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FEDERAL CCR COMPLIANCE CORRECTIVE MEASURES ASSESSMENT

**POWERTON GENERATING STATION
W1798010008**

13082 EAST MANITO ROAD
PEKIN, ILLINOIS

Prepared on behalf of: Midwest Generation, LLC

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ABBREVIATIONS AND ACRONYMS

Term	Definition/Description
CCR	Coal Combustion Residuals
CFR	Code of Federal Regulations
CMA	Corrective Measures Assessment
cm/sec	Centimeters per second
COC	Constituent of concern
DO	Dissolved Oxygen
ELUC	Environmental Land Use Control
GMZ	Groundwater Management Zone
GWPS	Groundwater Protection Standards
GWPT	Groundwater Pump & Treat
HASP	Health and Safety Plan
IAC	Illinois Administrative Code
Illinois EPA	Illinois Environmental Protection Agency
MWG	Midwest Generation, LLC
MNA	Monitored natural attenuation
MSL	Mean sea level
PRB	Permeable Reactive Barrier
Redox	Reduction and Oxidation
SO ₄	Sulfate
SOP	Standard Operating Procedure
TACO	Tiered Approach to Corrective Action Objectives
WCG	Weaver Consultants Group North Central, LLC

1 INTRODUCTION

On behalf of Midwest Generation, LLC (MWG), **Weaver Consultants Group North Central, LLC (WCG)** has prepared this Corrective Measures Assessment (CMA) Report pursuant to the United States Environmental Protection Agency's (USEPA's) Coal Combustion Residuals (CCR) Rule at 40 Code of Federal Regulations (CFR) Part 257 Subpart D. This CMA Report is responsive to a confirmed exceedance at a statistically significant level above a Groundwater Protection Standard (GWPS) at the Powerton Generating Station (Powerton) for an Appendix IV assessment monitoring constituent under the Federal CCR Rule.

One exceedance of the GWPS was observed during the 4th quarter 2024 and confirmed in January of 2025 for molybdenum at MW-15. This well was again sampled for molybdenum in February of 2025 as part of the Nature and Extent of Impacts Evaluation (N&E Evaluation), at which point the concentration of molybdenum was below the GWPS. The molybdenum concentration at MW-15 was also below the GWPS during semi-annual groundwater monitoring activities performed in May 2025.

This CMA Report evaluates potential corrective measures in their effectiveness to meet regulatory requirements pursuant to 40 CFR Part 257.96(c) for molybdenum observed in groundwater at a statistically significant level exceeding the GWPS defined under the Federal CCR Rule. This CMA Report includes the following information:

- A summary of the site geology/hydrogeology and nature and extent of the observed exceedances as identified by the N&E Evaluation performed to date pursuant to 40 CFR Part 257.95(g); and
- An evaluation of the effectiveness of potential corrective measures in meeting the requirements set forth in 40 CFR Part 257.96(c)(1) through 257.96(c)(3).

1.1 Station Background

The Powerton Station began operating in the 1920s and was acquired by MWG in 1999. The Powerton Station has three units considered Federal CCR Surface Impoundments that are covered under the Federal CCR Rule (refer to **Figure 1**). The Federal CCR Surface Impoundments include the Ash Surge Basin, Ash Bypass Basin, and inactive Former Ash Basin, which is being planned for closure. These three Surface Impoundments are also regulated CCR units under the 35 Ill. Adm. Code Part 845 Illinois CCR Rule and an Illinois CMA is also being performed concurrently to address exceedances observed at wells within the state groundwater monitoring program.

A N&E Evaluation is being implemented at the Station to satisfy both the Federal and Illinois CCR Rule. Based on the findings of the N&E Evaluation and as discussed in further detail below, this CMA focuses on the Ash Surge Basin as the primary potential source of groundwater impacts.

The Ash Surge Basin was previously the primary basin used for the treatment/collection of ash at the Powerton Station. The Ash Surge Basin was constructed in 1978 with at least a 12-inch Poz-o-Pac™ liner on the bottom topped with a bituminous seal coat and a Hypalon® liner on the sides of the basin. The Ash Surge Basin was relined in 2013 with a bottom geotextile cushion layer placed on top of the Poz-o-Pac™, 60-mil HDPE geomembrane liner, a top geotextile cushion, a 12-inch-thick sand cushion layer, and a 6-inch-thick limestone warning layer. The Ash Surge Basin has been removed from service as of October 14, 2024. The Powerton Station has developed alternate CCR processing capacity and is currently not using the treatment/collection capacity previously provided by the Ash Surge Basin.

1.2 Corrective Measures Assessment Process

According to 40 CFR Part 257.96(a), the assessment of corrective measures must be initiated within 90 days after finding that a constituent listed in Appendix IV has been detected at a statistically significant level exceeding the GWPS at the downgradient waste boundary. The laboratory results for the January 2025 verification groundwater monitoring event were received on January 15, 2025. Therefore, the assessment of corrective measures was initiated by April 15, 2025 and a notice indicating this was placed on MWG's Federal CCR Website. The assessment of corrective measures is to be completed within 90 days after initiation of assessment of corrective measures, unless the owner or operator demonstrates the need for additional time to complete the assessment of corrective measures due to site-specific conditions or circumstances. The owner or operator must obtain a certification from a qualified professional engineer, or approval from the Participating State Director or approval from EPA where EPA is the permitting authority attesting that the above demonstration for additional time is accurate. A demonstration from a qualified professional engineer for an additional 60 days to complete the assessment of corrective measures was submitted to the Illinois Environmental Protection Agency (Illinois EPA) by WCG on April 17, 2025. As all three surface impoundments regulated under the Federal CCR Rule are also regulated under the Illinois CCR Rule, the approval of this demonstration (received June 3, 2025) by the Illinois EPA extends the regulatory due date for this CMA to September 15, 2025. The above demonstration from a qualified professional engineer and subsequent approval from the Illinois EPA have been posted to the MWG Federal CCR Rule Compliance website.

