CLOSURE / POST-CLOSURE PLAN

GRAND TOWER ENERGY CENTER LLC (GTEC)
INACTIVE ASH BASIN CLOSURE

This Closure/Post-Closure Plan has been prepared in accordance with the US EPA Code of Federal Regulations Part 257.102 and Part 257.104

This Plan has been prepared on behalf of:

Grand Tower Energy Center LLC (GTEC)
Grand Tower, Illinois

This Plan has been prepared by:

ERM NC, Inc.
15720 Brixham Hill Avenue, Suite 120
Charlotte, North Carolina 28277

March 2019

CLOSURE / POST-CLOSURE PLAN
GRAND TOWER ENERGY CENTER, LLC (GTEC)
INACTIVE ASH BASIN

Table of Contents

CLOSURE / POST CLOSURE PLAN
GRAND TOWER ENERGY CENTER, LLC (GTEC)
INACTIVE ASH BASIN
Grand Tower, Illinois

SECTION 1.0 – BACKGROUND INFORMATION

Grand Tower Energy Center, LLC (GTEC) is a 478 Megawatt (MW) natural gas combined cycle facility that is located north of Grand Tower, Illinois adjacent to the east bank of the Mississippi River in Jackson County. GTEC is located on about 300 acres of land and is a "merchant facility" selling energy and capacity into the Midcontinent Independent System Operator (MISO) system. The GTEC facility is currently owned by Main Line Generation LLC, a subsidiary of Rockland Capital, and was purchased from Ameren in February 2014.

GTEC has reportedly produced electricity since 1951 utilizing both coal and oil fired boilers prior to converting to natural gas in 2001. While operating coal fired boilers, GTEC developed a coal combustion waste (CCW) impoundment for both fly ash and bottom ash residuals. Reportedly, original construction of the impoundment contained an internal divider soil berm to segregate bottom ash and fly ash residuals. The earliest plans reviewed for the basin were prepared by Sargent & Lundy dated 1969. Based on plans dated 1985, the basin was expanded from an original 10 acre footprint to the current 21.7 acre footprint.

The CCW impoundment has not received CCW materials since converting to natural gas in 2001. The impoundment continues to receive low volume facility waste water, which discharges to an unnamed tributary of the Mississippi River under an active NPDES permit (NPDES Permit No. IL0000124). Subsequent to closure, the low volume waste will be diverted from the CCW basin to a treatment system within the power plant to eliminate influent sources from the basin.

Based on the operational history of the facility, the GTEC CCW basin is classified as an "Inactive Ash Basin" in accordance with Federal Regulations. Based on additional field explorations performed by ERM in 2015 within the CCW Basin footprint, approximately 650,000 cubic yards (CY) of ash materials are currently within the basin footprint. These materials are located above a low permeable soil liner with coefficients of permeability generally ranging from 1×10^{-5} cm/sec to 1×10^{-7} cm/sec. With additional soil test borings along the perimeter of the basin, ERM was able to determine that soil berms were constructed on the north, west and east perimeter of the basin. With this information in mind, the GTEC CCW basin is proposed to be "closed in place" with a consolidation of materials into a smaller footprint.

SECTION 2.0 – REGULATORY REQUIREMENTS

Closure of the GTEC 21.7-acre CCW inactive ash basin is proposed to meet or exceed the regulatory requirements of:

US EPA, Code of Federal Regulations (CFR) Part 257 - 257.102 Criteria for conducting closure of CCR landfills and CCR surface impoundments.

(a) Closure of a CCR landfill, CCR surface impoundment, or any lateral expansion of a CCR unit must be completed either by leaving the CCR in place and installing a final cover system or through removal of the CCR and decontamination of the CCR unit, as described in this section.

When closure was originally evaluated in 2015, the basin was classified as an "inactive ash basin" that would close prior to April 17, 2018, requiring fewer regulatory items be completed.

Following August 4, 2016, the Federal Rules were amended affecting "inactive ash basins" for closure requirements with the following:

257.100(6) Closure and post-closure care. The owner or operator of the inactive CCR surface impoundment must:

> ***(i) No later than April 17, 2018, prepare an initial written closure plan as set forth in § 257.102(b); and***
>
> ***(ii) No later than April 17, 2018, prepare an initial written post-closure care plan as set forth in § 257.104(d).***

This written closure plan is prepared in accordance with 257.102(b) which states:

257.102(b) Written closure plan
(1) Content of the plan. The owner or operator of a CCR unit must prepare a written closure plan that describes the steps necessary to close the CCR unit at any point during the active life of the CCR unit consistent with recognized and generally accepted good engineering practices. The written closure plan must include, at a minimum, the information specified in paragraphs (b)(1)(i) through (vi) of this section.

