1505 East High Street
Jefferson City, Missouri 65101
Telephone (573) 659-9078
Facsimile (573) 659-9079

GREDELL Engineering Resources, Inc.

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

Prepared for:

Sikeston Power Station
1551 West Wakefield Avenue
Sikeston, MO 63801

April 2018

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

April 2018

Table of Contents

PROFESSIONAL ENGINEER'S CERTIFICATION 1
1.0 INTRODUCTION 2
2.0 CLOSURE PLAN 3
2.1 Reroute Process Water/Piping Modifications 3
2.2 Dewater Surface Water 3
2.3 Installation of Drainage and Stormwater Management 3
2.4 Stabilization and Grading 3
2.5 Closure Documentation 4
3.0 FINAL COVER SYSTEM 5
3.1 Alternative Cover System 5
3.2 Selection of a Final Cover System 6
3.3 Settlement and Subsidence of Cover System 6
3.4 Method of Installation 7
4.0 CCR UNIT INVENTORY AND AREA ESTIMATE 8
5.0 CLOSURE SCHEDULE 9
6.0 AMENDMENTS 10
7.0 MISCELLANEOUS REQUIREMENTS 11

List of Appendices

Appendix A Figures
Appendix B Initial Closure Schedule

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 initial closure plan for the Sikeston Board of Municipal Utilities, Sikeston Power Station, Fly Ash Pond meets the requirements of 40 CFR 257.102(b) 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: 04-18-2018

Registration Number: PE-021137
State of Registration: Missouri

1.0 INTRODUCTION

Pursuant to 40 CFR 257.100(e), the owner or operator of an inactive Coal Combustion Residual (CCR) unit must prepare an initial closure plan in compliance with 40 CFR 257.102(b) that identifies the manner and timing of closure and describes 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); an approximate 61-acre Bottom Ash Pond and an approximate 30-acre Fly Ash Pond (Figure 1). The Bottom Ash Pond is an active CCR surface impoundment and was subject to the original closure plan requirements of 40 CFR 257.102(b). The Fly Ash Pond is subject to extension compliance deadlines resulting from the initial inactive status and the Response to Partial Vacatur (the Direct Final Rule), for section 40 CFR 257.100 (effective October 4, 2016) and the Federal CCR Rule section 257.102(b) (effective October 19, 2015). Owners or operators of inactive CCR surface impoundments subject to the provisions of the new 40 CFR 257.100(e)(6)(i) must, by April 17, 2018, comply with the requirements at 40 CFR 257.102(b).

The Fly Ash Pond currently receives direct precipitation and discharges into the Process Waste Pond, a non-CCR surface Impoundment. The Process Waste Pond discharges through NPDES Outfall #003 into Richland Drainage Ditch #4.

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 Fly 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 Fly Ash Pond at SPS. The Fly Ash Pond is an approximate 30-acre, CCR surface impoundment constructed in the early 1980's during the initial construction of the SPS. The Fly Ash Pond was constructed with a compacted soil liner, but the liner has not been found to consistently comply with the liner performance criteria set forth in the CCR Rule.

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

2.1 Reroute Process Water/Piping Modifications

The Fly Ash Pond will remain in service as an active impoundment until at least 2023. Consequently, once the Fly 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

Water ponded on the Fly Ash Pond will be removed either passively (by gravity drainage) or actively (by pumps or trenches). To dewater portions of the surface impoundment, the CCR material may be moved and stockpiled within the footprint of the impoundment to allow surface water to drain from the surface of the ponded 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 "low". Therefore, the design flood hazard event is the 100-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 target 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 Fly Ash Pond during final grading operations. CCR material within the footprint that is relocated and placed elsewhere within the Fly 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 Fly Ash Pond is provided in Appendix A, 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 properly and successfully implemented. Additional closure documentation will include the following:

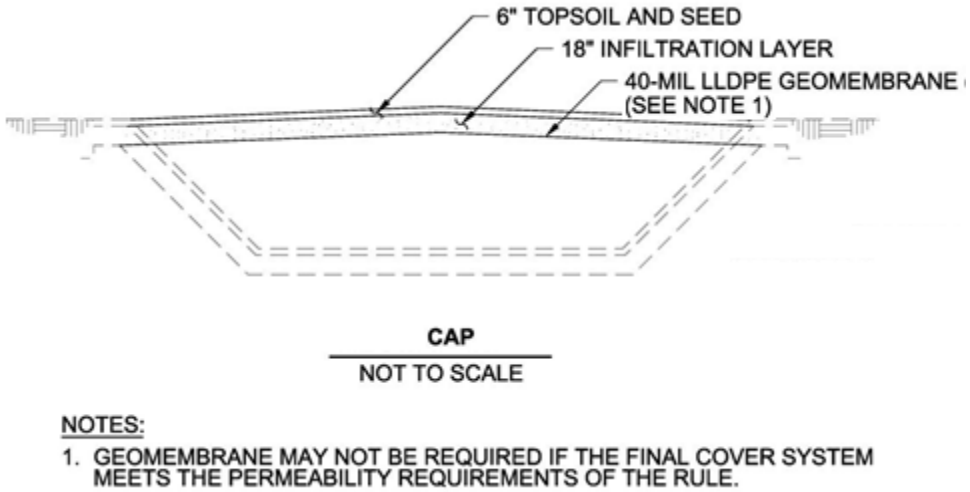
- Annual progress reports summarizing closure progress and projected closure activities;
- Notification of completion of closure will be finalized and placed in the Operating Record within 30 days of the actual closure completion date.
- SPS must also comply with the closure recordkeeping requirements [257.105(i)],

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 the 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 erosion layer (e.g., earthen material, or topsoil) 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), whichever is less. As part of the engineering design, a geotechnical evaluation of the CCR materials in the surface impoundment will be completed. A typical final cover system will have a minimum 6-inch erosion layer to support vegetative growth and minimize erosion.

A cross section of a typical, compliant final cover system is shown below.



Typical CCR Unit Cap

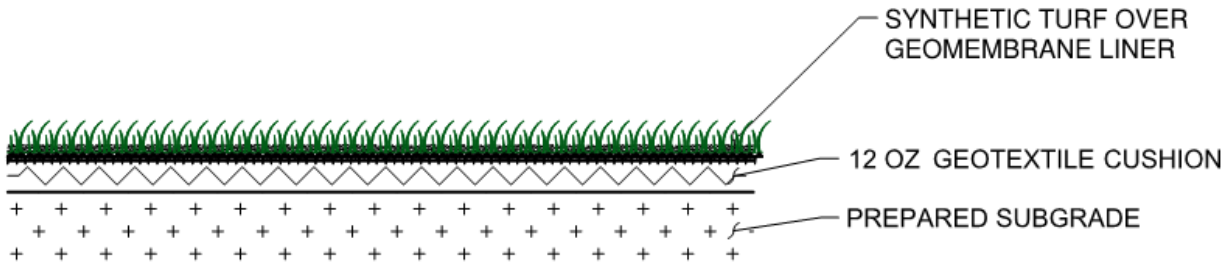
3.1 Alternative Cover System

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. 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.

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 Fly Ash Pond, depending upon the ease of construction and projected installation 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 Fly 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 x 10^{-5} cm/s.

- A soil only final cover system consisting of an 18-inch infiltration layer and a 6-inch erosion layer capable of supporting the growth of vegetation. The layer thicknesses stated above 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 due to the documented thickness of CCR materials (approximately 20 feet). 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. Therefore, settlement may occur for the duration of grading activities, but the amount of settlement is expected to be reduced once the final cover system is installed and construction is complete. 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 development of the final design. Instability of the cover system is not anticipated, based on the anticipated flat grades. A 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 any existing 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 final seeding and restoration.

4.0 CCR UNIT INVENTORY AND AREA ESTIMATE

Table 1 is SBMU's estimate of CCR materials within the Fly Ash Pond, along with an estimate of the final cover area. The final cover area may decrease if the footprint of the Fly 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)
Fly Ash Pond	840,000	50,000	30+/-

The Fly Ash Pond has limited remaining capacity and is currently used on an intermittent basis, as allowed by 257.102(e)(2)(ii)(*3*).

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 remaining capacity of the Fly Ash Pond, operational needs, construction progress and budgetary constraints.

Table 2: Estimated Closure Date

CCR Unit	CCR Type	Estimated Closure Date
Fly Ash Pond	Primarily Fly Ash	2024

SBMU has developed an initial closure schedule based on the current anticipated date of receiving the final waste, the requirements of 257.102, projected construction milestones. The estimated completion date reflected in Table 2 is based on the Initial Closure Schedule found in Appendix B. This initial closure schedule assumes that no other requirement of 40 CFR 257 will require closure of Fly Ash Pond prior to the existing capacity being used.

