

## TECHNICAL MEMORANDUM

**DATE** October 10, 2018

**Project No.** 18107517

**TO** Jeff Jones  
Luminant Generation Company LLC

**FROM** Patrick J. Behling, P.E.

**LUMINANT GENERATION COMPANY LLC  
CCR RULE LOCATION RESTRICTION DEMONSTRATION  
SANDOW 5 GENERATING PLANT – MILAM COUNTY, TEXAS  
AX LANDFILL**

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Luminant Generation Company LLC (Luminant) formerly operated the Sandow 5 Generating Plant (Sandow 5) located approximately 7 miles southwest of Rockdale in Milam County, Texas (Figure 1). Unit No. 5 was an approximately 581-megawatt, lignite-fired electric generation unit that was placed into service in 2009. Coal Combustion Residuals (CCR) including fly ash and bed ash were generated as part of Unit No. 5 operation. Sandow Unit No. 5 suspended operations in early 2018.

The U.S. Environmental Protection Agency's (EPA's) rule entitled *Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities* (CCR Rule) has established technical requirements for CCR landfills and surface impoundments (See 80 Fed. Reg. 21,302 (Apr. 17, 2015); 83 Fed. Reg. 36,435 (July 30, 2018)). The following landfill at Sandow 5 has been identified as an Existing CCR Landfill regulated under the CCR Rule:

- AX Landfill.

The AX Landfill Ash (AX LF) is located approximately 7,500 feet south of Sandow 5 (Figure 1). Golder Associates Inc. (Golder) was retained by Luminant to evaluate the AX LF against the applicable location restriction criterion for existing CCR landfills described in Section 257.64 of the CCR Rule. This memorandum sets forth Luminant's location restriction demonstration and corresponding certification required by the CCR Rule.

### LOCATION RESTRICTION DEMONSTRATION – SUMMARY OF FINDINGS/CONCLUSIONS

This location restriction demonstration concludes that the AX LF satisfies the CCR Rule location restriction criterion for existing CCR landfills (unstable areas). The AX LF is underlain by mine spoil that has the potential for settlement; however, the AX LF has been designed to ensure that the integrity of the structural components of the CCR unit will not be disrupted in accordance with §257.64.

A professional engineering certification for the subject location restriction evaluations is included as part of this memorandum.

### MEMORANDUM ORGANIZATION

The memorandum is organized as follows:

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SECTION 1.0 - Location Restriction Criterion & CCR Unit Description

SECTION 2.0 - Unstable Areas

SECTION 3.0 - Limitations

SECTION 4.0 - Professional Certification

FIGURE 1 – Site Plan – AX Landfill

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## **SECTION 1.0 Location Restriction Criterion & CCR Unit Description**

### **LOCATION RESTRICTION CRITERION**

Existing CCR Landfills must comply with the Unstable Areas location restriction described in Section 257.64 of the CCR Rule. The CCR Rule requires that the CCR Landfill owner or operator certify that the CCR Unit meets the specified location restriction requirements by October 17, 2018 for continued operation of the CCR Unit.

### **CCR UNIT DESCRIPTION**

The AX LF received bed ash, fly ash and a limited amount of other non-hazardous waste from Sandow 5 and is considered an existing CCR Landfill under the CCR Rule. The AX LF consists of two cells (Cell 1 and Cell 2). The landfill was registered with the TCEQ as a Class 2 non-hazardous industrial waste landfill in June 2008 and the registration was updated in February 2015 (PBW, 2008; PBW, 2015)). Cell 1 was constructed in 2013 and Cell 2 was constructed in 2015. A third landfill cell (Cell 2A) was constructed in 2016; however, Cell 2A never received any CCR or other non-hazardous waste.

The AX LF is constructed partially above and partially below grade and is surrounded by engineered earthen dikes that extend approximately 10 to 15 feet above surrounding grade. A geosynthetic liner system consisting of a 30 mil thick Geomembrane Supported Geosynthetic Clay Liner (GSGCL) underlain by 2 feet of soil exhibiting a minimum hydraulic conductivity of  $5 \times 10^{-5}$  cm/sec has been installed in the AX LF.