This CMA Report follows the requirements and objectives defined in 40 CFR Part 257.96 and identifies potential corrective measures based on their ability to prevent further releases, remediate any existing releases, and restore the affected area, where applicable. Corrective measures were developed with consideration to all available sampling data, including the two most recent sampling events at MW-15 in which the data indicated that the GWPS for molybdenum was met. Each potential corrective measure is then analyzed in its effectiveness to meet the following criteria, pursuant to 40 CFR Part 257.96(c)(1) through 257.96(c)(3):

- The performance, reliability, ease of implementation, and potential impacts of appropriate potential remedies, including safety impacts, cross-media impacts, and control of exposure to any residual contamination;
- The time required to begin and complete the corrective action plan; and
- The institutional requirements, such as State or local permit requirements or other environmental or public health requirements that may substantially affect implementation of the corrective action plan.

The above analysis is presented in **Section 3**.

2 CURRENT SITE CONDITIONS

The current site conditions are summarized below with reference to previously submitted technical documentation pertaining to the Powerton Groundwater Monitoring Program and the N&E Evaluation performed in response to identification of the confirmed exceedance for molybdenum above the GWPS.

2.1 Geology and Hydrogeology

The lithology beneath the Ash Surge Basin consists of unconsolidated deposits, primarily composed of alluvial sands and gravels with interspersed clays and silty clays. The unconsolidated deposits are underlain by shale, limestone, and coal from the Carbondale Formation. Boring logs indicate three distinct geologic units at the Site. The uppermost unit consists of fill observed to be mostly tan, brown, and black fine to medium sand to silty sand with some gravel and clay seams. Some areas include indications of cinders and brick fragments within boring logs. The fill unit is located within the vadose zone. Beneath this unit, the geology consists of a discontinuous clay to silty clay to silt unit. The clay/silty clay unit is discontinuous at the Site. The clay/silty clay unit generally extends from the area of the Ash Surge Basin to the south and west portions of the Site. Some boring logs indicate the absence of silty clay, while others document a unit up to 18 feet thick, comprising clay and silty clay. Boring logs for wells on the north and east portion of the Site indicate no observed clay/silty clay unit. Below the clay/silty clay unit lies the sand and gravel unit. The sand and gravel unit consists mostly of light brown, brown and/or gray medium to coarse sands and gravels.

The Illinois River is located north of the Site, and Powerton Lake is to the west-northwest. Groundwater at the Site is typically encountered between 18 and 32 feet below ground surface (KPRG, 2025). Both the clay/silty clay and sand and gravel geologic units are saturated. The screened intervals of monitoring wells have been set in either the clay/silty clay unit or the sand and gravel unit. The groundwater elevation observed in these two units demonstrates two distinct but hydraulically connected groundwater units. Groundwater contour maps have historically been generated for each unit. Pursuant to the *Federal CCR Compliance Annual Groundwater Monitoring and Corrective Action Report – 2024 Ash By-Pass Basin and Ash Surge Basin* (KPRG, 2025) dated January 31, 2025 prepared by KPRG, groundwater in the clay/silty clay unit moves to the east and west from the vicinity of the Ash Surge Basin, driven by the thinning of the silt/clay unit. Groundwater in the sand and gravel unit moves generally to the north-northwest, towards the Illinois River (KPRG, 2025). Groundwater contour maps show some temporal fluctuations, with the highest water levels generally occurring within the first and second quarters of the year.

2.2 Nature and Extent of Groundwater Impacts

After the exceedance of the GWPS was confirmed, pursuant to 40 CFR Part 257.95(g), a N&E Evaluation was initiated on behalf of MWG by KPRG and Associates, Inc. (KPRG). The N&E Evaluation implemented to date has consisted of collecting and analyzing groundwater samples from CCR monitoring wells onsite, soil samples from berms surrounding the Ash Surge Basin, and surface water and pore water samples from the Former Intake Canal. No new wells screened in the clay/silty clay unit were installed as part of the N&E Evaluation because concentrations of molybdenum observed during the N&E Evaluation at MW-15 met the GWPS and therefore the molybdenum detected at a statistically significant level exceeding the GWPS has been defined.

Additional technical information pertaining to the N&E Evaluation is presented below.

2.2.1 Extent of Impacts – Clay/Silty Clay Unit

Groundwater and pore water sampling data collected during the N&E Evaluation indicates compliance with the GWPS with respect to the molybdenum exceedance previously identified at MW-15 within the clay/silty clay unit. Molybdenum was not detected in groundwater during the N&E Evaluation at a concentration exceeding the GWPS. As no groundwater impacts were identified at concentrations exceeding the GWPS during the N&E Evaluation, the prior confirmed concentration of molybdenum at MW-15 above the GWPS observed during the January 2025 sampling event may have been a temporal or statistical anomaly.

2.2.2 Other N&E Evaluation Data

In addition to groundwater sampling, soil samples collected from the impoundment berms were analyzed using the Synthetic Precipitation Leaching Procedure (SPLP). The SPLP is a method referenced in the 35 Ill. Adm. Code Part 742 Tiered Approach to Corrective Action Objectives (TACO) regulations for evaluation of the Soil Component to Groundwater Ingestion Exposure Pathway. The results from these soil samples surrounding the Ash Surge Basin indicate that constituents listed in 40 CFR Part 257 Appendix IV are not leaching into groundwater at a concentration that would cause GWPS exceedances. No impacts to pore water or surface water within the Former Intake Canal were observed. As previously noted, the concentration of molybdenum at MW-15 has decreased below the GWPS as of February 2025 and remained below the GWPS according to data from the May 2025 monitoring event.

In response to the recent groundwater, surface water, and pore water sampling, a survey into the geomembrane liner in the Ash Surge Basin was also performed. A Leak Location Survey was conducted on the Ash Surge Basin using a combination of a soil covered and exposed geomembrane survey

methodologies. The results from this survey identified four minor tears in the geomembrane of the Ash Surge Basin. Potential leak points at geomembrane batten strip connections in the Ash Surge Basin were also identified, including along the north side of the weir wall, where the geomembrane liner was observed to be pulling away from batten strip connections, creating holes.

Observed tears in the geomembrane have been repaired in accordance with the maintenance requirements outlined in the Federal CCR Rule. Locations in which minor leak points were identified due to insufficient batten strip connections have also been repaired. Modifications to the batten strip connections at the Ash Surge Basin weir wall are discussed as a potential corrective measure below in **Section 3**.

