FINAL CLOSURE PLAN
LINCOLN STONE QUARRY
JOLIET #9 STATION
JANUARY 2022

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

Midwest Generation, LLC (Midwest Generation) currently operates the natural gas-fired generating station, referred to as Joliet #9 Station, located in Joliet, Illinois ("Site" or "generating station"). Midwest Generation converted the generating station from coal to natural gas in 2016. As part of the previous coal-fired operations, the station operated Lincoln Stone Quarry (LSQ) to manage/store the coal combustion residuals (CCR) created at the generating station as part of the electricity generating process. LSQ consists of an inactive West Filled Area (WFA), the formerly active Main Quarry, and the North Quarry. Decant water from the Main Quarry is gravity drained to the North Quarry. The North Quarry is not used to manage/store CCR but rather as a settling pond that is used to treat the water discharged from the Main Quarry.

The LSQ is operated and permitted as a landfill regulated by Illinois Environmental Protection Agency (EPA) Bureau of Land under 35 Ill. Adm. Code, Subtitle G, Part 811. It has been permitted as a landfill since approximately 1976. The operations are still subject to the conditions and requirements of its landfill Operating Permit No. 1994-241-LFM Modification No. 24. In 2015, the LSQ was also determined to be regulated under the newly passed Federal Register, Environmental Protection Agency, 40 CFR Parts 257.94 and 257.95 Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule dated April 17, 2015 (Federal CCR Rule) and subsequent amendments. The LSQ operations also fall under the newly promulgated Ill. Adm. Code Title 35, Part 845: Standards for the Disposal of Coal Combustion Residuals in Surface Impoundments (State CCR Rule). LSQ is not currently in service, and no liquids or wastewater is directed into it.

As required by 845.700(b), Midwest Generation will be closing LSQ. A preliminary closure plan was submitted as part of the Joliet #9 Lincoln Stone Quarry operating permit application and is finalized as part of submitting the construction permit application to execute the closure of LSQ. 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 LSQ 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 and is included as part of this final closure plan in Attachment 1.

The closure alternatives analysis report evaluated various scenarios that involved either closure by removal or closure in place. The scenarios evaluated are listed as follows:

- Scenario 1: Closure by removal to an off-site landfill;
- Scenario 2: Closure by removal to an on-site landfill;
- Scenario 3: Closure in place with a IEPA prescribed soil final cover system;

- Scenario 4: Closure in place with an alternate final cover system;
- Scenario 5: Closure in place by consolidating the CCR and covering with a final cover system;
- Scenario 6: Closure in place with hydraulic controls;
- Scenario 7: Closure in place with hydraulic containment;
- Scenario 8: Closure in place with a wet closure.

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 LSQ in place and construct an alternative final cover system (Scenario 4) as the closure method. This closure plan has been prepared in accordance with 35 Ill. Adm Code 845.720(b) and 845.750 for LSQ 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 LSQ will be accomplished by leaving the CCR in place 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 Closure with CCR Left in Place [845.720(a)(1)(C)]

LSQ will be closed by leaving the CCR in place in accordance with 845.750. As required, a final cover system (FCS) will be installed over the CCR in accordance with 845.750(c).

The following construction activities will be conducted to execute the closure in place in accordance with 845.750:

- Site Clearing and Decommissioning;
- Dewatering;
- Regrade and Compact CCR;
- Install Underdrain System; and
- Install Final Cover System;

Each of these items are discussed in detail in the following paragraphs.

3.1 Site Clearing and Decommissioning of Sluice Pipelines

Vegetation will be removed from the site to execute the closure. Trees and grass from the east side of the WFA and other areas around LSQ as needed will be removed and disposed of either onsite or offsite. The topsoil and clay on the WFA will be scraped to expose the existing CCR material and stockpiled. This will allow the east portion of the WFA to be regraded to lessen the existing slope and assist in creating the desired elevations needed to install the FCS.

Three sluice pipelines enter LSQ from under Patterson Road along the west side of the WFA. Two sluice pipelines run along the west and south sides of the WFA and then discharge into the southwest corner of the Main Quarry. The third sluice pipeline runs along the north side of the WFA and discharges into the northwest corner of the Main Quarry. Abandoned portions of the former sluice pipelines still exist along the southern perimeter of the Main Quarry.

