

**CCR POST-CLOSURE PLAN  
BIG BROWN STEAM ELECTRIC STATION  
NORTH AND SOUTH BOTTOM ASH PONDS  
FREESTONE COUNTY, TEXAS**

OCTOBER 2016

PREPARED FOR:

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PBW Project No. 5196C

**PROFESSIONAL CERTIFICATION**

This document and all attachments were prepared by Pastor, Behling & Wheeler, LLC under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I hereby certify that this Post-Closure Plan has been prepared in accordance with the requirements of Section 257.104 of the CCR Rule.



*Patrick J. Behling 10/05/16*  
Patrick J Behling, P.E.  
Principal Engineer  
PASTOR, BEHLING & WHEELER, LLC

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## 1.0 INTRODUCTION

Luminant Generation Company, LLC (Luminant) operates the Big Brown Steam Electric Station (BBSES) located approximately 10 miles northeast of Fairfield, Freestone County, Texas (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.

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 the US Environmental Protection Agency (USEPA) 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 national operating criteria for existing CCR surface impoundments and landfills, including development of post-closure plans (PCP) for all CCR impoundments and landfills. Pastor, Behling & Wheeler, LLC (PBW) was retained by Luminant to develop this post-closure plan for the Bottom Ash Ponds at BBSES.

### 1.1 CCR Surface Impoundment Post-Closure Care Requirements

40 CFR 257.104 of the CCR Rule specifies the post-closure care requirements for existing CCR units that have been closed in accordance with 40 CFR 257.102. Following closure of a CCR unit, the owner/operator must conduct post-closure care for the unit, consisting of at least the following:

- Maintaining the integrity and effectiveness of the final cover system, including making repairs to the final cover as necessary to correct the effects of settlement, subsidence, erosion, or other events, and preventing run-on and run-off from eroding or otherwise damaging the final cover; and
- Maintaining the groundwater monitoring system for the unit and monitoring the groundwater in accordance with the requirements of 40 CFR 257.90 through 257.98 of the CCR Rule.

Post-closure care must be conducted for 30 years after the CCR unit has been closed. If at the end of the 30-year post-closure care period, groundwater assessment monitoring is being performed at the unit in

accordance with 40 CFR 257.95 of the CCR Rule, post-closure care of the unit must continue until the unit has returned to groundwater detection monitoring under 40 CFR 257.95.

Once the post-closure care period has been completed, the owner/operator of the CCR unit must prepare a notification verifying that post-closure care has been completed. The notification must include certification by a qualified professional engineer verifying that post-closure care has been completed in accordance with the written closure plan for the unit. The notification must be placed in the facility operating record within 60 days of the completion of post-closure care.

40 CFR 257.104(d) of the CCR Rule specifies that a written PCP must be prepared for each existing CCR unit that describes the post-closure care activities for the unit. The PCP must include, at a minimum, the following information:

- A description of the required post-closure monitoring and maintenance activities and the frequency at which these activities will be performed;
- The name, address, telephone number, and email address of the person or office to contact about the facility during the post-closure care period; and
- A description of the planned uses of the closed unit property during the post-closure period. Post-closure use of the property must not disturb the integrity of the final cover, liner, or any other component of the unit containment system, or the function of the monitoring systems.

If the owner/operator of the unit desires to disturb any of the components of the closure during the post-closure care period, a qualified professional engineer must certify that the disturbance of the final cover, liner, or other component of the containment system, including any removal of CCR, will not increase the potential threat to human health or the environment. The certification must be placed in the facility operating record and the Texas Commission on Environmental Quality (TCEQ) must be notified.

The PCP must be certified by a qualified professional engineer and must document how the PCP has been designed and constructed to comply with the requirements of Section 257.104.

In accordance with 40 CFR 257.104(d)(2) of the CCR Rule, the initial PCP for an existing CCR unit must be completed and placed in the facility operating record no later than October 17, 2016. The PCP must be amended whenever:

- There is a change in the operation of the unit that would substantially affect the written PCP in effect; or

- After post-closure activities have commenced, unanticipated events necessitate a revision of the written PCP.