> (i) A narrative description of how the CCR unit will be closed in accordance with this section.
>
> (ii) If closure of the CCR unit will be accomplished through removal of CCR from the CCR unit, a description of the procedures to remove the CCR and decontaminate the CCR unit in accordance with paragraph (c) of this section. ***(Does not apply to this facility; close in place)***
>
> (iii) If closure of the CCR unit will be accomplished by leaving CCR in place, a description of the final cover system, designed in accordance with paragraph (d) of this section, and the methods and procedures to be used to install the final cover. The closure plan must also discuss how the final cover system will achieve the performance standards specified in paragraph (d) of this section.

(iv) An estimate of the maximum inventory of CCR ever on-site over the active life of the CCR unit.

(v) An estimate of the largest area of the CCR unit ever requiring a final cover as required by paragraph (d) of this section at any time during the CCR unit's active life.

(vi) A schedule for completing all activities necessary to satisfy the closure criteria in this section, including an estimate of the year in which all closure activities for the CCR unit will be completed. The schedule should provide sufficient information to describe the sequential steps that will be taken to close the CCR unit, including identification of major milestones such as coordinating with and obtaining necessary approvals and permits from other agencies, the dewatering and stabilization phases of CCR surface impoundment closure, or installation of the final cover system, and the estimated timeframes to complete each step or phase of CCR unit closure. When preparing the written closure plan, if the owner or operator of a CCR unit estimates that the time required to complete closure will exceed the timeframes specified in paragraph (f)(1) of this section, the written closure plan must include the site-specific information, factors and considerations that would support any time extension sought under paragraph (f)(2) of this section.

SECTION 3.0 – CLOSURE PLAN

3.1 CLOSURE NARRATIVE

The GTEC 21.7-acre ash basin will be closed in place with installation of an engineered cap system to resist erosion and minimize rainfall infiltration. The closure footprint of the ash basin will be reduced from 21.7 acres to approximately 14 acres. The estimated total amount of ash material currently in place is 650,000 CY.

The basin will be slowly dewatered utilizing the existing NPDES outfall located at the southern end of the basin and in accordance with the existing NPDES permit conditions. Following and during dewatering, ash from the north end of the basin will be excavated and transported to the south end of the basin, consolidating the overall footprint. Ash materials will be placed at a maximum slope of 4H:1V for long term stability and maintenance. An estimated 200,000 CY of ash material will be excavated and/or re-graded to achieve proposed final elevations. Once proposed final elevations are achieved, the surface will be prepared for installation of a synthetic liner system. A minimum of three (3) feet of soil will be placed above the liner system for long term protection and establishing an erosion resistant vegetated surface.

Portions of the proposed closure footprint will be located in the 100-year floodplain (existing conditions as well). All slope areas located below the 100-year floodplain elevation will receive an additional layer of rock/stone protection to resist erosive forces during flooding events.

The remainder of the existing basin area beyond the proposed closure limits will be seeded to provide a stabilized vegetative cover for long term drainage. The existing soil berm located on the west side of the basin (currently in the 100-year floodplain) will be removed as a source of cover soils above the liner system. This will also increase the capacities of the 100-year floodplain and floodway in the immediate vicinity.

This closure plan will be placed in the GTEC operating record prior to closure. The closure plan shall be reviewed and updated if any changes occur at the facility that may require a deviation from this closure plan.

3.2 FINAL COVER SYSTEM

The final cover system has been designed to meet or exceed the requirements included in CFR Part 257.102 (d) *Closure performance standard when leaving CCR in place.* The final cover system was also designed to meet Title 35 of Illinois Administrative Code (IAC) Section 840.126 *Final Cover System,* which was developed specifically for the closure of ash basins in Hutsonville, Illinois. The intent of the final closure system is to:

- Minimize storm water infiltration into the closed footprint with a low permeable/barrier layer;
- Provide an infiltration layer above the low permeable/barrier layer to avoid instability due to saturated conditions;
- Provide a protective layer above the low permeable/barrier layer; and
- Provide a stabilized final closure surface to resist erosive forces.

The final cover system proposed for the GTEC CCW basin closure consists of an erosion layer, protective soil layer, drainage layer and a barrier layer. The multi-layered final cover system will provide permeability less than the bottom liner system (average between 1 X 10^{-5} cm/sec to 1 X 10^{-7} cm/sec) and less than the minimum requirement of 1 X 10-5 cm/sec.

