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2020 DAM AND DIKE INSPECTION REPORT
GEVR-20-017

H.W. PIRKEY POWER PLANT
BOTTOM ASH PONDS

Marshall, Texas

Prepared for:

AMERICAN ELECTRIC POWER
BOUNDLESS ENERGY

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Dam & Dike Inspection Report
Bottom Ash Ponds

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PIRKEY POWER PLANT
MARSHALL, TEXAS

INSPECTION DATE **October 27, 2020**

PREPARED BY _____ **DATE** 12-21-20
Murphy Parks, P.E.

REVIEWED BY _____ **DATE** 12-21-20
Colin Young, P.E.

12-21-20

STATE OF TEXAS
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LICENSED
PROFESSIONAL ENGINEER

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ENGINEERING FIRM
F-2144

I certify to the best of my knowledge, information and belief the information contained in this report meets the requirements of 40 CFR § 257.83(b).

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1.0 INTRODUCTION

This report was prepared by Freese and Nichols, Inc., in part, to fulfill requirements of 40 CFR 257.83 and to provide South Western Electric Power Company (SWEPCO) and Pirkey Power Plant with an evaluation of the facility.

The AEP H.W. Pirkey Plant is located in southern Harrison County, approximately 5 miles southeast of Hallsville, Texas, and approximately 8 miles southwest of Marshall, Texas.

American Electric Power Service Corporation's Civil Engineering Division administers the Pirkey Power Plant's Dam Inspection and Maintenance Program (DIMP). As part of the DIMP, staff from Freese and Nichols, Inc. conducted dam and dike inspections. This report contains the inspection findings, observations, photographic descriptions, conclusions, and maintenance recommendations. This inspection report addresses the East and West Bottom Ash Ponds at the Pirkey Power Plant.

Murphy Parks, P.E. and Justin Tran, E.I.T. conducted the Bottom Ash Ponds Inspection. Mr. Greg Carter, P.E. of AEP Plant Engineering Region 5, was the facility contact for the inspection and accompanied Freese and Nichols staff during the inspection. The inspection was performed on October 27, 2020. Weather conditions were mostly overcast, with temperatures ranging from 53° F in the morning to 60° F in the afternoon.

This report has been prepared by Murphy Parks, P.E. The report presents: (i) Description of the impoundments, (i) Summary of Visual Observations; (ii) Conclusions; and (iii) Recommendations. Photographs identifying typical conditions, problem areas, items that need correction or requiring additional monitoring, have been selected from the inspection field photographic file and provided in Attachment B.

2.0 DESCRIPTION OF IMPOUNDMENTS

2.1 EAST BOTTOM ASH POND

The East Bottom Ash Pond (BAP) CCR unit is located at the north end of the Plant and approximately 2,000 feet north-northwest of Brandy Branch Reservoir. The East BAP is partially incised below the existing natural ground surface with an embankment height of approximately 4 feet. The East BAP embankments are constructed of compacted clay on a 3:1 slope (3 feet horizontal, 1 foot vertical). The elevation of the top of the embankment around the perimeter of the East BAP is approximately 357 feet above mean sea level (feet msl), and the normal operating level is approximately 354 feet msl. At the time of inspection, the East BAP was not in service and ash material was being excavated from the pond. The interior bottom elevation of the East BAP is approximately 347.0 feet msl.

Surface water elevation in the East BAP is controlled by a stop log-regulated window cut into a concrete riser and a manually operated gate valve on a 36-inch-diameter discharge pipe at the southwest corner of the pond. Clear water overflow from the East BAP discharges through the 36-inch-diameter corrugated metal pipe into the 2.7-acre Secondary Bottom Ash Pond located directly south of the East BAP. Water in the Secondary Bottom Ash Pond is either pumped (recirculated) back into the boiler ash hopper, or gravity discharged through a pipe at the southwest corner of the Secondary Bottom Ash Pond into an unnamed intermittent tributary of Hatley Creek via Outfall 006 in accordance with Texas Pollutant Discharge Elimination System (TPDES) Permit No. WQ0002496000.

