Meramec Energy Center
CCR Surface Impoundment MCPC
(Pond 496)
CCR Unit Closure Plan

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CCR Unit Closure Plan

Prepared for

Ameren Missouri
Project No. 90683
Ameren, Missouri

Revision 1
November 2016

Prepared by

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

INDEX AND CERTIFICATION

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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).

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Scott A. Martin, P.E.
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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 Published April 17, 2015
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
MCPC	CCR Surface Impoundment MCPC or Pond 496
Meramec	Meramec Energy Center

1.0 INTRODUCTION

On April 17, 2015, the Environmental Protection Agency (EPA) issued the final version of the federal Coal Combustion Residual Rule (CCR Rule) to regulate the disposal of coal combustion residual (CCR) materials generated by electric utilities and independent power producers.

Ameren Missouri (Ameren) is subject to the CCR Rule and is required to develop a Closure Plan for existing CCR surface impoundments per 40 Code of Federal Regulations (CFR) §257.102. This document serves as Ameren's Closure Plan for the existing CCR Surface Impoundment MCPC (Pond 496) at the Meramec Energy Center (Meramec). The Closure Plan is required to contain the following, as required in §257.102(b)(1):

- A description of how the CCR Unit will be closed.
  - For in-place closure: A description of the final cover system, methods for installing final cover system, and methods for 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.

Additionally, the CCR Unit will be subject to the post-closure care requirements contained in §257.104, and a Post-Closure Plan has been prepared as a separate, stand-alone document.

2.0 CLOSURE PLAN

2.1 Facility and Surface Impoundment Description

Meramec is located in southeast 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 MCPC (Pond 496), referred to herein as MCPC, is located on the northeast side of the Meramec facility. As-built construction documents are not available to document that a liner system was installed; therefore, MCPC has been classified as an existing, unlined CCR surface impoundment.

2.1.1 CCR Inventory and Extent

MCPC has an approximate surface area of 10 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 MCPC over its active life is approximately 274,000 cubic yards (CY) of CCR material. Ameren periodically removes CCR from MCPC for beneficial use (primarily used for cement kiln raw feed).

2.2 Closure Method

The CCR Rule allows for CCR Units to be closed through removal of CCR or by leaving CCR material in-place. MCPC 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, 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. Once stabilized, the CCR will be compacted and graded to promote drainage.

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):

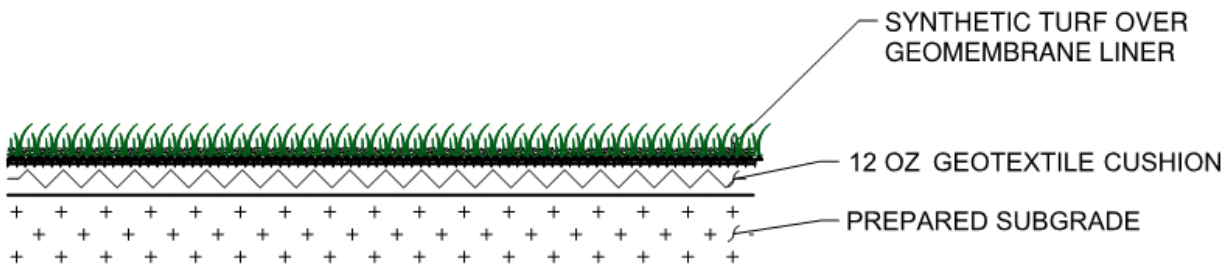
- Have a permeability less than or equal to the permeability of any bottom liner system or natural subsoils present, or a permeability no greater than $1x10^{-5}$ centimeters per second (cm/sec), whichever is less.
- The infiltration of liquids through the closed CCR Unit must be minimized by the use 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.

MCPC will be capped and closed in-place as described herein, and in accordance with the requirements of the CCR Rule. MCPC will be closed using an alternative cover system, which will consist of (from bottom to top):

- Geotextile cushion (to protect the overlying geomembrane),
- 40-mil (minimum) linear low-density polyethylene (LLDPE), high-density polyethylene (HDPE), or ethylene propylene diene monomer (EPDM) geomembrane,
- Synthetic turf.

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 will be compiled prior to the commencement of construction, 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 MCPC'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. As discussed above, MCPC construction documents are not available. MCPC was reportedly constructed by excavating soils within MCPC (silts and clays), and the excavated materials were utilized for pond berms. Site specific permeability information of the pond base and/or natural subsoils is not available at this time.

The proposed cover system will feature a geomembrane component which has a permeability of 2.0×10^{-12} cm/sec, which represents the maximum permeability value of the potential geomembrane material types planned to be utilized for closure[1].The alternative final cover system uses a geomembrane component to achieve the minimum permeability requirements of the CCR Rule, rather than relying on the permeability of an 18-inch infiltration layer.

2.2.2.2 Geometry and Stormwater Management

The geometry and stormwater management controls of MCPC 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, as well as limiting the infiltration of run-off.