2.3 Evaluation of Risk

The Powerton Station is bordered by various surface water bodies that serve as a discharge location for the shallow groundwater units. As discussed in **Section 2.1**, groundwater in the clay/silty clay unit has a westerly flow component towards the Former Intake Canal and an easterly flow component due to the slope/trace of the surface topography and the clay/silty clay unit. Based on the local geology and hydrogeology, the primary contaminant migration pathway at the Ash Surge Basin is downward to groundwater within the unconsolidated clay/silty clay unit. Due to the proximity of the Ash Surge Basin to the plant Former Intake Canal, which is a hydrogeologic flow boundary for the clay/silty clay unit, minimal to no downward vertical flow mixing is anticipated within the unconsolidated clay/silty clay unit itself. The direction of natural groundwater flow conditions dominates downgradient migration pathways, with no man-made preferential pathway corridors identified. There are no potable water wells between the Ash Surge Basin and the anticipated downgradient flow discharge boundary. Water well searches indicate there are no potable surface water intakes on the Illinois River along or within at least several miles downstream of the subject site.

Potential onsite exposures to impacted groundwater are managed at the Site through institutional controls currently in place, including a Groundwater Management Zone (GMZ) and Environmental Land Use Control (ELUC), which bans the installation and use of groundwater for potable purposes. As shown on **Figure 1**, the extent of prior groundwater impacts based on the recent N&E Evaluation for molybdenum previously exhibiting a confirmed exceedance of the GWPS is within the GMZ and ELUC. An ELUC is an acceptable institutional control for addressing the Groundwater Ingestion Pathway under various Federal environmental regulations, such as the Superfund and Resource Conservation and Recovery Act (RCRA) regulations. These institutional controls result in an incomplete exposure pathway relative to the Groundwater Ingestion Exposure Route.

The N&E Evaluation confirmed that no groundwater impacts for molybdenum remain at a concentration exceeding the GWPS and groundwater flowing from the clay/silty clay unit towards the Former Intake Canal has not impacted pore water or surface water. Surface water data collected during the N&E Evaluation were compared against General Use (Surface) Water Quality Standards, and no exceedances were observed. Therefore, the existing groundwater conditions are not believed to present an ecological threat.

3 CORRECTIVE MEASURES ASSESSMENT

3.1 Corrective Measures Assessment Goals

The goal of this Corrective Measures Assessment is to, within the framework of the 40 CFR Part 257.96 regulations, develop practical alternatives to address groundwater exceedances believed to be attributable to releases from the Ash Surge Basin. This framework requires that:

1. Human exposure be controlled; and
2. Groundwater be restored to concentrations below the GWPS.

Multiple rounds of subsequent groundwater sampling at MW-15 have indicated the initial trigger for this CMA (i.e., molybdenum) no longer exhibits concentrations exceeding the GWPS. Each potential corrective measure has been evaluated using the corrective measure assessment process, as described in **Section 1.2**.

3.2 Potential Corrective Measures

Potential corrective measures identified for the Powerton Station are presented below. Each potential corrective measure was developed based on findings provided in the N&E Evaluation performed to date. Alternatives 1 through 3 are designed to prevent further releases. Alternatives 4 through 7 are designed to remediate releases and restore the affected area to concentrations below the GWPS.

The potential corrective measures considered for the Powerton Station are:

- Alternative 1: Capping of the Ash Surge Basin Weir Wall;
- Alternative 2: Basin Retrofit;
- Alternative 3: Closure by Removal;
- Alternative 4: Monitored Natural Attenuation;
- Alternative 5: Hydraulic Containment;
- Alternative 6: Physical Containment/Hydraulic Barrier; and
- Alternative 7: Permeable Reactive Barrier.

Pursuant to 40 CFR Part 257.97, a corrective measure must be selected as soon as feasible. Pursuant to 40 CFR Part 257.97(a), the owner or operator must prepare a semiannual report describing the progress in selecting and designing the remedy. Upon selection of a remedy, the owner or operator must prepare a final report describing the selected remedy and how it meets the standards specified in 40 CFR Part

257.97(b). The owner or operator must obtain a certification from a qualified professional engineer or approval from the Participating State Director or approval from the EPA (where the EPA is the permitting authority) that the selected remedy meets the requirements set forth in 40 CFR Part 257.97. The report has been completed when it is placed in the operating record.

Groundwater quality has improved to the point where no concentrations of molybdenum above the GWPS have been observed since the confirmation sampling in January 2025.

The following section provides a brief description of each potential corrective measure. A more detailed evaluation of each alternative is presented in **Section 3.3** and **Table 1**.

3.2.1 Alternative 1: Capping of the Ash Surge Basin Weir Wall

Capping of the weir wall applies to the Ash Surge Basin northern end and would include changes to how the current geomembrane liner is anchored to the structural concrete of the weir wall. The weir wall sits on the northern portion of the Ash Surge Basin and consists of a 12-inch thick concrete wall extending above the liquid line of the Ash Surge Basin. **Figures 2, 3, and 4** include construction details of the weir wall produced during the Ash Surge Basin liner replacement completed in 2013. **Figure 2** includes a plan view of the Ash Surge Basin, showing the weir wall along the northern portion of the basin. The current design includes batten strips or bar attachments used to anchor the geomembrane to the concrete weir wall (**Figure 3** detail 5 and **Figure 4** detail C-C030). Visual inspection during the Leak Location Survey identified the batten bar anchor locations as points where holes in the geomembrane liner are likely forming due to the liner pulling away from the batten bars.

The capping of the weir wall would include removal of the batten bar attachments, welding of a new geomembrane liner section to the exposed/existing geomembrane to allow for extension of the geomembrane liner over the top of the weir wall, and anchoring of the geomembrane liner to the exterior of the Ash Surge Basin concrete weir wall with new batten bars. This alternative would improve the performance of the Ash Surge Basin during high precipitation events by moving the geomembrane liner anchor location to the exterior of the Ash Surge Basin concrete weir wall, where water that has been in contact with CCR would no longer be in contact with the batten bar attachments.