2.2 WEST BOTTOM ASH POND

The West BAP CCR unit is located at the north end of the Plant and approximately 3,000 feet northwest of Brandy Branch Reservoir. The West BAP embankments have a maximum height of approximately 25 feet and are constructed of compacted clay on a slope ranging from 2.5:1 (2.5 feet horizontal, 1 foot vertical) to 3:1. The elevation at the top of the embankment around the perimeter of the West BAP is approximately 357 feet msl, and the normal operating level is approximately 354 feet msl. At the time of inspection, the West BAP was in service and the pool level was at 351.8 feet above msl. The interior bottom elevation of the West BAP is approximately 347 feet above msl.

Surface water elevation in the West BAP is controlled by a stop log-regulated window cut into a concrete riser and a manually operated gate valve on a 36-inch-diameter discharge pipe at the southeast corner of the pond. Clear water overflow from the West BAP discharges through the 36-inch-diameter corrugated metal pipe into the 2.7-acre Secondary Bottom Ash Pond located southeast of the West BAP. Water in the Secondary Bottom Ash Pond is either pumped (recirculated) back into the boiler ash hopper, or gravity discharged through a pipe at the southwest corner of the Secondary Bottom Ash Pond into an unnamed intermittent tributary of Hatley Creek via Outfall 006 in accordance with Texas Pollutant Discharge Elimination System (TPDES) Permit No. WQ0002496000.

3.0 REVIEW OF AVAILABLE INFORMATION (257.83(b)(1)(i))

A review of available information regarding the status and condition of the CCR Ponds, which include files available in the CCR operating record, such as design and construction information, periodic structural stability assessments, previous 7-day inspection reports, 30-day instrumentation data, and previous annual inspections has been conducted. Based on the review of the data there were no signs of actual or potential structural weakness or adverse conditions.

4.0 CHANGES IN GEOMETRY SINCE LAST INSPECTION (257.83(b)(2)(i))

No modifications have been made to the geometry of the East and West Bottom Ash Ponds since the 2019 annual inspection. The geometry of the impoundment has remained essentially unchanged.

5.0 CHANGES THAT EFFECT STABILITY OR OPERATION (257.83(b)(2)(vii))

Based on interviews with plant personnel and field observations there were no changes to the East and West Bottom Ash Ponds since the last annual inspection that would affect the stability or operation of the impounding structure.

6.0 IMPOUNDMENT CHARACTERISTICS (257.83(b)(2)(iii, iv, v))

6.1 EAST BOTTOM ASH POND

Table 1 is a summary of the minimum, maximum, and present depth and elevation of the impounded water and CCR material since the previous annual inspection; the storage capacity of the impounding structure at the time of the inspection; and the approximate volume of the impounded water at the time of the inspection.

Table 1 Summary of Relevant Storage Information for East Bottom Ash Pond

	Primary Ash Pond
Approximate **Minimum** depth of impounded water since last annual inspection	0.0 ft (347.0 feet msl)
Approximate **Maximum** depth of impounded water since last annual inspection	8.0 ft (355 feet msl)
Approximate **Present** depth of impounded water at the time of the inspection	0.0 ft (347 feet msl)
Approximate **Minimum** depth of CCR since last annual inspection	0.5 ft (347.5 feet msl)
Approximate **Maximum** depth of CCR since last annual inspection	7.5 ft (354.5 feet msl)
Approximate **Present** depth of CCR at the time of the inspection	2.0 ft (349.0 feet msl)
Storage Capacity of impounding structure at the time of the inspection	188 acre-ft
Approximate volume of impounded water at the time of the inspection	0 Gallons at El. 347 feet msl
Approximate volume of CCR at the time of the inspection	2,500 CY

6.2 WEST BOTTOM ASH POND

Table 2 is a summary of the minimum, maximum, and present depth and elevation of the impounded water and CCR material since the previous annual inspection; the storage capacity of the impounding structure at the time of the inspection; and the approximate volume of the impounded water at the time of the inspection.

