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GREDELL Engineering Resources, Inc.

Sikeston Board of Municipal Utilities
Sikeston Power Station
Bottom Ash Pond
Closure Plan

Prepared for:

Sikeston Power Station
1551 West Wakefield Avenue
Sikeston, MO 63801

October 17, 2016

Sikeston Board of Municipal Utilities
Sikeston Power Station
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Closure Plan

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PROFESSIONAL ENGINEER'S CERTIFICATION

40 CFR 257.102(b) Written Closure Plan

I, Thomas R. Gredell, P.E., a professional engineer licensed in the State of Missouri, hereby certify in accordance with 40 CFR 257.102(b)(4) that the closure plan for the Sikeston Board of Municipal Utilities, Sikeston Power Station, Bottom Ash Pond meets the requirements of 40 CFR 257.102(b)(1) as found in federal regulation 40 CFR 257, Subpart D – Standards for the Disposal of Coal Combustion Residuals in Landfills and Surface Impoundments and has been prepared using good engineering and environmental practices.

Name: Thomas R. Gredell, P.E.

Signature: _____

Date: 10-17-2016

Registration Number: PE-021137
State of Registration: Missouri

1.0 INTRODUCTION

Pursuant to 40 CFR 257.102 (2), the owner or operator of a Coal Combustion Residual (CCR) unit must prepare a closure plan identifying the manner and timing of closure and describe such cover compliance with the designated performance criteria set forth in the CCR Rule with respect to the installation method for the final cover system.

There are two CCR surface impoundments at Sikeston Board of Municipal Utilities' (SBMU) Sikeston Power Station (SPS); one inactive and one active. The Fly Ash Pond is an inactive CCR surface impoundment and ceased receiving CCR and CCR transport water prior to October 19, 2015. The Bottom Ash Pond is an active CCR surface impoundment. A map showing the location of the two CCR surface impoundments is provided in Appendix A as Figure 1.

The Bottom Ash Pond currently receives direct precipitation, CCR transport water, and other low volume wastewaters. The Bottom Ash Pond discharges to the Process Waste Pond, a non-CCR surface Impoundment. The Process Waste Pond discharges through NPDES Outfall #003 to Richland Drainage Ditch #4. This closure plan focuses on the Bottom Ash Pond.

2.0 CLOSURE PLAN

Pursuant to 40 CFR 257.102, a surface impoundment can either be closed by leaving the CCR material in place and installing a final cover system or through removal of the CCR. The Bottom Ash Pond at SPS will be closed by capping and leaving the CCR materials in place as allowed by regulation. This plan describes the process that SBMU will use to close the Bottom Ash Pond at SPS. The Bottom Ash Pond is an approximate 61-acre, CCR surface impoundment constructed in the early 1980's during the initial construction of the SPS. The Bottom Ash Pond was constructed with a compacted soil liner, but has not been found to consistently comply with the liner performance criteria set forth in the CCR Rule.

Primary activities common to most impoundment closures are listed below. Initial project schedules are presented in Section 5 and Appendix B.

2.1 Reroute Process Water/Piping Modifications

The Bottom Ash Pond will remain in service as an active impoundment until the SPS ceases operation. Consequently, once the Bottom Ash Pond is closed, there is no need for process water. Therefore, all water systems will be taken out of service prior to closure and all associated piping will be removed or plugged.

2.2 Dewater Surface Water

Liquid from the Bottom Ash Pond will be removed either passively (by gravity drainage) or actively (by extraction wells, pumps or trenches). To dewater portions of the surface impoundment, the CCR material may be moved and stockpiled along the margins of the impoundment to allow water to drain from the ash.

2.3 Installation of Drainage and Stormwater Management

Stormwater management systems will be designed and constructed to collect and control runoff, including the peak flow resulting from the design flood event. The design flood event is based on the CCR unit's flood hazard potential rating. The current flood hazard rating is "significant". Therefore, the design flood hazard event is the 1000-year event. Inflow design flood control system plans and calculations are certified by a professional engineer and updated every five years.

2.4 Stabilization and Grading

The CCR Rule requires that closure systems for CCR units preclude the probability of future ponding of water, sediment, or slurry and that wastes within an impoundment are stabilized. A CCR unit is considered stable when it is structurally suitable for use as a base layer and can

accommodate construction activities. Stabilization techniques include pore dewatering and/or compaction via tracking by earth moving equipment.

