October 2016

Luminant
1601 Bryan Street
Dallas, Texas 75201

RE: HYDROLOGIC & HYDRAULIC CAPACITY REQUIREMENTS
CCR SURFACE IMPOUNDMENTS, OAK GROVE SES
ROBERTSON COUNTY, TX

1.0 INTRODUCTION

The “Disposal of Coal Combustion Residuals (CCR) from Electric Utilities rule” (40 Code of Federal Regulations (40 CFR) Part 257), effective October 19, 2015, requires that the owner or operator of all existing non-incised CCR surface impoundments conduct a hydrologic and hydraulic (H&H) evaluation. This letter provides the H&H assessment pursuant to §257.82 for the Oak Grove Steam Electric Station’s (OGSES) CCR Surface Impoundments, identified as flue gas desulphurization (FGD) Ponds FGD-A, FGD-B, and FGD-C. As low hazard structures (pursuant to §257.73), it is required that the CCR impoundment’s inflow design control system be adequate to manage flow from a 24-hour, 100-year return period inflow design flood.

2.0 INFLOW DESIGN CONTROL SYSTEM

The CCR surface impoundments (FGD-A, FGD-B and FGD-C) are ring dikes with no additional watershed area except direct rainfall on the footprint of each facility. Additional stormwater is pumped to the CCR impoundments from a series of sump pumps throughout the plant site. The pumped stormwater can be operationally controlled and sent to any of the three impoundments as excess storage volume exists. While water can be pumped out of the ponds during a storm event, this analysis assumes that during a major storm event, the rate of non-stormwater inflow equals the rate of pump discharge and as such are neglected from this analysis.

The US Weather Bureau’s Technical Paper No. 40 (Hershfield, 1961) specifies a depth of 10.5 inches of rainfall for the 24-hour, 100-year return period. With a total surface impoundment footprint of about 38 acres, direct rainfall accumulation of 33 acre-feet occurs over all three CCR impoundments during the 100-year event. With a plant area of about 41 acres over mostly impervious surface, rainfall runoff of 35 acre-feet occurs from the plant to a series of sump pumps for subsequent pumping to the CCR impoundments. Between direct rainfall and pumping, a total of 68 acre-feet (33 + 35) of volume is sent to the three CCR surface impoundments.
Luminant operates all three surface impoundments with an operational freeboard of 2 feet. With a total footprint area of about 38 acres, the three CCR impoundments have a total surcharge volume of 75 acre-feet to be used in the event of a major storm. During the course of the 24-hour, 100-year rainfall event, the surcharge volume is used for storm storage with 7 acre-feet (75-68) of free storage remaining at its conclusion.

3.0 CONCLUSION

Based on the conditions described above, each of the three CCR surface impoundments meet the hydraulic criteria specified in §257.82. The details of this analysis per CCR impoundment are attached to this letter.

Golder appreciates the opportunity to assist Luminant with this project. If you have any questions, or require further assistance from Golder, please contact the undersigned at (281) 821-6868.

Sincerely,

GOLDER ASSOCIATES INC.

Michael Chilson, PE (GA)  
Senior Civil Engineer

Jeffrey B. Fassett, PE  
Senior Consultant and Associate

MTC/JBF/kc

Attachments:
Figures 1 – Site Layout
Attachment 1 - Hydrologic Evaluation

Reference

4.0 CERTIFICATION

I hereby certify that this report has been prepared in general accordance with normally accepted civil engineering practices and in accordance with the requirements of 40 CFR 257.82.

Jeffrey B. Fassett, PE
Golder Associates Inc.
Firm Registration Number F-2578
FIGURE 1
SITE LAYOUT
100-Year Rainfall Depth \( P \) = 10.5 inches

**PLANT HYDROLOGY**

Plant Watershed Area (WSA) = 41 acres
Runoff Curve Number (CN) = 98
Potential Watershed Retention (S) = 0.20 inches
Runoff Depth (Q) = 10.3 inches
Runoff Volume (RV) = 35.1 acre-feet

\[
S = \frac{1000}{CN} - 10
\]

\[
Q = \frac{(P - 0.2S)^2}{(P + 0.8S)}
\]

\[
RV = \frac{A \cdot Q}{12}
\]

**FGD CAPACITY**

<table>
<thead>
<tr>
<th></th>
<th>FGD-A</th>
<th>FGD-B</th>
<th>FGD-C</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area (ResA)</td>
<td>9.4</td>
<td>11.3</td>
<td>17.0</td>
<td>37.7</td>
</tr>
<tr>
<td>Freeboard (FB)</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Surcharge Volume (SurchargeV)</td>
<td>18.8</td>
<td>22.6</td>
<td>34.0</td>
<td>75.4</td>
</tr>
</tbody>
</table>

|                  |       |       |       |       |
| Direct Rainfall Volume (DirectV) | 8.2   | 9.9   | 14.9  | 33.0  |
| Sump Inflow from Plant (SumpV)   | 8.7   | 10.5  | 15.8  | 35.1  |
| Total Storm Inflow (StormV)      | 17.0  | 20.4  | 30.7  | 68.0  |

|                  | 1.8   | 2.2   | 3.3   | 7.4   |
| Excess Storage (ExV)     |

\[
DirectV = \text{ResA} \cdot \frac{P}{12}
\]

\[
\text{SumpV} = \text{fraction of RV}
\]

\[
\text{StormV} = \text{DirectV} + \text{SumpV}
\]

\[
\text{ExV} = \text{SurchargeV} - \text{StormV}
\]

**OTHER INFLOWS and ASSUMPTIONS**

- This analysis assumes non-stormwater inflows do not exceed the capacity of the discharge pumps.
- It further assumes that the discharge pumps, during the storm event, are used to keep up with non-stormwater inflows and do not contribute to excess storage.
• After a storm passes, the stored storm surcharge would be evacuated through the discharge pump system for operational uses. No other discharge devise was assumed in this analysis.
• This analysis assumes stormwater runoff from the coal pile and landfill would be stored in the Lignite Runoff Pond and at the landfill until adequate space exists within the FGD ponds.