2.2.2.3 Integrity of the Final Cover

Settling and subsidence of the final cover system is expected to be minimal. Settlement would potentially be caused by consolidation of the CCR material, general fill material, or underlying natural subsoils due

[1] Per the Hydrologic Evaluation of Landfill Performance (HELP) Model User's Guide for Version 3 - EPA/600/R-94/168a.

to the dynamic loads typically resulting from construction activities; consequently, this settlement is expected to be minimal following final cover installation activities. General fill will be installed in a controlled manner to minimize post-fill installation settlement. Maintenance will be conducted as necessary to maintain the integrity of the final cover, as outlined in the Post-Closure Plan for MCPC (separate document).

2.2.3 Final Cover Schedule

According to §257.101 of the CCR Rule, closure of the MCPC will commence no later than six months following the date on which a closure event is triggered. For the purposes of this Plan, closure of MCPC is assumed to have commenced when Ameren has ceased placing CCR material into MCPC and has completed any of the following actions or activities:

- Taken any steps necessary to implement the written Closure Plan.
- Submitted a completed application for any required state or agency permit or permit modification.
- Taken any steps necessary to comply with any state or other agency standards that are a prerequisite, or are otherwise applicable, to initiating or completing the closure of a CCR Unit.

In the event that closure of MCPC is required due to a location restriction or groundwater impacts, but not a safety factor assessment, the CCR unit may continue to receive CCR material beyond the six-month maximum duration, provided that MCPC satisfies the criteria specified §257.103(a) or §257.103(b).

No later than the date Ameren initiates closure of MCPC, a Notification of Intent to Close the CCR Unit will be prepared. The notification is considered completed when it has been placed in the facility's CCR Operating Record. The notification will then be posted on Ameren's CCR public website within 30 days.

2.2.3.1 Closure Completion

Closure for MCPC 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 shall be completed pursuant to §257.102(f)(2).

For the purpose of this Closure Plan, closure of MCPC is considered complete when the final cover system is installed and applicable construction completion documentation is finalized. Based on the closure schedule provided in Appendix B, it is estimated that the closure of MCPC will be completed in less than five years. The estimated closure year is 2026.

Within 30 days of completion of closure of MCPC, 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.

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

The MCPC 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	10/13/2016	Initial Closure Plan	Burns & McDonnell
1	11/14/2016	Revisions to cover page to use Ameren's standard cover page, and Section 2.2.3.1 to include estimated year of MCPC closure	Burns & McDonnell

APPENDIX A – SITE AERIAL FIGURE

NORTH

0 150' 300'

SCALE IN FEET

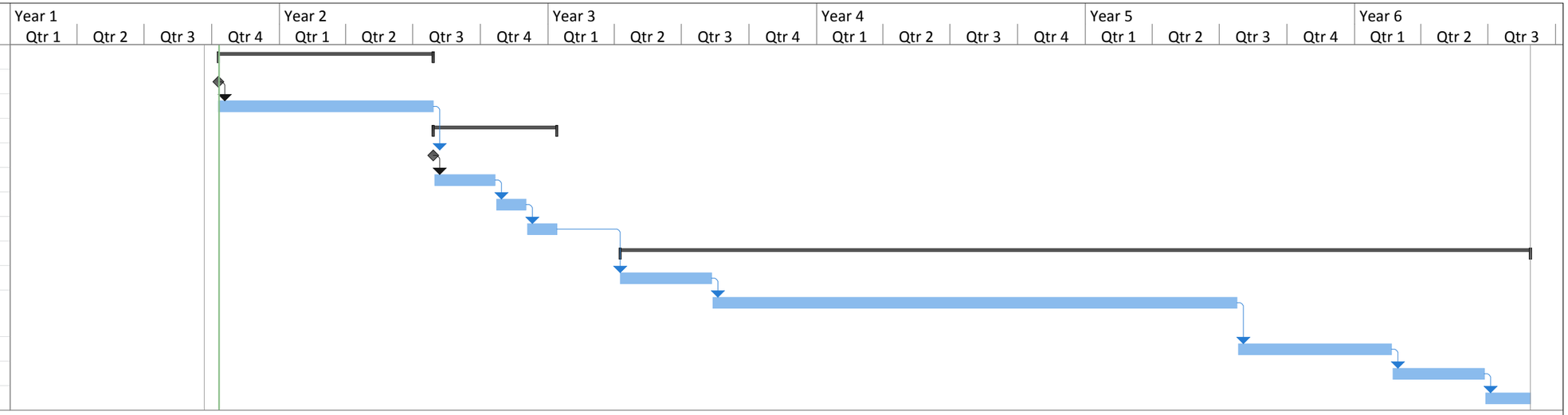
BURNS McDONNELL

Figure 1

AMEREN MISSOURI
SURFACE IMPOUNDMENT MCPC
SITE AERIAL

APPENDIX B – CLOSURE SCHEDULE

ID	Task Name
1	**Permitting & Design Support**
2	Closure Trigger
3	Permitting and Design
4	**Preparation for Closure**
5	Design Documents Issued for Bid
6	Bid Period
7	Bid Evaluation
8	Contract Award
9	**Construction**
10	Dewater and Unwater CCR Material
11	Grading CCR Material and Prepare Surface for Cover
12	Placement of Alternative Cover System
13	Topsoil and Seeding
14	Site Cleanup and Demobilization



Project: MCPC 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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