

# DAM & DIKE INSPECTION REPORT

GERs – 15 – 029

PIRKEY POWER PLANT

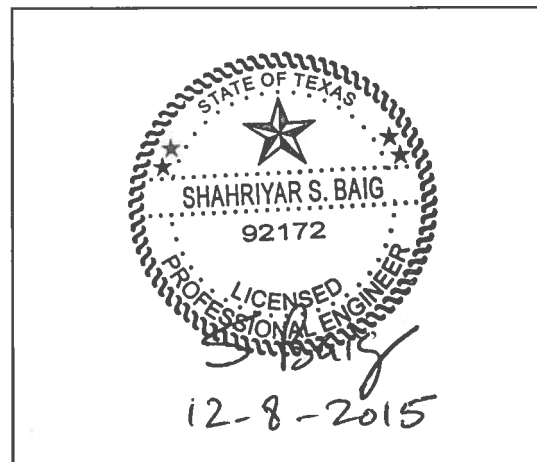
BOTTOM ASH POND COMPLEX  
AMERICAN ELECTRIC POWER  
(SWEPCO)  
HALLSVILLE, TEXAS

INSPECTION DATE September 29 & 30, 2015

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**2015 DAM & DIKE INSPECTION REPORT  
BOTTOM ASH POND COMPLEX**

**GERS-15-029  
(Rev 1)**

**PIRKEY POWER PLANT**

**AMERICAN ELECTRIC POWER  
(SWEPCO)  
HALLSVILLE, TEXAS**

**PREPARED BY  
GEOTECHNICAL ENGINEERING  
AEP SERVICE CORPORATION  
1 RIVERSIDE PLAZA  
COLUMBUS, OHIO**

**June 1, 2016  
(Rev 1)**

**ANNUAL DAM AND DIKE INSPECTION REPORT  
PIRKEY POWER PLANT  
BOTTOM ASH STORAGE PONDS  
YEAR 2015  
GERS-15-029**

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## **INTRODUCTION**

AEPSC (American Electric Power Service Corporation) Civil Engineering manages the Dam Inspection and Maintenance Program (DIMP) at AEP facilities. As part of the DIMP, staff from the Geotechnical Engineering Section conducts dam and dike inspections annually. The 2015 inspection of Designated CCR Surface Impoundments at the Pirkey Power Plant were performed by Mr. Brett A. Dreger, P.E. and Mr. William G. Carter, P.E. This report was prepared by Mr. Brett A. Dreger, P.E. and serves as a summary of the inspection and an assessment of the general conditions of the facility.

Mr. William G. Carter, P.E. of AEP Plant Engineering Region 5, was the facility contact for the inspection. The inspection was performed on September 29 & 30, 2015. Weather conditions were mostly sunny, with temperatures ranging from 70° F in the morning to 84° F in the afternoon.

### **General Information:**

#### **1. Background Information of West Bottom Ash Pond (BAP)**

The following section provides background information for the AEP H.W. Pirkey Generating Plant West BAP.

##### **1.1 Facility Location Description**

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. The West BAP CCR unit is located at the north end of the Plant and approximately 3,000 feet northwest of Brandy Branch Reservoir (**Figures 1 and 2**).

##### **1.2 Description of West BAP CCR Unit**

The following section will discuss the embankment configuration, area, volume, construction and operational history, and surface water control associated with the West BAP.

###### **1.2.1 Embankment Configuration**

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 (Sargent & Lundy, 1983). The elevation at the top of the embankment around the perimeter of the West BAP is approximately 357 feet above msl, and the normal operating level is approximately 354 feet above msl (Johnson & Pace, 2011). At the time of inspection the west bottom ash storage pond was out of service and the current pool elevation is approximately 350.5 feet amsl. The interior bottom elevation of the West BAP is approximately 347 feet above msl (Sargent & Lundy, 1983; Akron Consulting, 2012).

