Associated Electric Cooperative, Inc.

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2814 S. Golden, P.O. Box 754 Springfield, Missouri 65801-0754

October 3, 2023

Ms. Pam Hackler
Water Protection Program Director
Missouri Department of Natural Resources
P.O. Box 176
Jefferson City, MO 65102-0176

RE: Thomas Hill Energy Center – NPDES Permit MO-0095675, Special Condition 7(c).

Dear Ms. Hackler

Associated Electric Cooperative, Inc. (AECI), Thomas Hill Energy Center plans to discharge bottom ash transport water in accordance with 40 CFR 423.13 and MO-0095675 on January 1, 2024, and thereafter. Pursuant to the Thomas Hill Energy Center NPDES permit MO-0095675, special condition 7(c) and 40 CFR 423.19(c)(1) and (c)(2). AECI submitting the requisite Initial Certification Statement signed and certified by a professional engineer.

AECI is commissioning a concrete dewatering tank (CDT) replacing Ash Pond Cell 001. The concrete dewatering tank holds water from Unit 1, Unit 2, and bottom ash quenching water from Unit 3 at the Thomas Hill Energy Center. This tank is sized to handle bottom ash processes which use water to solidify bottom ash slag and convey it to the tank where it can be dewatered. In order to meet the ELG requirements, AECI has installed return pumps that are used to recirculate water back to the Unit in a closed loop process. Recirculated water from the CDT will replace the non-recirculated water currently used to supply feed water to the sluice pumps.

The attached pages outline the requirements for the Initial Certification Statement pursuant to 40 CFR 423.19. Each section of the statement is identified by the corresponding regulatory citation, starting with 423.19 (C)(3)(D), followed with AECIs response statement. Page six of the Initial Certification Statement contains requirements for 423.19 (C)(3) A, B, & C and the professional engineer's certification.

If the Department has questions, or needs further information, please contact me at rbennett@aeci.org or at 417-881-5412.

Sincerely,

Ryan Bennett
Environmental Analyst

423.19 (C)(3)(D) The primary active wetted bottom ash system volume in § 423.11(aa).

The volume of the Primary Active Wetted Bottom Ash System is 1,550,684 Gallons.

423.19 (C)(3)(E) Material assumptions, information, and calculations used by the certifying professional engineer to determine the primary active wetted bottom ash system volume.

The following table summarizes the maximum capacity of Bottom Ash Transport Water in all primary bottom ash collection: recirculation piping, recirculation tanks, slag tanks, sumps, and sluice lines. The list excludes volumes from associated surface impoundments, installed spares, redundancies, maintenance tanks and non-bottom ash transport systems that direct process water to the CDT. Calculations supporting the volumes shown are included in Appendix A.

Bottom Ash System Component	Volume (Gallons)
Unit 1 Slag Tank Volume	25,430 Gallons
Unit 2 Slag Tank Volume	34,930 Gallons
Unit 1 Sluice Line Volume	15,356 Gallons
Unit 2 Sluice Line Volume	15,729 Gallons
Return Piping Volume	30,447 Gallons
Concrete Dewatering Tank	1,428,794 Gallons
Total Volume	1,550,684 Gallons
10% of the Wetted Volume	155,068 Gallons/Day

Figure 1 – The primary wetted bottom ash system volumes

423.19 (C)(3)(F) A list of all potential discharges under § 423.13(k)(2)(i)(A)(1) through (4), the expected volume of each discharge, and the expected frequency of each discharge.

During normal operation AECI expects to discharge bottom ash purge water in volumes at or below the 30-day rolling average of 10 percent of the total primary active wetted bottom ash system volume when the follow events occur:

(1) To maintain system water balance when precipitation-related inflows are generated from significant storm events and cannot be managed by redundancies and secondary bottom ash system equipment. Volumes from these events will vary and may occur multiple times in any given year.

(2) To maintain system water balance when regular inflows from wastestreams other than bottom ash transport water exceed the ability of the bottom ash system to maintain normal operating conditions and segregating these other wastestreams is not feasible. Flow volumes and frequencies from these streams will vary.

