KPRG

ENVIRONMENTAL CONSULTATION & REMEDIATION

KPRG and Associates, Inc.

FINAL CLOSURE PLAN – FORMER ASH BASIN

POWERTON GENERATING STATION
MIDWEST GENERATION, LLC
PEKIN, ILLINOIS

Illinois EPA Site No. 1798010008-05

October 26, 2022

Submitted To:

Illinois Environmental Protection Agency
1021 North Grand Avenue East
Springfield, Illinois 62702

Prepared For:

Midwest Generation, LLC
13082 East Manito Rd.
Pekin, IL 61554

Prepared By:

KPRG and Associates, Inc.
14665 West Lisbon Road, Suite 1A
Brookfield, WI 53005

TABLE OF CONTENTS

1.0 INTRODUCTION 1
2.0 CLOSURE NARRATIVE 2
3.0 CCR REMOVAL and DECONTAMINATION 2
4.0 CLOSURE with CCR LEFT IN PLACE 3
5.0 MAXIMUM INVENTORY of CCR 6
6.0 LARGEST AREA of CCR REQUIRING a FINAL COVER 6
7.0 CLOSURE SCHEDULE 6
8.0 CLOSURE PLAN AMENDMENTS 8
9.0 PROFESSIONAL ENGINEER’S CERTIFICATION 8

1.0 INTRODUCTION [845.720(a)(1)(A)]

The Midwest Generation, LLC (Midwest Generation) Powerton Generating Station is located at 13082 East Manito Road, Pekin, Tazewell County, Illinois. The facility is a coal-fired electric power generating station occupying approximately 1,710 acres. Units 5 and 6 began operating in 1972 and 1975, respectively. Electrical power is transmitted from the site to the area grid through overhead transmission power lines. In conjunction with the station is a man-made perched cooling pond known as Powerton Lake, which occupies approximately 1,440 acres and provides cooling water to the facility.

In conjunction with the ash handling system, the Powerton Station utilizes basins identified as the Ash Bypass Basin and the Ash Surge Basin, which are located on the northeast side of the facility. Settled water is then conveyed to the Service Water Basin for reuse or discharge in accordance with the NPDES permit. An inactive ash basin, referred to as the Former Ash Basin (FAB), is located to the northeast of the existing Ash Surge Basin. The FAB is a 25-acre inactive CCR surface impoundment and has not been used since the 1970's. The FAB was previously one inactive surface impoundment when it was divided by a railroad embankment constructed in 2010. The divided FAB is referred to as the north portion and the south portion in this document for reference purposes. Standing water is present in some areas of the north and south portions along with vegetation and trees that have grown over the CCR due to the length of inactivity.

As required by 845.700(b), Midwest Generation will be closing the FAB. A preliminary closure plan was submitted as part of the Powerton operating permit application and is finalized as part of this construction permit application to execute the closure of the FAB. This final closure plan has been executed in accordance with 845.720(b), which includes completing a closure alternatives analysis. Pursuant to 845.710, a closure alternatives analysis was completed prior to selecting the closure method that will be used for the FAB and described in this final closure plan. The closure alternatives analysis was performed to evaluate the closure methods involving closure by removal and closure in place. The closure alternatives analysis report evaluated four different closure methods. The four different methods evaluated consisted of the following:

- Scenario 1: Closure by removal in accordance with 845.740.
- Scenario 2: Closure in place in both the north and south portions of the FAB and installation of a final cover system.
- Scenario 3: Consolidate the CCR in the southern portion of the FAB and installation of a final cover system.
- Scenario 4: Closure in place via in-situ soil stabilization and installation of a soil cover.

The closure alternatives analysis identified that closure in place provides both short- and long-term protection to groundwater and surface water along with ensuring overall protection to the public health, welfare, and safety. Therefore, Midwest Generation has selected to close the FAB in place and construct an alternative final cover system as the closure method. This closure plan has been prepared in accordance with 35 Ill. Adm. Code 845.720(b) and 845.750 for the FAB and describes the schedule and steps necessary for closure and methods for compliance with closure requirements.