Table 2 Summary of Relevant Storage Information for West Bottom Ash Pond

	Bottom Ash Storage Pond
Approximate **Minimum** depth of impounded water since last annual inspection	2.0 ft (349 feet msl)
Approximate **Maximum** depth of impounded water since last annual inspection	7.6 ft (354.6 feet msl)
Approximate **Present** depth of impounded water at the time of the inspection	4.8 ft (351.8 feet msl)
Approximate **Minimum** depth of CCR since last annual inspection	0.5 ft (347.5 feet msl)
Approximate **Maximum** depth of CCR since last annual inspection	7.5 ft (354.5 feet msl)
Approximate **Present** depth of CCR at the time of the inspection	1.0 ft (348.0 feet msl)
Storage Capacity of impounding structure at the time of the inspection	188 acre-ft
Approximate volume of impounded water at the time of the inspection	30 Million Gallons at El. 351.8 feet msl
Approximate volume of CCR at the time of the inspection	20,000 CY

7.0 INSPECTION (257.83(b)(1)(ii))

7.1 GENERAL

The summary of the visual observations uses terms to describe the general appearance or condition of an observed item, activity or structure. Their meaning is understood as follows:

Good: A condition or activity that is generally better or slightly better than what is minimally expected or anticipated from a design or maintenance point of view.

Fair or Satisfactory:

A condition or activity that generally meets what is minimally expected or anticipated from a design or maintenance point of view.

Poor: A condition or activity that is generally below what is minimally expected or anticipated from a design or maintenance point of view.

Minor: A reference to an observed item (e.g., erosion, seepage, vegetation, etc.) where the current maintenance condition is below what is normal or desired, but which is not currently causing concern from a structure safety or stability point of view.

Significant: A reference to an observed item (e.g. erosion, seepage, vegetation, etc.) where the current maintenance program has neglected to improve the condition. Usually, conditions that have been previously identified in the previous inspections, but have not yet been corrected.

Excessive: A reference to an observed item (e.g., erosion, seepage, vegetation, etc.) where the current maintenance condition is below or worse than what is normal or desired, and which may have affected the ability of the observer to properly evaluate the structure or particular area being observed or which may be a concern from a structure safety or stability point of view.

In addition, a "deficiency" is some evidence that a dam has developed a problem that could impact the structural integrity of the dam. There are four general categories of deficiencies. These four categories are described below:

1. Uncontrolled Seepage

   Uncontrolled seepage is seepage that is not behaving as the design engineer has intended. An example of uncontrolled seepage is seepage that comes through or around the embankment and is not picked up and safely carried off by a drain. Seepage that is collected by a drain can still be uncontrolled if it is not safely collected and transported, such as seepage that is not clear. Seepage that is unable to be measured and/or observe it is considered uncontrolled seepage. Wet or soft areas are not considered as uncontrolled seepage, but can lead to this type of deficiency. These areas should be monitored frequently.

2. Displacement:

   Displacement of the embankment is large scale movement of part of the dam. Common signs of displacement are cracks, scraps, bulges, depressions, sinkholes and slides.

3. Blockage of Control Features:

   Blockage of Control Features is the restriction of flow at spillways, decant or pipe spillways, or drains.

4. Erosion:

   Erosion is the gradual movement of surface material by water, wind or ice. Erosion is considered a deficiency when it is more than a minor routine maintenance item.

7.2 VISUAL INSPECTION (257.83(b)(2)(i))

A visual inspection of the CCR Ponds Complex was conducted to identify any signs of distress or malfunction of the impoundment and appurtenant structures. Specific items inspected included all structural elements of the dam such as upstream and downstream slopes, crest, and toe.

