

**2017 ANNUAL CCR UNIT INSPECTION REPORT  
LUMINANT BIG BROWN STEAM ELECTRIC STATION  
NORTH AND SOUTH ASH PONDS & ASH DISPOSAL AREA II  
FREESTONE COUNTY, TEXAS**

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**TABLE OF CONTENTS**

	<u>Page</u>
LIST OF FIGURES .....	iii
LIST OF APPENDICES .....	iii
1.0 INTRODUCTION .....	1
1.1 BSES Units Subject to Annual CCR Inspection Requirements .....	1
1.2 Annual CCR Surface Impoundment Inspection Requirements .....	3
1.3 Annual CCR Landfill Inspection Requirements .....	5
2.0 RECORDS REVIEW.....	6
2.1 CCR Unit Fugitive Dust Control Plan .....	6
2.2 Weekly Qualified Person Inspection Records .....	6
2.3 CCR Unit Design and Construction Documentation .....	7
2.4 2015 and 2016 Annual CCR Inspection Reports .....	7
3.0 CCR SURFACE IMPOUNDMENT INSPECTION .....	10
3.1 Surface Impoundment – Downstream Embankments.....	10
3.2 Surface Impoundment – Embankment Crest .....	11
3.3 Surface Impoundment – Upstream Embankments.....	11
3.4 CCR Impoundment Volumes.....	11
4.0 CCR LANDFILL INSPECTION.....	12
4.1 Perimeter Embankments .....	12
4.2 Landfill Cap .....	13
4.3 Active CCR Placement Areas .....	13
4.4 Storm Water and Contact Water Controls .....	14
5.0 SUMMARY OF FINDINGS .....	15
5.1 Visual Observation of Embankment Alignments .....	15
5.2 Visual Observations of Structural Integrity .....	15
5.3 CCR Unit Volumes at Time of Inspection.....	15
6.0 RECOMMENDATIONS .....	17
7.0 REFERENCES .....	18

**LIST OF FIGURES**

<u>Figure</u>	<u>Title</u>
1	Site Location Map
2	Site Vicinity Map
3	Annual Inspection Findings Summary Map - North and South Bottom Ash Ponds
4	Annual Inspection Photograph Log - North and South Bottom Ash Ponds
5	Annual Inspection Findings Summary Map - Ash Disposal Area II
6	Annual Inspection Photograph Log - Ash Disposal Area II

**LIST OF APPENDICES**

<u>Appendix</u>	<u>Title</u>
A	Photographs – Bottom Ash Ponds
B	Photographs – Ash Disposal Area II

LUMINANT

## 1.0 INTRODUCTION

Luminant Generation Company, LLC (Luminant) operated the Big Brown Steam Electric Station (BBSES) located approximately 10 miles northeast of Fairfield, Freestone County, Texas (see Figure 1). The BBSES consists of two coal/lignite-fired units with a combined operating capacity of approximately 1,150 megawatts. Coal Combustion Residuals (CCR) including fly ash, bottom ash and boiler slag are generated as part of BBSES unit operation. The CCRs are transported off-site for beneficial use by third-parties or are managed/disposed of by Luminant at the BBSES. Bottom ash is typically managed via mine placement in Area C of the nearby Luminant mine.

The CCR Rule (40 CFR 257 Subpart D - *Standards for the Receipt of Coal Combustion Residuals in Landfills and Surface Impoundments*) has been promulgated by EPA to regulate the management and disposal of CCRs as solid waste under Resource Conservation and Recovery Act (RCRA) Subtitle D. The final CCR Rule was published in the Federal Register on April 17, 2015. The effective date of the CCR Rule was October 19, 2015.

The CCR Rule establishes operating criteria for existing CCR surface impoundments and landfills, including annual inspection requirements for all CCR units to ensure that the design, construction, operation, and maintenance of the CCR units are consistent with recognized and generally accepted good engineering standards. Pastor, Behling & Wheeler, LLC (PBW) was retained by Luminant to perform the 2017 annual inspection of the CCR units at the BBSES. This report presents the findings of the 2017 annual inspection.

### 1.1 BBSES Units Subject to Annual CCR Inspection Requirements

The CCR Rule defines coal combustion residuals such as fly ash, bottom ash, boiler slag, flue gas desulfurization (FGD) materials (gypsum), and related solids generated from burning coal for the purpose of generating electricity by electric utilities and independent power producers. The annual inspection requirements of the CCR Rule apply to surface impoundments and landfills that dispose or otherwise engage in solid waste management of CCRs.

A site plan for the BBSES is shown on Figure 2. The following surface impoundments and landfills at the BBSES have been identified as CCR Units:

- North Bottom Ash Pond (NBAP) – surface impoundment;

- South Bottom Ash Pond (SBAP) – surface impoundment; and
- Ash Disposal Area II - landfill.

These CCR Units addressed in this report are described in greater detail below:

- Bottom Ash Ponds. The NBAP and SBAP (collectively “Bottom Ash Ponds” or “BAPs”) are located approximately 1,500 feet northwest of the BBSES power plant (PBW, 2016b). The BAPs share an interior embankment and are each approximately 250 feet wide, covering an area of approximately 8 acres each. The crest elevation of the BAP embankments is approximately 350 feet MSL.

Recovered sluice water, process waters and storm water runoff from the BBSES ash-water system are pumped to each pond through a series of above grade pipes on the east end. The BAPs are constructed partially above and partially below grade and all material that enters the ponds is pumped into the impoundments – there are no gravity discharges to the BAPs.

The BAPs do not have an emergency spillway. Decanted water is returned to the power plant for use in the bottom ash system. When sufficient bottom ash has accumulated in one pond, the bottom ash slurry is diverted to the other pond. Bottom ash in the active pond is then removed and transported via truck to the nearby Luminant mine for placement in Area C or other beneficial use.

The NBAP and the SBAP are each approximately 1,400 feet long by 250 feet wide. The BAPs are surrounded by engineered earthen embankments that extend approximately 14 to 21 feet above grade depending on the surrounding topography. The exterior slopes of the embankments are vegetated with grasses and similar vegetation.

The BAPs were originally constructed in the late 1960s and were relined with a 3-foot thick clay liner in 1989-1990. As-built engineering drawings indicate that the clay liner has a permeability of  $<1 \times 10^{-7}$  cm/sec.

The bottom of the BAPs is located at approximately 328 feet MSL and the crest elevation of the earthen embankments is approximately 350 feet MSL. The design operating fluid/CCR level in the BAPs is approximately 347 feet MSL (approximately 3 feet below the crest of the perimeter embankments). The BAPs are classified as a low hazard potential impoundment in accordance with the requirements of 40 CFR 257.73(a)(2) of the CCR Rule.

- Ash Disposal Area II. Ash Disposal Area II is located approximately 3,500 feet northeast of the BBSES power plant (PBW, 2016c). Ash Disposal Area II is the primary disposal facility for CCRs generated at the BBSES.