The FCS will connect to the contours of the existing grade of LSQ and the WFA along the southwest and northwest corners of the Main Quarry. This will require the sluice pipes in these areas to be removed to accommodate the proposed grade of the FCS to be tied into the existing grade. These removed portions of the sluice pipelines will be hauled from the site to a disposal facility or a salvage yard. The remaining portions of the sluice pipelines can be left in place as long as they do not interfere with the closure activities.

3.2 Dewatering

The Main Quarry will be dewatered to an extent to allow the CCR to be regraded and compacted. The Main Quarry discharge pipes will be used to dewater LSQ by gravity to the inlet elevation of the pipes, which is approximately 527.5 feet amsl. At the point where the discharge pipes have dewatered the Main Quarry to the maximum extent possible, the remaining water will be artificially pumped from the Main Quarry through the discharge pipes. The discharge pipes from the Main Quarry drain by gravity into the settling pond located inside the North Quarry, from which the water is then pumped to the Des Plaines River. The discharge to the Des Plaines River is a NPDES regulated outfall. Continuing to pump the water through the discharge pipes will allow this water to be discharged using LSQ's existing NPDES discharge permit. As much of the water as possible will be pumped from the Main Quarry to expose the CCR. This is necessary to regrade and compact the CCR to minimize settling and allow it to support the FCS.

3.3 Regrade and Compact CCR

The CCR in LSQ will be regraded to a relatively uniform elevation to allow for the placement of the FCS. In general, the majority of the CCR is located in three different places: 1) in the southern portion of the Main Quarry, 2) the WFA and 3) a pile located on the east side of the Main Quarry. The CCR in the southern portion of the Main Quarry will be redistributed over the entire surface area of the Main Quarry to achieve a relatively uniform elevation. The CCR in the WFA has already been covered and will remain covered in place, except for the east slope, which will be regraded to lessen the existing slope and allow for the placement of the FCS. The FCS will then be placed over the CCR in the Main Quarry and the regraded eastern slope of the WFA. CCR from the upper portion of the east pile will be redistributed along with the other CCR in the Main Quarry to form the surface on which the FCS will be placed. This CCR will be distributed over the entire extent of the Main Quarry with the surface sloping towards the existing drainage pipes for the Main Quarry.

The CCR will be compacted to stabilize it prior to placement of the FCS and to reduce the potential for future settling. Due to the sandy composition of the CCR, most settlement will occur during regrading and compaction with time dependent settling of the CCR expected to be insignificant.

3.4 Underdrain

A Groundwater Impact Assessment (GIA) was performed on the groundwater flow system for LSQ in response to the mining operations at Vulcan Quarry. The approved GIA numerical groundwater model was used to evaluate the rebound of the water table once Vulcan Quarry mining to the southeast was ceased along with their ongoing dewatering operations. The model estimated that once Vulcan Quarry ceased mining and the groundwater levels around the Main Quarry returned to passive levels, the water level in the Main Quarry would reach an approximate elevation of 540 ft amsl. In order to address this situation an underdrain system will be installed in the Main Quarry.

The underdrain system will be installed to assist in controlling the flow of groundwater that enters the bottom of the Main Quarry. If the water level within the Main Quarry rises to an approximate 540 ft amsl elevation, this projected water level would be higher than the proposed elevation of the FCS and this would put upward pressure on the FCS. In order to prevent the water level from rising too high and causing upward pressure on the FCS an underdrain system will be installed. The underdrain system will create an outlet for rising groundwater and will prevent any uplifting pressure on the FCS. This portion of the underdrain system will be installed near the existing discharge pipes and consists of five (5) pipes arrayed evenly as a half circle, as shown on Sheet 3. Each pipe is four (4) inches in diameter and three of the pipes are approximately 150 feet long and two of the pipes are approximately 700 feet long. The longer pipes extent toward the south and southwest. The pipes will connect to the existing Main Quarry discharge pipes. The location and configuration would allow the water to be discharged without the need for pumping.

3.5 Installation of the Final Cover System

The closure of LSQ will consist of installing the FCS over the regraded CCR. The FCS will comply with 35 Ill. Adm. Code 845.750(c). The FCS will be the ClosureTurf cover system created by Watershed Geo, LLC, which uses a geomembrane low permeability layer and synthetic turf with a specialized sand infill as the final protective layer. The geomembrane low permeability layer will be installed in accordance with the manufacturer's recommendations. The final protective layer will be constructed to protect the geomembrane from UV damage, minimize erosion, and control stormwater runoff.