### **1.2.2 Area/Volume**

The West BAP is approximately 30.9 acres in size. The design maximum ash storage capacity of the West BAP is 188 acre feet at an elevation of 354 feet above msl (normal operating level) and 216.5 acre feet at an elevation of 355 feet above msl (maximum operating level) (Sargent & Lundy, 1983; Akron Consulting, 2012). Other pertinent information at the time of inspection is listed below:

#### **West Ash Pond (which had just become non-active in September 2015)**

- Approximate Minimum Depth of Ash for the Year: 0'
- Approximate Maximum Depth of Ash for the Year: 7.5'
- Approximate Average Depth of Ash for the Year: 4.5'
- Approximate Minimum Depth of Water for the Year: 4'
- Approximate Maximum Depth of Water for the Year: 7.5'
- Approximate Present Depth of Water at Inspection : 5'
- Approximate Volume of Ash in September 2015: 200,000 cubic yards
- Approximate Volume of Water in September 2015: 18 Million Gallons at Elev. 352.0

### **1.2.3 Construction and Operational History**

The H.W. Pirkey Power Plant West BAP was constructed in 1983 and 1984, and began operation in 1985. Throughout the life of the Plant, CCR materials (fly ash, bottom ash, economizer ash, flue gas desulfurization sludge) have been generated. The West BAP, which was placed into operation in 1985, receives bottom ash sluiced from the power plant boiler. Clear water overflow from the West BAP discharges into the Clearwater Pond located southeast of the West BAP. Bottom ash and economizer ash is periodically excavated from the West BAP and hauled by truck to either the on-site landfill for disposal, or sold for offsite beneficial re-use.

The base of the West BAP was constructed in 1983 with a compacted clay liner (Sargent & Lundy, 1983). Following installation of the compacted clay liner, soil borings S-8 through S-11 were advanced below the base of the West BAP to total depths of six feet in September 1983 (Southwestern Laboratories, 1984). The lithologic data from soil borings S-8 through S-11 confirm at least six feet of clay is present below the base of the West BAP (Sargent & Lundy, 1984).

### **1.2.4 Surface Water Control**

Surface water elevation in the West BAP is controlled by a weir box 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 pipe into the 2.7- acre Clearwater Pond located southeast of the West BAP. Water in the Clearwater Pond is either pumped (recirculated) back into the boiler ash hopper, or gravity discharged through a pipe at the southwest corner of the Clearwater 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. Background Information of the East Bottom Ash Pond (BAP)**

The following section provides background information for the AEP H.W. Pirkey Generating Plant East BAP.

### **2.1 Facility Location Description**

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. The East BAP CCR unit is located at the north end of the Plant and approximately 2,000 feet north-northwest of Brandy Branch Reservoir (**Figures 1 and 2**).

### **2.2 Description of East Bottom Ash Pond CCR Unit**

The following section will discuss the embankment configuration, area, volume, construction and operational history, and surface water control associated with the East BAP.

#### **2.2.1 Embankment Configuration**

The East BAP is partially incised into native soils with an embankment height of approximately 4 feet (AMEC, 2011). The East BAP embankments are constructed of compacted clay on a 3:1 slope (3 feet horizontal, 1 foot vertical) (Sargent & Lundy, 1983). The elevation of the top of the embankment around the perimeter of the East BAP is approximately 357 feet above msl, and the normal operating level is approximately 354 feet above msl (Johnson & Pace, May 2011). At the time of inspection the east bottom ash storage pond was in service and the current pool elevation is approximately 353.25 feet amsl. The interior bottom elevation of the East BAP is approximately 347 feet above msl (Sargent & Lundy, 1983; Johnson & Pace, June 2011).