Minimum design grades for final cover are not established by the CCR Rule. However, a one percent (1%) grade is a practical minimum for final cover slopes of a surface impoundment. Steeper slopes may be constructed, as necessary, in areas where settlement due to saturated CCR is anticipated. SBMU will optimize the use of existing onsite CCR materials to achieve final grades and promote positive drainage.

As currently anticipated, CCR material will not be removed from within the footprint of the Bottom Ash Pond during final grading operations. CCR material within the footprint that is relocated and placed elsewhere within the Bottom Ash Pond to achieve a site earthwork balance will be placed in thin, loose lifts of uniform thickness and compacted. Additional volumes of CCR material may be transported from other onsite sources at SPS to achieve the necessary final grades. Using conventional earth moving techniques, this CCR material will be placed in thin loose lifts of uniform thickness and compacted. A site plan for the Bottom Ash Pond is provided in Appendix A as Figure 2.

2.5 Closure Documentation

A construction quality assurance plan, engineering drawings, bid specifications and as-built construction drawings will be developed to demonstrate that appropriate closure activities were successfully implemented. Additional closure documentation will include the following:

- Annual progress reports summarizing closure progress and projected closure activities;
- Notification of completion of closure will be finalized within 60 days of the actual closure completion date.

The closure notices and progress reports will be placed in SPS's Operating Record, sent to the Director of Missouri Department of Natural Resources (MDNR) before close of business on the required compliance date and placed on SPS's CCR public website within 30 days of placing said information in the Operating Record.

3.0 FINAL COVER SYSTEM

Minimum standards for cover include an 18-inch infiltration layer and a 6-inch topsoil layer to support vegetative growth. The final cover system must have a permeability less than or equal to that of the bottom liner, or no greater than 1 x 10^{-5} centimeters per second (cm/s). As part of the engineering design, geotechnical assessments of the CCR materials in the surface impoundment will be performed. A typical final cover system will have sufficient topsoil to support vegetative growth and minimize erosion.

A cross section of a typical, compliant final cover system is shown in Figure 1.