The PCP must be amended at least 60 days prior to a planned change in the operation of the facility or CCR unit, or no later than 60 days after an unanticipated event requires the need to revise an existing PCP. If the PCP is revised after post-closure activities have commenced for a CCR unit, the PCP must be amended no later than 30 days following the triggering event. The owner or operator of the CCR unit must obtain a written certification from a qualified professional engineer that the initial and any amendment of the PCP plan meets the requirements of Section 257.104 of the CCR Rule.

## **1.2 BSES Units Subject to Post-Closure Plan 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 PCP requirements of the CCR Rule apply to existing and new CCR units that dispose or otherwise engage in solid waste management of CCR.

This PCP addresses the following CCR surface impoundments at the BSES:

- North Bottom Ash Pond (NBAP); and
- South Bottom Ash Pond (SBAP).

The NBAP and SBAP (collectively “Bottom Ash Ponds” or “BAPs”) are located approximately 1,500 feet northwest of the BSES power plant (Figure 2). The NBAP and SBAP are located immediately adjacent to each other and share an interior earthen embankment. Due to their proximity to each other, the NBAP and SBAP will be considered one CCR surface impoundment (identified as the “BAPs”) for the purposes of this post-closure plan.

## **1.3 Description of North and South Bottom Ash Ponds**

The BAPs receive recovered overflow from bottom ash dewatering bins and other BSES process wastewater sources. The ponds also act as a surge basin for storm water runoff from the BSES ash-water system and periodically may receive non-hazardous liquid metal cleaning wastes delivered by truck from other Luminant facilities under a Texas Commission on Environmental Quality (TCEQ) industrial

waste permit. 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 located 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 NBAP and the SBAP are each approximately 1,400 feet long by 250 feet wide. The BAPs are constructed partially above and partially below grade and are surrounded by engineered earthen embankments that extend approximately 14 to 21 feet above grade. The exterior slopes of the embankments are vegetated with grass 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 dated February 8, 1991 indicate that the clay liner has a permeability of  $<1 \times 10^{-7}$  cm/sec ((TXU, 1991; TUEC, 1998). 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 above mean sea level (MSL) (approximately 3 feet below the crest of the perimeter embankments). A digital topographic site plan of the BAPs was created from the as-built engineering drawings for the ponds (PBW, 2016a). Based on this site 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). The total design operating capacity of the BAPs is approximately 79,700,000 gallons or approximately 245 acre-ft. 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 (PBW, 2016b).

As described in the CCR Closure Plan prepared for the BAPs, Luminant plans to close both BAPs in accordance with Section 257.102(d) of the CCR Rule by leaving CCR in-place and constructing a final cover system over the CCR located within the combined footprint of these two surface impoundments (PBW, 2016c). The proposed final grading plan for the final cover system is illustrated in Figure 3. Additional details regarding the final cover system are described in the CCR Closure Plan (PBW, 2016c).

## 2.0 POST-CLOSURE INSPECTION AND MAINTENANCE PLAN

Monitoring and maintenance activities will be performed to maintain the integrity and effectiveness of the final cover system as specified in 40 CFR 257.104(b)(1). During the post-closure monitoring and maintenance period at the site, the final cover of the closed CCR unit will be inspected at the frequency indicated in Table 1 below:

**Table 1 – Post-Closure Care Maintenance**

<b>Post-Closure Care Maintenance Item</b>	<b>Frequency of Inspections</b>	<b>Types of Deficiency Conditions to be looked for during inspections</b>
Final Cover Condition	Annually	Inspection for vegetation, erosion, settlement, ponding water, and functionality and the surface water drainage system
Vegetation	Annually	Erosion rills and depressions, vegetative stress
Drainage structures	Annually	Sediment and debris build up, component damage, blockages, erosion, ponding of water in non-designated areas, excessive vegetative growth

Each monitoring and maintenance activity will be documented and include the date, components and items monitored, name of the individual performing the monitoring/maintenance, a description of the deficiencies observed (if any), maintenance/repairs performed (if any), and related information.

At a minimum, maintenance will be performed as needed prior to the next scheduled inspection.



