Muscatine Power and Water
3205 Cedar Street
Muscatine, IA 52761-2204
563-263-2631
mpw.org

Action Plan for Evaluation and Elimination of CCR Landfill Water Discharges at SW-24 and SW-26 with Concentrations above Applicable Action Levels

Purpose

Muscatine Power and Water (MPW) is submitting this Action Plan in response to the Iowa Department of Natural Resources' request for a plan to address cutoff drain discharges at monitoring location SW-24 and surface water discharges at monitoring location SW-26 at the MPW coal combustion residual (CCR) landfill. The purpose of this plan is to identify the means, methods, and schedule by which MPW will evaluate, reduce, and ultimately eliminate discharges at SW-24 and SW-26 with exceedances of applicable action levels. In addition, for SW-24, MPW will include study and evaluation of cutoff drain operation followed by selection of remedial action to ensure discharged concentrations do not exceed identified action levels.

The plan with completion date is based on MPW's planned compliance with the 2024 Environmental Protection Agency (EPA) Rule for Effluent Limitation Guidelines for Steam Electric Plants (ELG); it currently requires zero liquid discharge (ZLD) of combustion residual leachate (CRL) for which (EPA) has determined an achievable compliance date is 12/31/2034. The SW-24 cutoff drain discharges will require additional study, followed by selection of remedial actions taken during the same time frame, but there is not a ZLD requirement, and they have different chemistry than collected leachate. The included engineering dependency chart outlines planned actions to evaluate potentially feasible options, select a remedial action, and implement action. This plan will be updated as additional engineering evaluations, monitoring data, and regulatory changes/determinations become available.

Background

The MPW CCR landfill includes a National Pollution Discharge Elimination System (NPDES) outfall denoted as SW-26. This surface water discharge is not an identified drinking water source. In addition, data have indicated that groundwater cut-off drains (groundwater interception systems to keep offsite groundwater entering the landfill area), have elevated concentrations of some parameters at SW-24. Cut off drains are not NPDES outfalls and are not an identified source of drinking water.

MPW recognizes the need to further evaluate pathways and develop a long-term solution. This requires data collection over multiple seasons and consideration of potential extreme weather conditions and is ongoing. This Action Plan is intended to satisfy the objective while incorporating ongoing engineering efforts associated with combustion residual leachate (CRL) management and federal ELG Rule compliance requiring zero liquid discharge of CRL and of flue gas desulfurization wastewater (FGDW) at the generation site which is remote from the CCR landfill site..

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Action Plan

Component 1: Continue Leachate Volume Reduction

Objective

Reduce the volume of leachate requiring management.

Actions

- Continue landfill cover installation activities that minimize precipitation infiltrating into CCR materials, following a 2019-2020 project that added final cover to 10.5 acres and temporary cover to an additional 5 acres.
    - Complete the Rain Cover Project in 2026, covering 2.7 acres, and continue to monitor leachate flow volume to evaluate resulting reductions in leachate generation.
    - Continue efforts to reduce exposed landfill surface areas where practical.
- Incorporate leachate reduction considerations into future landfill management activities as opportunities arise.

Expected Outcome

Increased cover will reduce leachate generation rates and correspondingly reduce potential for transport of leachate-related constituents.

Component 2: Evaluate Leachate Collection System Performance and Cutoff Drain Operations/Performance

Objective

Determine the existing leachate collection and groundwater interception systems and quantify the volume of leachate and intercepted groundwater flow requiring management.

Actions

- Continue multi-year monitoring of collected leachate flow volumes.
    - Evaluate seasonal variability associated with rainfall, snowmelt, and resulting groundwater conditions.
- Upgrade leachate flow monitoring and pumping equipment as necessary to improve data quality and operational reliability.
- Establish design flow conditions for future treatment and storage infrastructure.

- Evaluate groundwater cutoff drain system performance, flow volume, and its relationship to conditions observed at SW-24.

Expected Outcome

Improved understanding of leachate collection system performance, flow variability, and the relationship between intercepted leachate and observed surface water impacts. Improved understanding of cut-off drains' performance and potential sources for elevated concentrations of certain parameters.

Component 3: Evaluate and Address Potential Sediment Sources

Objective

Determine whether accumulated sediments within the runoff control pond and associated drainage features contribute to observed constituent concentrations and plan for removal as needed.

Actions

- Conduct sediment depth surveys.
- Perform sediment characterization and analytical testing.
- Evaluate whether accumulated sediments represent a continuing constituent source.
- Develop and implement sediment removal activities where warranted.

Expected Outcome

Identification and mitigation of potential sediment sources that may contribute to monitoring results at SW-26.

Component 4: Evaluate Feasibility of Options, Select Remedial Alternative, and Implement Management Strategy

Objective

Implement a permanent system that eliminates surface water discharge of CCR landfill leachate.

