AECOM Imagine it. Delivered.

AECOM
9400 Amberglen Boulevard
Austin, TX 78729
aecom.com

Project name:
Spruce ELG Wastewater Compliance

Project ref:
60566130

To:
Isaac Beck

From:
Keith Benton

CC:
Louisa Eclarinal
Jeremy Wilks

Date:
July18, 2018

Subject: Spruce ELG Wastewater Complinance – FGD Wastewater Evaporation Pond

Under the current Permit To Discharge Wastes from the Sommers/Deely/Spruce Electric Station, TPDES Permit WQ0001514000, wastewater from the Spruce Flue Gas Desulfurization (FGD) system is combined with other wastewater streams prior to treatment and discharge at Outfall 109. To achieve compliance with the latest requirements of the Federal Environmental Protection Agency (EPA) guidelines as promulgated in the Federal Regulation 40 CFR 423; otherwise known as Effluent Limitations Guidelines (ELGs), CPS Energy plans to implement an evaporation technology for treatment of the FGD system wastewater stream.

The primary technology that will be implemented for treatment of the FGD wastewater is an evaporation pond. Wastewater spray dryers are being evaluated as an alternative or "back-up" evaporative technology. Wastewater spray dryers use hot flue gas to evaporate the wastewater and the dried salts are removed with the fly ash or disposed of separately as a separate solid waste stream. For both options, the FGD wastewater will be separated from the low volume waste (LVW) streams prior to being sent to the evaporative treatment system. For the evaporation pond option, the suspended solids content in the FGD wastewater purge stream will be low. These evaporative technologies are both zero liquid discharge (ZLD) and do not produce an effluent wastewater discharge stream.

The following information for the FGD wastewater evaporation pond is preliminary and subject to final design and pond siting considerations.

1. **USGS Map**

   The attached US Geological Survey (USGS) map for the Elmendorf, TX quadrangle shows the approximate location of the FGD wastewater evaporation ponds. The approximate latitude and longitude of the FGD evaporation pond is 29° 19′ 54″ North and 98° 18′ 46″ West.

2. **Outfalls**

   There is no discharge outfall from the evaporation ponds. The flow to the evaporation ponds is variable dependent on plant load, chlorine content in the coal and the FGD system operating parameters.

3. **Description of effluent disposal site**

   The FGD evaporation pond will be sized to meet the average and critical conditions per the attached storage calculations[1][2]. The evaporation pond is sized for a maximum FGD wastewater effluent flow of 0.11 MGD (76 gpm) and an average flow of 0.050 MGD (35 gpm) over the life of the pond. Based on the preliminary design, the

[1] TCEQ Instructions for Completing the Industrial Wastewater Permit Application, Instructions for Industrial Worksheet 3.1Surface land Applications and Evaporation, 2. Evaporation Ponds, page 72 of 128, May 2017

[2] TCEQ Instructions for Completing the Industrial Wastewater Permit Application, Appendix 7 – Example – Storage Calculation for Evaporation Ponds without Irrigation, pages 127 -128 of 128

evaporation ponds will have an overall surface area of 100 acres and a storage capacity of 1,000 acre-feet (AF). The pond will be constructed using multiple surface cells of approximately 20 to 30 acres each.

The preliminary pond size is based on the maximum FGD wastewater effluent flow. Optimization of the FGD process may result in a lower effluent flow and thence a reduction in the evaporation pond size. The final pond size will be based on the optimized flowrate.

The evaporation pond will be lined with a composite liner that includes a leak collection and recovery system (LCRS). The LCRS will be used to convey any leakage that occurs within the composite liner to a collection trench and sump so that any liquid within the liner can be removed and pumped back into the evaporation pond. The preliminary design includes a composite liner consisting of primary and secondary geomembrane liners, a geosynthetic clay liner (GCL), and a drainage geonet between the two 60-mil HDPE geomembrane liners. Additionally, the composite liner may include an optional soil cement over liner to protect the geosynthetic liners during solids removal if required.