### **3.0 GROUNDWATER MONITORING**

As specified in 40 CFR 257.104(b)(3), groundwater monitoring activities will continue throughout the post-closure care period in accordance with 40 CFR 257.90 through 40 CFR 257.98. All groundwater monitoring wells that are part of the groundwater monitoring network will be monitored and maintained during the post-closure care period in accordance with the Groundwater Sampling and Analysis Plan, which will be finalized and placed in the Operating Record by October 17, 2017.

If at the end of the 30-year post-closure care period, groundwater assessment monitoring is being performed at the unit in accordance with 40 CFR 257.95, post-closure care of the unit must continue until the unit has returned to groundwater detection monitoring under 40 CFR 257.95.

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#### 4.0 FACILITY CONTACT INFORMATION

**Table 2: Contact Information**

<b>Name</b>	Luminant - Environmental Services
<b>Address</b>	1601 Bryan St., Dallas, Texas 75201
<b>Telephone Number</b>	214-875-8654
<b>Email</b>	CCRPostClosurePlan@Luminant.com

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## **5.0 POST-CLOSURE LAND USE**

Post-closure use of the property will not disturb the integrity of the final cover, liner system, or any other component of the containment system, or function of the monitoring system in accordance with §257.104(d)(1)(iii) unless necessary to comply with the maintenance requirements of this subpart or as otherwise provided as allowed under this subpart.

Post-closure land use is anticipated to be undeveloped/unchanged and the area will be deed recorded and deed restricted to prevent disturbance of the closed waste management unit.

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## **6.0 NOTIFICATION OF COMPLETION OF POST-CLOSURE CARE PERIOD**

No later than 60 days following completion of the post-closure care period, a certification will be prepared by a qualified professional engineer verifying that the post-closure care has been completed in accordance with this Post-Closure Plan.

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## 7.0 REFERENCES

Pastor, Behling & Wheeler, LLC (PBW), 2016a. History of Construction - Big Brown Steam Electric Station North and South Bottom Ash Ponds, Freestone County, Texas. October.

PBW, 2016b. Hazard Classification Assessment – Big Brown Steam Electric Station North and South Bottom Ash Ponds, Freestone County, Texas. October.

PBW, 2016c. CCR Closure Plan – Big Brown Steam Electric Station North and South Bottom Ash Ponds, Freestone County, Texas. October.

