



**Labadie Energy Center  
Closure Plan  
LCPB (Fly Ash Pond)  
CCR Surface Impoundment**

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Closure Plan  
(LCPB) Fly Ash Pond  
CCR Surface Impoundment  
Franklin County, Missouri**

**October 2016**

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Professional Engineer's Certification

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By means of this certification, I have reviewed this CCR Unit Closure Plan for Surface Impoundment LCPB (Fly Ash Pond) at Ameren Missouri's Labadie Energy Center. Such plan describes the steps necessary to close the CCR unit and such activities are in accordance with general accepted and good engineering activities, and it meets the requirements of 40 CFR §257.102(b). Such plan may be amended as authorized by 40 CFR §257.102(b)(3).

Name: Thomas R. Gredell, P.E.

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

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.

Stormwater, CCR transport water and other low volume wastewaters discharge from the active CCR unit through NPDES permitted Outfall 002 of Missouri Operating Permit No. MO-0004812. A map showing the location of the active CCR surface impoundment is appended hereto as Figure 2.

The active CCR surface impoundment is referred to as Surface Impoundment LCPB (Fly Ash Pond). Surface Impoundment LCPB currently discharges CCR transport water into Surface Impoundment LCPA (Bottom Ash Pond). Surface Impoundment LCPA receives CCR transport water. Stormwater currently collects on Surface Impoundment LCPB, which discharges to Surface Impoundment LCPA. This closure plan will focus on Surface Impoundment LCPB (Fly Ash Pond).

## **2.0 Closure Plan**

Pursuant to 40 CFR §257.102, a surface impoundment can be closed by leaving the CCR material in place and installing a final cover system, or through removal of the CCR. The surface impoundments at the Labadie Energy Center will be closed by capping and leaving the CCR materials in place as contemplated and authorized by the regulations. This report describes the process which Ameren Missouri will use to close Surface Impoundment LCPB at Labadie Energy Center. LCPB is a 77-acre, lined impoundment constructed in the early 1990's. Surface Impoundment LCPB utilizes a single 60 mil geomembrane liner, but does not include a compacted soil liner or approved equivalent base liner and, therefore, does not 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 piping systems to Surface Impoundment LCPB have not yet been physically removed. To preclude the probability of future impoundment of water, water systems and piping will be rerouted to prevent future discharge of plant service water systems or other drainage to the closed ash pond. The primary water system going to Surface Impoundment LCPB is the process water used to create a slurry to discharge the dry fly ash into LCPB. Once

Surface Impoundment LCPB no longer receives fly ash (CCR), there is no need for process water. Therefore, all Surface Impoundment LCPB 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 Surface Impoundment LCPB 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 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 adequately manage flow during peak discharge of the design flood event and collect and control runoff during the same design storm. The design flood event is based on the CCR unit's flood hazard potential rating. The inflow design flood control system plan and calculations are certified by a professional engineer and updated every five years.

## **2.4 Stabilization and Grading**

The CCR Rule requires closure systems for CCR units to preclude the probability of future impoundment of water, sediment or slurry and the stabilization of wastes within an impoundment. A CCR layer is considered stabilized when it is structurally suitable for use as a base layer and can accommodate construction activities. Stabilization techniques could include dewatering and/or compaction via tracking by earth moving equipment.

Minimum design slopes are not established within the CCR Rule. However, a slope of one percent (1%) will be used as a practical minimum for final slopes of the surface impoundments. Additional slopes will be provided, as feasible, in areas where settlement due to saturated CCR is anticipated. Ameren Missouri will optimize the use of existing onsite CCR materials to achieve final grade, reduce the overall footprint of the CCR units and enhance drainage.