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

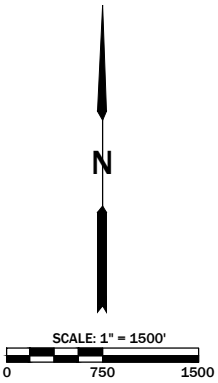
Section 257.102 includes other requirements that SBMU must comply with, as listed below:

- 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



CLOSURE PLAN
FLY ASH POND
SIKESTON POWER STATION

FIGURE 1 - AERIAL VIEW

GREDELL Engineering Resources, Inc.

ENVIRONMENTAL ENGINEERING LAND - AIR - WATER

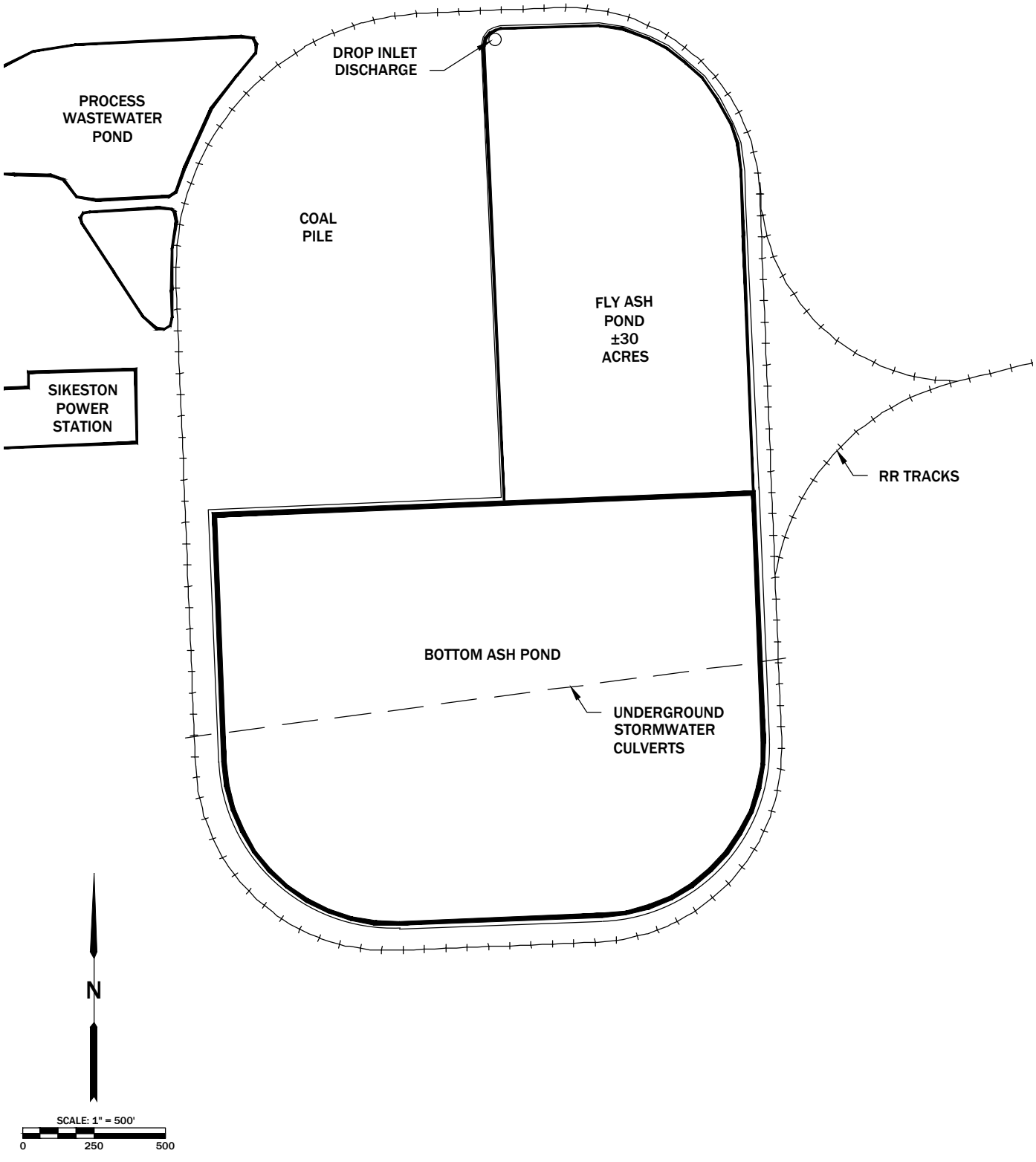
1505 East High Street
Jefferson City, Missouri