## Section 2.0 Unstable Areas

Section 257.64(a) of the CCR Rule states:

- a) *An existing or new CCR landfill, existing or new CCR surface impoundment, or any lateral expansion of a CCR unit must not be located in an unstable area unless the owner or operator demonstrates by the dates specified in paragraph (d) of this section that recognized and generally accepted good engineering practices have been incorporated into the design of the CCR unit to ensure that the integrity of the structural components of the CCR unit will not be disrupted.*

Section 257.53 of the CCR Rule defines unstable area as follows:

- Unstable area: a location that is susceptible to natural or human-induced events or forces capable of impairing the integrity, including structural components of some or all of the CCR unit that are responsible for preventing releases from such unit. Unstable areas can include poor foundation conditions, areas susceptible to mass movements, and karst terrains.
- Poor Foundation Conditions: those areas where features exist which indicate that a natural or human-induced event may result in inadequate foundation support for the structural components of an existing or new CCR unit.
- Areas Susceptible to Mass Movement: those areas of influence (i.e., areas characterized as having an active or substantial possibility of mass movement) where, because of natural or human-induced events, the movement of earthen material at, beneath, or adjacent to the CCR unit results in the downslope transport of soil and rock material by means of gravitational influence. Areas of mass movement include, but are not limited to, landslides, avalanches, debris slides and flows, soil fluctuation, block sliding, and rock fall.
- Karst terrain: an area where karst topography, with its characteristic erosional surface and subterranean features, is developed as a result of dissolution of limestone, dolomite, or other soluble rock. Characteristic physiographic features present in karst terrain include, but are not limited to, dolines, collapse shafts (sinkholes), sinking streams, caves, seeps, large springs, and blind valleys.

Under § 257.64(b), the following factors must be considered when determining whether an area is unstable:

- on-site or local soil conditions that may result in significant differential settling;
- on-site or local geologic or geomorphic features; and
- on-site or local human-made features or events (both surface and subsurface).

The CCR Rule requires that an existing CCR landfill not be located in an unstable area, or if the unit is located in such an area, the CCR Unit must be designed to maintain the integrity of the structural components of the unit. Soil geotechnical investigations performed in the AX LF area concluded that soils underlying the landfill consist primarily of 100 feet or more of disturbed overburden soil (mine spoil), which is comprised of highly heterogenous, interbedded layers of sands, silts and/or clays. The mine spoil is underlain by a seam of hard, undisturbed lignite and the lignite is underlain by hard, unmined silty sands/clays and/or sandstone underburden.

Since the AX LF is constructed on top of mine spoil, it is necessary to ensure that the structural components of the AX LF will not be disrupted. The liner system is the critical structural component for the AX LF that could potentially be affected by settlement of the underlying spoil due to the loading placed on the liner from the CCR material placed in the landfill. The liner system in the AX LF was engineered to accommodate this potential settlement without damage to the unit by increasing the length of the overlaps of the GSGCL material at the GSGCL panel seams to account for possible movement of the panels during settlement. Due to the adequacy of the design of the AX LF, the integrity of the structural components of the CCR unit will not be disrupted despite the underlying mine spoil. Thus, the AX LF meets the requirements of 40 CFR Section 257.64.

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## Section 3.0 Limitations

In preparing this evaluation, Golder has reviewed historic, design and investigative information and other data furnished by Luminant. Golder has relied on this information in completing the location restriction evaluation for the AX LF.

The conclusions presented in this memorandum assume that subsurface site conditions in the vicinity of the AX LF reasonably match those conditions associated with site borings, laboratory testing results, etc. The reported conclusions are also based on our understanding of current site operations, maintenance and CCR management practices at Sandow 5 at the current time as provided by Luminant.

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## Section 4.0 Professional Certification

I, Patrick J. Behling, being a Registered Professional Engineer in good standing in the State of Texas, do hereby certify, to the best of my knowledge, information, and belief, that the information contained in this CCR Rule Location Restriction Demonstration has been prepared in accordance with the accepted practice of engineering. I certify that the CCR Unit described in this report and as explained further in the CCR Rule Location Restriction Evaluation – Sandow 5 AX Landfill, Golder Associates Inc. October 10, 2018, meets the requirements of 40 CFR Section 257.64.



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Figures



CLIENT  
LUMINANT GENERATION COMPANY LLC

PROJECT  
SANDOW STEAM ELECTRIC STATION  
AX LANDFILL  
CCR RULE LOCATION RESTRICTION DEMONSTRATION  
TITLE  
**SITE PLAN**

CONSULTANT	YYYY-MM-DD	2018-10-15
	DESIGNED	BZH
	PREPARED	BZH
	REVIEWED	PJB
	APPROVED	PJB



REFERENCE(S)  
IMAGERY FROM GOOGLE EARTH DATED 1/07/2018.

PROJECT NO.  
18107517-5

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FIGURE  
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