FINAL

ANNUAL INSPECTION REPORT NEARMAN CREEK BOTTOM ASH IMPOUNDMENT

Kansas City, Kansas

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PREPARED FOR

KANSAS CITY BPU
THE POWER OF COMMUNITY

Kansas City Board of Public Utilities

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1.0 Executive Summary

This report presents a summary of the annual inspection for the KCBPU Nearman Bottom Ash Impoundment in Kansas City, Kansas. The annual inspection was completed by Black & Veatch on December 16, 2015. The annual inspection was completed in compliance with 40 CFR § 257.83 and included review of available information regarding the impoundment as well as a visual inspection of the impoundment and appurtenant structures.

1.1 SUMMARY OF FINDINGS

Inspection of the bottom ash impoundment did not identify any signs of structural weakness or conditions that would disrupt or affect the safety of the impoundment. Several minor issues were observed and included the following:

- Minor slope irregularities were observed on the exterior east dike.
- Standing water was observed along the toe of a portion of the north facing exterior dike.
- Riprap was missing at the location of the bottom ash pond discharge pipe.
- Minor erosion was observed at the plant access road adjacent to the bottom ash sluice pipes.

1.2 RECOMMENDATIONS

Based on the results of the inspection, Black & Veatch recommends minor repairs to the impoundment be completed. The repairs include the following:

- Along the east facing exterior slope, the minor surface irregularities and depressions should be regraded and seeded.
- The minor surface disturbances along south facing exterior slops should be monitored to ensure that burrowing activity does not cause further disturbance to the slope.
- The toe area on the north facing exterior slope should be regraded to prevent standing water from accumulating at the toe of the slope.
- The area of the previously sealed bottom ash pond discharge pipe should be repaired to prevent erosion.
- The erosion along the bottom ash sluice pipe should be repaired to prevent further erosion of the plant access road.

2.0 Inspection Team and Date of Inspection

2.1 INSPECTION TEAM

The inspection team consisted of one KCBPU Staff Scientist and two Black & Veatch geotechnical engineers. The inspection team members included:

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Additional surveying support subsequent to the inspection was completed by Kissick Construction Company, Inc. under subcontract to KCBPU.

2.2 DATE OF INSPECTION

The inspection team began their work at 9:00 a.m. on Wednesday, December 16, 2015 and completed their work at 11:00 a.m.

2.3 WEATHER DURING INSPECTION

The weather on the day of the inspection was partly sunny to overcast with temperatures ranging from 30 to 50^{o} Fahrenheit. The most recent rain at the site occurred three days prior on December 13th, with approximately 2 inches of rain over a one day period. Within the past 30 days of the inspection, the site had received approximately 5 inches of rain. The ground surface of the impoundment was dry; however, standing water was noted in several areas surrounding the impoundment.

3.0 Description of Surface Impoundment

3.1 LOCATION AND GENERAL DESCRIPTION

The KCBPU Nearman Creek Power Station Surface Impoundment is located in Kansas City, Kansas, within Wyandotte County, in northeastern Kansas. The surface impoundment is a bottom ash settling pond and a clear water pond that are separated by an internal dike. Descriptions within this report may identify the facility as the surface impoundment, bottom ash pond, or ash pond. The two ponds are hydraulically connected by a 24-inch diameter reinforced concrete pipe (RCP). The impoundment operates as a closed loop system that is designed to accumulate and store bottom ash that is sluiced form the existing Unit 1 coal-fired boiler then recirculate clean water from the clear water pond back to the plant operations. The clear water is recycled by way of a pump located in an adjoining pump house. Bottom ash is typically removed annually from the bottom ash pond at a rate of approximately 7,500 to 10,000 tons per year.

The impoundment was designed by Lutz, Daily & Brain of Shawnee Mission, Kansas. Construction was completed May 30, 1980 and was permitted by the KDHE on February 11, 1982. The impoundment was constructed by building a perimeter dike consisting on-site clay and clayey silt materials on the existing soils. Both ponds were designed with a 3-foot thick layer of impervious fill as a base. In 2015, an investigation completed by GeoSource of Topeka, Kansas confirmed that the thickness of the impervious fill was generally consistent with the original design.

The bottom ash pond was originally designed with a discharge structure that consisted of a 30-inch diameter RCP. The original purpose of the pipe was to permit emergency inflow into the pond in case of exterior flooding to help stabilize the embankments and to allow emergency discharge of impounded water. Since completion of construction, the pipe has been closed by mechanical means and was later sealed with concrete.