The final cover system will consist of the following layers (listed from top to bottom) for the closure cap:

- A 6-inch **Erosion (Vegetative Soil) Layer** consisting of soil capable of supporting native plant growth and designed to maintain vegetative growth over the closure footprint. These soils will be taken from the onsite western berm area. For areas of the closure cap located below the 100-yr floodplain elevation, an additional layer of appropriately-sized rock/stone protection will be placed to resist flooding erosive forces.
- An 30-inch **Protective Soil Layer** to prevent damage due to freezing or puncture to the Drainage and Barrier Layers located beneath;
- A **Drainage Layer** consisting of double-sided heat-bonded or sewn geocomposite. The geocomposite is designed to horizontally drain storm water that has percolated through the Erosion and Protective Soil Layers in order to prevent the build-up of water over the Barrier Layer (thus minimizing infiltration); and
- A **Barrier Layer** consisting of a 40-mil Textured Linear Low Density Polyethylene (LLDPE) geomembrane placed over prepared subgrade ash materials.

Due to the highly elastic nature of the LLDPE membrane, the final cover system will accommodate differential settlement anticipated to occur during the post-closure period. The post settlement surface slopes will be no less than five (5) percent to promote positive drainage across the cover system surface and at a maximum slope not greater than twenty five (25) percent (pre-settlement) to facilitate construction and prevent erosion.

Elements included in the closure activities are illustrated on the Closure Plans and detail sheets under separate cover.

3.3 MAXIMUM INVENTORY OF CCW ONSITE

The GTEC CCW basin is inactive and has not received additional ash materials since 2001. In order to estimate the volume of waste in place within the basin, twenty (20) auger probes were advanced through the basin footprint to record depth of ash and evaluate the base liner materials. Using these results, a bottom of ash grading plan was developed to compare with existing topography to compute a volume of ash in place. Based on these results (and include in Table 1 below), an estimated 650,000 CY of CCW ash materials are within the CCW basin. The ash pond is determined to be of adequate stability based on boring logs completed in 2016.

Grand Tower Energy Center (GTEC)
Ash Basin - Volume of Ash Currently in Place

Based on exploration borings and development of bottom of ash plan, determine the amount of ash in place using the contour method

CONTOUR	PERIMETER AREA (SF)	INTERIOR EXISTING BELOW AREA (SF)	ADJUSTED AREA FOR REMOVAL (SF)	AVG. AREA (SF)	THICKNESS (FT)	VOLUME (CF)	VOLUME (CY)
348	32,050	0	32,050				
				116,683	2	233,366	8,643
350	201,316	0	201,316				
				406,228	2	812,456	30,091
352	611,140	0	611,140				
				656,023	2	1,312,045	48,594
354	700,905	0	700,905				
				714,540	2	1,429,080	52,929
356	728,175	0	728,175				
				735,996	2	1,471,992	54,518
358	749,567	5,750	743,817				
				748,864	2	1,497,727	55,471
360	767,864	13,954	753,910				
				758,620	2	1,517,240	56,194
362	786,321	22,991	763,330				
				767,821	2	1,535,641	56,876
364	804,937	32,626	772,311				
				773,858	2	1,547,715	57,323
366	823,714	48,310	775,404				
				751,485	2	1,502,969	55,666
368	842,651	115,086	727,565				
				712,611	2	1,425,222	52,786
370	861,747	164,090	697,657				
				689,619	2	1,379,238	51,083
372	881,004	199,423	681,581				
				526,975	2	1,053,949	39,035
374	483,397	111,029	372,368				
				270,051	2	540,101	20,004
376	0	167,733	167,733				
				107,010	2	214,020	7,927
378	0	46,287	46,287				
				30,934	2	61,867	2,291
380	0	15,580	15,580				
						TOTAL	**649,431** **CY**

Table -1

3.4 SCHEDULE FOR CLOSURE

Closure of the GTEC Inactive Ash Basin will occur following appropriate permitting from the Illinois Environmental Protection Agency (IEPA). Following receipt of necessary permits, closure is expected to be completed in approximately six (6) months, depending on weather. It is estimated that construction will be completed in the year 2019.