The boundaries of Labadie's CCR surface impoundments do not overlap, but they are adjacent and separated by a common berm. Therefore, they will require a coordinated approach to grading to properly manage stormwater runoff. Grading modifications related to Surface Impoundment LCPB will not consider drainage from Surface Impoundment LCPA to the west and other locations of the plant. As currently anticipated, CCR material may be removed from within the footprint of Surface Impoundment LCPB during final grading operations for use in closing LCPA. Additional quantities of CCR material are not anticipated to be imported from other onsite CCR units at the LEC site to achieve the necessary final grades. Using conventional earth moving, CCR material will be placed in

approximate 8-inch loose lifts and compacted. A site plan for Surface Impoundment LCPB is provided as Figure 3 in Appendix A.

## **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:

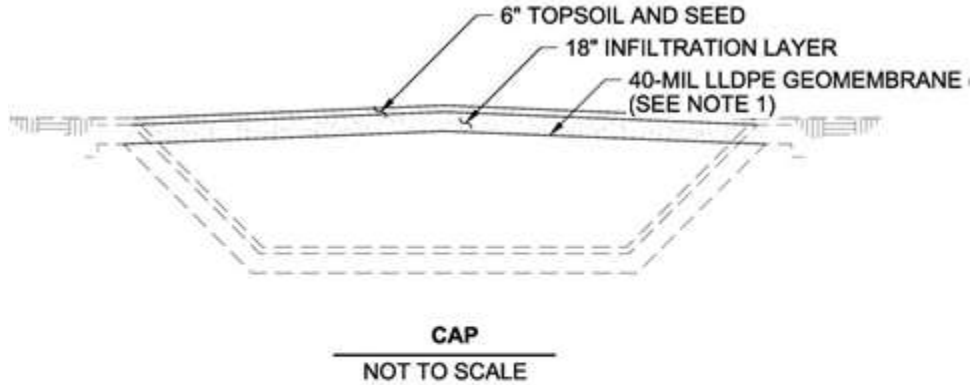
- The annual progress reports summarizing closure progress and projected closure activities;
- Notification of completion of closure will be finalized within 60 days of the actual closure completion date.

The closure notices and progress reports will be placed in Labadie Energy Center'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 Ameren'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 a geomembrane liner overlain by an 18-inch infiltration layer and 6 inches of topsoil to support the growth of vegetation. The final cover is required to have permeability less than or equal to that of the bottom layer, or  $1 \times 10^{-5}$  centimeters per second (cm/s). Alternative cover systems are authorized, provided that such design meets or exceeds the CCR Rule performance standards. As a 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 soil cover to support vegetative growth and minimize erosion

A typical cross section of the final cover system is shown in Figure 1.



**NOTES:**

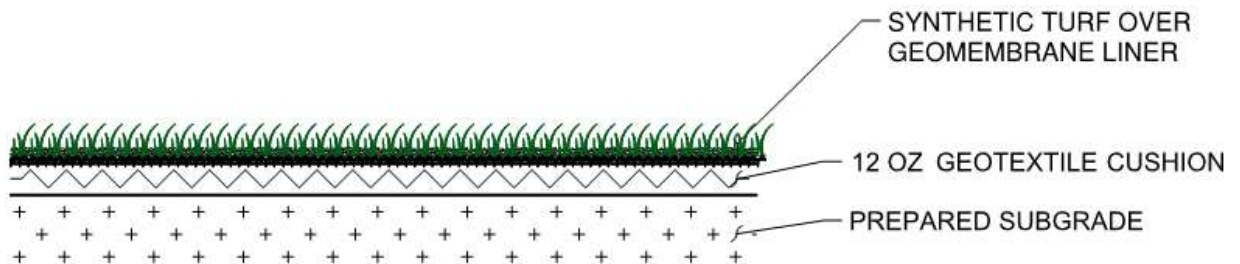
1. GEOMEMBRANE MAY NOT BE REQUIRED IF THE FINAL COVER SYSTEM MEETS THE PERMEABILITY REQUIREMENTS OF THE RULE.