3.2 POND DIMENSIONS AND CAPACITIES

Based on the original construction drawings, the impoundment's exterior and internal dikes have a nominal crest elevation of 763 feet. The geotechnical report provided by GeoSource in September 2015 shows elevation 744.8 is the average interior elevation of the settling area of the pond. The pond was designed with a 3-foot thick layer of impervious material and the presence of this layer was confirmed in the GeoSource report. The side slopes of the dikes, both interior and external are designed with 3 horizontal to 1 vertical slopes. The exterior slopes are covered with riprap on the northern portion only and grass vegetation cover on all other external slopes. The interior slopes were originally designed without riprap cover; however, due to erosion issues, riprap was later placed on all interior slope surfaces.

The impoundment covers approximately 21.5 acres and has a design storage capacity of 294,870 cubic yards. Bottom ash is reclaimed from the pond and stockpiled in the southwest corner of the bottom ash pond. In 2009, volume of material stored in the pond was estimated as 107,282 cubic

yards. Since 2009, subsequent operation of the impoundment has further reduced the volume of the bottom ash. The current estimated volume of bottom ash within the impoundment, including the stockpiled bottom ash is approximately 95,000 cubic yards.

3.3 POND INSTRUMENTATION

There is currently no instrumentation at the bottom ash or clear water pond. Based on GPS surveying that was completed in December, 2015, the water levels of both ponds were approximately elevation 759.7 feet.

3.4 POND OPERATING AND INSPECTION PROCEDURES

In accordance with the Operations Plan prepared by Blackstone Environmental, dated November 11, 2015, the impoundment is inspected on a weekly, monthly and an annual basis by plant personnel. Weekly and monthly inspections were initiated on October 19, 2015. No previous annual inspection reports have been prepared.

4.0 Inspection Findings

Black & Veatch completed the annual inspection based on the requirements of §257.83 of the CCR rules. The inspection was completed as a visual inspection with the main goals of identifying signs of distress or malfunction of the impoundment, appurtenant, and hydraulic structures. As part of this inspection, Black & Veatch also performed a review of the available information which included the following documents;

a. Coal Combustion Waste Impoundment Round 7 – Dam Assessment Report, prepared by Dewberry & Davis, LLC, April 2011

b. Geotechnical Exploration and Stability Analysis of the Nearman Creek Power Station Bottom Ash Pond Dike, prepared by AECOM Technical Services, Inc, November 2011.

c. Geotechnical Engineering Report, Bottom Ash Pond Evaluation, prepared by GeoSource, LLC September 2, 2015.

d. Geotechnical Report, Erosion, Ash Ponds Dike Slopes, prepared by Terracon, June 20, 2008

e. Original Ash Pond Design Drawings and Specifications, prepared by Lutz, Daily & Brain, various dates.

f. Operations Plan KCBPU Nearman Creek Power Plant Bottom Ash Surface Impoundment, prepared by Blackstone Environmental, November 11, 2015.

Black & Veatch also reviewed the weekly and monthly inspection reports as well as interviewed personnel responsible for the completion of the inspection reports.

Field inspection of the impoundment included a site walk to observe the dam crest, upstream slope, downstream slope, and discharge structures.

4.1 RESULTS OF INSPECTION

4.1.1 Crest

The interior and exterior dike crest surfaces are covered with gravel road base material. The crest of the dikes appeared to be in good condition (Figure 4-1). No signs of cracking, settlement, movement, erosion or deterioration were observed during the assessment.

Little to no vegetation was observed along the crest. The KCBPU staff indicated that vegetation is periodically sprayed as part of the landscape maintenance.

Figure 4-1 Exterior Dike Crest Condition

4.1.2 Interior Slopes

The interior slopes of the bottom ash and clear water pond dikes are protected by riprap and appeared to be in excellent condition (Figure 4-2a and b). There were no signs of erosion or surface instability. Minimal vegetation was observed within the slopes.

(a)

(b)

Figure 4-2 Bottom Ash (a) and Clear Water (b) Pond Interior Slope Conditions

4.1.3 Exterior Slopes

In the northern portion of the impoundment, the exterior dike slope surface is covered with large riprap and appears to be in excellent condition (Figure 4-3). There were no indications of slumping or instability observed on this portion of the impoundment. Little to no vegetation was noted within the riprap.