2.0 CLOSURE NARRATIVE [845.720(a)(1)(A)]

The closure of the FAB will be accomplished by consolidating the CCR in place in the southern portion and covering with a final cover system in accordance with 35 Ill. Adm. Code 845.750. The closure will achieve the closure performance standards in accordance with 845.750(a) and listed as follows:

1. Control, minimize, or eliminate, to the maximum extent feasible, post-closure infiltration of liquids into the waste and releases of CCR, leachate, or contaminated run-off to the ground or surface waters or to the atmosphere;

2. Preclude the probability of future impoundment of water, sediment, or slurry;

3. Include measures that provide for major slope stability to prevent the sloughing or movement of the final cover system during the closure and post-closure care period;

4. Minimize the need for further maintenance of the CCR surface impoundment; and

5. Be completed in the shortest amount of time consistent with recognized and generally accepted engineering practices.

3.0 CCR REMOVAL and DECONTAMINATION [845.740(a)]

The CCR from the north portion of the FAB will be either hydraulically dredged into the south portion of the FAB or mechanically excavated and dumped into the south portion of the FAB. The CCR in the north portion averages 16 feet in depth and the groundwater elevation ranges from 434 feet above mean sea level (ft amsl) to 439 ft amsl. Excavation of the north portion CCR may consist of mechanically excavating the CCR above the groundwater elevation, loading onto trucks and transporting to the south portion where they would end dump the CCR into the south portion of the FAB. Dumped CCR material may be stockpiled and allowed to drain, as necessary. The embankment that surrounds the north portion of the FAB would also be excavated and placed in the south portion of the FAB. It is anticipated that the embankment would be mechanically excavated and transported to the south portion via trucks.

Excavation of the CCR below the groundwater elevation may occur through hydraulically dredging the CCR and discharging in the south portion of the FAB. The dredged CCR would be contained, allowing the CCR to settle and the water would be returned into the north portion of the FAB for reuse in the hydraulic dredging process. The water would be returned to the north portion of the FAB by mechanically pumping through a newly installed pipe through the berm that separates the north and south portions. The hydraulic dredging will mix the CCR with the existing standing water in the north portion and/or water from the south portion to create slurry, which will be pumped to the southern portion. This slurry will be pumped into the south portion through one of the culverts that will be directionally drilled and installed underneath the railroad tracks that separate the north portion and the south portion. The culverts are anticipated to be 18”ø high-density polyethylene (HDPE) pipes. The decanted dredge water will be pumped from the south portion through the east culvert back into the north portion where it will be reused to slurry and pump CCR from the north portion. Using the two pipes under the railroad will prevent the need to suspend operations of the railroad during the closure activities.

After CCR removal, the north portion of the FAB will be graded to create a stormwater runoff management area for the south portion of the FAB. Dewatering will be necessary to finish grading the north portion of the FAB after CCR removal. Once grading is complete, a new gravel road will be constructed along the north perimeter to allow for access to the existing monitoring wells and the slopes of the north portion of the FAB will be permanently stabilized.

The gravel road is anticipated to be constructed using breaker run as an initial base to ensure the base of the road is above the groundwater elevation. The breaker run will then be covered with traffic bond or a similar type stone, graded, and compacted.

The amount of CCR that is either mechanically excavated or hydraulically dredged, or whether or not one method is chosen over the other will ultimately be decided by the contractor selected to perform the closure work. Having both methods of CCR removal approved in the construction permit allows flexibility to perform the CCR removal method that will be least impactful to the surrounding environment.

Permanent stabilization of the north portion will consist of installing erosion control blanket and seeding the disturbed areas. Erosion control blanket will be installed on all slopes equal to or greater than a three feet horizontal run to a one-foot vertical rise (3H to 1V). Areas disturbed by the execution of the CCR removal from the north portion will be seeded using grass and plants native to the Pekin area. However, those areas do not include the location of the consolidated CCR material. The stabilization of the consolidated CCR material is discussed in the following section. Fertilizer will be applied as necessary to facilitate grass growth.

4.0 CLOSURE with CCR LEFT IN PLACE [845.720(a)(1)(C)]

Once the CCR material placed in the south portion of the FAB is sufficiently dried, it will be graded to achieve the desired elevations needed for the FCS. The FCS would then be constructed on top of all the consolidated CCR. The south FAB FCS would be sloped to drain stormwater off but not so steep as to cause erosion. In general, the CCR grades will be sloped towards the perimeter to drain stormwater off the south portion FCS. The stormwater will then drain through newly installed pipes through the berm, which will discharge into the north portion of the FAB. This will minimize the potential for ponding and infiltration into the CCR below. As the slopes are constructed, measures will be taken to prevent sloughing and movement of the material and final cover system during the post-closure period. The layer of fill material directly below the geomembrane will be free from large, protruding, or sharp objects that could potentially damage the geomembrane.

The proposed FCS for the south portion of the FAB is the proprietary ClosureTurf cover system created by Watershed Geo, LLC. ClosureTurf consists of a geomembrane low permeability layer that also incorporates a drainage layer. The final protective layer is replaced with engineered synthetic turf that is infilled with sand/small aggregate to provide ballast to the synthetic turf. The infiltration layer will be a 60-mil HDPE geomembrane with a hydraulic conductivity that is no greater than 1x10-7 cm/sec. The engineered synthetic turf is comprised of polyethylene fibers that are tufted through a double layer of woven geotextiles that are highly UV and heat resistant. The engineered synthetic turf is then infilled with small aggregate that is approximately 1/8 inch to 1/4 inch diameter in size. The small aggregate is brushed into the synthetic turf to ensure that it settles to the bottom of the turf, which provides ballast and prevents the turf's movement during wind events.

