



Date: 10/11/24 (via email)

To: Wendy Heib, NPDES Industrial Permit Coordinator

RE: Progress Report for Muscatine Power and Water (MPW) Unit 9 Compliance with 40 CFR 423 - Effluent Limitation Guidelines for the Steam Electric Power Generating Point Source Category (ELG) Requirements for FGD Wastewater

Dear Ms. Heib,

Requirements in 423.19(h)(3), require an annual progress report for the planned Voluntary Incentive Program (VIP) technology selected by MPW for Unit 9 in the Notice of Planned Participation (NOPP) submitted 10/11/2021.

This report is being provided to fulfill those requirements and update the IDNR on the current progress made towards the items listed in the engineering dependency chart provided to IDNR on 10/11/2021.

### **10-11-22 – Annual progress report (based on engineering dependency chart)**

Ongoing Assessment of Emerging/New Technologies (1/11/2021-11/01/2023):

- Thermal Spray Dryer and RO water reduction presentation
  - Similar spray dry evaporator technology to what was available in other industries in 2015.
  - MHI has these systems operating in China on several units and one unit online in U.S. as of 2022. The U.S. installation does not incorporate wastewater reduction and treats a very large amount of wastewater.
  - They have proposed and piloted a few conventional RO water reduction units where the permeate could be reused in the WFGD system. There is a single permanent installation with a mechanical vibratory RO technology that was piloted and then continued use by the Owner after the pilot, but MHI do not recommend that technology to their customers due to high O&M costs.
- High Pressure Reverse Osmosis technology
  - Minor improvement to recovery rate and some improvements to online analyzers/control loops to improve reliability/recovery

- Only lab-scale treatability studies for larger dischargers have been conducted. There have been no large-scale pilots or full installations in a FGDW application.

Evaluation of existing process equipment (10/10/2022-12/09/2023):

- Evaluation of existing waste process equipment (10/10/2022-12/09/2023)
  - Budgeting 2023/2024 for seal water reduction testing and flow monitoring
  - FGD operators and engineers have begun identifying water reduction possibilities. Engineering tested existing equipment capability of clarifying waste streams and producing useful FGD byproduct. Operators ran waste product at lower than normal density setpoints testing process operation.
    - Currently testing effects on overall process chemistry on reducing and increasing flows and the impacts at variable boiler load.
    - Consulted with experts regarding boiler mercury treatment and potential impacts to wet scrubbers.
    - Operators are identifying water separation opportunities in FGD
- Characterization of process and effluent streams (10/10/2022-12/09/2023):
  - Engineering is working to identify experts in the field of WFGD water reduction and water balance characterization

### **10-11-23 – Annual progress report (based on engineering dependency chart)**

Ongoing Assessment of Emerging/New Technologies (1/11/2021-11/01/2023):

- MPW Engineering has not found promising emergent technologies in a review of available industry literature but will continue to evaluate.
  - MPW sent Mitsubishi Power operating data to help evaluate the feasibility of their spray dryer evaporator technology being a part of the wastewater treatment solution.
  - MPW continues to collect FGD wastewater samples and test quarterly per current NPDES permit.

Available Technology Re-Study (01/01/2023-11/01/2023):

- Additional Preliminary Engineering Studies (01/01/2023-09/01/2023):
  - Had engineering consultant provide an updated cost estimate for FGD wastewater treatment compliance.
- Selection of Technologies to Pilot (09/01/2023-11/01/2023):
  - High pressure reverse osmosis membrane technology was identified as a potential technology to pilot.

Evaluation of existing process equipment (10/10/2022-12/09/2023):

- Evaluation of existing FGD process equipment (10/10/2022-12/09/2023) continues.
  - Budgeting 2023/2024 for seal water reduction testing and flow monitoring

- FGD operators and engineers have begun identifying water reduction possibilities. Engineering tested existing equipment capability of clarifying waste streams and producing additional useful FGD byproduct. Operators ran process with product at lower-than-normal density setpoints to test process operation.
  - Currently testing effects on overall process chemistry on reducing and increasing flows and the impacts at variable boiler load.
  - Consulted with experts regarding boiler mercury treatment and potential impacts to wet scrubbers.
  - Operators are identifying water separation opportunities in FGD.
- Characterization of process and effluent streams (10/10/2022-12/09/2023) continues:
  - Engineering is working to identify experts in the field of WFGD water reduction and water balance characterization.

### **10-11-24 – Annual progress report (based on engineering dependency chart)**

#### Pilot Testing (1/1/2024-10/31/2024):

- Planning/procurement/Testing (1/1/2024-9/30/24):
  - AECOM has been retained to perform a water balance study and to recommend process and equipment changes to reduce and reuse water to reduce FGD wastewater quantity.
    - Pilot testing of a treatment technology or technologies will be conducted after wastewater reduction and characterization efforts determine the best technologies to test.
    - MPW has been performing operational testing as recommended by AECOM:
      - Testing at various unit loads and FGD flue gas inlet temperatures to determine absorber tower evaporation rates
      - Rerouting vacuum drum filtrate back into the absorber tower quencher for reuse
      - Reducing water input from seal water by shutting off the absorber spray pump and absorber tower quencher agitators and reducing seal water to the wet film contactor (WFC) pump
      - Reducing water by reducing mist eliminator spray duration
      - Monitoring chloride concentration levels to compare with compatibility with existing materials of construction.
      - Capturing inflow and outflow flow data using flowmeters.
    - Draft report of study for existing water balance and recommendations for additional reductions has been received
    - MPW and AECOM will continue performing operational testing in Q4 2024 and 2025 to support selection of permanent wastewater reduction opportunities to minimize treatment equipment size.
      - A waterless seal has been selected for trial run on an absorber tower quencher spray pump and a purchase agreement is in progress. Changing from seal water to waterless seals on various equipment has been recognized as an opportunity to substantially reduce wastewater.

- A goal of operational testing is to find the maximum steady-state chloride level and continue to evaluate absorber tower evaporation rates at lower unit loads as water use is reduced.
- Review of results(09/30/2024-10/31/2024):Operational testing to date has shown a reduction in water use and wastewater quantities along with increased chloride concentration that is to be expected with the cycling up of reused wastewater.
- The engineering dependency chart will be updated as needed based on the 2024/2025 operational testing results that allow selection of appropriate size pilot scale treatment options while ensuring to maintain compliance with the 12/31/28 deadline.

MPW will continue to assess any emerging/new technologies for FGD wastewater treatment, as well as submit progress reports on an annual basis.

Regards,



Jean Brewster  
Manager, Environmental Affairs  
Muscatine Power and Water

cc. Greg Slonka - Director, Power Production and Supply