(3) During periods AECI determines adverse water chemistry inhibits the facility's ability to properly operate the CDT, or perform maintenance, and the installed CDT treatment equipment, or non-ash transport water treatment equipment, is unable to return water chemistry to within operating parameters. AECI's ability to maintain system reliability within a reasonable timeframe to correct water chemistry will be considered a factor in deciding to discharge bottom ash purge water.

Water chemistry upset conditions are not a planned operating condition therefore AECI cannot reasonably predict an accurate estimate of volume or frequency. AECI does expect that as operations continue and this new technology is implemented these events will reduce over time in volume and frequency.

(4) When conducting maintenance not included in the above three activities and not exempted from the definition of transport water, and when water volumes cannot be managed by redundancies or other secondary bottom ash system equipment.

Unscheduled maintenance activities are not a standard operating condition therefore AECI cannot reasonably predict an accurate estimate of volume or frequency. AECI does expect that as operations continue and this new technology is implemented these events will reduce over time in volume and frequency. Estimated discharge volumes and frequencies for regularly scheduled maintenance activities and common repair items are listed below in *423.19 (C)(3)(G)(4)*.

423.19 (C)(3)(G) Material assumptions, information, and calculations used by the certifying professional engineer to determine the expected volume and frequency of each discharge including a narrative discussion of why such water cannot be managed within the system and must be discharged.

In corresponding order to the list above, the following narrative describes why, during closed loop operation, water from these cannot be managed within the CDT and must be discharged. Included in the narrative are material assumptions and calculations used by the professional engineer to determine expected volume and frequency of wastewater flows resulting from the events listed.

(1) Based upon the exposed surface area of the concrete dewatering tank and its adjacent dewatering pads, 1" of precipitation will produce approximately 18,600 gallons which will result in a 2.2" change in level of the tank. This water may need to be discharged in order to maintain normal operating conditions. For a 10-year/24-hour storm event of 4.97" this will produce a change in tank level of approximately 11".

(2) Inflows from wastestreams other than bottom ash transport water that may need to be discharged in order to maintain normal operating conditions would include, but not be limited to, the following sources:
   a. Boiler wash – The interior, fireside surface of the boiler must periodically be cleaned by washing with high-pressure water. We anticipate an average of six boiler washes per year. A boiler wash event can vary from a few days to a week and would include spraying water at varying rates in the boiler to remove material buildup. Water flow rates are varied during this process
   b. Tripper room floor washes – The tripper room is where coal enters the top of storage bunkers within the power block prior to combustion. To meet combustible dust safety requirements, AECI must frequently wash the tripper room removing coal dust buildup. Wash water containing coal dust is collected via drains and routed to the CDT. These flows occur at least weekly but are considered fairly minor in volume.
   c. Unit 3 pulverizer washdown – The coal pulverizers on Unit 3 must periodically be washed down to meet combustible dust safety requirements during maintenance activities. Wash water containing coal dust is routed to the submerged flight conveyor sump from which it is pumped to the CDT.
   d. Unit 3 submerged flight conveyor continuous overflow – The submerged flight conveyor on Unit 3 continuously overflows water used to cool the ash entering it. This water enters a sump from which it is pumped to the CDT.
   e. Slag tank cooling water – Cooling water from the slag tanks on Units 1 and 2 can enter the sluice stream when slag gates become worn and leak by.

(3) Discharges to maintain system water chemistry would include, but not be limited to, the following:
   a. Managing pH levels
   b. Managing substances or conditions causing corrosion
   c. Managing substances or conditions causing scaling
   d. Managing biological conditions
   e. Managing dissolved elements
   f. Managing temperature