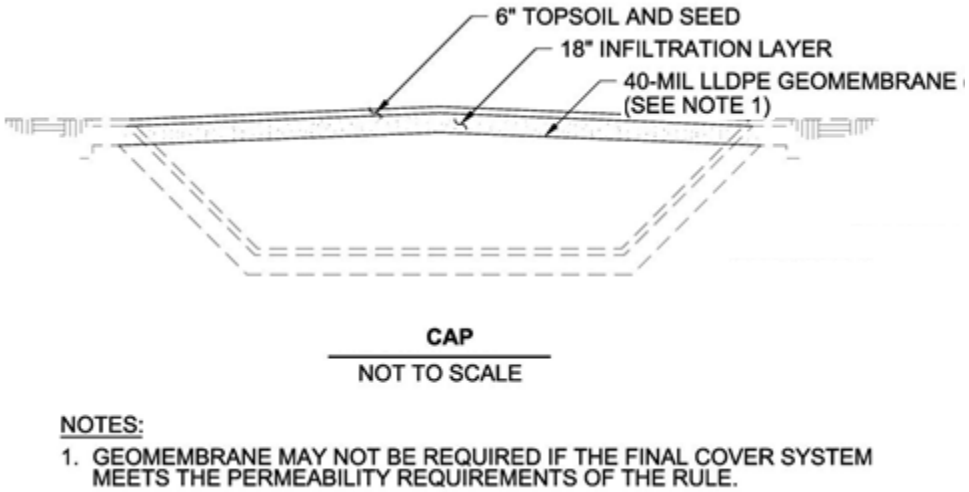


Figure 1: Typical CCR Unit Cap

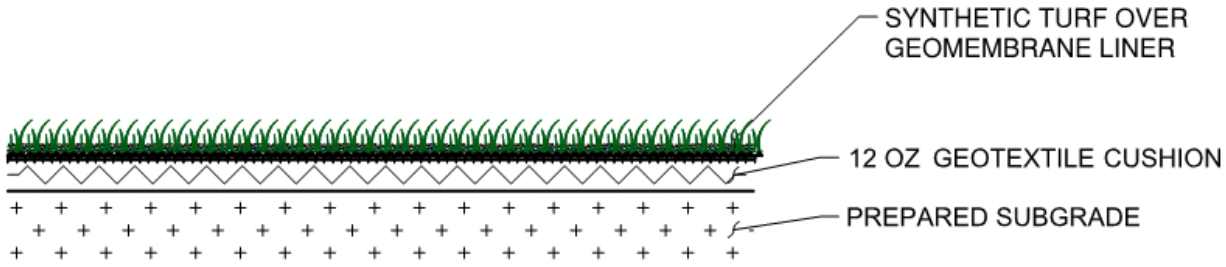
3.1 Alternative Cover System

The CCR Rule authorizes the use of an alternative final cover system for closure, provided the system meets equivalent performance requirements. Alternative final cover systems comprised of synthetic turf material can demonstrate equivalence with the prescriptive final cover requirements in solid waste applications and have been approved for use as final cover, primarily in municipal Subtitle D landfill applications. Benefits of an alternative cover system include reduced cover system costs when soils are locally unavailable, reduced environmental impact from haul trucks, potentially shortened construction timeframes, potential improvements to stormwater discharge quality, ability to accommodate settling and subsidence and reductions in post-closure care maintenance. SBMU may install an alternative cover system at SPS.

Consideration of an alternative cover system may be based on discussions with manufacturers and facility managers, site visits and/or field demonstrations. Technologies considered by SBMU may prevent contact of CCR materials with percolating rainwater, promote controlled runoff to stormwater detention systems, reduce borrow volume requirements and minimize maintenance.

Performance considerations used to evaluate various synthetic products include the following: permeability; constructability; cost; installation time; thickness; puncture strength; wind resistance; flood resistance; CCR compatibility; vehicle traffic; storm flow velocity restrictions; maintenance; erosion control; and UV protection.

A cross section of a typical potential alternative cover system is set forth below.



SBMU may use an engineered synthetic turf system at SPS to close the Bottom Ash Pond, depending upon the ease of constructability and projected costs at SPS.

3.2 Selection of a Final Cover System

Final design of the final cover system will include an estimate of probable construction cost to allow SBMU to select the most cost effective final cover system for the Bottom Ash Pond. An estimate of probable construction cost may include possible alternative design configurations for the final cover system. All final cover system designs will be designed in accordance with 40 CFR 257.102(d)(3) and have a permeability not greater than 1×10^{-5} cm/s.

- A soil only final cover system consisting of an 18-inch infiltration layer and 6-inch erosion layer capable of supporting the growth of vegetation. Layer thicknesses shall be minimums.
- An alternative final cover system consisting of a geosynthetic infiltration layer and a 24-inch thick erosion layer capable of supporting the growth of vegetation.
- An alternative final cover system consisting of a geosynthetic infiltration layer and a geosynthetic turf erosion layer.

3.3 Settlement and Subsidence of Cover System

Settling and subsidence of the final cover system is expected to be minimal. Settlement on the impoundment occurs during consolidation of the CCR material, general fill material or underlying natural subsoils under new loads from grading activities. Saturated CCR material may settle under the additional loading from grading activities and cover materials. This settlement may occur for the duration of grading activities and is expected to be minimized once the final cover

system is installed. General fill will be placed in a controlled manner to minimize post-cover system installation settlement.

Slope stability and mass stability of the covered-in-place material will be analyzed during completion of the final design. Instability of the cover system is not anticipated, based on the relatively flat sloping grades. The stable cover system design concept will minimize the need for excessive future maintenance.

3.4 Method of Installation

Closure construction will consist of erosion and sediment control installation, clearing and grubbing of vegetation, dewatering, grading and compaction of CCR materials, construction of a compacted clay layer and erosion layer or alternative cover system, installation of stormwater controls and performance of final seeding and restoration.

4.0 CCR UNIT INVENTORY AND AREA ESTIMATE

Table 1 is SBMU's estimate of CCR materials within the Bottom Ash Pond, along with an estimate of the final cover area. The final cover area may decrease if the footprint of the Bottom Ash Pond is consolidated as part of the closure process.

Table 1: Estimated CCR Inventory and Cover Area

CCR Unit	Estimated Inventory (CY)	Estimated Capacity (CY)	Estimated Final Cover Area (Ac)
Bottom Ash Pond	1,192,000	342,000	61+/-

5.0 CLOSURE SCHEDULE

Table 2 identifies the CCR surface impoundment and anticipated closure date. This schedule is preliminary and subject to revision based upon operational needs, construction progress and budgetary constraints.

