Meramec Energy Center
CCR Surface Impoundment MCPE
(Pond 489)
CCR Unit Closure Plan

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CCR Unit Closure Plan

Prepared for

Ameren Missouri
Project No. 90683
Ameren, Missouri

Revision 1
April 2018

Prepared by

Burns & McDonnell Engineering Company, Inc.
Kansas City, Missouri

INDEX AND CERTIFICATION

Ameren Missouri
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Report Index

Certification

I hereby certify, as a Professional Engineer in the state of Missouri, that the information in this document was assembled under my direct personal charge. This report is not intended or represented to be suitable for reuse by Ameren Missouri or others without specific verification or adaptation by the Engineer. I certify that this Closure Plan and the Final Cover System specified herein satisfy the requirements presented in 40 CFR §257.102(b).

04/11/18 5:58 PM

Scott A. Martin, P.E.
License Number 2010019572
License renewal date: December 31, 2018.
Pages or sheets covered by this seal: As noted above

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LIST OF ABBREVIATIONS

Abbreviation	Term/Phrase/Name
Ameren	Ameren Missouri
BMcD	Burns & McDonnell
CCR	Coal Combustion Residual
CCR Rule	EPA Coal Combustion Rule
CFR	Code of Federal Regulations
cm/sec	Centimeters per second
CQA	Construction Quality Assurance
CY	Cubic yard
EPA	Environmental Protection Agency
EPDM	Ethylene propylene diene monomer
HDPE	High-density polyethylene
HELP	Hydrologic Evaluation of Landfill Performance
LLDPE	Low-density polyethylene
MCPE	CCR Surface Impoundment MCPE or Pond 489
Meramec	Meramec Energy Center

1.0 INTRODUCTION

Ameren Missouri (Ameren) is subject to the CCR Rule and is required to develop a Closure Plan for CCR surface impoundments per 40 Code of Federal Regulations (CFR) §257.102. This document serves as Ameren's Closure Plan for the CCR Surface Impoundment MCPE (Pond 489) at the Meramec Energy Center (Meramec), which was affected by the August 5, 2016 CCR Rule revisions.

The Closure Plan is required to contain the following, as required in §257.102(b)(1):

- A description of the final cover system, methods for installing final cover system, and a discussion on how the final cover system is achieving compliance with the standards outlined in §257.102(d).
- An estimate of the maximum inventory of CCR material ever stored in the CCR Unit over its active life.
- An estimate of the largest area requiring a final cover as required by §257.102(d) at any time during the active life of the CCR Unit.
- A schedule for completing CCR Unit closure activities, including the anticipated year of closure and major milestones for permitting and construction activities.

2.0 CLOSURE PLAN

2.1 Facility and Surface Impoundment Description

Meramec is located in southeastern St. Louis County, Missouri and consists of four generating units (a site aerial figure is included as Appendix A). Units 1 and 2 are fired on natural gas (fuel switching from coal to natural gas was completed in April 2016), and Units 3 and 4 are fired on coal. CCR generated at the facility includes fly ash and bottom ash.

Surface Impoundment MCPE (Pond 489), referred to herein as MCPE, is located on the southwest side of the Meramec facility. MCPE contains an existing high density polyethylene (HDPE) geomembrane liner with a nominal 60-mil thickness; however, the liner system is not in compliance with the CCR Rule as it does not contain a compacted soil liner, or approved equivalent base liner below the geomembrane. MCPE has been classified as an unlined CCR surface impoundment.

2.1.1 CCR Inventory and Extent

MCPE has an approximate surface area of 25 acres, as measured within the perimeter dikes, which represents the largest area that would require a final cover. The estimated maximum inventory of CCR in MCPE is approximately 900,000 cubic yards (CY) of CCR material.

2.2 Closure Method

The CCR Rule allows for CCR Units to be closed by leaving CCR material in-place. MCPE is planned to be closed with CCR material in-place, and accordingly, will follow the closure performance standards referenced in 40 CFR §257.102(d). If the design or use changes in the future, this Closure Plan will be updated accordingly (see Section 3.0).

2.2.1 Drainage / Stabilization of CCR Material

Prior to installing the final cover system, Ameren will perform the following activities outlined in §257.102(d) of the CCR Rule:

- Eliminate free liquids by removing liquid wastes or solidifying the remaining wastes and waste residues.
- Stabilize remaining wastes sufficiently in order to support the final cover system.

Free liquids will be removed using constructed drainage channels and a pumping system, with excess water discharged under the current NPDES Permit. Free liquid removal will be performed throughout construction, as necessary, to manage surface water and storm water runoff. Prior to installing the final

cover system, CCR materials will be graded to promote drainage and compacted in a controlled manner to stabilize CCR to sufficiently support the final cover system.