Section 845.750(c)(1) requires that the low permeability layer must have a permeability less than or equal to the permeability of any bottom liner system present or a hydraulic conductivity no greater than 1 x 10-7 centimeters per second (cm/sec). The FAB does not have a bottom liner system; therefore, the structured geomembrane's permeability for the final cover system must be no greater than 1 x 10-7 cm/sec. As such, the structured geomembrane in the ClosureTurf final cover system will be a 60-mil HDPE structured geomembrane that combines a studded drain surface on the top side and a spiked friction surface on the bottom side into one geomembrane liner. This structured geomembrane has a permeability that has been independently tested at 1.5 x 10-13 cm/sec.

When using a geomembrane as the low permeability layer, it is required by 845.750(c)(1)(B)(i) to have a hydraulic flux equivalent or superior to a 3-foot layer of soil with a hydraulic conductivity of 1 x 10-7 cm/sec. The following table demonstrates that the geomembrane provides a superior performance at reducing the infiltration of liquid when compared to a 3-foot thick layer of earthen material. The following table is created here to demonstrate the geomembrane that will be used as part of the ClosureTurf final cover system is compliant with 845.750(c)(1)(B)(i).

Table – Liquid Flow Rate Comparison Between Low Permeability Layers Constructed Using Geomembrane & Earthen Material

Parameter	Symbol	Value
Liquid Flow Rate Through Earthen Material		
Hydraulic Conductivity	k	1×10^{-7} m/sec
Hydraulic Head Above Layer	h	0.14 m
Layer Thickness	t	3 ft = 0.91 m
Hydraulic Gradient Through Earthen Material	$i = h / t$	0.15
Liquid Flow Rate Through Layer per Acre of Final Cover System	$q = k \times (i + 1)$	1.15×10^{-7} m^3/sec/m^2

Liquid Flow Rate Through Geomembrane		
Hole Area in Geomembrane	a	3.1 mm^2 / 4000 m^2
Acceleration Due to Gravity	g	9.81 m/sec^2
Hydraulic Head Above Layer	h	0.14 m
Liquid Flow Rate Through Layer per Unit Area	$q = 0.6a(2gh)^{0.5}$	7.71×10^{-10} $m^3/sec/m^2$

The geomembrane comes in rolls, which will be deployed with the spike side down and the stud side up on top of the graded general fill material. The rolls will be deployed perpendicular to the slope elevation contours and the deployment method will protect the geomembrane as well as the graded material below. Adequate anchoring will be used, such as sand bags, to prevent uplift by wind during the deployment of the geomembrane rolls. The edges of each roll are overlapped in the downgrade direction a minimum of three inches to form the seam that is then welded together. Welding is performed by either extrusion welding or hot wedge welding depending on manufacturer's recommendations and as construction of the geomembrane dictates.

The geomembrane will be covered with engineered synthetic turf and sand/aggregate infill, which will be the final protective layer. The engineered synthetic turf is green and replaces the need for an erosion layer and vegetation while providing a natural look and feel of grass and protecting the geomembrane from extreme weather. The engineered turf will be installed in accordance with the manufacturer's recommendations and equipment used during the installation will not damage the turf or the underlying geomembrane. The engineered synthetic turf also comes in rolls, which will be rolled out on top of the geomembrane starting from the highest slope to the lowest slope. The rolls will be deployed so that the filaments of the engineered turf are pointed upslope and the edges of each roll touch each other so the seams can be joined together. The turf will be laid substantially smooth and it will be secured with sandbags at the top of any slope after it is deployed. The engineered synthetic turf will cover all of the geomembrane and will follow the same slope as the geomembrane. The rolls of the engineered turf are joined together either by sewing with polyester thread or by fusion seaming with a fusion welder.

A specified sand/aggregate infill will be placed between the blades of the engineered synthetic turf after the turf is in place on top of the geomembrane. The sand infill will be spread with a minimum thickness of 0.5 inches and a maximum thickness of 0.75 inches using conveyor systems and/or express blowers. The infill will be driven into the space between the synthetic blades and the sand/aggregate mixture will meet ASTM C-33-03 for fine aggregates. The infill thickness will be checked at approximately 100-foot grid intervals. The sand infill installation will be done as to not damage or displace previously installed ClosureTurf components and the placement will not occur with snow or ice on the engineered turf.