SBMU has developed preliminary work schedules based on project milestones and the estimated completion date reflected in Table 2. See the Initial Closure Schedule in Appendix B.

Table 2: Estimated Closure Date

CCR Unit	CCR Type	Estimated Closure Date
Bottom Ash Pond	Bottom Ash, Fly Ash and Scrubber Sludge	2034

6.0 AMENDMENTS

Section 257.102(b)(3) addresses amendments of written closure plans. SBMU may amend this closure plan as required. However, the plan must be amended when there is a change in the CCR unit operation that would substantially affect the current written closure plan.

In addition, either before or after closure activities have commenced, unanticipated events may necessitate a revision to the written closure plan.

Amendments must be completed at least 60 days prior to a planned change in the operation of the facility or CCR unit, or no later than 60 days after an unanticipated event requires the need to revise the plan. For written closure plans that are revised after closure activities have commenced for a CCR unit, the plan must be amended no later than 30 days following the triggering event.

Each amendment must be certified by a professional engineer that the amended plan meets the requirements of 40 CFR 257.102(b)(1).

7.0 MISCELLANEOUS REQUIREMENTS

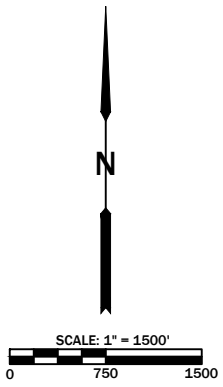
Section 257.102 includes other requirements that SBMU must comply with, as listed below:

- Section 257.102(i) includes specific requirements related to *deed notations* following completion of closure;
- Section 257.102(j) references the recordkeeping requirements specified in 257.105(i), the notification requirements specified in 257.106(i), and the Internet posting requirements specified in 257.107(i).

APPENDICES

APPENDIX A

Figures



CCR SURFACE IMPOUNDMENT CLOSURE
SIKESTON BOARD OF MUNICIPAL UTILITIES

FIGURE 2 - AERIAL VIEW

GREDELL Engineering Resources, Inc.

ENVIRONMENTAL ENGINEERING LAND - AIR - WATER

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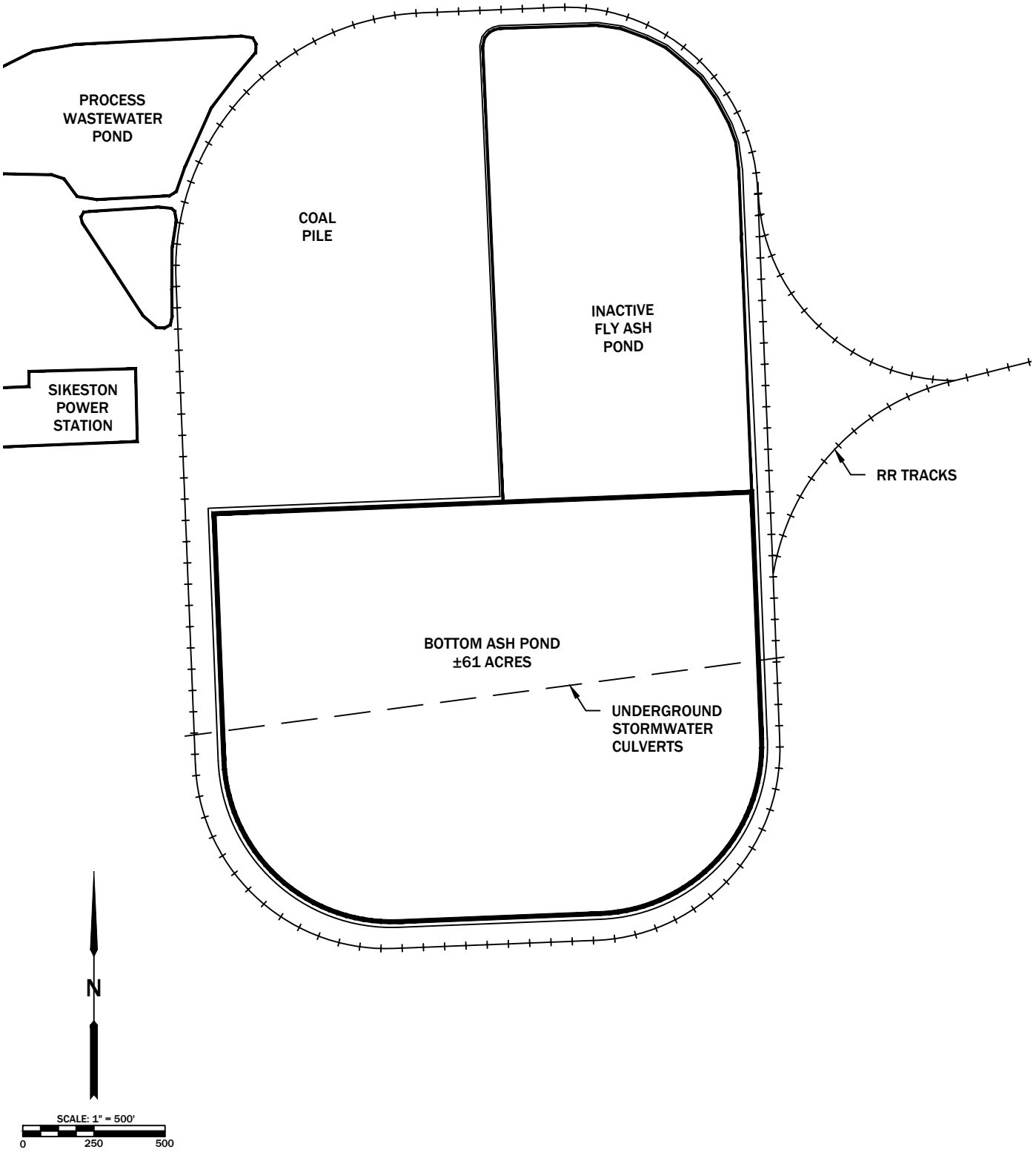
MO CORP. ENGINEERING LICENSE NO. E-2001001669-D