The design criteria for the evaporation ponds will be as follows:

a. Effluent Flow:
    i. Maximum 0.11 MGD (76 gpm)
    ii. Average 0.050 MGD (35 gpm)
b. Pond freeboard: 2 feet (minimum)
c. Crest:
    i. Width: 20 feet minimum,
    ii. Centerline Radius: 50 feet minimum.
    iii. Crest Slope:
        1. 2 percent from crown at centerline or,
        2. 2 percent from inside edge to outside edge of embankment.
    iv. Gravel surfacing for maintenance vehicles.
        1. 6 inch thickness, 3/4 inch minus.
d. Bottom of Pond:
    i. Bottom slope: 0.5 percent minimum,
    ii. 6 inch thickness soil cement (if required)
e. Embankment side slopes:
    i. Height: To be determined
    ii. Inside slopes: 3:1 (Horizontal: Vertical),
    iii. Outside slopes: 3:1 (Horizontal: Vertical).
f. Leakage collection recovery system (LCRS):
    i. 6 inch perforated collection pipe to convey leakage to a free-draining gravel collection sump to allow for leakage within the composite liner to be removed and pumped back into the cell.
    ii. 16 inch side-slope riser pipe (HDPE) to allow for leakage to be removed from the LCRS and discharged back into the cell.
    iii. LCRS will slope at 2% maximum.
    iv. Bottom of LCRS will be 5 feet (minimum) above groundwater elevation.
g. Pond embankments will include the following criteria:
    i. Embankment material may consist of excavated material, depending on the results of a site specific geotechnical investigation.
    ii. Embankment crests will accommodate maintenance vehicles.
    iii. If solids removal is required, access ramps will be provided to allow excavators or front loader access into the cells to remove accumulated sediments.
    iv. Storm water will be diverted around pond embankments.

4. Description of FGD wastewater routing from the facility to the disposal site

   FGD wastewater purge will be pumped from the Spruce FGD system to the evaporation ponds through 1 of 2 lines. The lines will be constructed of high density polyethylene (HDPE) pipe. Pipe runs within the plant area will be run in pipe trenches and racks. Outside of the plant area, the pipe runs will be buried and the route marked. The routing plan has not been established at this time. To the extent possible the route will follow alongside existing access ways to facilitate inspection and maintenance.

5. Rainfall Inundation Controls

   The evaporation ponds are sized in accordance with Critical and Average conditions as shown in the attached calculations[3][4]. The design shall maintain a freeboard of not less than 2 feet under the "worst case scenario" defined as the 25-year lowest net evaporation assuming daily flow to the pond at the permitted rate. In operation the ponds will be monitored for potential overtopping. Should overtopping appear eminent, excess water will be routed to other available cells within the evaporation pond, or stored in temporary tanks.

6. Description of the wastewater generating process

   The wastewater effluent to the evaporation pond is generated by the Spruce plant FGD process. Soluble species enter the FGD system through the absorption of acid gases in the flue gas and the evaporation of make-up water to the system. The soluble species will cycle up in the liquor and be purged as wastewater. FGD wastewater will have low total suspended solids (TSS). The preliminary design is based on the discharge of the FGD wastewater directly to the evaporation pond without additional treatment.

7. List of raw materials, major intermediates, and products handled for the new treatment system.

   No raw materials, intermediates or products are required for operation of the FGD wastewater evaporation pond.

8. Flow schematic with a water balance showing each treatment unit and all sources of water and wastewater flow into the treatment plant and to each outfall/point of disposal.

   The attached flow schematics reflect the existing system and modifications required for the new FGD evaporation pond.

9. Daily average effluent flow into ponds.

   The daily average effluent flow to the FGD evaporation pond is variable and will range from 0 MGD to 0.11 MGD (76 gpm). The average flow to the FGD evaporation pond is 0.050 MGD (35 gpm) over the life of the pond. Preliminary pond size calculations are attached. This sizing evaluation is based on the average long-term conditions and worst-case critical conditions as defined in Appendix 7 of "Instructions for Completing the Industrial Wastewater Permit Application", Form TCEQ-10411_10055-inst (May 2017).

10. The following is a summary of information for the FGD wastewater evaporation pond:

    a. Use Designation (treatment, disposal, containment, or evaporation)

       i. Evaporation

    b. Any outfalls associated with the pond

       i. No outfalls

    c. Liner type (compacted clay, in-situ clay, or synthetic) and associated data

       i. Synthetic, composite liner consisting of primary and secondary 60-mil HDPE geomembrane liners and a geosynthetic clay liner (GCL).