3.4.1 CLOSURE SEQUENCE

The inactive ash basin closure activities will be initiated in phases beginning with dewatering of free standing ponded waters within the basin footprint. This will be accomplished utilizing the existing NPDES outfall structure located at the south end of the basin. Following substantial dewatering, removal of CCW materials will begin on the west side of the basin to establish drainage to the sediment basin. These activities will be followed by moving ash from the north end of the basin to the south end for final disposition. This process will continue until proposed grades are achieved in accordance with the Closure Plans. Following completion of excavation and grading activities, a synthetic liner system, including a 40-mil linear low density polyethylene and geocomposite drainage layer, will be installed over the prepared closure footprint above. Three feet of soil cover containing a 30-inch thick vertical percolation layer overlain by a six (6)-inch vegetative layer will be placed above the liner system. The perimeter of the closure will contain an anchor trench two (2) feet in depth for permanently securing the synthetic liner system.

3.4.2 DETERMINATION OF CLOSURE AREA

Determination of the closure area has been performed through evaluation of historic plans and field verifications including twenty (20) auger probes within the basin area. Based on these results and computations for volume of CCW materials in place, a consolidated closure footprint of about 14 acres was developed to encapsulate 650,000 CY of CCW materials.

3.4.3 NOTIFICATION OF INTENT TO CLOSE

Notification of intent to close the GTEC Inactive Ash Basin was placed in the facility operating record dated March 3, 2015; Technical Memorandum – Prepared by ERM NC, Inc., Rockland Capital – Grand Tower Energy Center, LLC, Former CCR Impoundment Closure Alternatives, Grand Tower, Jackson County, Illinois.

3.4.4 FINAL CLOSURE CONSTRUCTION

The final closure system at the GTEC Inactive Ash Basin facility shall be constructed in accordance with the requirements of the Construction Quality Assurance (CQA) Plan, Technical Specifications, and Engineering Drawings, incorporated by reference as part of this Closure Plan. Each referenced item has been prepared specifically for the GTEC Inactive Ash Basin Closure.

3.4.5 CERTIFICATION OF CLOSURE CONSTRUCTION

Following closure construction activities, a certification document will be prepared summarizing closure activities along with CQA activities conducted throughout the closure. This document will be signed by the project engineer, an Illinois registered professional engineer, verifying that closure has been completed in accordance with the closure plan. This document will also be placed in the facility operating record.

3.4.6 RECORDATION OF DEED

Following closure of the GTEC Inactive Ash Basin, GTEC shall record a notation on the deed to the facility property, or some other instrument that is normally examined during title search. The notation on the deed shall, in perpetuity, notify any potential purchaser of the property that the land has been used for closure of a CCW ash basin and is subject to requirements of a post-closure care plan.

SECION 4.0 – POST CLOSURE CARE PLAN

Post-closure care will begin immediately following final closure of the GTEC Inactive Ash Basin and continue for a minimum period of five (5) years. The post-closure care period may increase up to 30 years based on conditions of the approved Groundwater Management Zone (GMZ) issued by IEPA. The purpose of the plan is to provide the necessary information for preserving the integrity of the basin closure during the post-closure period. This post-closure plan specifically addresses maintenance activities for the final cover, groundwater monitoring wells, and erosion and sedimentation control system to be installed at the closed GTEC Inactive Ash Basin.

4.1 MAINTENANCE AND MONITORING

Following final closure of the GTEC Inactive Ash Basin, GTEC shall conduct post-closure care for a minimum of five (5) years, except as may be provided under the approved Groundwater Management Zone, once issued by IEPA. At a minimum, post-closure care shall consist of the activities as detailed below.

4.1.1 FINAL COVER SYSTEM

Inspection of the final cover system will take place quarterly. The inspection will consist of a field reconnaissance of the entire final cover system. Items of concern to be noted by the inspector include, but are not limited to signs of erosion (ruts, sediment deposits, etc.), patches of distressed or dead vegetation, animal burrows, settlement and/or ponded water, upheaving, stained soil due to seeps, cracks in the cover, and tree saplings (especially species with tap roots). Following each inspection, a summary report of the condition of the final cover and the items requiring repair or maintenance shall be recorded on an inspection form and filed in the post-closure log book for the facility. Areas that require further attention should be photographed and delineated on a map of the facility and attached to the inspection report. Since post-closure inspection personnel will most likely change during the post-closure period, the post-closure log book should be kept in a standardized format as part of the operating record of the facility so that new inspection personnel may easily review the results of past post-closure inspections of the site.

Action should be taken immediately to address any items of concern identified during the inspection. Obvious repair items should be performed under the supervision of the post-closure maintenance manager. If an item of concern requires further investigation to determine a course of action, the Engineer responsible for closure design should be contacted for consultation.

Maintenance required for the final cover is minimal. The vegetative cover should be mowed at least twice a year to suppress weed and brush growth. If vegetative cover is not adequate in any particular area, fertilizer should be applied and the area re-seeded in order to re-establish vegetation. Insecticides may be used to eliminate insect populations that are detrimental to the vegetation. Animal burrows and eroded or depressed areas should be filled in with compacted soil and reseeded.