DATE	SCALE	PROJECT NAME	REVISION
10/2016	AS NOTED	SIKESTON	
DRAWN	APPROVED	FILE NAME	SHEET #
AJK	TG	CLOSURE PLAN	1 OF 1

M:\Share\CADDFiles\SIKESTON\POND CLOSURE\CLOSURE PLAN.dwg, FIGURE 2 - AERIAL VIEW, 10/13/2016 4:09:47 PM



CCR SURFACE IMPOUNDMENT CLOSURE SIKESTON BOARD OF MUNICIPAL UTILITIES

FIGURE 3 - SITE PLAN

GREDELL Engineering Resources, Inc.

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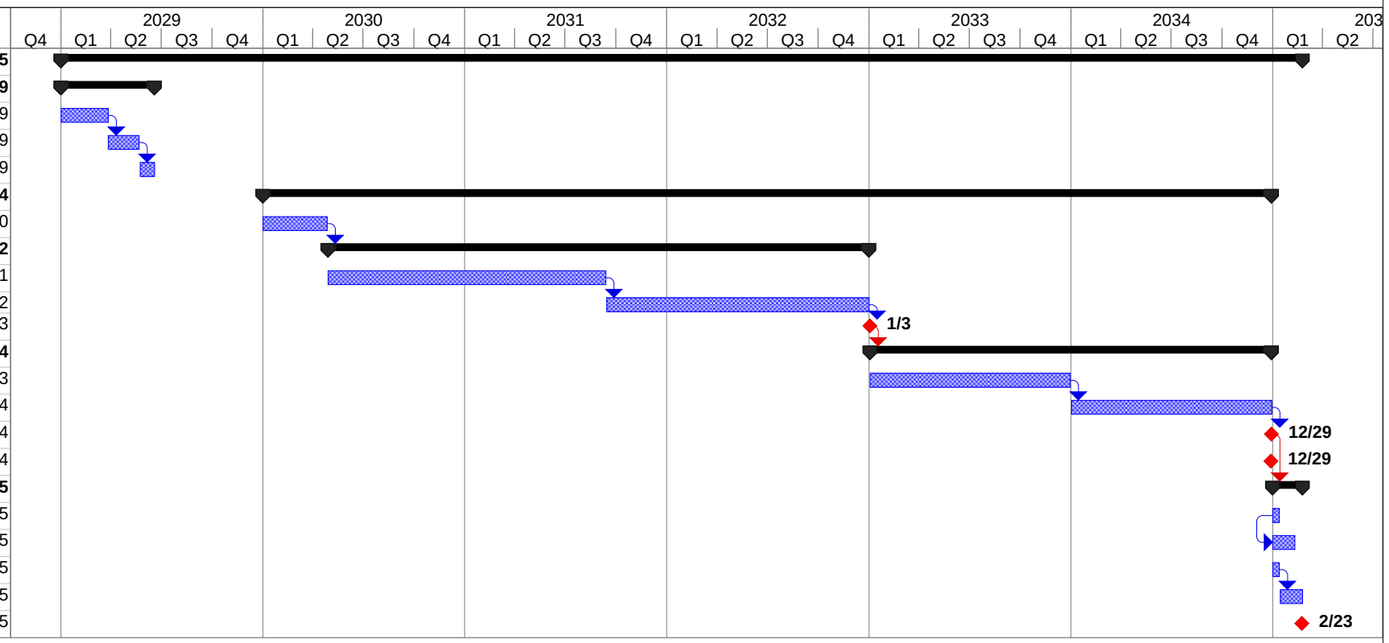
M:\Share\CADDFiles\SIKESTON\POND CLOSURE\CLOSURE PLAN.dwg, FIGURE 3 - SITE PLAN, 10/13/2016 4:09:47 PM