(4) Discharges for other maintenance activities would include, but not be limited to, the following:
   a. Emptying dewatering tank for cleaning or repairs: This will result in a discharge volume of 1.4 Million gallons based on the Concrete Dewatering Tank volume listed in Figure 1 above. It is estimated this activity will be required once per year.
   b. Emptying piping for repair or replacement: This will result in a potential discharge of approximately 15,000 gallons based on the sluice line volumes listed in the above table. This activity is estimated to occur up to 6-8 times per year.
   c. Emptying slag tank for maintenance or repair: The volume from the slag tanks is drained and likely discharged from the CDT during regular maintenance outages that twice per year and possibly during unplanned outages throughout the year. The volumes of 25,430 and 34,930 gallons as listed in Figure 1 above from Units 1 and 2, respectively, are estimated to each discharge a minimum of twice per year.
   d. Emptying Unit 3 submerged flight conveyor and sump for maintenance or repair: This activity will result in a total potential discharge of approximately 48,000 gallons once per year. Volume is based on volume of both the Unit 3 Submerged flight conveyor tank and sump listed in Figure 1 above.

Non-Ash Transport Water Flows

Pursuant to Thomas Hill Energy Center – NPDES Permit MO-0095675, wastewater flows that are not regulated by 40 CFR 423.13(k), for example industrial stormwater or non-ash transport flows in items (2)a thru (2)e and (4)d above, are permitted to discharge from the CDT effluent and are not regulated as bottom ash purge water, thus do not contribute to the 30-day rolling average of 10 percent of the total primary active wetted bottom ash system volume limit.

For DMR reporting AECI will numerically separate bottom ash purge water and non-ash transport water as follows:
If during a boiler wash event, the CDT discharges 100,000 gallons in 24 hours and 90,000 gallons of the flow are attributed to boiler wash water. Then 10,000 gallons are attributed to ash-transport water discharged from the Primary Active Wetted Bottom Ash System. The 10,000 gallons of ash-transport water discharged is accounted for in the facility permit limit of a 30-day rolling average of 10% percent, bottom ash purge water.

Boiler wash water, a non-ash transport wastewater, may discharge the 90,000-gallon effluent from the CDT, as regulated by applicable wastewater effluent criteria and the site-specific NPDES permit limits.

423.19 (C)(3)(H) A list of all wastewater treatment systems at the facility currently, or otherwise required by a date certain under this section.

The Primary Active Wetted Bottom Ash System described, with a volume of 1,550,684 gallons, is the only wastewater treatment system at the facility regulated under this section of the rule.

423.19 (C)(3)(I) A narrative discussion of each treatment system including the system type, design capacity, and current or expected operation.

A concrete dewatering tank is used to treat wastestreams from the bottom ash collection systems on all 3 units at the Thomas Hill Energy Center. The tank consists of four cells – a primary settling cell, a secondary settling cell, a hot well cell, and a clear well cell. The majority of the solids settle in the primary settling cell where they are removed with an excavator and placed on the primary dewatering pad allowing excess water to drain back into the primary settling cell. Some solids carry over to the secondary settling cell where they are removed with an excavator and placed on the secondary dewatering pad allowing excess water to drain back into the secondary settling cell. The hot well includes mixers and injection points for chemicals. The clear well includes return water pumps that recycle the water, sending it back to the sluice pumps in the plant for re-use in sluicing operations. Each of the individual unit's bottom ash collection systems are described below.

Unit 1 utilizes two slag tanks, with a volume of 12,715-gallons each, to which molten slag is collected for solidification upon exiting the boiler. These slag tanks discharge their entire volume to the concrete dewatering tank approximately 6 times per day via 12" pipes. This pipe has a volume of 15,356 gallons. These tanks are refilled using recirculated water from the concrete dewatering tank return pipe that serves both Unit 1 and Unit 2. This return pipe has a volume of 30,447 gallons.

Unit 2 utilizes two slag tanks, with a volume of 17,465 gallons each, to which molten slag is collected for solidification upon exiting the boiler. These slag tanks discharge their entire volume to the concrete dewatering tank approximately 6 times per day via 12" pipes. This pipe has a volume of 15,729 gallons. These tanks are refilled using recirculated water from the concrete dewatering tank return pipe that serves both units Unit 1 and Unit 2. This return pipe has a volume of 30,447 gallons.