EAST BOTTOM ASH POND

In general, the crest, interior slopes, and exterior slopes of the dike appear to be in satisfactory and stable condition. No erosion, sloughing, or slides were noted on the interior or exterior slopes. No significant change to the pond was noted from the 2019 inspection. No significant settlement or misalignment was observed. Seeps were not observed during the inspection. No animal burrows were observed during the inspection. The East BAP was not in service during the inspection. There were no signs of potential structural weakness or conditions which may be disrupting to the safe operation of the impoundment.

1. (Photograph 1) The north side crest area appeared to be in satisfactory condition with no signs of rutting, settlement, or misalignment. The bottom of the pond had been excavated of ash material (Photograph 7). Dense tree vegetation was noted on the downstream slope and toe area. This issue was discussed in the field, and AEP staff explained that beyond the toe there is a roadway embankment which effectively forms a secondary containment along the north side.

2. (Photograph 2) A partial breach section was observed in the interior ash berm which forms a small containment pond in the northeast corner. The section of the East BAP is incised into native ground.

3. (Photographs 3-5) The east and south sides of the pond were in satisfactory condition, with no signs of rutting, settlement, or misalignment. The upper portion of the interior slope was vegetated and needed to be mowed. The bottom of the pond had been excavated of ash material. The perimeter drainage ditch that runs along the east and south sides of the pond was heavily vegetated, which prevented complete inspection of the ditch (Photograph 5). Water was standing in the ditch as a result of recent rainfall.

4. (Photograph 5) The south embankment was in satisfactory condition with no signs of rutting, settlement, or misalignment. The upstream slope had been excavated of ash material, and the exposed slope appeared in good condition. This embankment section is a shared embankment with the Secondary Bottom Ash Pond.

5. (Photograph 7) The overflow discharge structure walkway, railings, metal decking, and visible concrete appeared in satisfactory condition. Significant corrosion was observed on the outlet slide gate, frame, and stem. Given the pond was dry, the functionality of the overflow structure could not be judged.

Overall, the East BAP is in satisfactory condition. There were no signs of potential structural weakness or conditions that would disrupt to the safe operation of the impoundment.

WEST BOTTOM ASH POND

In general, the crest, interior slopes, and exterior slopes of the dike appear to be in satisfactory and stable condition. No significant change to the interior or exterior slopes were noted from the 2019 inspection. No significant settlement or misalignment was observed. Hog damage was observed in multiple locations. The West BAP was in service during the inspection. There were no signs of potential structural weakness or conditions which may be disrupting to the safe operation of the impoundment.

1. (Photographs 8-9) The north embankment was in satisfactory condition. The interior slope was in fair overall condition. Minor wave erosion was noted on the slope, and vegetation along the upper portion of the slope was slightly overgrown. The exterior slope was in good overall condition, and there were no signs of sloughing, seepage, or signs of instability. The slope was well vegetated and had recently been mowed.

2. (Photographs 10-12) The west embankment was in satisfactory condition. The interior slope was in fair overall condition; minor wave erosion was noted on the slope similar to rest of the pond (Photograph 11). The exterior slope was in fair overall condition, and there were no signs of sloughing, seepage, or signs of instability. Significant hog damage had occurred throughout the slope, primarily towards the southern end (Photograph 12). Mature trees are established along the downstream toe on the northern half of the embankment. An erosion gully has formed just inside the tree line, but is largely obscured from underbrush (Photograph 10). The erosion gully appears to be the result of surface runoff from the area to the south.

3. (Photographs No. 13-17) The south embankment was in satisfactory condition. The interior slope was in fair overall condition; minor wave erosion was noted on the slope similar to rest of the pond (Photograph 14). The exterior slope was in good overall condition, and there were no signs of sloughing, seepage, or signs of instability. Vegetation quality on the south exterior slope is noticeably better the west and north embankments (Photograph 15). Minor hog damage was noted in several locations on the exterior slope, typically near the crest (Photograph 16). Downstream of the toe in the southeast corner of the pond, a low area ponds water (Photograph 17). The ponded water appeared to be associated with a partially blocked culvert which drains the local runoff beneath an access embankment; this area did not appear to be the result of embankment seepage.