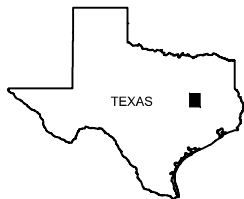
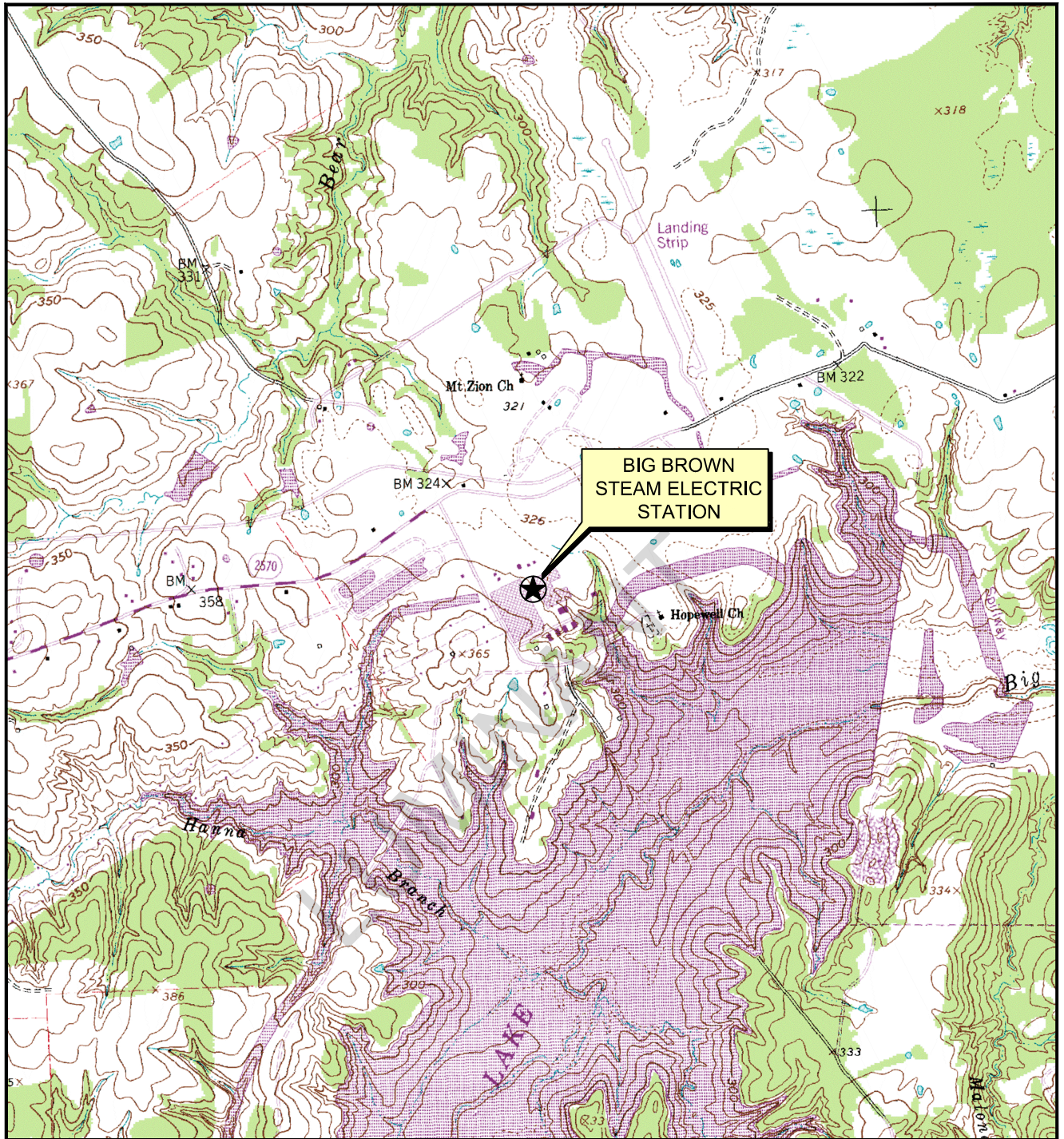
Texas Utilities Electric Company (TUEC), 1998. *Application for Permit to Receive and Process Non-Hazardous Solid Waste, Big Brown Steam Electric Station, Freestone County, Texas*. February.

TXU Electric Company (TXU), 1991. As-Built Engineering Drawings 119-1134-301-01, 119-1134-301-02, and 119-1134-301-03, Big Brown Steam Electric Station – Bottom Ash Ponds, February 8.

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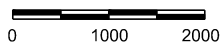
**Figures**