#### **2.2.2 Area/Volume**

The East BAP is approximately 30.9 acres in size. The design maximum ash storage capacity of the East BAP is 188 acre feet at an elevation of 354 feet above msl (normal operating level) (Sargent & Lundy, 1983). Johnson & Pace calculated the East BAP ash storage capacity in 2011 at 161 acre feet at an elevation of 355 feet above msl (maximum operating level) (Johnson & Pace, June 2011). Other pertinent information at the time of inspection is listed below:

**East Ash Pond (which was cleaned out in Nov-Dec 2014 and was active in September 2015)**

- Approximate Minimum Depth of Ash for the Year: 0'
- Approximate Maximum Depth of Ash for the Year: 5.0'
- Approximate Average Depth of Ash for the Year: 1.0'
- Approximate Minimum Depth of Water for the Year: 2'
- Approximate Maximum Depth of Water for the Year: 5.5'
- Approximate Present Depth of Water At Inspection: 5'
- Approximate Volume of Ash in September 2015: 25,000 cubic yards
- Approximate Volume of Water in September 2015: 22 Million Gallons at Elev. 352.0

**2.2.3 Construction and Operational History**

The H.W. Pirkey Power Plant was constructed in 1983 and 1984, and began operation in 1985. Throughout the life of the Plant, CCR materials (fly ash, bottom ash, flue gas desulfurization sludge) have been generated. The East BAP, which was placed into operation in 1985, receives bottom ash sluiced from the power plant boiler. Clear water overflow from the East BAP discharges into the Clearwater Pond located directly south of the East BAP. Bottom ash is periodically excavated from the East BAP and hauled by truck to either the on-site landfill for disposal, or sold for offsite beneficial re-use.

The base of the East BAP was constructed in 1983 with a compacted clay liner (Sargent & Lundy, 1983). Following installation of the compacted clay liner, soil borings S-4 through S-7 were advanced below the base of the East BAP to total depths of six feet in September 1983 (Southwestern Laboratories, 1984). The lithologic data from soil borings S-4 through S-7 confirm at least six feet of clay is present below the base of the East BAP (Sargent & Lundy, 1984).

**2.2.4 Surface Water Control**

Surface water elevation in the East BAP is controlled by a weir box 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 pipe into the 2.7- acre Clearwater Pond located directly south of the East BAP. Water in the Clearwater Pond is either pumped (recirculated) back into the boiler ash hopper, or gravity discharged through a pipe at the southwest corner of the Clearwater Pond into an unnamed intermittent tributary of Hatley Creek via Outfall 006 in accordance with Texas Pollutant Discharge Elimination System (TPDES) Permit No. WQ0002496000.

**SUMMARY OF VISUAL OBSERVATIONS**

The summary of the visual observations presented herein 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, cracks, concrete surface 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, cracks, concrete surface etc.) where the current maintenance program has neglected to improve the condition. Usually, conditions that have been identified in previous inspections, but have not been corrected.
Excessive:	A reference to an observed item (e.g., erosion, seepage, vegetation, cracks, concrete surface etc.) where the current maintenance condition is above 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.

Results of the visual inspection performed on September 29 & 30, 2015 are summarized below. Pond water elevation is presented in the instrumentation data section of this report.

### **West Bottom Ash Pond**

At the time of inspection the west bottom ash storage pond was out of service and the current pool elevation is approximately 350.5 feet amsl. In general the downstream slopes of West Bottom Pond were in fair condition with no observed signs of seepage or instability. Most slope areas previously noted as being bare now have good vegetation cover with some sparse areas still observed on the west side. (Photographs No. 1, and No. 2). The crest and interior slopes were in fair and stable condition with no signs of instability (Photograph No. 3, 4, 5 and 6). The West Bottom Ash Pond outlet structure appeared in fair and functional condition (Photograph No. 7).

## **East Bottom Ash Pond**

At the time of inspection the east bottom ash storage pond was in service and the current pool elevation is approximately 353.25 feet amsl. The interior slopes and the crest areas of the East Bottom Ash Pond were in fair and stable condition with no signs of erosion or instability (Photograph No. 8, 9 and No. 10). The dikes of the East Bottom Ash Pond are typically 3 to 4 feet tall related to the exterior ground. A portion of the outside slope of the north embankment is heavily vegetated, but because it serves as a perimeter drainage ditch, tree removal would be detrimental from an erosion control standpoint. Also, considering the low heights of these dikes and the low pond operating level compared to the ground surface elevation at the toe, there is low risk to the integrity of the pond by leaving the vegetation in place. The rest of the exterior slopes also act as a perimeter drainage ditch with controlled vegetation cover (Photograph No. 11 and No. 12). The perimeter ditch is very flat and does hold water after heavy rains. The outlet structure appeared to be in fair and working condition (Photograph No. 13).