Actions

MPW will continue to evaluate options for ZLD for CRL required in the 2024 ELG Rule, including feasibility of transporting leachate from the remote landfill to a developing Flue Gas Desulfurization Wastewater (FGDW) treatment system at the generation site and will select a long-term management alternative capable of achieving ZLD or equivalent elimination of routine leachate discharge by the date EPA set for compliance, 12/31/2034. Alternatives under evaluation include:

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Leachate Alternative A: Dedicated Landfill ZLD Facility

- Evaluate feasibility of lined evaporation and storage infrastructure (pond) to contain accumulated leachate
    - Consider effect of Iowa climate and if net evaporation would be sufficient
    - Consider mechanical evaporators
    - Evaluate pond cleanout requirements in all seasons
    - Consider freezing weather operations and limitations.
- Evaluate passive evaporation and mechanical evaporation technologies.
- Size facilities based on measured leachate generation rates under variable weather conditions.

Leachate Alternative B: Integration with Generating Station FGD Facilities

- Evaluate feasibility of leachate transfer from the remote CCR landfill to the generating station.
- Integrate leachate management within the developing FGD changes to meet ELG Rule requirements
- Evaluate storage, reliability, transportation, and operational requirements.
- If the Facility FGD system ceases to operate and is not available for CRL use, a detailed plan for leachate management, including monitoring and treatment needed to meet regulatory requirements, will be developed.

Leachate Alternative C: Equivalent Future BAT Technology

- EPA is currently reconsidering the ELG Rule and may change in early 2027, thus changing the BAT for CRL (currently ZLD). Any new BAT will need to be evaluated with associated treatment options identified.

MPW will select a preferred alternative following completion of engineering, operational, environmental, and economic evaluations.

Cut-Off Drain Study

- Evaluate Cut-off drain operations
    - Assess potential operational improvements
    - Assess applicable action levels
- Identify and assess the feasibility of options to reduce discharges of parameters above selected action levels before selecting a remedial measure.

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MPW will select a preferred alternative for cut-off drain changes following completion of engineering, operational, environmental, and economic evaluations.

Interim Measures

Until a permanent solution is implemented, MPW will continue with the following measures:

- Continue monitoring at SW-24 and SW-26.
- Evaluate options for potential cut-off drain operational improvements and chemistry
- Continue annual evaluation of groundwater cut-off drain system performance.
- Continue operation and maintenance of IDNR-approved existing CRL collection systems.
- Continue implementation of infiltration reduction projects as applicable.
- Continue investigation and management of pond sediment accumulation.

These measures are intended to minimize constituent loading while permanent corrective actions are evaluated and implemented in accordance with the CRL ZLD compliance date determined by EPA in the 2026 Date Extension Rule (91 FR 28487; Docket EPA-HQ-OW-2009-0819).

If you have any questions, please contact Jean Brewster at jbrewster@mpw.org.

Implementation Plan with Dates Affected by Results from Planned Studies - Engineering Dependency Chart

ID	Milestone	Target Completion	Dependency
1	Partial Cover Project	2020 (completed)	N/A
2	Rain Cover Project	2026 (completed)	N/A
3	Continue Leachate Volume Characterization and Monitoring	2024-2028	1,2: Collection of sufficient flow, precipitation, chemistry, and seasonal operating data to establish design basis conditions
4a	Sediment Survey and Characterization	2026-2027	1,2
4b	Develop Sediment Management Plan	2027	4a: Completion of sediment survey, characterization results, and evaluation of potential constituent contributions
4c	Complete Evaluation of Long-Term Leachate Management Alternatives and Cut-off Drain alternatives	2026-2028	3, 4a: Completion of leachate flow characterization, source reduction evaluations, sediment investigations, cutoff drain (SW-24) evaluation, and preliminary engineering studies
5a	Select Preferred Alternative	Following Feasibility Evaluations	4c: Completion of technical, operational, environmental, and economic evaluations of alternatives for leachate and for cut-off drain discharges
5b	Complete Detailed Engineering Design	2028-2030	4c, 5a: Selection of preferred alternative; establishment of design flow and constituent loading basis
5c	Obtain Approvals, Funding, and Permits	2029-2031	5a, partial 5b: Completion of preliminary and detailed design; internal capital approval process; regulatory permitting requirements

5d	Construct Permanent Leachate Management Infrastructure and Selected Cut-off Drain Changes	2029-2033	5b, 5c: Receipt of permits and approvals; funding authorization; equipment procurement, weather impacts, and contractor availability
5e	Commission, Test and Place Selected Leachate Management and Cut-off Drain Operation	2033-2034	5d: Completion of construction; startup testing; operational readiness verification for both leachate and cut-off drain changes
6	Complete Sediment Removal Activities (if warranted)	2029-2033	4b,5e: Implement sediment management plan, including excavation, and disposal after leachate management infrastructure is in place
7	Eliminate Routine CCR Leachate Surface Water Discharges	No Later Than December 31, 2034*	5d, 5e, 6: Successful commissioning and demonstration of permanent leachate management system performance

*Schedule subject to modification based on final regulatory requirements, engineering findings, permitting requirements, and ongoing EPA ELG rulemaking activities; leachate management after FGD facility discontinuation will be addressed at the time, and comply with regulations in place at that time.