Ash Disposal Area II covers an area of approximately 240 acres and consists of ten active landfill cells (Cells 1 through 10) on the east side, one landfill cell that has been constructed but not yet used (Cell 11), and an area sufficient for nine future landfill cells (Cells 12 through 20) on the west side. Cells 1 through 5 were constructed in sequence beginning in approximately 1987 and Cells 6 through 11 were constructed in sequence beginning in approximately 1992.

The landfill is constructed partially above and partially below grade and is surrounded by engineered earthen embankments that extend approximately 10 to 15 feet above the surrounding grade. Cells 1 through 11 have a 3-foot thick compacted clay liner.

As of 2017, the majority of the surface areas of Cells 1 through 8 have been covered with either a permanent clay cap or a temporary soil cap. The permanent clay cap covers an area of approximately 17.5 acres along the west side of the landfill and also a small portion of the north side of the landfill. The permanent clay cap consists of a minimum 3-foot thick compacted clay liner with a hydraulic conductivity of  $1 \times 10^{-7}$  cm/sec or less topped by a minimum 18" thick vegetative soil layer. The temporary soil cap covers an area of approximately 75 acres and varies in thickness from approximately 10 to 24 inches of sandy clay. Vegetation has been established on both of temporary and permanent cap areas.

During 2017, CCR placement occurred in the non-capped portions of Cells 1-8 and in Cells 9 and 10. Cell 10 was used for temporary contact water containment during 2017. Cell 11 was used temporarily in 2016 to contain a small amount of ash contact water, but all contact water has been removed and no wastewater was placed in Cell 11 in 2017.

## **1.2 Annual CCR Surface Impoundment Inspection Requirements**

Section 257.83(b) of the CCR Rule specifies that annual inspections by a qualified professional engineer be performed for each CCR surface impoundment that: (1) has a dike height of five feet or more and a storage volume of 20 acre-feet or more; or (2) has a dike height of 20 feet or more. The NBAP and SBAP are surface impoundments surrounded by earthen embankments (dikes) with heights of five feet or more and the BAPs have a storage volume greater than 20 acre-feet. As a result, the BAPs are subject to the annual inspection requirements of Section 257.83(b) of the CCR Rule.

The annual CCR surface impoundment inspection must include the following:

- A review of available information regarding the status and condition of the CCR unit, including files available in the operating record, such as CCR unit design and construction information required by Sections 257.73(c)(1) and 257.74(c)(1), previous periodic structural stability assessments required under Sections 257.73(d) and 257.74(d), the results of inspections by the qualified person as required under Section 257.83(a), and the results of previous annual CCR inspections (where applicable).
- A visual inspection of the CCR unit to identify signs of distress or malfunction of the impoundment and appurtenant structures, and
- A visual inspection of any hydraulic structures underlying the base of the impoundment or passing through the dike of the impoundment for structural integrity and continued safe and reliable operation.

The qualified professional engineer must prepare a report following each inspection that addresses the following:

- Any changes in geometry of the impounding structure since previous annual inspection;

- The location and type of existing instrumentation and the maximum recorded readings of each instrument since the previous annual inspection;
- The approximate minimum, maximum, and present depth and elevation of the impounded water and CCR since the previous annual inspection;
- The storage capacity of the impounding structure at the time of the inspection;
- The approximate volume of the impounded water and CCR at the time of the inspection;
- Any appearances of actual or potential structural weakness of the impoundment, in addition to any existing conditions that are disrupting or have the potential to disrupt the operation and safety of the impoundment and appurtenant structures; and
- Any other change(s) which may have affected the stability or operation of the impounding structure since the previous inspection.

The first annual CCR inspection for the BAPs was performed in 2015 (PBW, 2016a). A 2016 annual CCR inspection would have been required for the BAPs in accordance with Section 257.83(b); however, CCR Rule Section 257.83(b)(4)(ii) states the following regarding annual inspection requirements for surface impoundments:

*(ii) In any calendar year in which both the periodic inspection by a qualified professional engineer and the quinquennial (occurring every five years) structural stability assessment by a qualified professional engineer required by Sections 257.73(d) and 257.74(d) are required to be completed, the annual inspection is not required, provided the structural stability assessment is completed during the calendar year...*

A five-year structural stability assessment was performed for the NBAP and SBAP during 2016 by Golder Associates as required under CCR Rule Section 257.73(d) (Golder, 2016). Since the five-year structural stability assessment was performed for the NBAP and SBAP during 2016, a 2016 annual inspection was not performed for the NBAP and SBAP in accordance with CCR Rule Section 257.83(b)(4)(ii).

### **1.3 Annual CCR Landfill Inspection Requirements**

Section 257.84(b) of the CCR Rule specifies that annual inspections be performed for CCR landfills by a qualified professional engineer. The annual CCR landfill inspection must include a review of available information regarding the status and condition of the CCR landfill including files available in the operating record, such as the results of inspections by the qualified person as required under Section

257.84(a), and the results of previous annual CCR inspections (where applicable) and visual inspection of the CCR landfill to identify signs of distress or malfunction of the landfill. The qualified professional engineer must prepare a report following each inspection that addresses the following:

- Any changes in geometry of the structure since the previous annual inspection;
- The approximate volume of CCR in the landfill at the time of the inspection;
- Any appearances of an actual or potential structural weakness of the CCR unit, in addition to any existing conditions that are disrupting or have the potential to disrupt the operation and safety of the CCR unit; and
- Any other change(s) which may have affected the stability or operation of the CCR unit since the previous annual inspection.

Ash Disposal Area II is classified as an Existing CCR Landfill under the CCR Rule and is therefore subject to the annual inspection requirements of Section 257.84(b). Annual CCR inspections for Ash Disposal Area II were performed in 2015 and 2016 (PBW, 2016a; PBW, 2017).



## **2.0 RECORDS REVIEW**

In accordance with the requirements of 40 CFR Part 257.84(b)(i), PBW reviewed the following information from the facility operating records for Ash Disposal Area II at the BSEES:

- Fugitive Dust Control Plan (FDCP),
- 2016 BSEES Annual Dust Control Report (ADCR),
- Weekly qualified person inspection records,
- Historical CCR unit design and construction documentation, and
- 2015 and 2016 Annual CCR Inspection Reports.

### **2.1 CCR Fugitive Dust Control Plan**

The CCR FDCP for the BSEES dated October 2015 and the 2016 BSEES ADCR were reviewed by PBW as part of the annual CCR inspection (Luminant, 2015). The FDCP was certified by a Registered Professional Engineer on October 5, 2015, and placed into the operating record on October 19, 2015. The BSEES CCR FDCP includes the following dust control measures:

- Water spray or fogging systems;
- Compaction;
- Vegetative cover; and
- Reduced vehicle speeds.

The FDCP is implemented during periodic removal of CCR solids from the BAPs. Controls are also in place at Ash Disposal Area II to comply with the FDCP during placement of CCR. In addition, during loading of fly ash at the BSEES power plant, the material is conditioned during the loading process to mitigate fugitive dust. The FDCP includes provisions to amend the plan as necessary, and the plan includes a log for citizen complaints. No citizen complaints were recorded on the 2016 BSEES ADCR.