4.1.2 GROUNDWATER MONITORING WELLS

Inspection of the groundwater monitoring wells will take place semi-annually during sampling events. The inspection will consist of verifying the condition of the monitoring wells to ensure that they are providing representative samples of the groundwater being collected. The inspector should note the following:

1) The total depth of the well should be recorded every time a water sample is collected or a water level reading is taken to determine if sediment has accumulated at the bottom. If sediment build-up has occurred, the sediment shall be removed by pumping or bailing, and the cause investigated.

2) If turbid samples are collected from a well, redevelopment of the well will be performed.

3) The aboveground protective casing shall be inspected for damage. The protective casing shall be of good structural integrity and free of any cracks or corrosion. The lockable cover and lock shall also be inspected at this time.

4) The surface seals shall be inspected for settling and cracking. If the seal is damaged in any way, the seal shall be replaced.

5) The well casing and cap shall be inspected. The casing and cap shall be of good structural integrity and free of any cracks or corrosion. Any debris shall be removed from around the cap to prevent it from entering the well.

The condition of the groundwater monitoring system shall be recorded on the inspection form and filed in the post-closure logbook following each sampling event. Monitoring of the groundwater wells shall be conducted as described in the groundwater monitoring plan.

4.1.3 GROUNDWATER SAMPLING

Based on the recent results of groundwater monitoring, GTEC proposes to monitor the well network for a minimum period of five years following completion of the CCW basin closure. Sampling and analyses will occur semi-annually following completion of CCW basin closure activities. Wells will be developed and sampled using low flow peristaltic pumps with samples placed in laboratory supplied containers, and shipped using chain-of-custudy. The samples will be placed in laboratory supplied coolers and shipped to the laboratory for analytical testing. Groundwater samples will be analyzed by an IEPA-approved laboratory semi-annually and analyses will include the Appendix III and IV parameters. Field parameters will include pH, specific conductivity, and temperature, at a minimum.

The semi-annual results will be submitted to IEPA including a summary of field activities, laboratory analyses, constituent trends and evaluation of statistically significant increases for constituent concentrations. At the end of the first five-year monitoring and reporting post-closure time frame, a groundwater performance monitoring report will be submitted to IEPA to either demonstrate restoration of groundwater quality to Class I

standards or present a continued groundwater monitoring plan for an additional five years. In addition, the results will be compared to the modeled concentrations to evaluate that a decreasing trend, as defined through modeling, is occurring at the predicted rate. Significant changes from the model results will lead to additional calibration and assessment of future expected rates of decrease for the constituents of concern.

4.1.4 SURFACE WATER MONITORING

Stormwater sampling in accordance with NPDES requirements for closed landfills shall continue in accordance with NPDES General Permit NCG 120000.

4.2 INDIVIDUAL RESPONSIBLE FOR POST-CLOSURE MAINTENANCE

The GTEC Plant Manager will be responsible for operations and maintenance of the site during the post-closure period. The Owner can be reached at the following address:

Grand Tower Energy Center, LLC
1820 Power Plant Rd
Grand Tower, IL 62942
(618) 565-2318

Over the course of the post-closure period, the individual responsible for providing the post-closure services is subject to change. The IEPA shall be informed of the individual serving as responsible party if changes occur.

4.3 PLANNED USE FOLLOWING CLOSURE

Post-closure use of the property shall not disturb the integrity of the final cover, liner, or any other components of the containment system, or the function of the monitoring systems. The Division may approve any disturbance of these systems if the owner or operator demonstrates that disturbance of the final cover, liner or other component of the containment system, including any removal of waste, will not increase the potential threat to human health or the environment.

There are no planned uses for the ash basin site after closure. The property will continue to be owned and maintained by GTEC with public access prohibited. If at some later date, GTEC wishes to propose alternative end uses for the facility, this plan will be revised accordingly.

4.4 NOTIFICATION

GTEC shall notify the IEPA that a post-closure plan has been prepared and placed in the operating record prior to permit issuance. The post-closure plan shall be updated if any changes occur at the facility that require a deviation from the approved post-closure plan.

4.5 CERTIFICATION OF POST-CLOSURE

Following completion of the post-closure care period for the CCW surface impoundment, GTEC shall notify the IEPA that a certification, signed by an independent registered professional Engineer, verifying that post-closure care has been completed in accordance with the post-closure plan and has been placed in the operating record.