4. The overflow discharge structure walkway, railings, metal decking, and visible concrete appeared in satisfactory condition. Significant corrosion was observed on the outlet slide gate, frame, and stem. A varmit hole was noted in the interior slope near the walkway bridge.

Overall, the West BAP is in satisfactory condition. The impoundment is functioning as intended with no signs of potential structural weakness or conditions that would disrupt to the safe operation of the impoundment.

7.3 INSTRUMENTATION (257.83(b)(2)(ii))

The monitoring instrumentation for the West Bottom Ash Pond includes two (2) open pipe type piezometers, Piezometers W-1 and W-3. The piezometers are located in the crest areas and are flush-mount design. There is no monitoring instrumentation for the East Bottom Ash Pond.

Monitoring instrumentation data was reviewed as part of the annual inspection program for the Pirkey Bottom Ash Ponds. The maximum and minimum readings since the last annual inspection, a time period of September 2019 to October 2020, are reported below. Readings for the pond water elevation from the most recent 7-day inspection date of October 20, 2020 are also reported.

Pond Name	Crest Elevation feet msl	Boring/Piezometer	Min/Max/Oct. 20, 2020 WSEL feet msl
West Bottom Ash	357.0	W-1	323.88/330.68/323.88
West Bottom Ash	357.0	W-3	318.97/321.57/319.27

Piezometers W-1 and W-3 are in service and water level readings are measured on a monthly basis. The readings of the piezometers are in good agreement with the operating levels of the pond and are within the tolerance that would provide for a greater than minimum required stability for a facility of this type.

8.0 SUMMARY OF FINDINGS

Based on the visual observations during the inspection, the dam and appurtenances are generally in good condition. Specific conclusions related to this inspection include:

- There is no evidence of distress that would indicate the possibility of immediate sliding, slope instability, settlement, misalignment or cracking of the bottom ash pond embankments. As such, it is concluded that the dam and dikes are performing as designed.
- Overall, the slope conditions of the embankments were generally in good overall condition. Hog damage on the West BAP should be repaired.
- Vegetation management for the facilities is considered satisfactory. However, some areas have mature tree and brush vegetation near the toe and these areas should be maintained at least 25 feet from the toe of the embankment.

9.0 RECOMMENDATIONS

A summary of our recommendations for general maintenance and continued monitoring, as well as any recommendations for remedial activities, is provided as follows:

9.1 MAINTENANCE ITEMS

The following maintenance items were identified during the visual inspection:

- The partial breach of the interior ash berm at the northwest corner of the East BAP should be repaired prior to the pond being put back into service.
- The drainage ditch around the east and south sides of the East BAP should be maintained so that vegetation does become so thick that it obstructs flow.

- Areas with dense stands of tree and brush vegetation near the downstream toe should be maintained at least 25 feet from the toe of the embankment.
- The erosion gully at the downstream toe of the West BAP west embankment should be repaired and stabilized.
- Hog dam and animal burrows should be repaired.
- Given its proximity to the downstream toe of the south east corner of the West BAP, the low area which ponds water should be drained and vegetation maintained similar to the surrounding areas. The culvert beneath the access ramp may need to be cleaned out.
- In the West BAP piezometer reading spreadsheet, labels for the "Depth to Water" and "Water Level Elevation" columns should be flipped.

9.2 ITEMS TO MONITOR

- Wave erosion on the interior slopes should be routinely monitored. If the erosion progresses to the point where more substantial scarps develop that could threaten the integrity of the crest, then corrective measures will be needed.

9.3 DEFICIENCIES (257.83(b)(2)(vi))

There were no deficiencies or signs of structural weakness or disruptive conditions that were observed at the time of the inspection that would require additional investigation or remedial action. There were no deficiencies noted during any of the quarterly inspections. If any of these conditions occur before the next annual inspection contact AEP Geotechnical Engineering immediately.

If you have any questions with regard to this report, please do not hesitate to contact Murphy Parks, P.E. at (817)-735-7439 or MHP@freese.com.