QUADRANGLE LOCATION



Scale in Feet



**LUMINANT GENERATION COMPANY, LLC**  
**BIG BROWN STEAM ELECTRIC STATION**

Figure 1

**SITE LOCATION MAP**

PROJECT: 5196C

BY: ADJ

REVISIONS

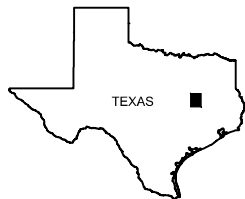
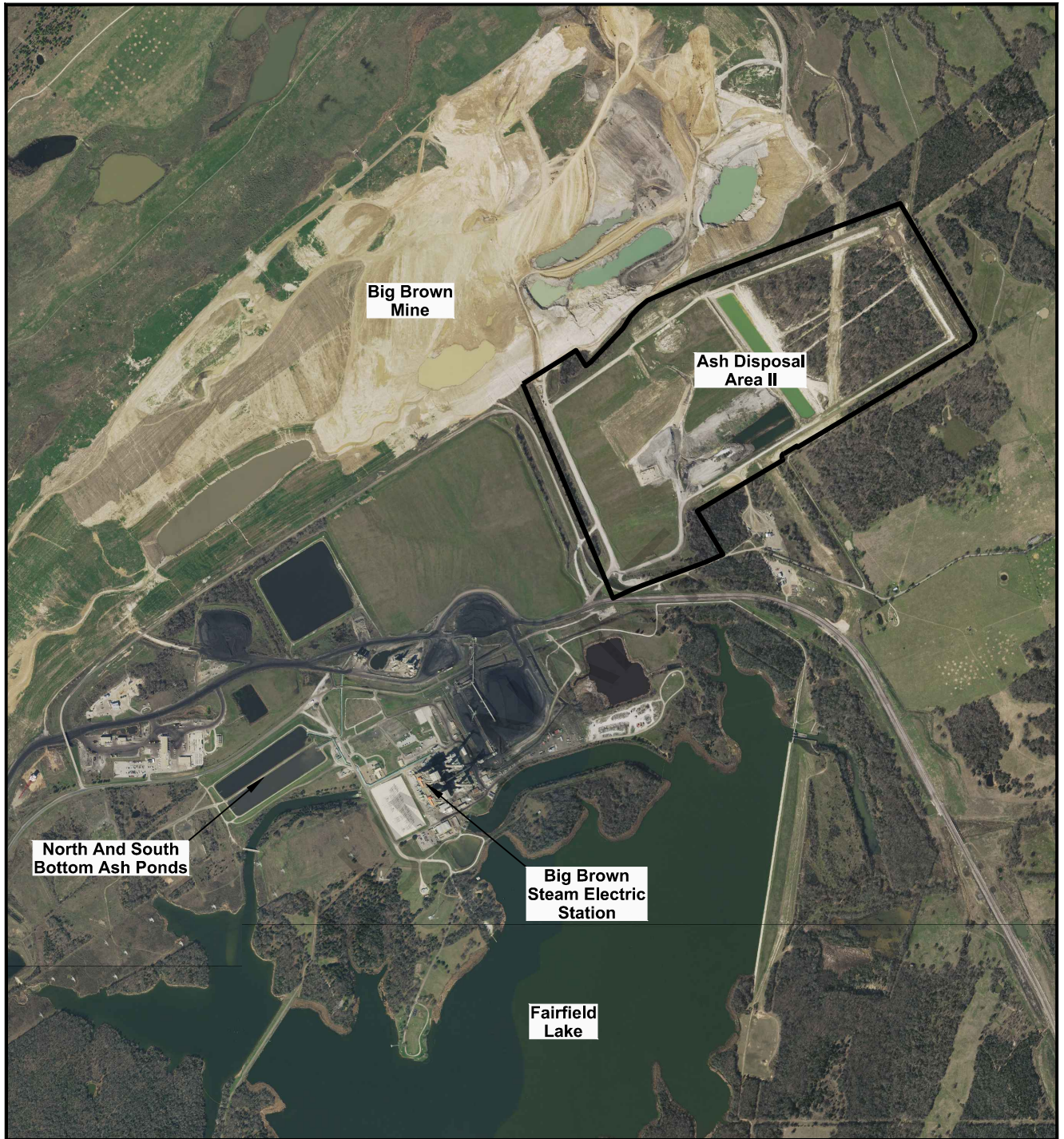
DATE: AUG., 2016

CHECKED: RBL/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.