### **2.2 Weekly Qualified Person Inspection Records**

Weekly inspections of CCR Units by a qualified person are required under Section 257.84(a) of the CCR Rule. Weekly CCR qualified person inspections of the BAPs and Ash Disposal Area II were performed throughout 2017.

PBW reviewed the weekly qualified person inspection from November and December 2016 and January 2017 through the date of the annual inspection by PBW. Items identified for monitoring or action at each CCR Unit during the 2017 weekly qualified person inspections can be summarized as follows:

- NBAP and SBAP:
  - Monitor minor feral hog damage.
- Ash Disposal Area II:
  - Monitor minor feral hog damage;
  - Monitor/repair interior slope erosion on face of Cell 10 embankment; and
  - Monitor/repair cap erosion in Cells 1-8 area.

The overall status of the BAPs and Ash Disposal Area II was reported as “satisfactory” during all weekly qualified person inspections. No conditions with the potential to result in structural weakness of the impoundment embankments or that could potentially disrupt the operation and safety of the impoundments were reported. Recommended action items were limited to routine maintenance of access roads, erosion and animal burrows that do not currently have the potential to result in structural weakness or disrupt the operation and safety of the impoundments and landfill.

### **2.3 CCR Unit Design and Construction Documentation**

PBW reviewed the following documents that included information concerning the design and construction of the BAPs and Ash Disposal Area II:

- CCR Closure Plan - Big Brown Steam Electric Station Ash Disposal Area II, Freestone County, Texas. October (PBW, 2016b)
- CCR Closure Plan - Big Brown Steam Electric Station North and South Bottom Ash Ponds, Freestone County, Texas. October (PBW, 2016c)
- Certification of Liner Construction - Big Brown Steam Electric Station North and South Bottom Ash Ponds, Freestone County, Texas. October (PBW, 2016d)
- History of Construction - Big Brown Steam Electric Station North and South Bottom Ash Ponds, Freestone County, Texas. October (PBW, 2016e)

Descriptions of the design and construction characteristics for the BAPs and Ash Disposal Area II are presented in Section 1.1 of this annual report.

### **2.4 2015 and 2016 Annual CCR Inspection Reports**

Annual CCR inspections for Ash Disposal Area II were performed in 2015 and 2016 (PBW, 2016a; PBW, 2017). An annual CCR inspection for the BAPs was performed in 2015 (PBW, 2016a); however,

as described in Section 1.2 of this report, an annual CCR inspection was not performed for the BAPs in 2016, since the five-year structural stability assessment was performed for the BAPs during 2016 (Golder, 2016).

As a result, PBW reviewed the 2015 Annual CCR Inspection Report for the BAPs and the 2016 Annual CCR Inspection Report for Ash Area II. The recommendations from the previous Annual CCR Inspection Reports regarding the BAPs (2015) and Ash Disposal Area II (2016) and the status of activities to address the recommendations at the time of the 2017 Annual CCR Inspection can be summarized as follows:

### **BAPs**

<b>Recommendation from 2015 Annual BAP CCR Inspection</b>	<b>Status at Time of 2017 Annual CCR Inspection</b>
Severe erosion was observed on the upstream embankment on the east side of the NBAP, near the ash slurry piping platform. A section of concrete near the platform had been undermined and the clay liner of the impoundment was visible in these areas. These areas should be repaired and provided with rock rip rap or other erosion control material.	This area has been repaired. No further action is necessary.
Minor areas of erosion were observed on the upstream embankment on the west side of both BAPs, near the piers. These areas should be monitored and rock rip rap or other erosion control material should be placed in these areas if the erosion becomes worse.	Rock rip rap has been placed along the waterline on the interior slopes of all NBAP and SBAP embankments. No further action is necessary.
Monitor the small area of feral hog damage on the north embankment of the NBAP.	This area has been repaired. No further action is necessary.
Monitor the area of small animal burrows observed on the north embankment of the NBAP and repair with compacted clay fill or similar material if necessary.	A small number of minor animal burrows were observed in this area. This area is monitored as part of the weekly inspections and repairs are completed as necessary.
Monitor the wet areas observed near the toe of the embankment slopes to allow for identification of potential seepage during weekly inspections performed during seasonally dry periods.	Wet areas were not visible in this area during the weekly inspections or the annual inspection. No further action is necessary.

**Ash Area II**

<b>Recommendation from 2016 Annual Ash Area II CCR Inspection</b>	<b>Status at Time of 2017 Annual CCR Inspection</b>
Significant erosion was observed in several areas on the interior slope face of the Cell 10 embankment, along the south side. These areas should be repaired and provided with rock rip rap or other erosion control material as necessary.	The erosion on the interior slope face of the south Cell 10 embankment had been repaired. No further action is necessary.
Minor erosion was observed along the interior slope face of the north, east and west embankments of Cell 11. These areas should continue to be monitored and repaired as necessary.	Moderate erosion was observed along the interior slope face of the west side of the Cell 11 embankment. This area of erosion should be repaired.
Small areas of feral hog damage and minor surficial erosion were observed along the north side of capped Cells 1-8. These areas should be monitored and repaired as necessary.	The small areas of feral hog damage and minor surficial erosion along the north side of capped Cells 1-8 have been repaired. No further action is necessary.

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### **3.0 CCR SURFACE IMPOUNDMENT FIELD INSPECTION**

The 2017 annual inspection of the BBSES CCR surface impoundments was performed on October 10, 2017. Patrick J. Behling, a registered professional engineer in the State of Texas, was accompanied by Luminant a qualified person during the inspection (Joe Hubbert). The inspection consisted of a walking visual survey of the downstream embankments, the embankment crest, and upstream embankments of the BAPs to identify potential areas of concern (if present) that could affect structural integrity or disrupt operation of the impoundment. BAP conditions observed during the 2017 inspection were compared to conditions reported from the most recent annual inspection (2015) to identify changes in geometry of the structure.

Figure 3 summarizes the field observations from the inspections of the BAPs. Photographs of the surface impoundments taken during the annual inspection are included as Appendix A. Figure 4 illustrates the location where photographs were taken during the inspection. The following sections summarize the results of the initial annual inspection, including specific observations related to the structural elements of the BAPs.

#### **3.1 Surface Impoundments – Downstream Embankments**

The downstream embankments of the BAPs were generally in good condition and no visual evidence of slope movement or misalignment was noted during the inspection. The embankments were well vegetated with grasses that had been mowed to a height sufficient for visual inspection of the embankment condition.

Surface conditions near the BAPs were generally dry and in good condition. As indicated on Figure 3, the following areas were noted for future monitoring or repair:

- Monitor the area of small animal burrows observed on the north embankment of the NBAP and repair with compacted clay fill or similar material if necessary.

The below grade valve box located immediately west of the SBAP was also inspected during the annual inspection. No evidence of seepage or leakage around/through the subsurface piping running from the impoundments to the valve box was observed.