**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.

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



Ameren Missouri is considering using an engineered synthetic turf system at Labadie CCR unit closures, depending upon the ease of constructability and design performance experienced at LEC.

### 3.2 Settlement and Subsidence of Cover System

Settlement on the impoundment may occur during consolidation of the CCR material, general fill material or underlying natural subsoils under new loads from grading activities. A portion of the CCR material within the impoundment contains cemented material that will have minimal settlement. The saturated, un-cemented CCR material encountered may settle under the additional loading. This settlement may occur for the duration of grading

activities and is expected to be minimal after the final cover system is installed. General fill will be installed 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 after completion of the final design, which is currently ongoing. 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 extensive future maintenance.

### 3.3 Method of Installation

Closure construction will consist of erosion and sediment control installation, clearing and grubbing, dewatering, grading and compaction of CCR, 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

Set forth below in Table 1 is Ameren Missouri’s estimate of CCR materials within the various units, along with the currently estimated final cover area. Note that actual cover areas may be reduced as the footprint of various units is consolidated as part of closure.

**Table 1: Estimated CCR Inventory and Cover Area**

CCR Unit	Estimated Inventory (CY)	Estimated Capacity (CY)	Estimated Final Cover Area (Ac)
LCPB (Fly Ash Pond)	3,065,327	3,362,000	77+/-

## 5.0 Closure Schedule

Table 3 below identifies the impoundment and anticipated closure date. This schedule is preliminary and subject to revision based upon operational needs, construction progress and budgetary constraints.

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

**Table 2: Estimated Closure Date**

CCR Unit	CCR Type	Estimated Closure Date
LCPB (Fly Ash Pond)	Fly Ash	2023



## 6.0 Miscellaneous Requirements

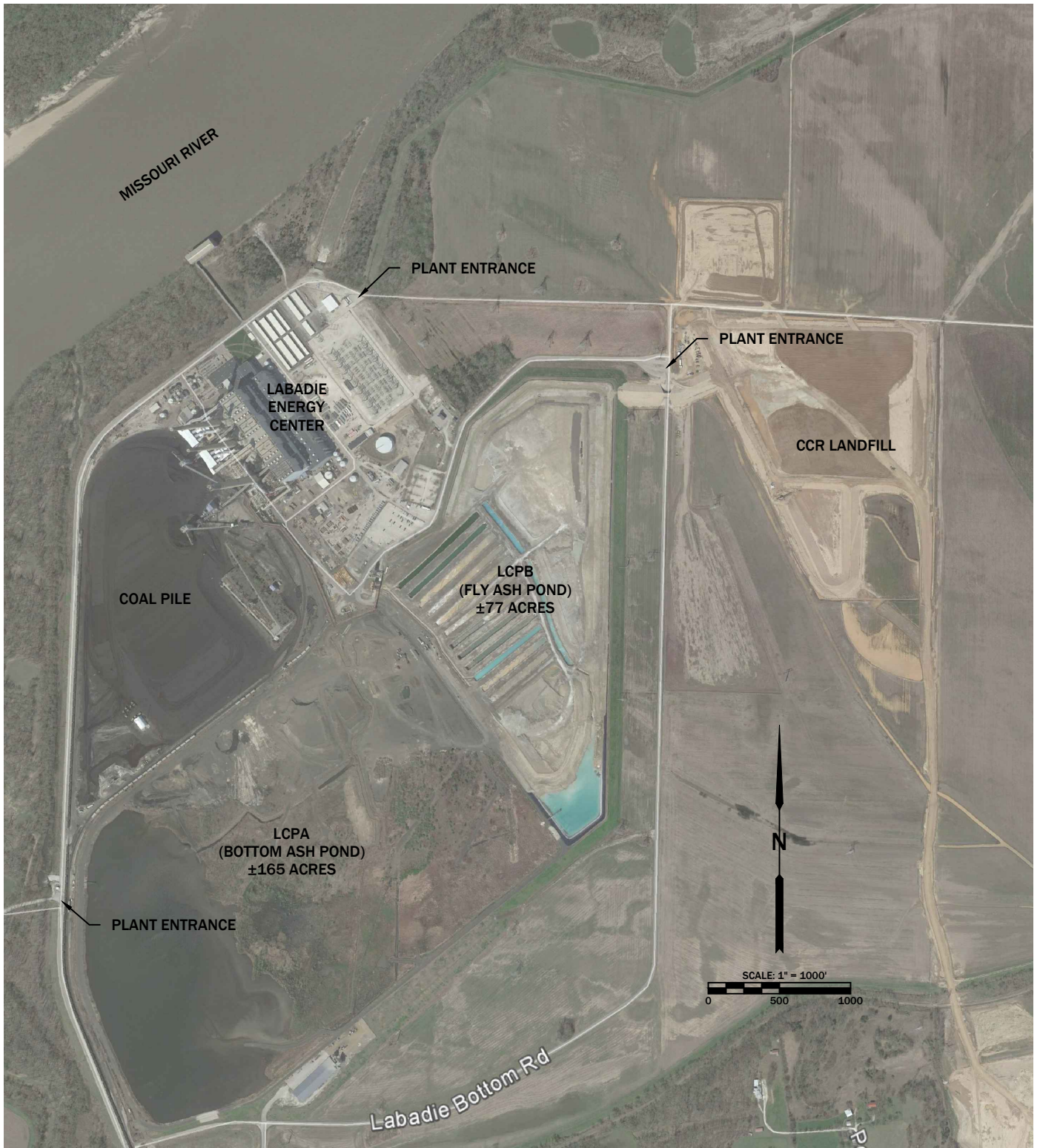
CFR §257 Section 257.102 includes other requirements that Ameren Missouri must comply with, as listed below:

- Section 257.102 (i) includes specific requirements related to *deed notations* following completion of closure.

# Appendix A

## Figures

M:\Share\CADD\Files\CONFIDENTIAL\SCHEFF-HARDIN - 2014\ASH POND PRELI GRADING\CLOSURE PLANS.dwg, FIGURE 2 - LABADIE ENERGY CENTER, 10/13/2016 11:42:11 AM



**CCR SURFACE IMPOUNDMENT CLOSURE  
LABADIE ENERGY CENTER**

**GREDELL Engineering Resources, Inc.**

**ENVIRONMENTAL ENGINEERING LAND - AIR - WATER**

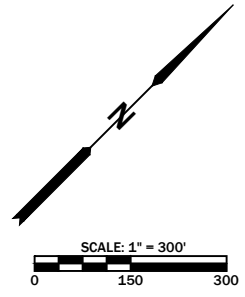
1505 East High Street  
Jefferson City, Missouri

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

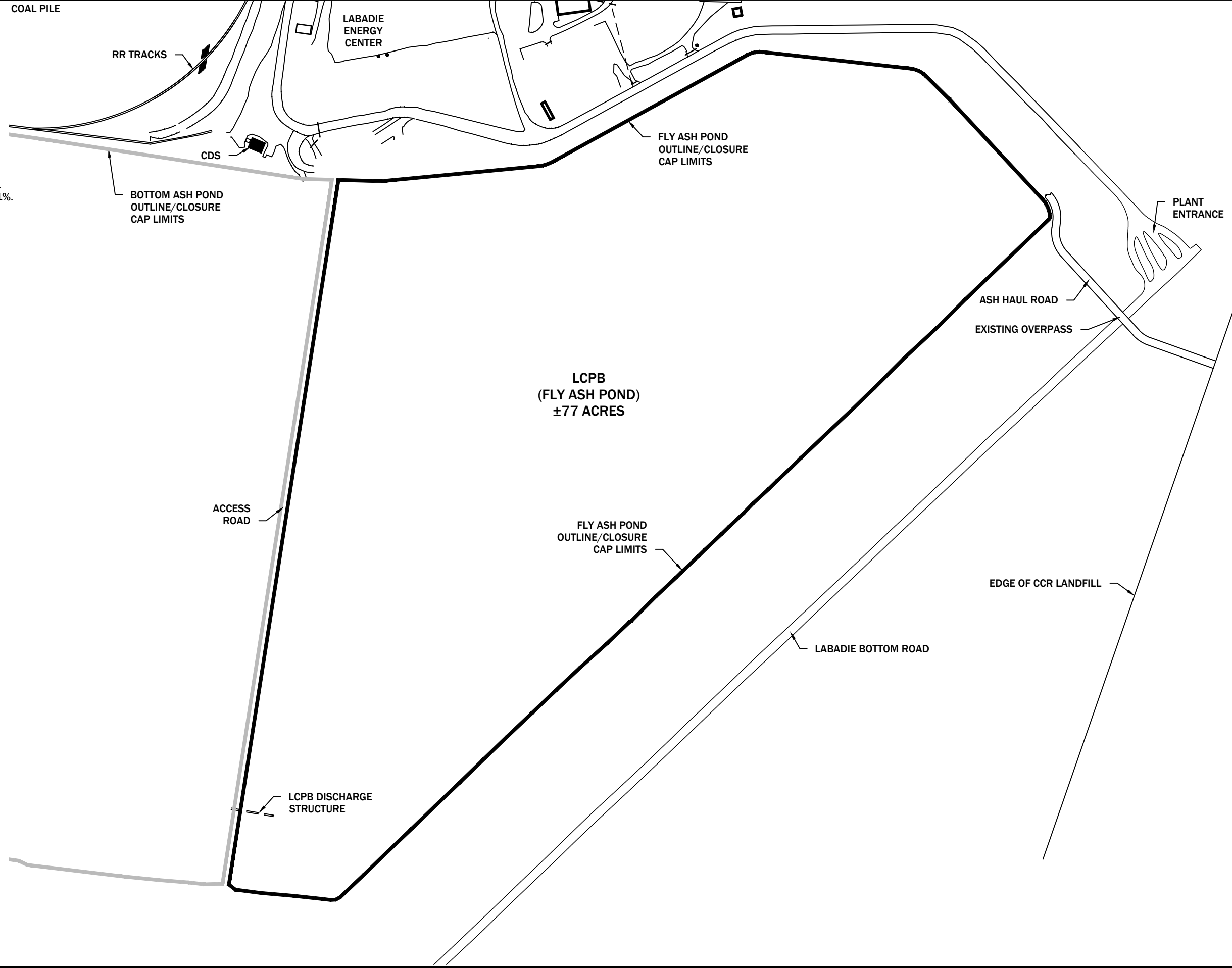
MO CORP. ENGINEERING LICENSE NO. E-2001001669-D

**FIGURE 2 - LABADIE ENERGY CENTER  
AERIAL VIEW**

DATE	SCALE	PROJECT NAME	REVISION
10/2016	AS NOTED	ASH POND PRELIM	
DRAWN AJK	APPROVED TRG	FILE NAME CLOSURE PLANS	SHEET # 1 OF 1



NOTE:  
CLOSURE CAP TO BE GRADED TO DRAIN.  
MINIMUM SLOPE OF GRADING WILL BE 1%.