Figure 4-3 Exterior Dike Slope in North Facing Slope of Impoundment

At the time of the inspection, standing water was noted at the toe of portions of the north facing slope (Figure 4-4). The standing water was clear with no indications of sediment or seepage issues at this location.

Figure 4-4 Standing Water along Toe of North Facing Slope

The riprap covering on the northern portion of the exterior dike surface stops at approximately the location of the bottom ash pond discharge pipe (Figure 4-5). There appeared to be some concrete surfacing extending below the sealed discharge pipe. Some large riprap was also noted further east of the discharge pipe (Figure 4-6); however, the riprap was partially covered with vegetation and was not continuous with the riprap on the north facing exterior slope. While there did not appear to be any significant erosion issues at this location, there did appear to be exposed bare soil and minor unravelling of the riprap edges.

Figure 4-5 Exterior Dike Slope Surface at Discharge Pipe.

Figure 4-6 Exterior Dike Slope Surface East of the Discharge Pipe.

In the remaining portions of the impoundment, the exterior slopes are generally covered with grass and low vegetation cover. There were no indications of significant slumping, instability, or erosion observed on these portions of the dike.

Along the east facing slope, there did appear to be some minor surface irregularities (Figures 4-7)

Figure 4-7 Minor Surface Irregularity Along East Facing Exterior Slope.

As shown in Figure 4-7, these surface irregularities appears as very low profile bulges on the slope with a height of generally less than 6 inches. The very small size suggests these may have been ruts that occurred during grading or maintenance operations. There were no signs of slope instability.

Three surface depressions, approximately 3 feet diameter, 6 inches deep, were also noted within the toe of the east facing exterior slope. The depressions did not appear to suggest any issues with seepage or surface instability. A small tree root was noted near the edge of one of the depressions suggesting these may have been locations were trees or stumps were previously removed.

Along the southeast facing exterior slopes, some minor surface disturbances likely caused by animals were noted (Figure 4-8). None of the disturbances were deep enough to indicate issues with animal burrowing activity.

Figure 4-8 Minor Surface Disturbances Along the Southeast Facing Exterior Slope.

4.1.4 Discharge Structures

Only the 30 inch diameter discharge pipe for the bottom ash pond was visible for inspection. This discharge pipe has been permanently sealed with concrete as shown in Figure 4-9. There were no signs of seepage or structural instability.

Figure 4-9 Bottom Ash Pond 30 Inch Diameter Discharge Pipe.

The 24 inch diameter pipe that connects the bottom ash and the clear water ponds is designed to be below water level and was not visible for inspection.

4.1.5 Appurtenant Structures

Additional structures observed during the inspection included the clear water pump house and bottom ash sluice pipes. A visual inspection of the exterior of the pump house indicated that the pump house was in good condition. The KCBPU staff indicated that the monthly equipment inspection of the sluicing system includes confirming the operation of the pump and gauges. The three bottom ash sluice pipe were also visually inspected and found to be in good working order. Minor erosion was noted where the sluice pipes pass beneath the plant access roads to the south of the impoundment (Figure 4-10).

Figure 4-10 Minor Erosion Along Bottom Ash Sluice Pipes

5.0 Conclusions and Recommendations

Based on the condition of the surface impoundment, as observed during the inspection in December 2015, the impoundment is considered sufficient to function as intended. There were no significant signs of distress or instability problems associated with the impoundment. The next periodic inspection should be scheduled for December 2016.

Several minor issues were noted during the inspection. The recommended actions to be completed for each of the issues are presented in the following subsections.

5.1 IMPOUNDMENT

Black & Veatch recommends minor work be completed along portions the exterior slope of the impoundment.

The toe area on the north facing exterior slope should be regraded to prevent standing water from accumulating at the toe of the slope.

In the area of the previously sealed bottom ash pond discharge pipe, the original design drawings indicate that riprap should extend along the exterior slope past the discharge pipe. The inspection indicated that the riprap was not continuous past the discharge pipe. While no significant erosion was observed at this location, bare soil was exposed and unravelling of existing riprap was observed; therefore the area should be repaired.

Along the east facing exterior slope, the minor surface irregularities and depressions should be regraded and seeded.

The minor surface disturbances along south facing exterior slops should be monitored to ensure that additional disturbance or borrowing activity does not cause further disturbance to the slope.

5.2 APPURTUNENT STRUCTURES

The erosion along the bottom ash discharge lines should be repaired to prevent further erosion of the plant access road.