### **3.2 Surface Impoundments – Embankment Crest**

The majority of the embankment crest is improved with a crushed aggregate access road. The access roads are generally in good condition. As indicated on Figure 3, the following areas were noted for future monitoring or repair:

- Monitor the limited area of minor rutting observed on the crest of the north embankment of the NBAP and repair as necessary.

No visual evidence of slope failures or misalignments were noted on the crests of the embankments.

### **3.3 Surface Impoundments – Upstream Embankment**

The upstream embankments of the BAPs were generally in good condition and no visual evidence of slope failures or misalignments was noted. No upstream embankment areas were noted for repair.

### **3.4 CCR Surface Impoundment Volumes**

BBSSES staff monitor fluid levels in the BAPs on a regular basis. At the time of the annual inspection, the level of fluid/CCR in both BAPs was approximately 347 feet MSL (approximately 3 feet below the crest of the perimeter embankments). A digital topographic plan of the BAPs was created using as-built engineering drawings for the ponds as part of the History of Construction Report prepared in 2016 (PBW, 2016e). Based on this topographic plan and using a design operating elevation of 347 feet MSL, the design operating capacity of the NBAP is approximately 40,000,000 gallons (123 acre-ft) and the design operating capacity of the SBAP is approximately 39,700,000 gallons (122 acre-ft).

Soundings performed in the NBAP and SBAP by Luminant personnel in May 2017 estimated the volumes of CCR solids present in each pond to be as follows:

- CCR Solids in NBAP: 53,800 CY
- CCR Solids in SBAP: 34,500 CY

#### **4.0 CCR LANDFILL FIELD INSPECTION**

The 2017 annual inspection of Ash Disposal Area II was performed on October 10, 2017. Patrick J. Behling, PE, a registered professional engineer in the State of Texas, was accompanied by a Luminant qualified person during the inspection (Joe Hubbert).

Ash Disposal Area II consists of eight partially closed landfill cells (Cells 1-8), two active landfill cells (Cells 9 and 10), one landfill cell that has been constructed but not yet used for CCR placement (Cell 11), and nine future landfill cells (Cells 12 through 20) on the western side. The inspection consisted of a walking visual survey of the embankments, CCR placement areas, and storm water/contact water control in Cells 10 and 11 and a driving survey of the partially capped landfill cells. Figure 5 summarizes the field observations from the inspection of Ash Disposal Area II. Photographs of the landfill taken during the annual inspection are included as Appendix B and Figure 6 illustrates the location where the photographs were taken. The following sections present the results of the annual inspection, including specific observations related to the structural elements of Ash Disposal Area II.

The inspection requirements for CCR landfills include a review of the design, construction, operation and maintenance of the landfill to determine if the CCR unit meets generally accepted good engineering practice. The primary objective of the visual inspection of Ash Disposal Area II was to identify any evidence of actual or potential structural weakness of the CCR unit, including conditions that are disrupting or have the potential to disrupt the operation and safety of the CCR unit. Landfill conditions observed during the 2017 inspection were compared to conditions reported from the 2016 inspection to identify changes in geometry of the structure.

##### **4.1 Perimeter Embankments**

The embankments surrounding Ash Disposal Area II were generally in fair/good condition. Consistent with the weekly qualified person inspections performed during 2017, no evidence of slope movements or misalignments that have potential to affect the structural integrity of the perimeter embankments around the landfill were noted.

The embankments around the partially capped cells (Cells 1-8) were mostly well vegetated and no visual evidence of slope failures or misalignments was noted in these areas.

As indicated on Figure 5, the following areas were noted for future monitoring or repair on the embankments around Cells 10 and 11:

- Heavy vegetation was observed in areas along the interior face of the permanent embankment on the south side of Cell 10. It is recommended that the vegetation in this area be cut/maintained to reduce the potential for liner/embankment damage due to shrub/tree roots.
- Moderate erosion was observed along the interior slope face of the west embankment of Cell 11. This area should be repaired.
- Minor erosion was observed along the interior slope face of the north and east embankments of Cell 11. These areas should continue to be monitored and repaired as necessary.
- A small area of feral hog damage was observed along the top of the interior slope face of the west embankment of Cell 11. This area should be monitored and repaired as necessary.

#### 4.2 Landfill Cap

The capped portions of Cells 1-8 appear to be adequately vegetated with limited areas of erosion. Small areas of feral hog damage and minor surficial erosion were observed along the north side of capped Cells 1-8. These areas should be monitored and repaired as necessary.

Two soil borrow piles were observed on top of the capped areas of Cells 1-8: one near the northeast corner and one near the southwest corner. The borrow piles have been vegetated to control erosion and no significant evidence of erosion was observed in these areas.

#### 4.3 Active CCR Placement Areas

During 2017, CCR placement occurred in the non-capped portions of Cells 1-8 and in Cells 9 and 10. Based on estimates provided by Luminant, the approximate quantities of CCR placed in Ash Disposal Area II from 2015 (the year of the initial CCR Annual Inspection) through September 2017 are as follows:

Year	CCR Placed (Tons)
2015	39,665
2016	37,500
2017	15,870
<b>Total</b>	<b>93,038</b>



#### **4.4 Storm Water and Contact Water Controls**

Storm water is diverted off the capped portions of Cells 1-8 to adjacent surface water ditches. Contact water from the active areas of the landfill is temporarily contained in Cells 10 and 11 and is allowed to evaporate, is pumped to the BBSES power plant for consumptive use, or is sprayed on the active portions of the landfill for dust control. No evidence of problems associated with the storm water and contact water controls at Ash Disposal Area II were observed during the inspection.

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## 5.0 SUMMARY OF FINDINGS

The findings of the 2017 annual inspection of the Ash Disposal Area II at the BBSES are summarized herein. Luminant qualified persons responsible for the weekly inspections accompanied PBW during the annual inspection to ensure that observed conditions did not represent a change in geometry since previous inspection or have the potential to disrupt operation and safety of the CCR units.

### 5.1 Visual Observation of Embankment Alignments

- Bottom Ash Ponds. Consistent with the 2015 annual CCR inspection performed on behalf of Luminant, previous structural integrity evaluations, and completed weekly inspections, no evidence of slope movements or misalignments that have potential to affect the structural integrity of the surface impoundment embankments were noted.
- Ash Disposal Area II. Consistent with the 2016 annual CCR inspection performed on behalf of Luminant and completed weekly inspections, no evidence of slope movements or misalignments that have potential to affect the structural integrity of the landfill were noted.

### 5.2 Visual Observations of Structural Integrity

- Bottom Ash Ponds. No conditions were observed during the annual inspection that indicates an actual or potential structural weakness of the BAPs is present. No changes in geometry of the structure were noted with respect to conditions documented in the 2015 CCR Annual Inspection Report. In addition, conditions observed during the annual inspection indicate that a disruption or the potential for disruption of the operation and safety of the CCR unit is not currently anticipated. A review of weekly inspections completed to date by Luminant and the completion of the annual inspection suggest that no changes that may affect the stability or operation of the impounding structure have been observed.
- Ash Disposal Area II. No conditions were observed during the 2017 annual inspection that indicate an actual or potential structural weakness of the perimeter embankments surrounding Ash Disposal Area II. No changes in geometry of the structure were noted with respect to conditions documented in the 2016 CCR Annual Inspection Report. In addition, conditions observed during the annual inspection indicate that a disruption or the potential for disruption of the operation and safety of the CCR unit is not currently anticipated. A review of weekly inspections completed to date by Luminant and the completion of this annual inspection did not identify any changes that may affect the stability or operation of the landfill.