[3] TCEQ Instructions for Completing the Industrial Wastewater Permit Application, Instructions for Industrial Worksheet 3.1Surface land Applications and Evaporation, 2. Evaporation Ponds, page 72 of 128, May 2017

[4] TCEQ Instructions for Completing the Industrial Wastewater Permit Application, Appendix 7 – Example – Storage Calculation for Evaporation Ponds without Irrigation, pages 127 -128 of 128

d. Dimensions of the liner

    i. Detailed information is not currently available. This information will be provided following a detailed geotechnical investigation of the area.

e. Depth from water surface

    i. Detailed information is not currently available. This information will be provided following a detailed geotechnical investigation of the area.

f. Average Depth from Natural Ground Level

    i. Detailed information is not currently available. This information will be provided following a detailed geotechnical investigation of the area.

g. Maximum Depth from Natural Ground Level

    i. Detailed information is not currently available. This information will be provided following a detailed geotechnical investigation of the area.

h. Freeboard (ft)

    i. 2 feet (minimum)

i. Surface Area (acres)

    i. Based on the preliminary evaluation of critical and average conditions, the total pond area is 100 acres.

j. Storage Capacity (gallons)

    i. Based on the preliminary evaluation of critical and average conditions, the total pond storage capacity is 635MM gallons (1,950 acre-feet) in multiple cells.

k. Meets requirements of 40 CFR Chapter 257, Subpart D

    i. Yes, the pond design will meet the requirements of 40 CFR Chapter 257, Subpart D

l. Leak Detection System information

    i. The evaporation pond will be lined with a composite liner and a leak collection and recovery system (LCRS). Leakage collection recovery system (LCRS) will be used to convey leakage within the composite liner to a collection trench and sump so that liquid within the liner can be removed and pumped back into the evaporation pond cell.

    ii. Leakage collection recovery system (LCRS):

        1. 6 inch perforated collection pipe to convey leakage to a free-draining gravel collection sump to allow for leakage within the composite liner to be removed and pumped back into the cell.

        2. 16 inch side-slope riser pipe (HDPE) to allow for leakage to be removed from the LCRS and discharged back into the cell.

        3. LCRS will slope at 2% maximum.

m. Seasonal high water table Depth vs Bottom Depth of Pond (indicate how GW will be protected if necessary)

    i. The bottom of LCRS will be a minimum of 5 feet above the seasonal high water table elevation.

11. Wastewater re-use for irrigation, evaporation, evapotranspiration beds, drip irrigation system, subsurface application, surface application or other.

    a. The FGD wastewater effluent will be treated and disposed by evaporation. The wastewater will not be reused for any purpose.

12. Stormwater management

    a. Precipitation that falls in the pond is accounted for in the pond sizing and will be evaporated along with the wastewater. Stormwater that falls outside the pond will be routed away from the pond by the embankments. Provisions to manage stormwater runoff have not been developed at this time and will be included in the final design and once final location has been determined.

13. Are there any groundwater monitoring wells associated with the ponds?

    a. Groundwater monitoring wells will be installed pending selection of the final location for the evaporation pond.

14. Is this in the Edwards Aquifer Recharge area?

    a. No, the Calaveras site is located south and east of the Edwards Aquifer Recharge area.

15. Evaporation Calculations

    a. An evaluation of the preliminary pond size is attached. This sizing evaluation is based on the average long-term conditions and critical worst-case conditions as defined in Appendix 7 of "Instructions for Completing the Industrial Wastewater Permit Application", Form TCEQ-10411_10055-inst (May 2017), attached.

    b. The calculated pond sizing is based on the maximum FGD wastewater effluent flow. The average effluent flow to the pond may be lower. Optimization of the FGD process may result in a lower effluent flow to the evaporation pond and a reduction in the pond size. The final pond size will be based on the optimized flowrate.

    c. Final calculations of the evaporation pond area and storage capacity will be submitted pending final design. The final design information will include geotechnical information and identify water wells within the area.

16. Describe each change to the permit and provide supplemental information to support the request

    As currently permitted, the station is authorized to discharge FGD wastewater, low volume waste (LVW), quench water, metal cleaning wastes (MCW) and stormwater at Outfall 109 after treatment in the Sludge Recycle Holding (SRH) pond. In practice, the station does not discharge MCW at this outfall, therefore it is removed from the discussion regarding Outfall 109. To achieve compliance with the Effluent Limitations Guidelines (ELGs) promulgated in federal regulation 40 CFR 423, FGD wastewater will be separated from the other streams for treatment via the evaporation pond. LVW streams that are currently sent to Outfall 109 will be separated and rerouting to the new LVW pond for treatment and discharge. The process for segregation will be impacted by regulatory deadlines to comply with the ELGs and with the Coal Combustion Residual (CCR) Rules and may lead to the following scenarios, requiring flexibility in the TPDES permit as outlined below.