Telephone: (573) 659-9078
Facsimile: (573) 659-9079

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

DATE	SCALE	PROJECT NAME	REVISION
4/2018	AS NOTED	SIKESTON	
DRAWN	APPROVED	FILE NAME	SHEET #
CP	TG	CLOSURE PLAN	1 OF 1

M:\Share\CADDFiles\SIKESTON\FLY AS POND APRIL EDITS\CLOSURE PLAN.dwg, FIGURE 1 - AERIAL VIEW, 4/6/2018 2:06:09 PM



CLOSURE PLAN
FLY ASH POND
SIKESTON POWER STATION

FIGURE 2 - SITE PLAN

GREDELL Engineering Resources, Inc.

ENVIRONMENTAL ENGINEERING LAND - AIR - WATER

1505 East High Street
Jefferson City, Missouri

Telephone: (573) 659-9078
Facsimile: (573) 659-9079

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

DATE	SCALE	PROJECT NAME	REVISION
4/2018	AS NOTED	SIKESTON	
DRAWN	**APPROVED**	**FILE NAME**	**SHEET #**
CP	TG	CLOSURE PLAN	1 OF 1

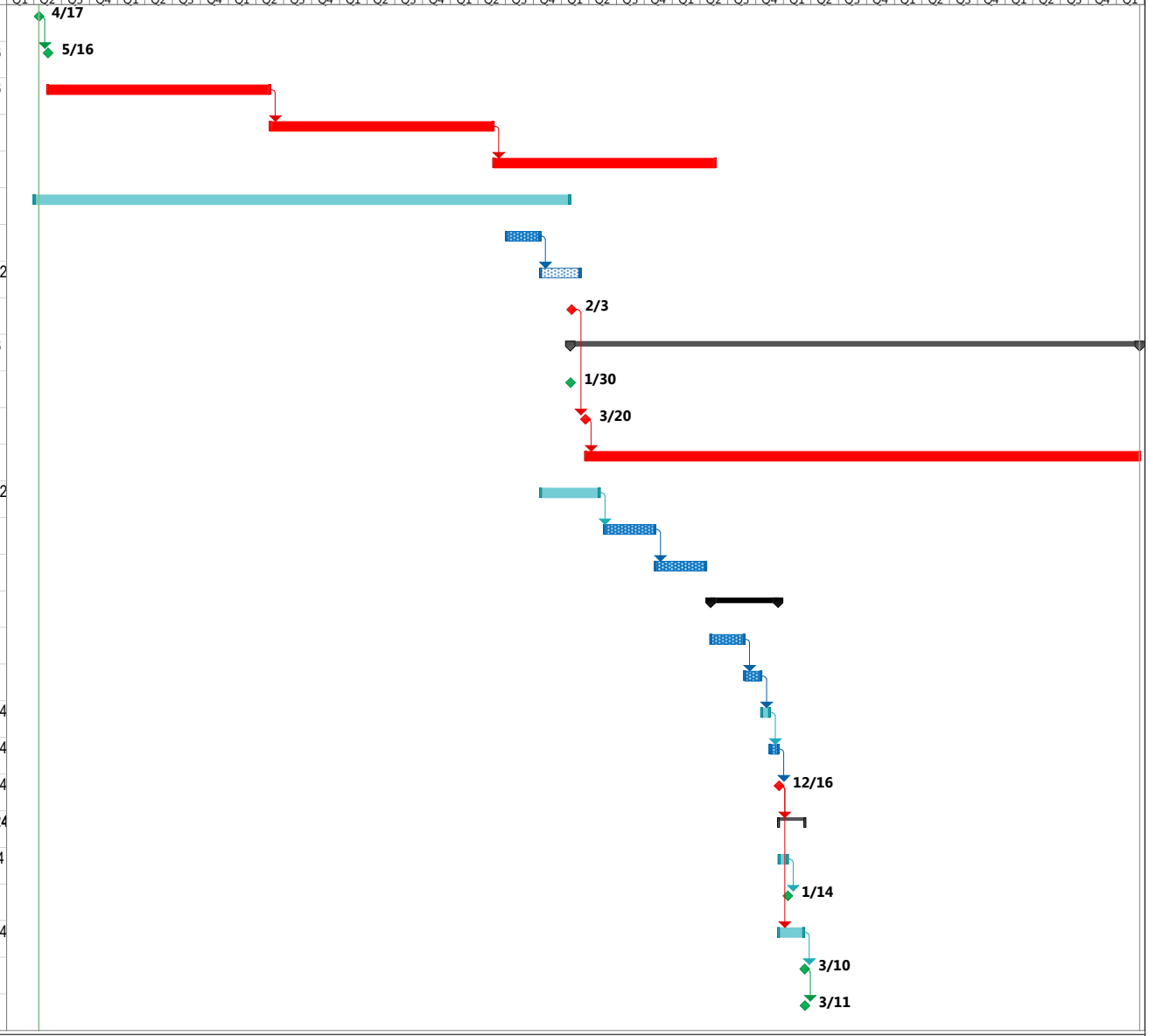
M:\Share\CADDFiles\SIKESTON\FLY AS POND APRIL EDITS\CLOSURE PLAN.dwg, FIGURE 2 - SITE PLAN, 4/6/2018 2:05:29 PM