ClosureTurf consists of a structured geomembrane overlain by engineered synthetic turf infilled with s specialized sand. The proposed structured geomembrane that will be used is MicroDrain, which is a 50-mil high-density polyethylene (HDPE) structured geomembrane that combines a studded drain surface on the top side and spiked friction surface on the bottom side into one geomembrane liner. The geomembrane will be deployed with the spike side down and the stud side up on top of the regraded CCR. The geomembrane will be deployed perpendicular to the slope elevation contours and the deployment method will protect the geomembrane as well as the regraded CCR. Adequate anchoring will be used, such as sand bags, to prevent uplift by wind during the deployment of the geomembrane. The edges of each geomembrane section 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.

Since LSQ does not have a bottom/sidewall liner to tie the FCS into, the geomembrane will abut the vertical rock sidewalls. The slope of the geomembrane will follow the slope of the regraded CCR, which is sloped away from the intersection between the vertical rock sidewalls and the Geomembrane to minimize the potential for infiltration.

The geomembrane will be covered with engineered synthetic turf. 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 will be rolled out on top of the geomembrane starting from the highest slope to the lowest slope. The engineered turf will be deployed so that the filaments of the engineered turf are pointed upslope and the edges of each section 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 sections of the engineered turf are joined together either by sewing with polyester thread or by fusion seaming with a fusion welder.

A specialized sand 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 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 top of the slope of the regraded WFA to anchor the ClosureTurf system. The anchor trench will bury the top slope edge of the geomembrane and engineered turf beneath two feet of soil to ensure it does not slide down the regraded slope. 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.

The FCS will be installed at and below the perimeter rim elevation of LSQ with the FCS sloping inward. Thus, all the runoff from the FCS will drain inward towards the existing discharge pipes. Runoff from adjacent local drainage areas will be drained into the Main Quarry and directed toward the existing discharge pipes, which will convey the runoff to the North Quarry settling pond. The existing discharge pipes are two 20" diameter metal pipes. The existing discharge pipes from the Main Quarry discharge to the settling pond in the North Quarry, from which the water is pumped to the Des Plaines River. The settling pond, and the North Quarry itself, also are below the surrounding ground surface.

The ClosureTurf final cover system uses a geomembrane liner as the low permeability layer control, minimize, or eliminate, to the maximum extent possible, the post-closure infiltration of liquids in the CCR below. The geomembrane's hydraulic flux must be equivalent or superior to a 3-foot layer of soil with a hydraulic conductivity of $1x10^{-7}$ cm/sec. The comparison of the two liners was done based on the liquid flow rate through an area for each layer type. The calculations and their results are shown in Attachment 5-2, which show that the geomembrane with a liquid flow rate of $7.74x10^{-10}$ $cm^3/s/cm^2$ provides a greater reduction compared to the earthen material with a liquid flow rate of $1.15x10^{-7}$ $cm^3/s/cm^2$.

4.0 Maximum Inventory of CCR [845.720(a)(1)(D)]

The maximum inventory of CCR ever on-site is based upon the current quantity of CCR in LSQ, which is approximately 4,300,000 cubic yards (CY). The estimated maximum inventory of CCR that will be covered by the FCS is approximately 2,573,000 CY.

5.0 Largest Area of CCR Requiring a Final Cover [845.720(a)(1)(E)]

The FCS will cover a maximum area of approximately 46 acres.

6.0 Closure Schedule [845.720(a)(1)(F)]

Implementation of closure, as described, is estimated to require forty-three months. Closure completion is estimated to occur 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. The total time to execute the closure activities is estimated to be approximately forty-three (43) months. An estimated schedule of anticipated closure activities is summarized in the table below:

Table – Closure-in-Place Major Milestone Schedule

Closure Activity	Schedule
Complete Closure Construction Documents and Obtain IEPA Closure Construction Permit	15 Months
Site Clearing and Demolition of Sluice Pipelines	3 Months
Dewatering	5 Months
Regrade and Compact CCR	7 Months
Installation of the Final Cover System	7 Months
Closure Certification and Report	6 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 Section 845.290; 2) photographs, including time, date and location information of the photographs, of the final cover system and groundwater collection 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 will be amended in accordance with 845.720(a)(3) if a change in the operation of LSQ 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 LSQ, 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 Joliet #9/Lincoln Stone Quarry has been prepared to meet the requirements of 845.720(b).

1/19/22

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

SEAL