APPENDIX B

Preliminary Work Schedule

SIKESTON BOARD OF MUNICIPAL UTILITIES - SIKESTON POWER STATION
BOTTOM ASH POND CCR SURFACE IMPOUNDMENT
CLOSURE SCHEDULE

ID	Task Name	Duration	Start	Finish
1	**CCR Surface Impoundment Closure**	**1605 days**	**Mon 1/1/29**	**Fri 2/23/35**
2	**Prepare Construction Documents, Bid, and Contractor Selection**	**121 days**	**Mon 1/1/29**	**Mon 6/18/29**
3	Prepare Construction Documents and Estimate	3.05 mons	Mon 1/1/29	Mon 3/26/29
4	Bid Process	2 mons	Tue 3/27/29	Mon 5/21/29
5	Contractor Selection and Finalize Contract	3.6 wks	Thu 5/24/29	Mon 6/18/29
6	**Implement CCR Surface Impoundment Closure**	**1304 days**	**Tue 1/1/30**	**Fri 12/29/34**
7	Prepare Notification of Intent to Close CCR Surface Impoundment	84 days	Tue 1/1/30	Fri 4/26/30
8	**Dewatering & Stabilization**	**700 days**	**Mon 4/29/30**	**Fri 12/31/32**
9	Dewatering Surface Water	18 mons	Mon 4/29/30	Fri 9/12/31
10	Grading and Stabilizing CCR	17 mons	Mon 9/15/31	Fri 12/31/32
11	Dewatering & Stabilization Complete	0 days	Mon 1/3/33	Mon 1/3/33
12	**Final Cover Construction**	**520 days**	**Mon 1/3/33**	**Fri 12/29/34**
13	Infiltration Layer	13 mons	Mon 1/3/33	Fri 12/30/33
14	Erosion Layer	13 mons	Mon 1/2/34	Fri 12/29/34
15	Final Cover Construction Complete	0 days	Fri 12/29/34	Fri 12/29/34
16	CCR Surface Impoundment Closure Complete	0 days	Fri 12/29/34	Fri 12/29/34
17	**CCR Surface Impoundment Regulatory Closure Documentation**	**40 days**	**Mon 1/1/35**	**Fri 2/23/35**
18	PE Certification that Closure is Complete (Federal)	2 wks	Mon 1/1/35	Fri 1/12/35
19	Prepare Notification of Closure of CCR Surface Impoundment (Federal)	30 days	Mon 1/1/35	Fri 2/9/35
20	Deed Notation (Federal)	2 wks	Mon 1/1/35	Fri 1/12/35
21	Notification of Deed Notation (Federal)	30 days	Mon 1/15/35	Fri 2/23/35
22	Regulatory Closure Documentation Complete	0 days	Fri 2/23/35	Fri 2/23/35



Project: SBMU - Sikeston Power Station CCR Surface Impoundment Closure
Prepared by GREDELL Engineering Resources, Inc.
Date: Fri 10/14/16

Task Milestone Summary