### 5.3 CCR Unit Volumes at Time of Inspection

- North Bottom Ash Pond
  - Operating Capacity: 40,000,000 gallons
  - CCR Solids: 53,800 cubic yards

- South Bottom Ash Pond

- Operating Capacity: 39,700,000 gallons
- CCR Solids: 34,500 cubic yards

- Ash Disposal Area II

- Based on estimates provided by Luminant, the approximate quantities of CCR placed in Ash Disposal Area II from 2015 (the year of the initial CCR Annual Inspection) through September 2017 are as follows:

<b>Year</b>	<b>CCR Placed (Tons)</b>
2015	39,665
2016	37,500
2017	15,870
<b>Total</b>	<b>93,038</b>

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## 5.0 RECOMMENDATIONS

The following recommendations are based on the results of the 2017 annual CCR inspection of Ash Disposal Area II:

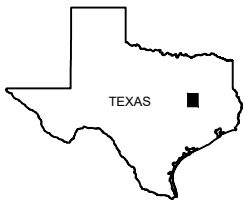
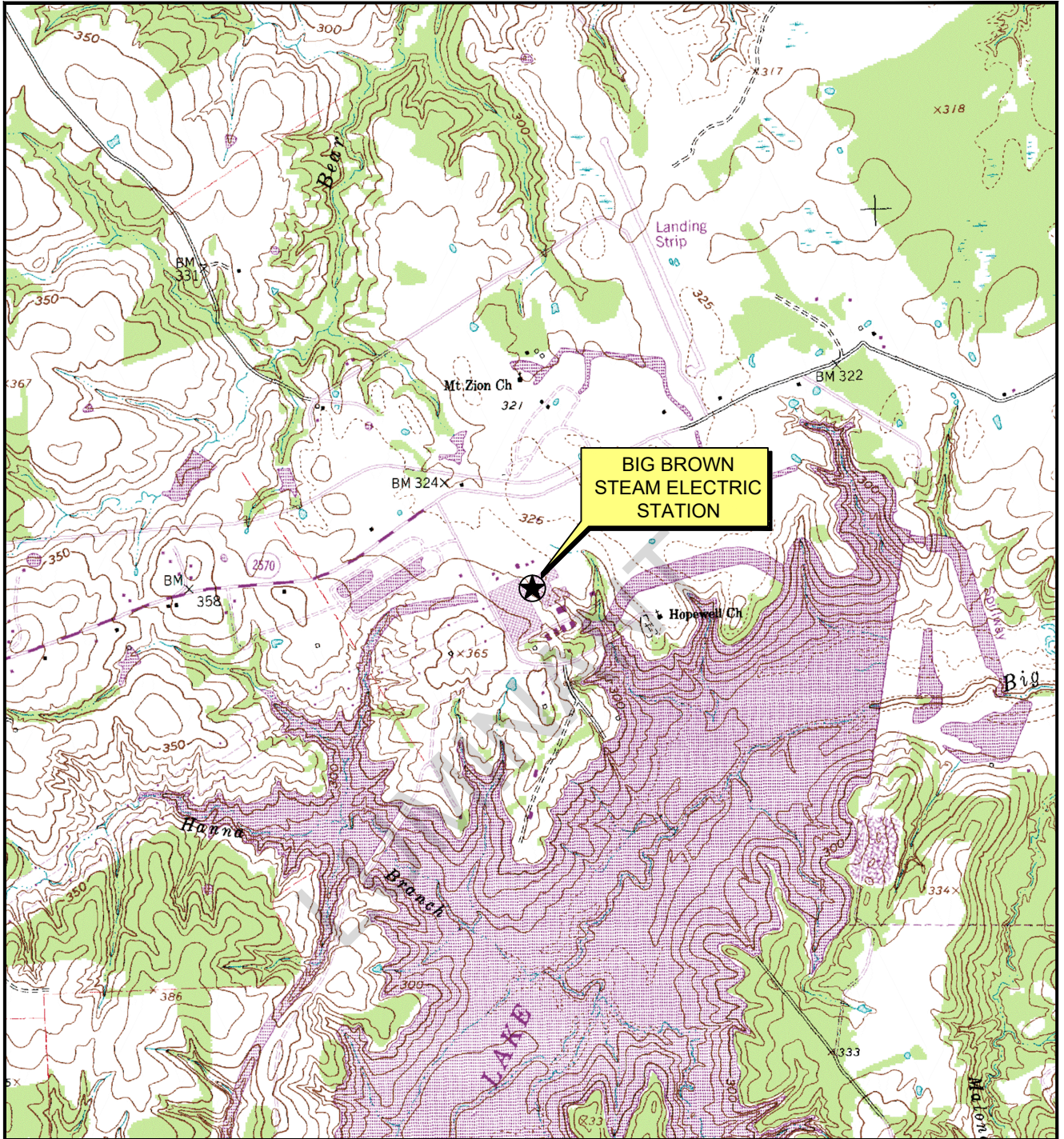
- BAPs - Monitor the area of small animal burrows observed on the north embankment of the NBAP and repair with compacted clay fill or similar material if necessary.
- BAPs - Monitor the limited area of minor rutting observed on the crest of the north embankment of the NBAP and repair as necessary.
- Ash Disposal Area II - Heavy vegetation was observed in areas along the interior face of the permanent embankment on the south side of Cell 10. It is recommended that the vegetation in this area be cut/maintained to reduce the potential for liner/embankment damage due to shrub/tree roots.
- Ash Disposal Area II - Moderate erosion was observed along the interior slope face of the west embankment of Cell 11. This area should be repaired.
- Ash Disposal Area II - Minor erosion was observed along the interior slope face of the north and east embankments of Cell 11. These areas should continue to be monitored and repaired as necessary.
- Ash Disposal Area II - A small area of feral hog damage was observed along the top of the interior slope face of the west embankment of Cell 11. This area should be monitored and repaired as necessary.
- This annual inspection report should be completed by filing the report in the operating record of the BBSES no later than January 18, 2018.
- The 2018 annual inspection of the BAPs and Ash Disposal Area II should be performed in October/November 2018.