## **ASSESSMENT OF RECENT INSTRUMENTATION DATA**

The monitoring instrumentation for the West Bottom Ash Pond consists of the following: two (2) active piezometers located through the main embankment and toe area. Monitoring instrumentation data is collected as part of the annual inspection program for the Primary Ash Pond. The piezometer level measured during the inspection is provided below.

<u>Pond Name</u>	<u>Crest Elevation msl</u>	<u>Boring/Piezometer</u>	<u>Water Level 10/26/2015 msl</u>
West Bottom Ash	357.0	W-1	331.38
West Bottom Ash	357.0	W-3	324.07

These piezometers were originally installed several years ago during a geotechnical investigation of the embankment materials. Since that study, the piezometers became in active and no water levels were recorded. Recently, these piezometers were re-developed and put back in service and water level readings are being performed on a monthly basis.

## **CONCLUSIONS**

Based on the visual inspection, the overall condition of the Designated CCR Impoundments (East and West Bottom Ash Ponds) is fair to good. Inspection and monitoring activities being performed by the Plant and AEPSC Civil Engineering & Geotechnical Services should continue. 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 dam and levees are generally fair with the exception of gopher activity. These areas overtime can lead to significant erosion and stability problems.
- Vegetation management for the facilities is considered good. However, some areas have sparse vegetation and/or are overgrown and should be managed accordingly;

## **RECOMMENDATIONS**

Following are remedial actions, general maintenance items and monitoring requirements that are recommended as a result of the inspection. Assistance or guidance with the implementation of these items can be provided by AEPSC Civil Engineering & Geotechnical Services:

## **REMEDIAL ACTIONS**

- Areas of sparse vegetation need to be reseeded and fertilized in order to establish adequate cover on the outside slopes of the west bottom ash pond.

## **GENERAL MAINTENANCE AND MONITORING**

- Any erosion gullies, slough areas (shallow slides), and gopher disturbed areas that are encountered should be stabilized as soon as possible. Erosion gullies and slough areas may be stabilized by redressing the slope and placing rip rap or re-vegetating, depending on the slope gradients and propensity for concentrated water flow. Gopher damaged areas should be redressed in the same fashion;
- A maintenance program of seeding, fertilizing and mulching the slopes of the dam and levees should be implemented. Establishing local grass varieties will prevent erosion and could improve stability of slopes. The local U. S. Dept. of Agriculture Natural Resource Conservation Service (NRCS) office can provide suitable seed mix design for the local climate and soils;

- The slopes of the ash pond dikes should be maintained free of brush and woody vegetation (except as noted for the north embankment of the East Bottom Ash Pond);
- Monitoring procedures and maintenance activities should be implemented in coordination with AEP Geotechnical Group;
- Continue Plant inspections of the facility in accordance with the Circular Letter and CCR Rules.

Based on the inspection and review of relevant documents, AEPSC Civil Engineering believes that the Designated CCR Impoundments have a general satisfactory appearance and are in fair condition. Inspections and monitoring should continue. If you have any questions with regard to this report, please do not hesitate to contact Brett Dreger at (614) 716-2258 (Audinet-200-2258).