APPENDIX A:

Inspection Photographs – CCR Ponds Complex

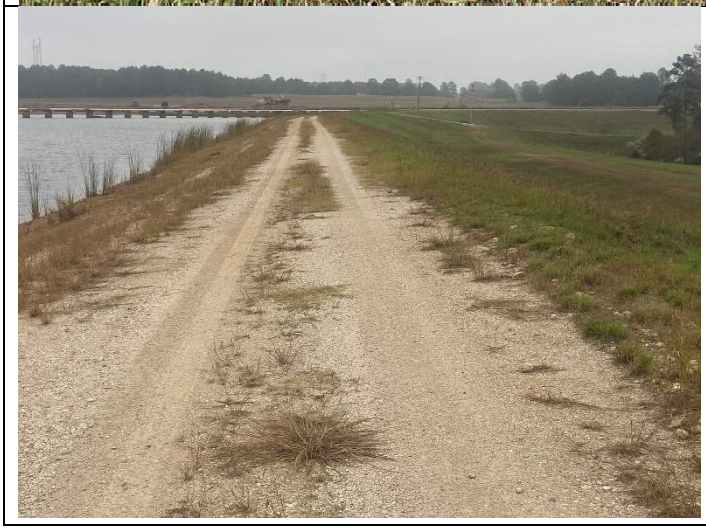
	Photograph 1: East Bottom Ash Pond View along crest of north embankment, looking east. Note pond was drained for ash material excavation. Note dense tree vegetation along downstream side of crest (left side of photo).
	Photograph 2: East Bottom Ash Pond View of northwest corner overflow pond, looking south. Arrow points to location of partial breach in the interior ash berm.
	Photograph 3: East Bottom Ash Pond View of east side of pond, looking south. Perimeter drainage ditch runs along left side of crest.

		Photograph 4: East Bottom Ash Pond View along crest and upstream slope along south side of pond, looking west. Vegetation coverage in upper section of slope is good, but needed to be mowed.
		Photograph 5: East Bottom Ash Pond View along upstream slope of shared embankment with Secondary Bottom Ash Pond (at left of photo). Ash material has been excavated from the upstream slope and bottom of pond.

	Photograph 6: East Bottom Ash Pond Ash material excavation activities near discharge structure.
	Photograph 7: East Bottom Ash Pond View of discharge structure.

		Photograph 8: West Bottom Ash Pond View along crest, looking west, of north side of pond. Crest was in good condition.
		Photograph 9: West Bottom Ash Pond View along exterior slope of north embankment, looking west. Note tree line along downstream toe.

	Photograph 10: West Bottom Ash Pond Typical view of exterior slope, looking south, along west side of pond. Slope had recently been mowed. Note tree line along downstream toe. Arrow points to location of erosion gully located just inside the tree line.
	Photograph 11: West Bottom Ash Pond Example of minor wave bite on interior slope, west side of pond.

	Photograph 12: West Bottom Ash Pond Area of significant hog damage on exterior slope of west embankment. Total extent of damage was approximately 150 yards long.
	Photograph 13: West Bottom Ash Pond View of crest of south embankment, looking east. Crest was in good overall condition.

	Photograph 14: West Bottom Ash Pond Example of minor wave erosion on interior slope of south embankment, looking east.
	Photograph 15: West Bottom Ash Pond View of exterior slope of south embankment, looking east. Note vegetation quality was better on south embankment compared to the other areas of the pond.

	Photograph 16: West Bottom Ash Pond Typical view of exterior slope of south embankment, looking west. Circled area indicates minor hog damage near the crest.
	Photograph 17: West Bottom Ash Pond Low area with ponded water at exterior toe of south embankment, southeast corner of pond. Arrow points to access embankment in the background.
	Photograph 18: West Bottom Ash Pond View of interior slope along east side of pond, looking north.

APPENDIX B:

Site Map – CCR Ponds Complex

SITE MAP: BOTTOM ASH PONDS
PIRKEY POWER PLANT