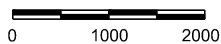




PHOTOGRAPH LOCATION



Scale in Feet



**LUMINANT GENERATION COMPANY, LLC**  
**BIG BROWN STEAM ELECTRIC STATION**

Figure 2

**SITE VICINITY MAP**

PROJECT: 5196C

BY: ADJ

REVISIONS

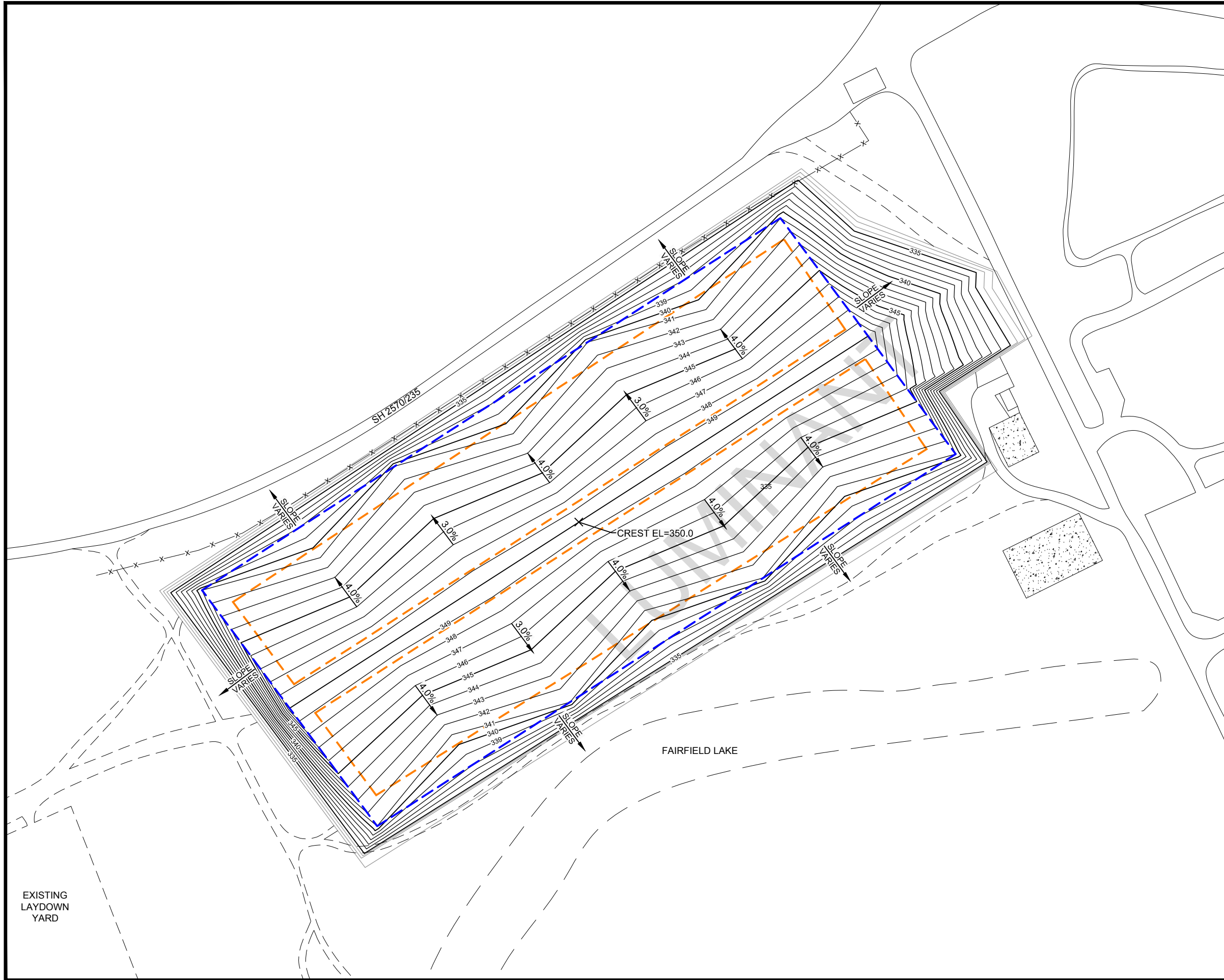
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CHECKED: RBL/PJB

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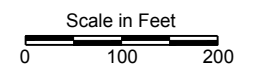
SOURCE:  
 Imagery from www.tnris.gov, Young, aerial photographs, 2015.





**EXPLANATION**

- Proposed Finished Grade Contour  
1 ft Interval
- Proposed Finished Grade Contour  
5 ft Interval
- Limits of CAP
- Estimated Limits of CCR  
(Elev. 339.0)



**LUMINANT GENERATION COMPANY, LLC**  
 BIG BROWN STEAM ELECTRIC STATION  
 Figure 3  
**BOTTOM ASH PONDS  
 PROPOSED CAP GRADING PLAN**

PROJECT: 5196C	BY: ADJ	REVISIONS
DATE: SEP., 2016	CHECKED: RBL/PJB	

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EXISTING  
LAYDOWN  
YARD