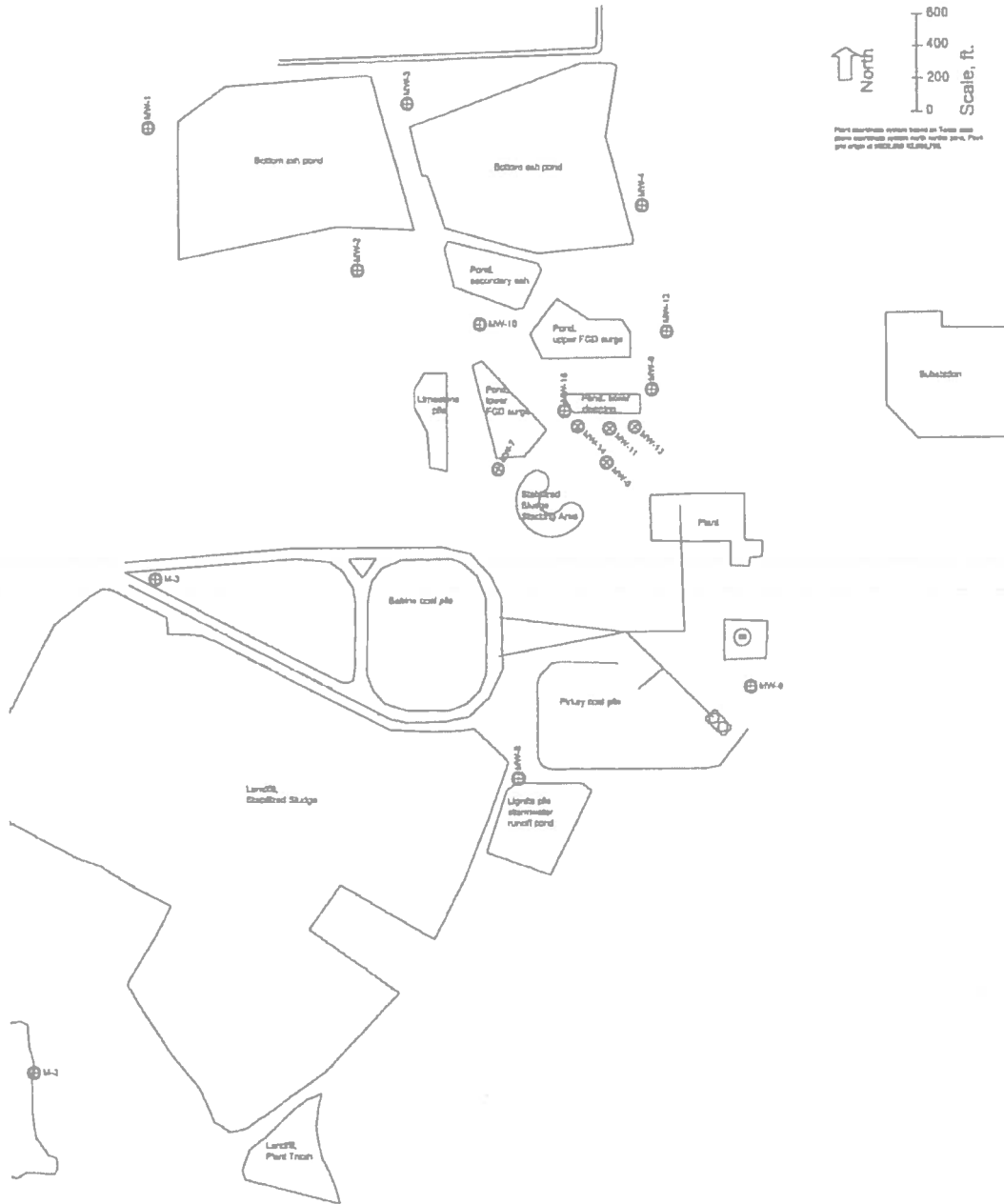
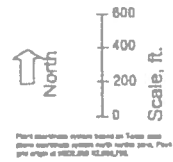


## **APPENDIX A**

### **VICINITY MAP AND PLAN VIEW**






# Pirkey Power Plant





## **APPENDIX B**

### **INSPECTION PHOTOGRAPHS**

<p>Photo # 1</p> <p>Downstream slope of West Bottom Ash Pond.</p>	 A wide-angle photograph showing a dirt path leading up a grassy and eroded slope under a cloudy sky.
<p>Photo # 2</p> <p>Downstream slope of West Bottom Ash Pond.</p>	 A photograph of a steep, eroded dirt slope with sparse vegetation, with trees visible on the right side.
<p>Photo # 3</p> <p>Typical inside slope area and crest conditions West Bottom Ash Pond.</p>	 A photograph showing a gravel path in the foreground, a grassy slope, and a body of water under a blue sky.