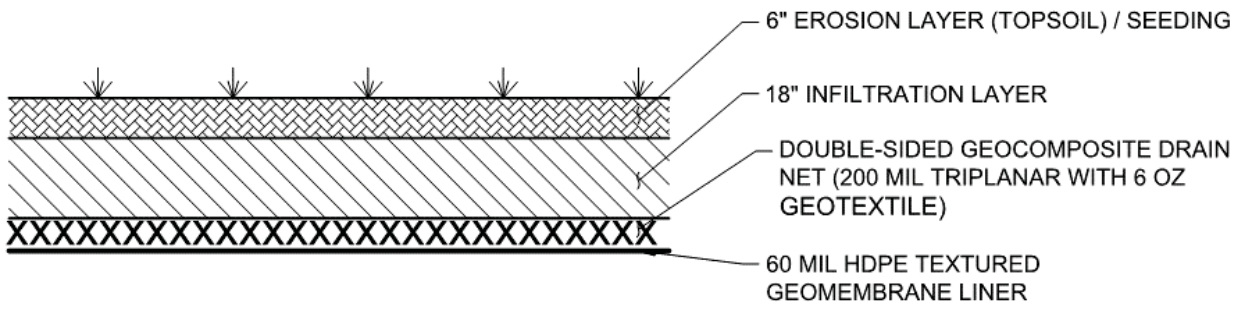
2.2.2 Final Cover System

The final cover system will be designed and constructed to meet the following criteria pursuant to §257.102(d)(3)(i):

- Have a permeability less than or equal to the permeability of any bottom liner system or natural subsoils present, or a permeability no greater than $1x10^{-5}$ centimeters per second (cm/sec), whichever is less.
- The infiltration of liquids through the closed CCR Unit must be minimized by the use of an infiltration layer that contains a minimum of 18 inches of earthen material.
- The erosion of the final cover system must be minimized by the use of an erosion layer that contains a minimum of six inches of earthen material that is capable of sustaining native plant growth.
- The disruption of the integrity of the final cover system must be minimized through a design that accommodates settling and subsidence.
- The owner or operator may select an alternative final cover system design, provided the alternative final cover system meets the above requirements.

MCPE will be capped and closed in-place as described herein, and in accordance with the requirements of the CCR Rule. MCPE will be closed using an alternative cover system, which will consist of (from bottom to top): a 60-mil high density polyethylene (HDPE) flexible geomembrane material, a geocomposite drainage layer, a nominally compacted 18-inch infiltration soil layer, and 6-inch erosion layer that is capable of sustaining native plant growth. A typical cross section of this alternative cover system is shown in Figure 2-1.

Figure 2-1: Final Cover System



A construction quality assurance (CQA) plan has been prepared, and the CQA program will be implemented during construction of the cover system.

2.2.2.1 Permeability and Infiltration

The federal minimum standard requires MCPE's cover system permeability to be less than or equal to that of the bottom liner, natural underlying subsoils, or $1x10^{-5}$ cm/sec, whichever is less.

The final cover system has an equivalent permeability to the existing liner system, and conforms to the closure requirements of the CCR Rule.

2.2.2.2 Geometry and Stormwater Management

The geometry and stormwater management controls of MCPE, following closure, will allow the CCR Unit to meet the following requirements as outlined in §257.102(d) of the CCR Rule:

- 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.
- Prevent future impoundment of water.
- Provide for slope stability to protect against sloughing or movement of the final cover system.

The closure system will be designed to provide adequate drainage during storm events. Intermediate swales will be utilized to limit the maximum overland flow distance, thereby minimizing ponded water, and limiting the infiltration of run-off.

2.2.2.3 Integrity of the Final Cover

Materials will be placed and compacted in a controlled manner to minimize post-fill installation settlement. Settlement would potentially be caused by consolidation of the CCR material, general fill material, or underlying natural subsoils due to the dynamic loads typically resulting from construction activities; consequently, this settlement is expected to be minimal following final cover installation activities. Maintenance will be conducted as necessary to maintain the integrity of the final cover, as outlined in the Post-Closure Plan for MCPE (separate document).

2.2.3 Final Cover Schedule

Closure activities commenced in 2017 as per the December 9, 2015 Notification of Intent to Close MCPE. The notification has been placed in the facility's CCR Operating Record, and is posted on Ameren's CCR public website.

2.2.3.1 Closure Completion

Closure for MCPE shall be completed within five years of commencing closure activities per the CCR Rule. The timeframe for completing closure of the CCR Unit may be extended if Ameren demonstrates that it is not feasible to complete closure of the CCR Unit within the required timeframe due to factors beyond the facility's control. A demonstration for an extension of the closure timeframe can be completed pursuant to §257.102(f)(2).

For the purpose of this Closure Plan, closure of MCPE is considered complete when the final cover system is installed. Per the closure schedule provided in Appendix B, the closure of MCPE was completed in less than five years.

Within 30 days of completion of closure of MCPE, Ameren will prepare a notification of closure and post it on the facility's CCR Operating Record and on Ameren's CCR public website. This notification shall include certification by a qualified professional engineer, registered in the State of Missouri, verifying that closure has been completed in accordance with this Closure Plan and the requirements of §257.102.

Following closure, Ameren will record a notation on the deed of the Meramec property, and within 30 days of the deed notation, Ameren will prepare a notification stating that the notation has been recorded per §257.102(i) and placed within the CCR Unit's Operating Record.

