

FINAL

# ANNUAL INSPECTION REPORT NEARMAN CREEK BOTTOM ASH IMPOUNDMENT

Kansas City, Kansas

B&V PROJECT NO. 190719

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PREPARED FOR



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 Kansas City Board of Public Utilities (KCBPU) Nearman Creek Power Station Bottom Ash Surface Impoundment in Kansas City, Kansas. The annual inspection was completed by Black & Veatch on December 6, 2016. 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 surface depressions were observed on the exterior east dike.
- Minor repair of riprap along the bottom ash discharge pipes where they pass beneath the access road.

### 1.2 RECOMMENDATIONS

Based on the results of the inspection, Black & Veatch recommends minor repairs to fill shallow surface depressions on the east facing exterior slope. The maintenance plan for removal of burrowing animals and spraying of vegetation in the rip rap should be continued. Riprap should be replaced at the washout near the discharge pipe that passes beneath the access road.

## 2.0 Inspection Team and Date of Inspection

### 2.1 INSPECTION TEAM

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

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### 2.2 DATE OF INSPECTION

The inspection team began their work at 9:00 a.m. on Tuesday, December 6, 2016 and completed their work at 10:30 a.m.

### 2.3 WEATHER DURING INSPECTION

The weather on the day of the inspection was sunny with temperatures ranging from 30 to 40° Fahrenheit. The most recent rain at the site occurred two days prior on December 4<sup>th</sup>, with approximately 1/2 inches of light rain over a one day period. The ground surface of the impoundment was dry; however, standing water was noted in several areas surrounding the impoundment due to the recent rain.

## 3.0 Description of Surface Impoundment

### 3.1 LOCATION AND GENERAL DESCRIPTION

The KCBPU Nearman Creek Power Station Bottom Ash 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 from 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.

The impoundment was designed by Lutz, Daily & Brain of Shawnee Mission, Kansas. Construction was completed May 30, 1980 and was permitted by the Kansas Department of Health and Environment (KDHE) on February 11, 1982. The impoundment was constructed by building a perimeter dike consisting of 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.

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 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 170,000 cubic yards. Bottom ash is reclaimed for beneficial use from the pond and temporarily stockpiled in the southwest corner of the bottom ash pond. In 2010, volume of material stored in the pond was estimated as 107,282 cubic yards. Since 2010, 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 an temporarily stockpiled bottom ash, is approximately 81,124 tons.

### 3.3 POND INSTRUMENTATION

There is a level indicator on the interior slope near the conduit between the ponds. The water level indicators are set to Elevation 760.59 feet at the top of the red marker, 759.55 feet at the top of the green marker and 758.49 feet at the bottom of the green marker. The approximate water elevation in the pond at the time of the inspection was Elevation 757.0 feet.



Figure 3-1 Water Level Indicator

### 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 annual basis by KCBPU personnel. Weekly and monthly inspections were initiated on October 19, 2015. The weekly and monthly inspection reports have been completed during the past year and were reviewed for this inspection.



## 4.0 Inspection Findings

Black & Veatch completed the annual inspection based on the requirements of §257.83 of the Coal Combustion Residuals (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. Geotechnical Engineering Report, Bottom Ash Pond Evaluation, prepared by GeoSource, LLC September 2, 2015.
- b. Geotechnical Report, Erosion, Ash Ponds Dike Slopes, prepared by Terracon, June 20, 2008.
- c. Original Ash Pond Design Drawings and Specifications, prepared by Lutz, Daily & Brain, various dates.
- d. Operations Plan KCBPU Nearman Creek Power Plant Bottom Ash Surface Impoundment, prepared by Blackstone Environmental, November 11, 2015.
- e. Bottom Ash Surface Impoundment Hazard Potential Classification Assessment, prepared by Black & Veatch, October 2016.
- f. History of Construction Report – Nearman Creek Bottom Ash Surface Impoundment, prepared by Black & Veatch, October 2016.
- g. Bottom Ash Impoundment Liner Assessment, prepared by Black & Veatch, October 2016.

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.

No vegetation was observed along the crest. The KCBPU staff indicated that vegetation has been periodically sprayed as part of the landscape maintenance and dead vegetation was observed.



Figure 4-1 Interior 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 4-2). There were no signs of erosion or surface instability. No vegetation was observed within the slopes. Water level has been reduced due to the ongoing construction and reduced power generation. The previous water levels could be observed as the darker riprap materials.



**Figure 4-2 Bottom Ash 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. No vegetation was noted within the riprap. The maintenance program includes periodic spraying of vegetation.



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. This is the lowest grade along the toe and collects surface water runoff from the areas beyond the embankment.



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

During the previous annual inspection, the north riprap has ended near the outlet structure. The outlet structure had been plugged, but the riprap around the structure was in poor condition. During the year, riprap had been placed around the plugged outlet and extended to meet the east embankment (Figure 4-5). The riprap placement had been spread evenly along the face of the slope and was composed of intact limestone cobbles and boulders with little to no shale seams. (Figure 4-6).



Figure 4-5 Exterior Dike Recent Riprap Placement.



**Figure 4-6 Exterior Dike Slope Surface East of the Plugged 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 (Figure 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 depressions on the slope with a height of generally less than 6 inches and diameter of approximately 3 feet. Three surface depressions were noted within the toe of the east facing exterior slope. The depressions did not appear to suggest any issues with seepage or surface instability. The depressions had been mowed and there was no rutting to indicate seepage issues.



There were fewer observed animal burrows than the previous annual inspection. The BPU personnel stated they have trapped several moles along the south and east slopes and animal removal is now part of the maintenance plan. (Figure 4-8). KCBPU has contracted the United States Department of Agriculture (USDA) Animal and Plant Health Inspection Service (APHIS) to handle any animal issues associated with the Bottom Ash Pond.



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

#### 4.1.4 Discharge Structures

Only the 30 inch diameter plugged 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. The new riprap has been placed around the structure and was removed from the area directly below the outlet to maintain observations of the plug.



**Figure 4-9 Bottom Ash Pond 30 Inch Diameter Plugged 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 two bottom ash sluice pipes 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 2016, 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 2017.

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.

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

The maintenance plan should continue to include the spraying of vegetation within the riprap and removal of burrowing animals.

### 5.2 APPURTENANT STRUCTURES

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