    a. Scenario 1 – The SRH pond must be closed due to CCR requirements prior to implementing the new low volume waste pond and evaporation ponds but the TPDES permit has not yet been reissued, and prior to the FGD compliance date (December 31, 2023).

        i. If a new "LVW pond" is already constructed, LVW, quench water and stormwater would be routed to this pond, thence to existing Outfall 109 for discharge.

        ii. If a new LVW pond is not available, LVW, quench water and stormwater would be routed to Outfall 109 or an existing outfall currently permitted to discharge LVW (i.e., Outfalls 102, 103 or 108). This routing may be temporary until a new LVW pond is constructed, or may be permanent.

        iii. FGD wastewater would be segregated from the other flows to avoid sending it to the new LVW pond. This flow would bypass the SRH Pond and continue to be directed to Outfall 109. If LVW, quench water and stormwater continue to flow to Outfall 109, the flows would be commingled prior to discharge.

    b. Scenario 2 – The SRH pond must be closed due to CCR requirements prior to implementing the new LVW pond and evaporation ponds after the TPDES permit has been reissued, and prior to the FGD ELGs compliance date of December 31, 2023.

i. If a new LVW pond is already constructed, LVW, quench water and stormwater would be routed to this pond, thence to new proposed Outfall 714 for discharge.

ii. If a new LVW pond is not available, LVW, quench water and stormwater would be routed to Outfall 109 or an existing outfall currently permitted to discharge LVW (i.e., Outfalls 102, 103, and 108). This routing may be temporary until a new LVW pond is constructed, or may be permanent.

iii. FGD wastewater would be segregated from the other flows to avoid sending it to the new LVW pond. This flow would bypass the SRH Pond and continue to be directed to Outfall 109 or to a new temporary Outfall 715. If LVW, quench water and stormwater continue to flow to Outfall 109, the flows would be commingled with FGD wastewater prior to discharge.

c. Scenario 3 –MOST LIKELY SCENARIO – The evaporation pond is available for FGD treatment at the FGD compliance date of December 31, 2023. The permit has been reissued.

i. The SRH pond will receive all currently permitted streams for treatment and discharge through Outfall 109 until the FGD evaporation pond is available.

ii. FGD wastewater would be segregated from the other flows and sent to the new evaporation pond.

iii. If there is no requirement to close the SRH pond, LVW, quench water and stormwater would continue to be routed to the SRH pond and discharged through Outfall 109 until the new LVW pond is operational.

iv. If a new LVW pond is available, LVW, quench water and stormwater would be routed to the new LVW pond and discharged via a new LVW outfall (proposed internal Outfall 714).

v. If a new LVW pond is not available, LVW, quench water and stormwater would be discharged via existing Outfall 109 or an existing outfall currently permitted to discharge LVW (i.e., Outfalls 102 103, and 108) . If LVW, quench water and stormwater continue to flow to Outfall 109, the flows would be commingled with FGD wastewater prior to discharge.

vi. Legacy FGD waste streams generated before December 31, 2023 would continue to be discharged at Outfall 109. After dewatering (post 2023), SRH pond clean closure will commence, and Outfall 109 capped and removed from the permit following closure of the SRH Pond.

d. Summary of permitting request. As noted above, there are several scenarios associated with Outfall 109. CPS Energy requests that all of the following actions be taken by TCEQ in order to provide the best flexibility in the permit to address all scenarios, should they occur.

i. Information submitted with the application includes preliminary design information on the LVW and evaporation ponds since CPS is in the initial stages of design. CPS will submit final design plans for the ponds as soon as possible and requests TCEQ review the ponds prior to permit reissuance. This will allow CPS to move forward with preparing the ponds as soon as possible.

ii. Update Outfalls 102 103, and 108 as needed to include the Spruce LVW, quench wastewater and stormwater currently going to the SRH pond to allow discharge of these wastes should the SRH pond is forced into early closure.

iii. Add a new outfall for discharges from the new LVW pond, proposed Outfall 714. The new outfall would discharge the treated LVW, quench wastewater and stormwater that are currently going to the SRH pond and discharged at Outfall 109.

iv. Add a new outfall (proposed Outfall 715) for discharge of the FGD legacy wastewater should the SRH pond is forced into an early closure before complete installation of the evaporation ponds in 2023.

v. Establish a compliance date for FGD wastewater at December 31, 2023 and authorize the use of the evaporation pond as a zero-liquid discharge evaporation technology