3.2.2 Alternative 2: Basin Retrofit

Given that the Ash Surge Basin falls under both the Federal and State CCR rules, retrofitting the CCR Surface Impoundment would include meeting both Federal and State retrofitting requirements. The proposed retrofitting process includes the removal of all CCR material and gravel warning/sand cushion layers currently in the Ash Surge Basin. Retrofitting of the Ash Surge Basin will be completed in compliance

with the 40 CFR Part 257 Federal and 35 Ill. Adm. Code Part 845 State retrofitting regulations, to satisfy the more stringent requirements.

3.2.3 Alternative 3: Closure by Removal

Closure of the Ash Surge Basin would be performed in accordance with the preliminary written Closure Plan and include removal of CCR and CCR contaminated materials for offsite disposal. The preliminary written Closure Plan for the Ash Surge Basin was prepared by a MWG contractor, Revision 1 dated October 29, 2021 and posted to MWG's Federal CCR website. A subsequent notice posted to MWG's Federal CCR website states the Ash Surge Basin will be retrofitted in accordance with the unit's Retrofit Plan (dated March 24, 2023) prepared in accordance with 40 CFR 257.102(k)(2) and 35 Ill. Adm. Code Part 845.770(c) and in accordance with the corresponding retrofit construction permit to be issued by the Illinois EPA.

3.2.4 Alternative 4: Monitored Natural Attenuation

Monitored Natural Attenuation (MNA) would be used to address molybdenum in groundwater detected at concentrations exceeding the GWPS. MNA is defined by the USEPA as 'the reliance on natural attenuation processes (within the context of a carefully controlled and monitored site cleanup approach) to achieve site-specific remediation objectives within a time frame that is reasonable compared to that offered by other more active methods'. Based on the following site conditions, Powerton Station would be a good candidate for application of MNA:

- As discussed in **Section 2.2** and in the N&E Evaluation, the Ash Surge Basin was identified as the most likely source of prior impacts to groundwater above the GWPS at MW-15. Compromises in the geomembrane liner in the Ash Surge Basin were discovered during the Leak Location Survey in April and May 2025. Powerton Station subsequently repaired the observed perforated locations in accordance with the maintenance requirements outlined in the Federal CCR Rule, which will prevent water in the basin in contact with CCR from migrating to groundwater.
- Multiple subsequent sampling events since January 2025 indicate the GWPS has been met, suggesting that natural attenuation mechanisms have the capacity to meet GWPS and/or the prior statistical exceedance was a temporal or statistical anomaly.
- There are no residual risks associated with exposure to impacted groundwater at Powerton Station due to the incomplete exposure pathway for Groundwater Ingestion. The implementation of MNA at this Site would monitor the constituent previously detected in groundwater at a concentration exceeding the GWPS associated with impacts originating from the recently repaired geomembrane compromises.

The application of MNA as part of a selected corrective measure is reliant on a detailed understanding of the local geologic, hydrogeologic, and geochemical conditions. Application of MNA as part of the selected corrective measure would include the development of a sampling and analysis plan with the collection of at least eight quarters of MNA parameter samples from the existing well network. This sampling and analysis plan would be developed as part of the corrective measure selection process and would be largely based on the existing groundwater monitoring plan being implemented at the Ash Surge basin under the Federal CCR Rules.

3.2.5 Alternative 5: Hydraulic Containment/Barrier

Hydraulic containment at the Powerton Station would most likely be implemented in the form of a groundwater pump and treat (GWPT) system. The GWPT system would target the extraction of impacted groundwater downgradient of the Ash Surge Basin. The extracted groundwater may be treated in an above-grade treatment system and reinjected into the subsurface, discharged into surface water, or transferred offsite for treatment and disposal. Effective hydraulic containment aims to create a capture zone that minimizes the migration of impacted groundwater.

3.2.6 Alternative 6: Physical Containment

Physical containment involves the installation of a vertical barrier, often combined with surface capping, to isolate the source material and prevent its migration beyond the barrier. At the Powerton Station, a physical containment system may include the installation of a slurry wall or sheet pile wall perpendicular to the downgradient groundwater flow. The physical containment system would extend either in a north-south direction for the clay/silty clay unit or in a predominantly east-west direction for the sand and gravel unit, across the length of the surface impoundments or downgradient plume.

Physical containment of groundwater would minimize migration of impacted groundwater downgradient from the impoundments. Due to the potential mounding effects driven by hydraulic pressure potentially building up behind the physical containment system, it is recommended to include hydraulic containment within the physical containment system.

3.2.7 Alternative 7: Permeable Reactive Barrier

A permeable reactive barrier (PRB) is the emplacement of a chemically reactive amendment, typically below the groundwater table, that captures or transforms dissolved-phase constituents within the groundwater. PRBs are designed to drive the capture or transformation of constituents in a way that utilizes the natural groundwater flow direction and path. At the Powerton Station, implementation of a

PRB would likely involve the injection of an amendment that would transform the inorganic contaminants into less harmful and/or less mobile chemical forms. Similar to physical containment, a PRB would likely extend in either a north-south or east-west direction, across the length of the downgradient plume, depending upon the groundwater unit.

3.3 Evaluation of Corrective Measure Alternatives

The identified potential corrective measures were evaluated as described in **Section 1.2**. The following section provides an evaluation of each potential corrective measure.

Alternative 1: Capping of the Ash Surge Basin Weir Wall

Capping of the Ash Surge Basin weir wall would require movement of the CCR within the basins to allow for sufficient workspace at the northern perimeter of the Ash Surge Basin (where connection points exist). This alternative would be reliable and relatively easy to implement within a reasonable time period. Because the Ash Surge Basin is also regulated under the State CCR Rule in addition to the Federal CCR Rule, implementation of this alternative would require submittal of a Construction Permit Application to the Illinois EPA pursuant to 35 Ill. Adm. Code Part 845.670(b).

Capping of the weir wall would improve the performance of the basin, specifically during high precipitation events. Implementation of the capping would require labor but would not require heavy machinery and therefore could be implemented with minimal safety impacts. Capping of the weir wall would improve the reliability with respect to the basin's ability to contain water that has been in contact with CCR but would not address exposure to constituents that have previously moved downgradient of the Ash Surge Basin.