## 6.0 REFERENCES

- Golder Associates (Golder), 2016. Structural Stability Assessment Report – Big Brown Steam Electric Station, October.
- Luminant, 2015. CCR Fugitive Dust Control Plan – Big Brown Steam Electric Station, October 5.
- Pastor, Behling & Wheeler, LLC (PBW), 2017. 2016 Annual CCR Unit Inspection Report - Big Brown Steam Electric Station Ash Disposal Area II, January 13.
- PBW, 2016a. 2015 Annual CCR Unit Inspection Report - Big Brown Steam Electric Station North and South Ash Ponds & Ash Disposal Area II, January 14.
- PBW, 2016b. CCR Closure Plan - Big Brown Steam Electric Station Ash Disposal Area II, Freestone County, Texas. October
- PBW, 2016c. CCR Closure Plan - Big Brown Steam Electric Station North and South Bottom Ash Ponds, Freestone County, Texas. October
- PBW, 2016d. Certification of Liner Construction - Big Brown Steam Electric Station North and South Bottom Ash Ponds, Freestone County, Texas. October
- PBW, 2016e. History of Construction - Big Brown Steam Electric Station North and South Bottom Ash Ponds, Freestone County, Texas. October

**FIGURES**

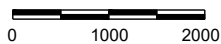
LUMINANT



QUADRANGLE LOCATION



Scale in Feet



**BIG BROWN STEAM ELECTRIC STATION**  
FAIRFIELD, TEXAS

Figure 1

**SITE LOCATION MAP**

PROJECT: 5313-A

BY: AJD

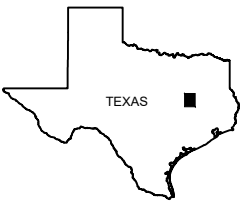
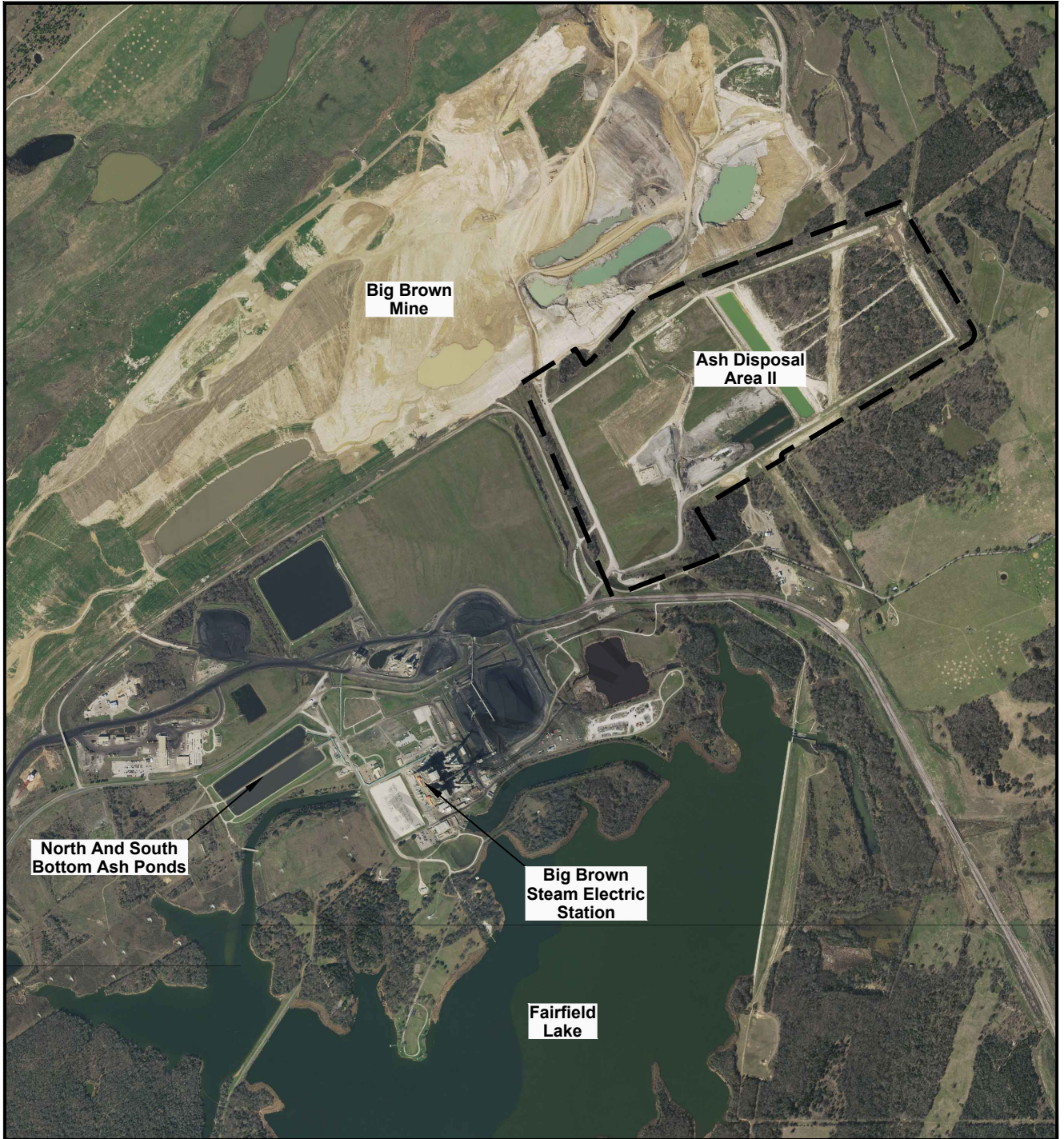
REVISIONS

DATE: DEC., 2017

CHECKED: PJB

**PASTOR, BEHLING & WHEELER, LLC**  
CONSULTING ENGINEERS AND SCIENTISTS

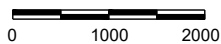
SOURCE:  
Base map from www.tnris.gov, Young, TX 7.5 min. USGS quadrangle dated 1961,  
revised 1982.



PHOTOGRAPH LOCATION



Scale in Feet



**BIG BROWN STEAM ELECTRIC STATION**  
 FAIRFIELD, TEXAS

Figure 2

**SITE VICINITY MAP**

PROJECT: 5313-A

BY: AJD

REVISIONS

DATE: DEC., 2017

CHECKED: PJB

**PASTOR, BEHLING & WHEELER, LLC**  
 CONSULTING ENGINEERS AND SCIENTISTS

SOURCE:  
 Imagery from www.tnris.gov, Young, aerial photographs, 2015.





MINOR SMALL ANIMAL  
BURROWS IN THIS AREA

REPAIRED  
FERAL HOG  
DAMAGE

ASH SLURRY INLET  
PIPING PLATFORMS

FM 2570

NORTH BOTTOM ASH POND

MINOR  
ACCESS ROAD  
RUTS

SOUTH BOTTOM ASH POND

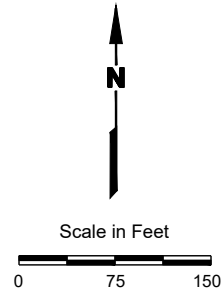
PIERS

REPAIRED  
FERAL HOG  
DAMAGE

PLANT COOLING  
WATER CHANNEL

VALVE BOX

REPAIRED  
FERAL HOG  
DAMAGE



SOURCE:  
Imagery from www.tnris.gov, Young, aerial photographs, 2015.