<b>GREDELL Engineering Resources, Inc.</b>		<b>CCR SURFACE IMPOUNDMENT CLOSURE LABADIE ENERGY CENTER</b>		<b>FIGURE 3 LCPB (FLY ASH POND) SITE PLAN</b>		BY
ENVIRONMENTAL ENGINEERING LAND - AIR - WATER		DATE 10/2016		PROJECT NAME ASH POND PRELIM		DATE
1505 East High Street		SCALE AS NOTED		FILE NAME CLOSURE PLANS		#
Jefferson City, Missouri		DESIGNED TRG		DRAWN A/JK		REVISION DESCRIPTION
MO CORP. ENGINEERING LICENSE NO. E-2001001669D		CHECKED AR		PROJECT NUMBER		
Telephone: (573) 659-9078		APPROVED TRG		ASH POND PRELIM		
Facsimile: (573) 659-9079		DATE 10/2016		CLOSURE PLANS		
		AS NOTED		SHEET #		
				1 OF 1		

M:\573659\ENR\LABADIE\ASHPOND\CLOSURE\PLANS\DWG\FIGURE 3.FLY ASH.PLT, 10/15/2016 11:42:42 AM

# **Appendix B**

## Closure Schedule

**AMEREN MISSOURI - LABADIE ENERGY CENTER  
LCPB CCR SURFACE IMPOUNDMENT (FLY ASH POND)  
CLOSURE SCHEDULE**

ID	Task Name	Duration	Start	Finish	2017				2018				2019				2020				2021				2022				2023			
					Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3
1	<b>CCR Surface Impoundment Closure</b>	<b>1634 days</b>	<b>Mon 1/2/17</b>	<b>Thu 4/6/23</b>																												
2	<b>Prepare Construction Documents, Bid, and Contractor Selection</b>	<b>100 days</b>	<b>Mon 1/2/17</b>	<b>Fri 5/19/17</b>																												
3	Prepare Construction Documents and Estimate	2 mons	Mon 1/2/17	Fri 2/24/17																												
4	Bid Process (Ameren)	2 mons	Mon 2/27/17	Fri 4/21/17																												
5	Contractor Selection and Finalize Contract	4 wks	Mon 4/24/17	Fri 5/19/17																												
6	<b>Implement CCR Surface Impoundment Closure</b>	<b>1305 days</b>	<b>Mon 2/12/18</b>	<b>Fri 2/10/23</b>																												
7	Prepare Notification of Intent to Close CCR Surface Impoundment	23 days	Mon 2/12/18	Wed 3/14/18																												
8	<b>Dewatering &amp; Stabilization</b>	<b>563 days</b>	<b>Mon 3/19/18</b>	<b>Wed 5/13/20</b>																												
9	Dewatering Surface Water	14.15 mons	Mon 3/19/18	Wed 4/17/19																												
10	Grading and Stabilizing CCR	14 mons	Thu 4/18/19	Wed 5/13/20																												
11	Dewatering & Stabilization Complete	0 days	Wed 5/13/20	Wed 5/13/20																												
12	<b>Final Cover Construction</b>	<b>717 days</b>	<b>Thu 5/14/20</b>	<b>Fri 2/10/23</b>																												
13	Infiltration Layer	18 mons	Thu 5/14/20	Wed 9/29/21																												
14	Erosion Layer	17.85 mons	Thu 9/30/21	Fri 2/10/23																												
15	Final Cover Construction Complete	0 days	Fri 2/10/23	Fri 2/10/23																												
16	CCR Surface Impoundment Closure Complete	0 days	Fri 2/10/23	Fri 2/10/23																												
17	<b>CCR Surface Impoundment Regulatory Closure Documentation</b>	<b>40 days</b>	<b>Fri 2/10/23</b>	<b>Thu 4/6/23</b>																												
18	PE Certification that Closure is Complete (Federal)	2 wks	Fri 2/10/23	Thu 2/23/23																												
19	Prepare Notification of Closure of CCR Surface Impoundment (Federal)	30 days	Fri 2/10/23	Thu 3/23/23																												
20	Deed Notation (Federal)	2 wks	Fri 2/10/23	Thu 2/23/23																												
21	Notification of Deed Notation (Federal)	30 days	Fri 2/24/23	Thu 4/6/23																												
22	Regulatory Closure Documentation Complete	0 days	Thu 4/6/23	Thu 4/6/23																												