Alternative 2: Basin Retrofit

The retrofitting process, governed by 40 CFR Part 257.102(k) regulations, is extensive and expensive. Further, because the Ash Surge Basin is also regulated under the State CCR Rule in addition to the Federal CCR Rule, additional permitting is required. Even though an Illinois Retrofit Construction Permit application was already submitted for the Ash Surge Basin, it would be necessary to complete a separate Illinois Construction Permit Application for the Ash Surge Basin to select the groundwater remedy in a Corrective Action Plan. A Written Retrofit Plan for the Ash Surge Basin was previously submitted to Illinois EPA in a Construction Permit Application dated July 27, 2023.

Alternative 3: Closure by Removal

Closure by Removal would require the removal of CCR and CCR impacted material in proximity of the CCR surface impoundments. Disturbances to local soils may cause changes in local geochemistry introducing

uncertainty of groundwater conditions in the short term. Due to the specific uses of each basin, additional alternate capacity may be required for continued operation of the Powerton Station.

Removal and transportation of CCR and CCR-impacted material would need to be performed in accordance with the December 3, 2024 Fugitive Dust Control Plan required by the Federal and Illinois CCR Rule (KPRG, 2024). Implementation of Closure by Removal in accordance with the above Fugitive Dust Control Plan will decrease the risk of dust production that may drive cross-media impacts. Dewatering and treatment of water removed from the Ash Surge Basin would also be required prior to removal of CCR material. Because the Ash Surge Basin is also regulated under the State CCR Rule in addition to the Federal CCR Rule, Closure by Removal would require submission of a combined Closure/Corrective Action Construction Permit Application to the Illinois EPA.

Alternative 4: Monitored Natural Attenuation

MNA has proven to be a reliable alternative to traditional corrective measures, easy to implement with minimal concerns for construction worker safety. MNA will reduce concentrations of inorganic constituents in groundwater through the natural mechanism of attenuation as groundwater flows from the surface impoundments downgradient. The use of MNA is not expected to result in an unacceptable risk to human health and the environment at Powerton, as human health risks are controlled as discussed above in **Section 2.3**. Because the Ash Surge Basin is also regulated under the State CCR Rule in addition to the Federal CCR Rule, certain state permitting requirements would also apply, if MNA is to be implemented as a groundwater corrective action. Other than the Illinois Construction Permit required to implement the Corrective Action, no other state or local permits are expected to be required in order to implement MNA.

Because there are no longer exceedances to GWPS of molybdenum and the Plant is already implementing a long-term groundwater sampling plan pursuant to the Illinois and Federal CCR programs, no significant additional MNA groundwater monitoring is expected to be required. MNA can provide a robust avenue for monitoring risks to human health and the environment, allowing time for corrective action if monitored risks increase above an acceptable level. The other corrective action alternatives would likely address source control, while MNA addresses residual impacts that have moved downgradient of the Ash Surge Basin.

Alternative 5: Hydraulic Containment/Barrier

A hydraulic containment system would require drilling and installation of extraction and reinjection wells. A pilot study would be required to determine the optimal extraction well spacing, pumping rates, and depths necessary to achieve hydraulic control. The pump-and-treat effluent may require treatment for regulatory compliance, and various state and/or local permits would be required to treat and discharge

the treated groundwater, including treatment works, as well as modification of the NPDES permit. A properly designed hydraulic containment system would minimize downgradient migration of impacted groundwater by creating a hydraulic barrier downgradient of the Ash Surge Basin. Due to the proximity of the Illinois River, the design and placement of the hydraulic containment system would need to be such that the extraction of clean surface water is minimized. Because the Ash Surge Basin is also regulated under the State CCR Rule in addition to the Federal CCR Rule, implementation of a hydraulic containment system would require submission of a Construction Permit Application to the Illinois EPA.

Implementation of a hydraulic containment system would be difficult at the Site. As mentioned above, extensive testing would be required to evaluate the site-specific effectiveness of this technology. Hydraulic containment would reduce the downgradient mobility of residual constituents in the groundwater, assuming a sufficient capture zone can be achieved. Operation of a hydraulic containment system would likely be considered for a short period as the GWPS have been achieved at the monitoring well location previously exhibiting a confirmed exceedance of the GWPS.

Alternative 6: Physical Containment

Physical containment of the impacted groundwater at the Powerton Station would require installation of a slurry wall via injections, trenching, or sheet pile wall. The extent of a physical containment system would need to take into consideration the groundwater seepage velocity in the clay/silty clay unit to understand the need for a paired hydraulic containment/pumping system. Should a hydraulic containment/pumping system be required with the physical containment system, a water treatment system would also be necessary. Because the Ash Surge Basin is also regulated under the State CCR Rule in addition to the Federal CCR Rule, the treatment system would require various state and/or local permits to install and operate, including Illinois Construction Permits for groundwater corrective action and treatment works, as well as modification of the NPDES permit. This would make this possible corrective measure alternative difficult and time consuming to implement.

The installation of a physical containment system itself would likely be moderate to difficult to implement at the Site. The local geology would be amenable to installation of a physical containment system; however, design of an accompanying hydraulic containment system would need to consider the local hydrogeology and will require a water treatment system. A physical containment system would minimize migration of impacted groundwater downgradient but would not remove significant amounts of residual constituent concentrations in the groundwater. Maintenance of a physical containment system would likely be considered for a short period, as the GWPS has been achieved at the monitoring well location previously exhibiting a confirmed exceedance of the GWPS.

Alternative 7: Permeable Reactive Barrier

Implementation of a PRB would include injection of an amendment to drive changes in local geochemical conditions. Based on groundwater sampling logs, the local aquifer naturally supports oxidizing conditions. Most PRBs used to address inorganic constituents require significantly reducing conditions. This will make implementation at this Site difficult. Maintenance of this PRB would likely require multiple injections of amendment in the short-term to obtain proper geochemical conditions. Long-term maintenance of a PRB would also need to be considered, with the injection of amendments likely required on a yearly basis, further complicating implementation. Because the Ash Surge Basin is also regulated under the State CCR Rule in addition to the Federal CCR Rule, an Illinois Construction Permit would be required to implement a PRB as the Corrective Action.