**BIG BROWN STEAM ELECTRIC STATION**  
FAIRFIELD, TEXAS

Figure 3  
**ANNUAL INSPECTION FINDINGS  
SUMMARY MAP NORTH AND  
SOUTH BOTTOM ASH PONDS**

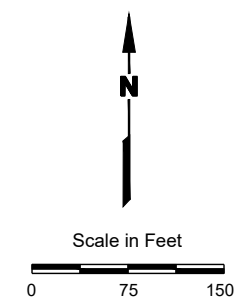
PROJECT: 5313-A	BY: AJD	REVISIONS
DATE: DEC., 2017	CHECKED: PJB	

**PASTOR, BEHLING & WHEELER, LLC**  
CONSULTING ENGINEERS AND SCIENTISTS



**EXPLANATION**

📍➔ Photograph Location and Direction



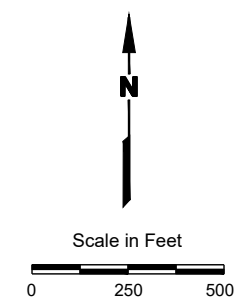
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Imagery from www.tnris.gov, Young, aerial photographs, 2015.

**BIG BROWN STEAM ELECTRIC STATION**  
FAIRFIELD, TEXAS

Figure 4  
**ANNUAL INSPECTION**  
**PHOTOGRAPH LOG NORTH AND**  
**SOUTH BOTTOM ASH PONDS**

PROJECT: 5313-A	BY: AJD	REVISIONS
DATE: DEC., 2017	CHECKED: PJB	

**PASTOR, BEHLING & WHEELER, LLC**  
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SOURCE:  
Imagery from www.tnris.gov, Young, aerial photographs, 2015.

**BIG BROWN STEAM ELECTRIC STATION**  
FAIRFIELD, TEXAS

Figure 5  
**ANNUAL INSPECTION FINDINGS**  
**SUMMARY MAP**  
**ASH DISPOSAL AREA II**

PROJECT: 5313-A	BY: AJD	REVISIONS
DATE: DEC., 2017	CHECKED: PJB	

**PASTOR, BEHLING & WHEELER, LLC**  
CONSULTING ENGINEERS AND SCIENTISTS



**EXPLANATION**

Photograph Location and Direction



Scale in Feet  
 0 250 500

SOURCE:  
 Imagery from www.tnris.gov, Young, aerial photographs, 2015.

**BIG BROWN STEAM ELECTRIC STATION**  
 FAIRFIELD, TEXAS

Figure 6  
**ANNUAL INSPECTION  
 PHOTOGRAPH LOG  
 ASH DISPOSAL AREA II**

PROJECT: 5313-A	BY: AJD	REVISIONS
DATE: DEC., 2017	CHECKED: PJB	

**PASTOR, BEHLING & WHEELER, LLC**  
 CONSULTING ENGINEERS AND SCIENTISTS

**APPENDIX A**  
**PHOTOGRAPHS – BOTTOM ASH PONDS**

LUMINANT



Pastor, Behling & Wheeler	DESCRIPTION	<b>Photograph 1</b> – (View SW) NBAP Ash Slurry Inlet Piping Structure at east end of pond.	
PROJECT NO. 5313A	SITE NAME	Big Brown Steam Electric Station – Bottom Ash Ponds Annual Inspection	DATE 10/10/2017



Pastor, Behling & Wheeler	DESCRIPTION	<b>Photograph 2</b> – Detail of repaired erosion at NBAP Ash Slurry Inlet Piping Structure.	
PROJECT NO. 5313A	SITE NAME	Big Brown Steam Electric Station – Bottom Ash Ponds Annual Inspection	DATE 10/10/2017



Pastor, Behling & Wheeler	DESCRIPTION	<b>Photograph 3</b> – (View SW) Interior of north embankment of NBAP from NE corner of pond. Note erosion control rock along waterline.	
PROJECT NO. 5313A	SITE NAME	Big Brown Steam Electric Station – Bottom Ash Ponds Annual Inspection	DATE 10/10/2017



Pastor, Behling & Wheeler	DESCRIPTION	<b>Photograph 4</b> – (View SW) Exterior of north embankment of NBAP. FM 2570 on right.	
PROJECT NO. 5313A	SITE NAME	Big Brown Steam Electric Station – Bottom Ash Ponds Annual Inspection	DATE 10/10/2017



Pastor, Behling & Wheeler	DESCRIPTION	<b>Photograph 5</b> – (View NE) Exterior of north embankment of NBAP.	
PROJECT NO. 5313A	SITE NAME	Big Brown Steam Electric Station – Bottom Ash Ponds Annual Inspection	DATE 10/10/2017



Pastor, Behling & Wheeler	DESCRIPTION	<b>Photograph 6</b> – (View NE) Exterior of north embankment of NBAP from NW corner of pond.	
PROJECT NO. 5313A	SITE NAME	Big Brown Steam Electric Station – Bottom Ash Ponds Annual Inspection	DATE 10/10/2017





Pastor, Behling & Wheeler	DESCRIPTION	<b>Photograph 7</b> – (View NW) West embankment of NBAP, toward NW Corner of pond.	
PROJECT NO. 5313A	SITE NAME	Big Brown Steam Electric Station – Bottom Ash Ponds Annual Inspection	DATE 10/10/2017



Pastor, Behling & Wheeler	DESCRIPTION	<b>Photograph 8</b> – (View NE) Interior of north embankment of NBAP from NW corner of pond. Note erosion control rock along waterline.	
PROJECT NO. 5313A	SITE NAME	Big Brown Steam Electric Station – Bottom Ash Ponds Annual Inspection	DATE 10/10/2017



Pastor, Behling & Wheeler	DESCRIPTION	<b>Photograph 9</b> – (View SE) West embankment of NBAP, from NW corner of pond.	
PROJECT NO. 5313A	SITE NAME	Big Brown Steam Electric Station – Bottom Ash Ponds Annual Inspection	DATE 10/10/2017



Pastor, Behling & Wheeler	DESCRIPTION	<b>Photograph 10</b> – (View NE) Center embankment of BAPs from west end. NBAP to left, SBAP to right.	
PROJECT NO. 5313A	SITE NAME	Big Brown Steam Electric Station – Bottom Ash Ponds Annual Inspection	DATE 10/10/2017



Pastor, Behling & Wheeler	DESCRIPTION	<b>Photograph 11</b> – (View NW) East embankment of SBAP from SE corner of pond.	
PROJECT NO. 5313A	SITE NAME	Big Brown Steam Electric Station – Bottom Ash Ponds Annual Inspection	DATE 10/10/2017



Pastor, Behling & Wheeler	DESCRIPTION	<b>Photograph 12</b> – (View NE) Exterior of south embankment of SBAP. Temporary pond water return piping on ground surface at left.	
PROJECT NO. 5313A	SITE NAME	Big Brown Steam Electric Station – Bottom Ash Ponds Annual Inspection	DATE 10/10/2017



Pastor, Behling & Wheeler	DESCRIPTION	<b>Photograph 13</b> – (View SW) Interior south embankment of SBAP. Note erosion control rock along waterline.	
PROJECT NO. 5313A	SITE NAME	Big Brown Steam Electric Station – Bottom Ash Ponds Annual Inspection	DATE 10/10/2017