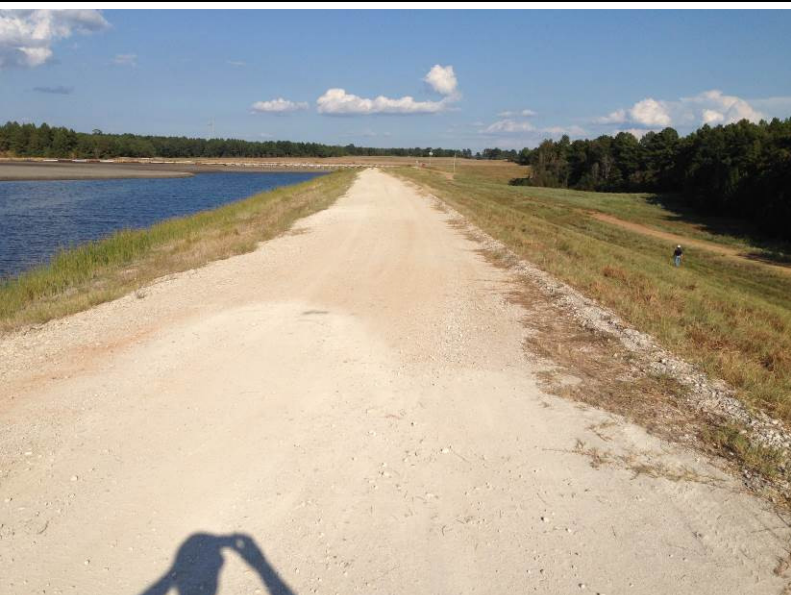
<p>Photo # 4</p>	 A photograph showing the interior slope of the West Bottom Ash Pond. The slope is covered in dry, brownish grass and some reeds. A gravel path runs along the top of the slope, and a person is visible walking on it in the distance. The pond water is visible on the left side of the slope.
<p>Interior slope of West Bottom Ash Pond.</p>	
<p>Photo # 5</p>	 A photograph showing a typical crest area of the West Bottom Ash Pond. A wide, gravel-covered path runs along the crest of the dike. The path is flanked by dry grass and some trees. The pond water is visible on the left side of the path.
<p>Typical crest area of the West Bottom Ash Pond.</p>	
<p>Photo # 6</p>	 A photograph showing a typical crest area of the West Bottom Ash Pond. A wide, gravel-covered path runs along the crest of the dike. The path is flanked by dry grass and some trees. The pond water is visible on the left side of the path. The shadow of the person taking the photo is visible in the foreground.
<p>Typical crest area of the West Bottom Ash Pond.</p>	



Photo # 7

Interior West Bottom Ash Pond outlet structure.



Photo # 8

Typical interior condition of East Bottom Ash Pond.



Photo # 9

Interior slope condition of East Bottom Ash Pond.








<p>Photo # 10</p>	
<p>Crest area of East Bottom Ash Pond.</p>	
<p>Photo # 11</p>	
<p>Crest area and exterior perimeter ditch of East Bottom Ash Pond.</p>	
<p>Photo # 12</p>	
<p>Crest and perimeter ditch of east Bottom Ash Pond.</p>	



Photo # 13

East Bottom Ash Pond outlet structure.



Photo # 14

Interior slope conditions of Secondary Ash Pond.



Photo # 15

Interior slope of Secondary Ash Pond showing discharge pipes from various sources.



Photo # 16

Typical interior slope conditions of Secondary Ash Pond.



Photo # 17

Typical crest conditions of Secondary Ash Pond.