Because PRBs are designed to react passively with groundwater, long-term effectiveness may also be an issue. Loss of residence time required for proper treatment may become an issue in areas of higher-than-expected groundwater flow. Additionally, the loss of treatment capacity due to reactions with impacted groundwater and precipitation of inorganic constituents may decrease the effectiveness of the PRB. Significant precipitation events may influence effectiveness through infiltration of oxygenated water into the subsurface, driving an increase in reduction-oxidation potential that may temporarily mobilize inorganic constituents. Therefore, a PRB may include long-term operations and maintenance, which could include long periods of downtime to replace or replenish spent reactive material.

4 REMEDY SELECTION

The purpose of this CMA is to begin the process of selecting a corrective measure for groundwater impacts based on further evaluation using the process and criteria outlined in 40 CFR Part 257.96. The formal remedy selection process, in accordance with 40 CFR Part 257.97, will begin after this document has been added to the MWG Federal CCR Website. The subsequent remedy selection process will identify a selected remedy that satisfies the following criteria, as outlined in 40 CFR Part 257.97(b):

- Be protective of human health and the environment;
- Attain the groundwater protection standards specified in 40 CFR Part 257.95(h);
- Control the sources of releases to reduce or eliminate, to the maximum extent feasible, further releases of constituents listed in Appendix IV into the environment;
- Remove from the environment as much of the contaminated material that was released from the CCR surface impoundment as is feasible, taking into account factors such as avoiding inappropriate disturbance of sensitive ecosystems; and
- Comply with standards for management of wastes as specified in 40 CFR Part 257.98(d).

To properly evaluate the selected remedy, the following criteria will be used, as outlined in 40 CFR Part 257.97(c):

- Long- and short-term effectiveness and protectiveness of each potential remedy, along with the degree of certainty that the remedy will prove successful based on considerations listed under 40 CFR Part 257.97(c)(1);
- Effectiveness of the remedy in controlling the source to reduce further releases based on consideration of each of the following potential factors: extent to which containment practices will reduce further releases, and extent to which treatment technologies may be used;
- Ease or difficulty of implementing each potential remedy based on consideration of factors listed under 40 CFR Part 257.97(c)(3); and
- Degree to which community concerns are addressed by each potential remedy.

MWG will have a semi-annual report prepared to discuss the progress in selecting a remedy, as required by 40 CFR Part 257.97(a). The selected remedy will be implemented in accordance with 40 CFR Part 257.98.







5 REFERENCES

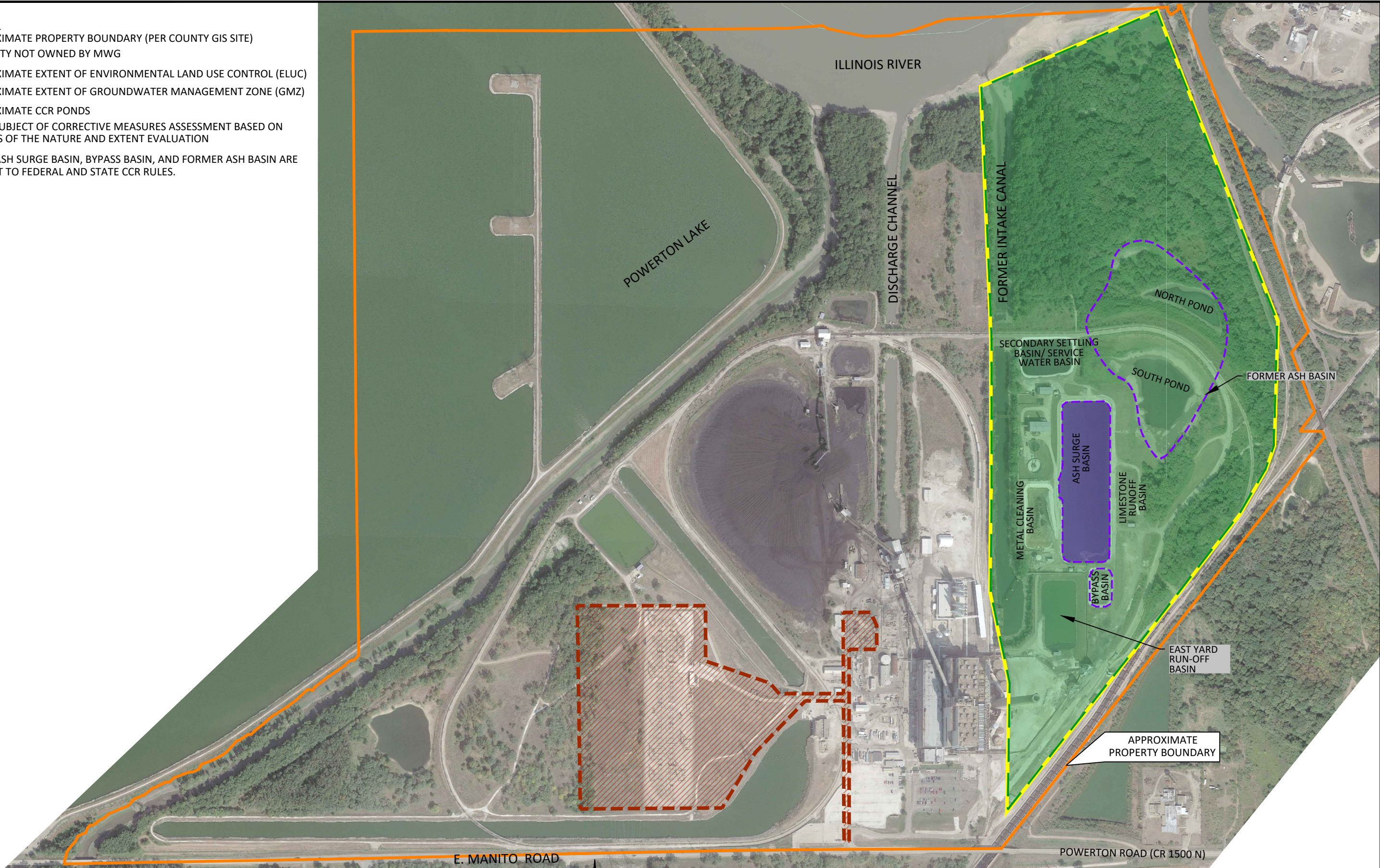
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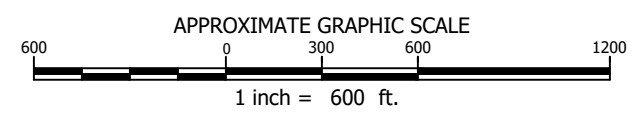
FIGURES

LEGEND

-  APPROXIMATE PROPERTY BOUNDARY (PER COUNTY GIS SITE)
 -  PROPERTY NOT OWNED BY MWG
 -  APPROXIMATE EXTENT OF ENVIRONMENTAL LAND USE CONTROL (ELUC)
 -  APPROXIMATE EXTENT OF GROUNDWATER MANAGEMENT ZONE (GMZ)
 -  APPROXIMATE CCR PONDS
 -  POND SUBJECT OF CORRECTIVE MEASURES ASSESSMENT BASED ON RESULTS OF THE NATURE AND EXTENT EVALUATION
- NOTE: ASH SURGE BASIN, BYPASS BASIN, AND FORMER ASH BASIN ARE SUBJECT TO FEDERAL AND STATE CCR RULES.