Unit 3 utilizes a submerged flight conveyor that continuously dewaters ash as it cools from a 34,028-gallon tank. The excess water overflows into a14,393-gallon sump where it is pumped overhead to the Unit 2 sluice pipes leading to the concrete dewatering tank. The piping between the sump and the Unit 2 sluice piping has a volume of 2,783 gallons.

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40 CFR 423.19(c)(3)
(A) A statement that the professional engineer is a licensed professional engineer.
(B) A statement that the professional engineer is familiar with the regulation requirements.
(C) A statement that the professional engineer is familiar with the facility.

I, Michael C. Stiefermann P.E., am a licensed professional engineer in good standing in the state of Missouri. I am familiar with the regulation requirements as well as the Thomas Hill Energy Center – Power Division facility, NPDES Permit MO-0095675.

Signed: ______________________
Michael C. Stiefermann

Print Name: Michael C. Stiefermann
Missouri License No.: E-29562
Title: Principal Engineer

Professional Engineers Seal:

STATE OF MISSOURI
MICHAEL C
STIEFERMANN
NUMBER
E-29562
REGISTERED PROFESSIONAL ENGINEER

10-03-2023

Appendix A

CALCULATION OF PRIMARY ACTIVE WETTED VOLUME

Unit 1 Slag Tank

Reference Hydro-Ash Corporation Drawing 8-2859-2A (TH1-019-073)

Upper Volume

$D_t := 14.0 \cdot ft$ $\quad H_t := 108 \cdot in$

$V_{c_0} := \frac{\pi}{4} \cdot D_t^2 \cdot H_t$ $\quad V_{c_0} = 10364 \cdot gal$

Lower Volume

$D_t := 14.0 \cdot ft$ $\quad D_b := 0 \cdot ft$ $\quad H_t := 49 \cdot in$

$V_{c_1} := \frac{\pi}{4} \cdot \left(\frac{D_t^2 + D_b^2}{2} \right) \cdot H_t$ $\quad V_{c_1} = 2351 \cdot gal$

$\sum V_c = 12715 \cdot gal$ $\quad 1700 \cdot ft^3 = 12717 \cdot gal$ $\quad PAWV_0 := 2 \cdot \sum V_c$

Unit 2 Slag Tank

Reference United Conveyor Corporation Drawing 527-54640-1 (TH2-119-010)

Upper Volume

$EL_b := 744 \cdot ft + 9.4375 \cdot in$ $\quad D_b := 16.5 \cdot ft$ $\quad Slope := \frac{15}{55.5625}$

$EL_t := 745 \cdot ft + 3 \cdot in$ $\quad H_t := EL_t - EL_b$ $\quad H_t = 5.5625 \cdot in$

$D_t := D_b - 2 \cdot \frac{H_t}{Slope}$ $\quad H_b := \frac{D_b}{2} \cdot Slope$

$D_t = 13.066 \cdot ft$ $\quad H_b = 26.727 \cdot in$

$V_{c_0} := \frac{\pi}{12} \cdot \left[D_b^2 \cdot H_b - D_t^2 \cdot (H_b - H_t) \right]$ $\quad V_{c_0} = 598 \cdot gal$

Center Volume

$D_t := 16.5 \cdot ft$ $\quad H_t := 8.16 \cdot ft$

$V_{c_1} := \frac{\pi}{4} \cdot D_t^2 \cdot H_t$ $\quad V_{c_1} = 13052 \cdot gal$

Lower Volume

$D_t := 16.5 \cdot ft$ $\quad D_b := 0 \cdot ft$ $\quad H_t := 4.77 \cdot ft$

$V_{c_2} := \frac{\pi}{4} \cdot \left(\frac{D_t^2 + D_b^2}{2} \right) \cdot H_t$ $\quad V_{c_2} = 3815 \cdot gal$