In accordance with §257.102(i), Ameren will record a notation on the deed to the property, following completion of closure. This notation is inform any potential future owner of the property of the previous use of the land, and that the land is restricted by post-closure care requirements.

3.0 REVISIONS AND AMENDMENTS

This initial MCPE Closure Plan shall be placed in the CCR Operating Record by April 17, 2018. The MCPE Closure Plan will be amended whenever there is a change in operation of the CCR unit that affects the current or planned closure operations. The Closure Plan will be amended 60 days prior to a planned change in operation, or within 60 days following an unplanned change in operation. If a written Closure Plan is revised after closure activities have commenced, the written Closure Plan will be amended no later than 30 days following the triggering event. The initial Closure Plan and any amendment will be certified by a qualified professional engineer in the State of Missouri for meeting the requirements of §257.102 of the CCR Rule. All amendments and revisions will be posted on the CCR public website within 30 days following placement in the facility's CCR Operating Record. A record of revisions made to this document is included in Section 4.0 of this document.

4.0 RECORD OF REVISIONS AND UPDATES

Revision Number	Date	Revisions Made	By Whom
0	4/27/17	Initial Closure Plan	Burns & McDonnell
1	4/11/18	Updated the closure schedule and associated narrative in Sections 2.2.3 and 2.2.3.1	Burns & McDonnell

APPENDIX A – SITE AERIAL FIGURE

NORTH

0 200' 400'

SCALE IN FEET

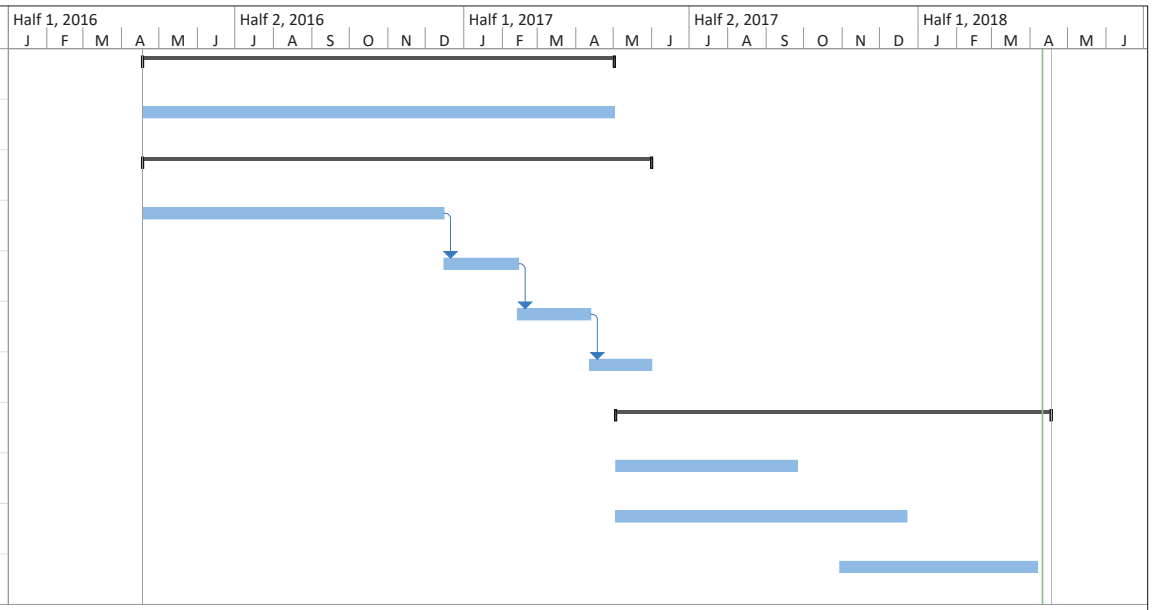
BURNS McDONNELL

FIGURE 1

AMEREN MISSOURI
SURFACE IMPOUNDMENT MCPE
SITE AERIAL

APPENDIX B – CLOSURE SCHEDULE

ID	Task Name	Start	Finish
1	**Permitting & Design Support**	**Mon 4/18/16**	**Mon 5/1/17**
2	Permitting and Design	Mon 4/18/16	Mon 5/1/17
3	**Preparation for Closure**	**Mon 4/18/16**	**Wed 5/31/17**
4	Design Documents Issued for Bid	Mon 4/18/16	Thu 12/15/16
5	Bid Period	Fri 12/16/16	Mon 2/13/17
6	Bid Evaluation	Mon 2/13/17	Wed 4/12/17
7	Contract Award	Wed 4/12/17	Wed 5/31/17
8	**Construction**	**Wed 5/3/17**	**Tue 4/17/18**
9	Remove Free Liquids	Wed 5/3/17	Mon 9/25/17
10	Grading CCR Material and Prepare Surface for Cover	Wed 5/3/17	Fri 12/22/17
11	Placement of Final Cover System	Mon 10/30/17	Fri 4/6/18



Project: MCPE Impoundment Closure

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

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