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PREPARED FOR:
 MIDWEST GENERATION, LLC

SITE LAYOUT MAP - POWERTON STATION

13082 E. MANITO ROAD
 PEKIN, IL

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DRAWN BY:	JEB
REVIEWED BY:	AS
DATE:	8/18/25
FILE:	5053-300
CAD:	PowertonSite2025.dwg
FIGURE 1	

TABLES

**Table 1
Corrective Measures Criteria Evaluation**

Criteria		Capping of the Ash Surge Basin Weir Wall	Basin Retrofit	Closure by Removal	Monitored Natural Attenuation	Hydraulic Containment/Barrier	Physical Containment	Permeable Reactive Barrier
40 CFR Part 257.96(c)(1)	Performance	Capping of the ASB weir wall would improve the performance of the basin, specifically during high precipitation events. Due to the original design of the geomembrane connection point, capping of the ASB weir wall would extend the geomembrane liner over the top of the weir wall, effectively moving the geomembrane liner anchor location to the exterior of the ASB concrete weir wall, where coal combustion residuals (CCR) impacted liquid will not be in contact with batten bar attachments.	A retrofit of the ASB would improve performance of the basin.	Closure of the ASB would remove CCR from the basin and prevent further release events. However, operation of the Powerton facility will continue. Additional alternate disposal capacity may be required to continue operation of the Powerton Station.	MNA will be applied to residual impacts at concentrations exceeding the groundwater protection standards (GWPS) to effectively document potential risks to potential receptors and allow for corrective action if unacceptable risk is observed. As of May 2025, no exceedances of GWPS have been observed at MW-15.	Hydraulic containment would minimize migration of impacted groundwater downgradient from the ASB. However, rebound of constituent concentrations can occur post-remediation.	Physical containment would minimize migration of impacted groundwater downgradient from the ASB. A physical containment system may need to be paired with upgradient pumping of groundwater to effectively contain impacted groundwater.	A PRB may minimize migration of CCR constituents in groundwater; however, the geochemical conditions required to transform molybdenum to a less harmful form can be extreme and difficult to maintain. To implement a successful PRB at this Site, regular loading of the PRB amendment is likely to be required.
40 CFR Part 257.96(c)(1)	Reliability	Capping of the weir wall would increase the reliability with respect to the ASB's ability to contain water that has been in contact with CCR.	A retrofit, to satisfy State and Federal requirements, at the ASB would increase reliability of the basin to contain CCR impacted material.	Closure by Removal would provide long-term reliability. However, short term increases in groundwater concentrations may be observed due to disturbances occurring during the removal process driving uncertainty in the local geochemistry of the aquifers.	Implementation of MNA would occur with the current long-term sampling plan. Attenuation of CCR constituents in groundwater is anticipated based on results of the current sampling plan and reduction of molybdenum concentrations below GWPS.	Implementation of a hydraulic containment system at Powerton is likely to minimize migration of impacted groundwater downgradient; however, due to the presence of two water bearing zones and varied hydrogeology, successful operation of a hydraulic containment system may be difficult. Extensive pilot testing is recommended to properly design at this Site.	Implementation of a physical containment system at Powerton is likely to minimize migration of impacted groundwater downgradient; however, maintaining hydraulic control via upgradient pumping, treatment, and reinjection is needed to maintain a reliable physical containment system. There is potential for impacted groundwater to escape the containment by moving around/under the barrier.	The ability of a PRB to minimize migration of molybdenum in groundwater is questionable. The geochemical conditions needed to transform molybdenum into a less harmful and less mobile form can require extreme ORP and pH. These conditions must be maintained for long enough that the less harmful form of molybdenum is able to stabilize. The ability of the aquifer to support these extreme conditions is questionable due to the naturally high ORP at most of the sampling wells onsite.
40 CFR Part 257.96(c)(1)	Ease of Implementation	Capping of the weir wall of the ASB would be relatively easy to implement due to the location and current design of the weir wall. The appropriate geomembrane liner extension would shift the anchor point to the exterior of the ASB.	Implementation of a retrofit of the ASB would be difficult to complete due to the invasive nature of the process and downtime required. A retrofit would require removal of all CCR in the basin currently, and installation of a system to comply with both State and Federal requirements. A retrofit would require a significant amount of capital investment.	Implementation of Closure by Removal would be difficult, requiring the removal of all CCR in the ASB.	MNA would be easily implemented. No significant MNA groundwater monitoring is expected to be required as the Station is already implementing a long-term groundwater sampling plan. However, some additional monitoring parameters useful to assess the effectiveness of MNA may be added to the existing groundwater monitoring program.	Implementation of a hydraulic containment system would be difficult due to the local geology and would require extensive pilot testing. The system would require several new groundwater extraction wells, paired with a reinjection system and above-grade treatment system.	Implementation of a physical containment system would be difficult due to the varied hydraulic conductivity between the two water bearing zones at the Site. Physical containment would likely occur via slurry wall or sheet pile wall, requiring multiple injection points or sheet pile driving locations.	The initial implementation of a PRB would be relatively similar to a physical containment system in the form of a slurry wall. Maintenance of the PRB may require reloading of amendment in the subsurface on a regular basis.
40 CFR Part 257.96(c)(1)	Potential Impacts of Appropriate Potential Remedies: Safety Impacts	The proposed capping of the weir wall is generally considered safe, however risks to worker safety are elevated due to potential exposure to CCR during the implementation of the geomembrane liner extension.	Retrofitting of the ASB is generally considered safe, however risks to worker safety are elevated due to the use of heavy machinery needed to remove and transport the CCR removed from the basin.	Closure of the ASB is generally considered safe, however risks to worker and public safety are elevated due to the use of machinery to remove CCR and transportation of CCR on public roads.	Implementation of MNA is considered safe when the proper safety measures are followed by onsite staff. A HASP and sampling SOP are currently being followed by all environmental staff while onsite.	Installation and operation of a hydraulic containment system is generally considered safe when the proper safety measures are followed by onsite staff. A HASP and sampling SOP are currently being followed by all environmental staff while onsite.	Installation of a physical containment system is generally considered safe when the proper safety measures are followed by onsite staff. A HASP and sampling SOP are currently being followed by all environmental staff while onsite.	Installation of a PRB is generally considered safe when the proper safety measures are followed by onsite staff. A HASP and sampling SOP are currently being followed by all environmental staff while onsite.
40 CFR Part 257.96(c)(1)	Potential Impacts of Appropriate Potential Remedies: Cross Media Impacts	Capping of the weir wall will not require the removal of CCR from these basins. It is unlikely that the capping implementation would produce any cross media impacts.	A retrofit of the ASB would require the removal of all CCR, increasing the potential of cross media impacts through production of dust during removal and transportation; however this risk will be decreased by the Fugitive Dust Control Plan currently in place.	Cross media impacts are likely to occur due to the invasive nature of Closure via Removal. Concentrations of CCR-related constituents in groundwater are likely to increase due to disturbances occurring during the removal process. Dust will be managed by the Fugitive Dust Control Plan to decrease potential risks to air.	It is unlikely that implementation of MNA would produce any cross media impacts.	Cross media impacts may occur during the installation of a hydraulic containment system via the drilling process. Care should be taken to avoid cross contamination via soil management plans.	Cross media impacts may occur during the installation of a physical containment system via the installation process. Care should be taken to avoid cross contamination via soil management plans.	Cross media impacts may occur during the installation of a PRB via the installation process. Care should be taken to avoid cross contamination via soil management plans.
40 CFR Part 257.96(c)(1)	Potential Impacts of Appropriate Potential Remedies: Control of Exposure to Any Residual Contamination	Capping of the weir wall does not provide direct control of exposure to residual contamination; however, given the environmental land use control (ELUC) and groundwater management zone (GMZ) previously established, there are no complete exposure pathways onsite or offsite and exposure control would not be necessary.	Retrofitting of the ASB does not provide direct control of exposure to residual contamination; however, given the ELUC and GMZ previously established, there are no complete exposure pathways for Groundwater Ingestion onsite or offsite and exposure control would not be necessary.	Closing the ASB does not provide direct control of exposure to residual contamination; however, given the ELUC and GMZ previously established, there are no complete exposure pathways onsite or offsite and exposure control would not be necessary.	MNA does not provide direct control of exposure to residual contamination; however, given the ELUC and GMZ previously established, there are no complete exposure pathways onsite or offsite and exposure control would not be necessary. Implementation of MNA would document concentration trends, allowing for responsive corrective action if risk rises above acceptable levels.	A properly designed and operated hydraulic containment system will minimize downgradient migration of impacted groundwater. However, given the ELUC and GMZ previously established, there are no complete exposure pathways onsite or offsite and exposure control would not be necessary.	A physical containment system paired with upgradient pumping will minimize downgradient migration of impacted groundwater. However, given the ELUC and GMZ previously established, there are no complete exposure pathways onsite or offsite and exposure control would not be necessary.	Given the challenges of maintaining geochemical conditions supportive of chemical transformation of molybdenum, it may be difficult for a PRB to effectively control downgradient migration of impacted groundwater. However, given the ELUC and GMZ previously established, there are no complete exposure pathways onsite or offsite and exposure control would not be necessary.