An anchor trench will be used on the perimeter of the FCS to anchor the ClosureTurf system. The anchor trench will bury the edge of the geomembrane and engineered turf beneath two feet of soil to anchor the geomembrane in place. The soil that is placed in the anchor trench will be compacted to prevent the potential pullout of the geomembrane and engineered turf.

QA/QC testing will be performed on the ClosureTurf cover system as part of the installation.

5.0 MAXIMUM INVENTORY of CCR [845.720(a)(1)(D)]

The estimated maximum inventory of CCR on-site contained in the north portion and the south portion is estimated at approximately 465,000 cubic yards (CY) and 240,000 CY, respectively.

6.0 LARGEST AREA of CCR REQUIRING a FINAL COVER [845.720(a)(1)(E)]

The north portion of the FAB will be closed by removing the CCR in accordance with 845.740; therefore, this section is not applicable to the north portion. The south portion of the FAB will be closed with CCR in place and the FCS will cover a maximum area of approximately 15.3 acres.

7.0 CLOSURE SCHEDULE [845.720(a)(1)(F)]

Implementation of closure through removal and closure in place of CCR is estimated to require up to 42 months. However, this closure implementation time may vary because of the estimated time it will take to receive an approved construction permit. The closure activities are anticipated to begin in early 2023 with submittal of the construction permit application and completion is estimated to be by the end of 2026. The initial closure activity is applying for and obtaining an IEPA construction permit and the final closure step is submitting a closure report and closure certification with the closure construction activities occurring in between. Once the closure construction is complete, an acceptance report will be submitted to IEPA. An estimated schedule of anticipated closure activities is summarized in the table below:

Closure Schedule

Activity No.	Closure Activity	Schedule
1	Complete Closure Construction Documents and Obtain IEPA Closure Construction Permit	15 Months
2	Site Clearing & Install of Erosion Control Measures	2 Months
3	North Portion CCR Removal	15 Months
4	South Portion Grading and Compacting of CCR	3 Months
5	Installation of the Final Cover System & Permanent Stabilization	3 Months
6	Closure Certification and Report	4 Months

7.0 INITIATION AND COMPLETION OF CLOSURE ACTIVITIES [845.730 & 845.760]

Closure activities will commence when one or more of the following conditions have occurred:

- No later than 30 days after the date on which the CCR unit received the known final receipt of CCR or non-CCR waste;
- No later than 30 days after the removal of the known final volume of CCR for the purpose of beneficial use;
- Within two years of the last receipt of waste for a unit that has not received CCR or non-CCR waste; or
- Within two years of the last removal of CCR material for the purposes of beneficial use.

Upon completion of the IEPA approved closure activities, a closure report and closure certification will be submitted to IEPA in accordance with 845.760(e). The closure report will contain the following information:

1) Engineering and hydrogeology reports, including monitoring well completion reports and boring logs, all CQA reports, certifications, and designations of CQA officers-in-absentia required by 845.290;

2) Photographs, including time, date and location information of the photographs, of the final cover system, if applicable, and any other photographs relied upon to document construction activities;

3) A written summary of closure requirements and completed activities as stated in the closure plan and in Part 845; and

4) Any other information relied upon by the qualified professional engineer in making the closure certification.

In accordance with 845.760(f), notification of closure of a CCR unit will be made within 30 days of IEPA's approval of the submitted closure report and closure certification. The notification will include certification from a qualified professional engineer, as required by 845.760(e)(2) and will be placed in the facility's operating record.

8.0 CLOSURE PLAN AMENDMENTS [845.720(a)(3) & 845.720(b)(4)]

This Closure Plan may be amended in accordance with 845.720(a)(3) if a change in the operation of the FAB would substantially affect the content of this Closure Plan or if unanticipated events necessitate revision of the plan. If a change in operation requires amendment to the Closure Plan, the plan will be amended no later than 60 days prior to the change in operation being implemented. If an unexpected event occurs that requires amendment of the Closure Plan, the plan will be amended within 60 days of the unexpected event or within 30 days of the unexpected event if the event occurs after closure activities have commenced. Amendments to this Closure Plan will be certified by a professional engineer registered in the State of Illinois in accordance with 845.720(a)(4).

If this final Closure Plan requires revisions after closure activities have started for the FAB, then Midwest Generation will submit a request to modify the construction permit within 60 days following the triggering event.

9.0 PROFESSIONAL ENGINEER'S CERTIFICATION [845.720(a)(4)]

This Closure Plan for the FAB has been prepared to meet the requirements of 845.720(b).

Joshua D. Davenport, P.E.
Illinois Professional Engineer

SEAL