Pastor, Behling & Wheeler	DESCRIPTION	<b>Photograph 14</b> – (View NE) Exterior of south embankment of SBAP from SW corner of pond.	
PROJECT NO. 5313A	SITE NAME	Big Brown Steam Electric Station – Bottom Ash Ponds Annual Inspection	DATE 10/10/2017



Pastor, Behling & Wheeler	DESCRIPTION	<b>Photograph 15</b> – (View NE) Interior of south embankment of SBAP from SW corner of pond.	
PROJECT NO. 5313A	SITE NAME	Big Brown Steam Electric Station – Bottom Ash Ponds Annual Inspection	DATE 10/10/2017



Pastor, Behling & Wheeler	DESCRIPTION	<b>Photograph 16</b> – (View SW) Exterior of south embankment of SBAP.	
PROJECT NO. 5313A	SITE NAME	Big Brown Steam Electric Station – Bottom Ash Ponds Annual Inspection	DATE 10/10/2017



Pastor, Behling & Wheeler	DESCRIPTION	<b>Photograph 17</b> – (View NE) Exterior of south embankment of SBAP from SW corner of pond.	
PROJECT NO. 5313A	SITE NAME	Big Brown Steam Electric Station – Bottom Ash Ponds Annual Inspection	DATE 10/10/2017



Pastor, Behling & Wheeler	DESCRIPTION	<b>Photograph 18</b> – (View NE) Exterior of north embankment of NBAP.	
PROJECT NO. 5313A	SITE NAME	Big Brown Steam Electric Station – Bottom Ash Ponds Annual Inspection	DATE 10/10/2017



Pastor, Behling & Wheeler	DESCRIPTION	<b>Photograph 19</b> – Typical repair of feral hog damage.	
PROJECT NO. 5313A	SITE NAME	Big Brown Steam Electric Station – Bottom Ash Ponds Annual Inspection	DATE 10/10/2017



Pastor, Behling & Wheeler	DESCRIPTION	<b>Photograph 20</b> – Minor access road ruts on north embankment of NBAP.	
PROJECT NO. 5313A	SITE NAME	Big Brown Steam Electric Station – Bottom Ash Ponds Annual Inspection	DATE 10/10/2017

**APPENDIX B**  
**PHOTOGRAPHS – ASH DISPOSAL AREA II**

LUMINANT





Pastor, Behling & Wheeler	DESCRIPTION	<b>Photograph 1</b> – (View NE) Interior toe of south embankment of Cell 10. Cell 10 on left. Active ash placement area. Heavy vegetation on right.	
PROJECT NO. 5313A	SITE NAME	Big Brown Steam Electric Station – Ash Disposal Area II Annual Inspection	DATE 10/10/2017



Pastor, Behling & Wheeler	DESCRIPTION	<b>Photograph 2</b> – (View SW) Interior toe of south embankment of Cell 10. Cell 10 on right. Active ash placement area.	
PROJECT NO. 5313A	SITE NAME	Big Brown Steam Electric Station – Ash Disposal Area II Annual Inspection	DATE 10/10/2017



Pastor, Behling & Wheeler	DESCRIPTION	<b>Photograph 3</b> – (View NE) Interior toe of south embankment of Cell 10. Cell 10 contact water collection area on left. Heavy vegetation on right.	
PROJECT NO. 5313A	SITE NAME	Big Brown Steam Electric Station – Ash Disposal Area II Annual Inspection	DATE 10/10/2017



Pastor, Behling & Wheeler	DESCRIPTION	<b>Photograph 4</b> – (View NW) North embankment of Cell 10. Cell 10 contact water collection area in foreground. Cell 9 in background.	
PROJECT NO. 5313A	SITE NAME	Big Brown Steam Electric Station – Ash Disposal Area II Annual Inspection	DATE 10/10/2017



Pastor, Behling & Wheeler	DESCRIPTION	<b>Photograph 5</b> – (View NW) East embankment of Cell 10 at SE corner of cell. Cell 10 to left, Cell 11 to right.	
PROJECT NO. 5313A	SITE NAME	Big Brown Steam Electric Station – Ash Disposal Area II Annual Inspection	DATE 10/10/2017



Pastor, Behling & Wheeler	DESCRIPTION	<b>Photograph 6</b> – Moderate erosion along west embankment of Cell 11.	
PROJECT NO. 5313A	SITE NAME	Big Brown Steam Electric Station – Ash Disposal Area II Annual Inspection	DATE 10/10/2017



Pastor, Behling & Wheeler	DESCRIPTION	<b>Photograph 7</b> – (View NW) West embankment of Cell 11. Feral hog damage at left foreground.	
PROJECT NO. 5313A	SITE NAME	Big Brown Steam Electric Station – Ash Disposal Area II Annual Inspection	DATE 10/10/2017



Pastor, Behling & Wheeler	DESCRIPTION	<b>Photograph 8</b> – Minor erosion at NW corner of Cell 11.	
PROJECT NO. 5313A	SITE NAME	Big Brown Steam Electric Station – Ash Disposal Area II Annual Inspection	DATE 10/10/2017



Pastor, Behling & Wheeler	DESCRIPTION	<b>Photograph 9</b> – (View SE) East embankment of Cell 11 from NE corner.	
PROJECT NO. 5313A	SITE NAME	Big Brown Steam Electric Station – Ash Disposal Area II Annual Inspection	DATE 10/10/2017



Pastor, Behling & Wheeler	DESCRIPTION	<b>Photograph 10</b> – (View SW) North embankment of Cell 11 from NE corner.	
PROJECT NO. 5313A	SITE NAME	Big Brown Steam Electric Station – Ash Disposal Area II Annual Inspection	DATE 10/10/2017



Pastor, Behling & Wheeler	DESCRIPTION	<b>Photograph 11</b> – (View SW) Moderate erosion of west embankment of Cell 11 (across cell).	
PROJECT NO. 5313A	SITE NAME	Big Brown Steam Electric Station – Ash Disposal Area II Annual Inspection	DATE 10/10/2017



Pastor, Behling & Wheeler	DESCRIPTION	<b>Photograph 12</b> – (View SW) South embankment of Cell 11 from SE corner.	
PROJECT NO. 5313A	SITE NAME	Big Brown Steam Electric Station – Ash Disposal Area II Annual Inspection	DATE 10/10/2017



Pastor, Behling & Wheeler	DESCRIPTION	<b>Photograph 13</b> – (View NW) East embankment of Cell 11 from SE corner.	
PROJECT NO. 5313A	SITE NAME	Big Brown Steam Electric Station – Ash Disposal Area II Annual Inspection	DATE 10/10/2017



Pastor, Behling & Wheeler	DESCRIPTION	<b>Photograph 14</b> – Typical cap erosion repair area.	
PROJECT NO. 5313A	SITE NAME	Big Brown Steam Electric Station – Ash Disposal Area II Annual Inspection	DATE 10/10/2017