

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
MARTIN LAKE STEAM ELECTRIC STATION – RUSK COUNTY, TEXAS
A1 AREA LANDFILL**

Luminant Generation Company LLC (Luminant) operates the Martin Lake Steam Electric Station (MLSES) located approximately 5 miles southwest of Tatum in Rusk County, Texas. The MLSES consists of three coal/lignite-fired units with a combined operating capacity of approximately 2,250 megawatts. Coal Combustion Residuals (CCR) including fly ash, bottom ash, boiler slag and scrubber gypsum are generated as part of MLSES unit operation.

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 the MLSES has been identified as an Existing CCR Landfill regulated under the CCR Rule:

- A1 Area Landfill.

The A1 Area Landfill (A1 LF) is located approximately 2.5 miles southeast of the MLSES power plant and is located in Panola County (Figure 1). Golder Associates Inc. (Golder) was retained by Luminant to evaluate the A1 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 A1 LF satisfies the CCR Rule location restriction criterion for existing CCR landfills (unstable areas). The A1 LF is underlain by mine spoil that has the potential for settlement; however, the A1 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:

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 – A1 Area 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 A1 LF is an above grade landfill that receives bottom ash, fly ash, scrubber gypsum and other non-hazardous waste from the MLSES and is considered an existing CCR Landfill under the CCR Rule. CCR is transported to the landfill in rail cars, off loaded and placed within the active areas at the landfill. The A1 LF was registered with the TCEQ in 1980 under SWR No. 31277 and has been receiving CCR since that time. The registered boundary of the A1 LF covers an area of approximately 986 acres.

The A1 LF is located within reclaimed areas of a former surface lignite mine and the landfill is surrounded by earthen embankments constructed of mine spoil that extend approximately 10 to 20 feet or more above surrounding grade. The A1 LF is lined with a 1-foot thick compacted clay bottom liner consisting of clay-rich mine spoil scarified and re-compacted to achieve an in-place permeability of 1×10^{-7} cm/sec or less. The bottom liner is underlain by low permeability, clay-rich mine spoil 70 to 170 feet in thickness. The earthen embankments are provided with a 3-foot thick compacted clay liner.

Approximately 675 acres of the A1 LF has been capped/closed using a 3-foot thick compacted clay cap (in-place permeability of 1×10^{-7} cm/sec or less) covered with a minimum 2-foot thick vegetative cover layer. Progressive capping/closure of the A-1 LF is performed as placement of CCR in the landfill reaches design elevations.

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 A1 LF area concluded that soils underlying the landfill consist of approximately 70 to 170 feet of disturbed overburden soil (mine spoil), which is comprised of fat and lean clays with varying percentages of sand and silt, or sand and silt with clay, and fragments of lignite and carbonaceous clay. Since the A1 LF is constructed on top of mine spoil, it is necessary to ensure that the structural components

of the A1 LF will not be disrupted. The liner system is the critical structural component for the A1 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 A1 LF is lined with a 1-foot thick compacted clay bottom liner consisting of clay-rich mine spoil scarified and re-compacted to achieve an in-place permeability of 1×10^{-7} cm/sec or less. Previous geotechnical investigations at the site concluded that the hydraulic conductivity of the underlying clay-rich spoil itself provides an effective barrier against seepage from the landfill and the hydraulic conductivity of the underlying spoil is expected to have decreased over time. As a result, the A1 LF has been designed to ensure that the integrity of the structural components of the CCR unit will not be disrupted despite the underlying mine spoil. Thus, the A1 LF meets the requirements of 40 CFR Section 257.64.

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Section 3.0 Limitations

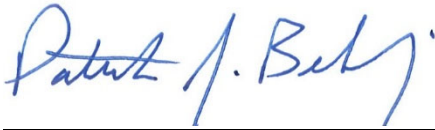
In preparing this evaluation, Golder has reviewed historic, design and investigative information and other data furnished by Luminant. Golder has relied on this information in completing the location restriction evaluation for the A1 LF.

The conclusions presented in this memorandum assume that subsurface site conditions in the vicinity of the A1 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 the MLSES 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 – Martin Lake Steam Electric Station A1 Area Landfill, Golder Associates Inc. October 10, 2018, meets the requirements of 40 CFR Section 257.64.



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Texas Engineering Firm No. 2578



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Figures



CLIENT
LUMINANT GENERATION COMPANY LLC

PROJECT
MARTIN LAKE STEAM ELECTRIC STATION
A1 AREA LANDFILL
CCR RULE LOCATION RESTRICTION DEMONSTRATION
TITLE
SITE PLAN

CONSULTANT



GOLDER

YYYY-MM-DD	2018-10-05
DESIGNED	BZH
PREPARED	BZH
REVIEWED	PJB
APPROVED	PJB

REFERENCE(S)
IMAGERY FROM GOOGLE EARTH DATED 4/6/2017.

PROJECT NO.
18107517-1

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FIGURE
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