grade, special attention will be focused to ensure that no settlement, subsidence, erosion, depressions or flat areas exist and that no water is allowed to pond above the cap system. Condition of the vegetation will be observed for maintenance needs (i.e., gaps in vegetation, presence of undesirable trees or brush).

- Stormwater Management System: The stormwater management system, including channels, culverts, slope drains, etc., will be inspected for erosion, integrity of channel lining, ponding, and accumulated sediment.

Maintenance during the post-closure care period will be performed as discussed below following the facility inspections.

- Erosion Damage Repair: Any areas exhibiting erosion will be repaired by reworking, replacing and/or compacting the material to design grade/specifications, and reseeding the area. Applications of additional fertilizer, selective herbicides, rodent control measures, etc. will be implemented as necessary. The selection of fertilizers and herbicides, will strive to minimize their impact on groundwater. Follow-up monitoring of the repaired area will be conducted.
- Settlement, Subsidence, Displacement: Any areas at the closed site exhibiting evidence of settlement, subsidence, or displacement will be examined to determine the cause of the movement. If backfilling or placing additional fill material is needed to maintain the integrity of the closed structure, it will be performed in accordance with the site/closure specifications, including seeding. If the condition reoccurs or persists, or if the severity of the condition initially is judged to warrant it, a detailed investigation of the cause will be performed and remedial action will be performed. Repairs will be made as necessary. Follow-up monitoring of the area will be performed.
- Closure Cap Surface: Any areas that show signs of ponding water or flat contours will be observed and addressed. Due to the design contours required to achieve the final cap grade, special attention will be focused on the cap surface to promote drainage, re-seeded to support vegetative growth, and maintained to minimize the ponding of water.
- Stormwater Drainage System: The channel linings are specified for design velocities. Maintenance of the stormwater management system will consist of removing sediment build up and/or undesirable vegetation from the stormwater management system's channels, culverts, and sediment basins as required. Eroded areas will be repaired by back-filling and reseeding in accordance with the specifications. Damage to culverts will be repaired; structure replacement will be performed if needed.

**3.2 SECTION 257.104(b)(3)**

***[Maintaining the groundwater monitoring system and monitoring the groundwater in accordance with the requirements of §§257.90 through 257.98.]***

The groundwater monitoring system will be observed for the general integrity of the wells, well casings and well protective casings. Any damaged portions of the monitoring wells and/or their protective casings will be replaced in-kind.

Monitoring the groundwater will be in accordance with the groundwater monitoring plan for this facility and in accordance with the requirements of §§257.90 through 257.98.

**4.0 POST-CLOSURE CONTACT 257.104 (d)(1)(ii)**

***[The name, address, telephone number and email address of the person or office to contact about the facility during the post-closure care period.]***

The name, address, telephone number, and email address of the person to contact about the facility during the post-closure period will be provided upon notification of closure.

**5.0 POST-CLOSURE PLANNED USE 257.104 (d)(1)(iii)**

***[A description of the planned uses of the property during the post-closure period. Post-closure use of the property shall not disturb the integrity of the final cover, liner(s), or any other component of the containment system, or the function of the monitoring systems unless necessary to comply with the requirements in this subpart...]***

The post-closure use of the property will be undisturbed vacant land space. The only activities occurring on the closed CCR unit will be related to the Post-Closure care activities. All other activities will be prohibited.