$\sum V_c = 17465 \cdot gal$ $\quad PAWV_1 := 2 \cdot \sum V_c$

Unit 1 Sluice Line

Reference AECOM Drawings T18-AHB-401 through 404

$D_p := 11.6 \cdot in$ $L_p := 2797 \cdot ft$ $A_p := \frac{\pi}{4} \cdot D_p^2$ $A_p = 0.734 \cdot ft^2$

$V_c := A_p \cdot L_p$ $V_c = 15356 \cdot gal$ $PAWV_2 := V_c$

Unit 2 Sluice Line

Reference AECOM Drawings T18-AHB-401 through 404

$D_p := 11.6 \cdot in$ $L_p := 2865 \cdot ft$ $A_p := \frac{\pi}{4} \cdot D_p^2$ $A_p = 0.734 \cdot ft^2$

$V_c := A_p \cdot L_p$ $V_c = 15729 \cdot gal$ $PAWV_3 := V_c$

Return Water Line

Reference AECOM Drawings T18-AHB-401 through 404

$D_p := 16.0 \cdot in$ $L_p := 2915 \cdot ft$ $A_p := \frac{\pi}{4} \cdot D_p^2$ $A_p = 1.396 \cdot ft^2$

$V_c := A_p \cdot L_p$ $V_c = 30447 \cdot gal$ $PAWV_4 := V_c$

Concrete Dewatering Tank

Reference AECOM Drawing T18-AHB-101

Primary Settling Tank

$L_{pt} := 193.7 \cdot ft$ $W_t := 35 \cdot ft$ $H_t := 14 \cdot ft$

$V_{c_0} := L_{pt} \cdot W_t \cdot H_t$ $V_{c_0} = 709999 \cdot gal$

Secondary Settling Tank + Hotwell + Clearwell

$L_{st} := (5 + 141.7 + 38.7 + 10.7) \cdot ft$ $W_t = 35 \cdot ft$ $H_t = 14 \cdot ft$

$V_{c_1} := L_{st} \cdot W_t \cdot H_t$ $V_{c_1} = 718796 \cdot gal$

$\sum V_c = 1428794 \cdot gal$ $PAWV_5 := \sum V_c$

Total Primary Active Wetted Bottom

$$PAWV = \begin{pmatrix} 25430 \\ 34930 \\ 15356 \\ 15729 \\ 30447 \\ 1428794 \end{pmatrix} \cdot gal \qquad \sum PAWV = 1550685 \cdot gal$$

$$\frac{10\% \cdot \sum PAWV}{day} = 155068 \cdot \frac{gal}{day}$$

Unit 3 Bottom Ash System Volumes (For Reference Only)

Unit 3 Submerged Flight Conveyor Tank

Reference Babcock & Wilcox Drawing 4762J (TH3-341A-1-002)

$$L_t := \left(79 + \frac{11}{2}\right) \cdot ft \qquad W_t := 80.75 \cdot in \qquad H_t := 8 \cdot ft$$

$$V_c := L_t \cdot W_t \cdot H_t \qquad V_c = 34028 \cdot gal$$

Unit 3 Submerged Flight Conveyor Sump

Reference Burns & McDonnell Drawing S22 (TH3-ENG-S-S22)

$$L_t := 4 \cdot ft \qquad W_t := 13 \cdot ft \qquad H_t := 7 \cdot ft$$

$$V_{c_0} := L_t \cdot W_t \cdot H_t \qquad V_{c_0} = 2723 \cdot gal$$

$$L_t := 20 \cdot ft \qquad W_t := 13 \cdot ft \qquad H_t := \left(\frac{7 + 5}{2}\right) \cdot ft$$

$$V_{c_1} := L_t \cdot W_t \cdot H_t \qquad V_{c_1} = 11670 \cdot gal \qquad \sum V_c = 14393 \cdot gal$$

Unit 3 Piping to Unit 2 Sluice

$$D_p := 10 \cdot in \qquad L_p := 682 \cdot ft \qquad A_p := \frac{\pi}{4} \cdot D_p^{\,2} \qquad A_p = 0.545 \cdot ft^2$$

$$V_c := A_p \cdot L_p \qquad V_c = 2783 \cdot gal$$