Table 1
Corrective Measures Criteria Evaluation

<p>40 CFR Part 257.96(c)(2)</p>	<p>Time Required to Begin and Complete the Remedy</p>	<p>3-5 Years: the capping of the ASB weir wall would likely require several years to work through completion of the required permits, design, Agency review, and implementation.</p>	<p>3-7 Years: the retrofit of the geomembrane would likely require several years to work through completion of required permits, design, Agency review, and implementation.</p>	<p>3-7 Years: the closure of the basin would likely require several years to work through completion of required permits, approvals, Agency review, and implementation.</p>	<p>5-10 Years: monitoring would likely continue for at least 5 years, or two quarters after concentrations have met the groundwater protection standards.</p>	<p>4-6 Years: a hydraulic containment system would likely require several years to work through pilot testing, completion of required permits, approvals, Agency review, and implementation. It is anticipated this remedy would operate until remedy completion is determined per 40 CFR 257.98(c).</p>	<p>3-5 Years: a physical containment system would likely require several years to work through pilot testing, completion of required permits, approvals, Agency review, and implementation. It is anticipated this remedy would operate until remedy completion is determined per 40 CFR 257.98(c).</p>	<p>3-5 Years: a PRB system would likely require several years to work through completion of required permits, approvals, Agency review, and implementation. It is anticipated this remedy would operate until remedy completion is determined per 40 CFR 257.98(c).</p>
<p>40 CFR Part 257.96(c)(3)</p>	<p>Institutional Requirements</p>	<p>Capping of the weir wall would require completion of an Illinois EPA construction permit per the IL CCR Rule.</p>	<p>Retrofitting of the ASB would require completion of an Illinois EPA construction permit per the IL CCR Rule.</p>	<p>Closure by Removal would require completion of an Illinois EPA construction permit per the IL CCR Rule.</p>	<p>Implementation of MNA would require completion of an Illinois EPA construction permit per the IL CCR Rule.</p>	<p>A hydraulic containment system would require completion of an Illinois EPA construction permit per the IL CCR Rule. Modification to the current NPDES permit would likely be required.</p>	<p>A physical containment system would require completion of an Illinois EPA construction permit per the IL CCR Rule. Modification to the current NPDES permit would likely be required.</p>	<p>A PRB would require completion of an Illinois EPA construction permit per the IL CCR Rule.</p>