APPENDIX B

Initial Closure Schedule

SBMU FLY ASH POND INITIAL CLOSURE SCHEDULE

ID	Task Name	Duration	Start
1	SPS Place Closure Plan into Operating Record	1 day	Tue 4/17/18
2	SPS Notify MDNR and Post on CCR Internet Site	1 day	Wed 5/16/18
3	Provide Documentation of Cont. CCR Placement	26.15 mor	Wed 5/16/18
4	Provide Documentation of Cont. CCR Placement	26.25 mor	Mon 5/18/20
5	Provide Documentation of Cont. CCR Placement	26.05 mor	Mon 5/23/22
6	Continued Fly Ash Placement	63 mons	Mon 4/2/18
7	Complete Closure Design	4 mons	Mon 7/4/22
8	Select Closure Contractor	95 days	Mon 10/24/22
9	Receive Final CCR Waste	1 day	Fri 2/3/23
10	**IMPLEMENT CLOSURE PER 257.102**	**1340 days**	**Mon 1/30/23**
11	SPS Place Notice of Intent to Close in Operating Record	1 day	Mon 1/30/23
12	Initiate Closure within 30 days of Final Waste	1 day	Mon 3/20/23
13	Complete Closure within 5 Years of Initiation	65.2 mons	Tue 3/21/23
14	Coordinate Permits or Approvals (IF ANY)	7 mons	Mon 10/24/22
15	Dewater CCR Waste	6 mons	Mon 5/22/23
16	Stabilize (Grade and Compact) CCR Waste	6 mons	Mon 11/6/23
17	**Construct Closure Cap**	**160 days**	**Mon 5/6/24**
18	Construct Infiltration Layer	4 mons	Mon 5/6/24
19	Construct Erosion Layer	2 mons	Mon 8/26/24
20	Install Drainage & Stormwater Management	1 mon	Mon 10/21/24
21	Seed, Fertilize and Mulch	4 wks	Mon 11/18/24
22	**Estimated Project Completion Date**	1 day	Mon 12/16/24
23	**NOTIFICATIONS REQUIRED BY 257.102**	**62 days**	**Mon 12/16/24**
24	P.E. Certificate Closure Complete per 257.102	4 wks	Tue 12/17/24
25	SPS Place Notice of Closure in Operating Record	1 day	Tue 1/14/25
26	Record Closure on Deed	12 wks	Mon 12/16/24
27	SPS Place Deed Notification in Operating Record	1 day	Mon 3/10/25
28	Comply with All OTHER Recordkeeping & Notifications	1 day	Tue 3/11/25



Project: SBMU Fly Ash Pond Closure Plan Schedule
Prepared by GREDELL Engineering Resources, Inc.
Date: Tue 4/17/18

Task	Project Summary	Manual Task	Start-only	Deadline
Split	Inactive Task	Duration-only	Finish-only	Progress
Milestone	Inactive Milestone	Manual Summary Rollup	External Tasks	Manual Progress
Summary	Inactive Summary	Manual Summary	External Milestone