



PowerSOUTH
ENERGY COOPERATIVE

Charles R. Lowman
Power Plant
Leroy, AL



Closure and Post-Closure Care Plan Scrubber Waste Pond

Issued October 2016



CDG Engineers and Associates, Inc.
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Andalusia, AL 36421
| cdge.com



PowerSouth
ENERGY COOPERATIVE

REPORT

**Closure and Post-Closure Care Plan
Scrubber Waste Pond
Charles R. Lowman Power Plant**

October 2016



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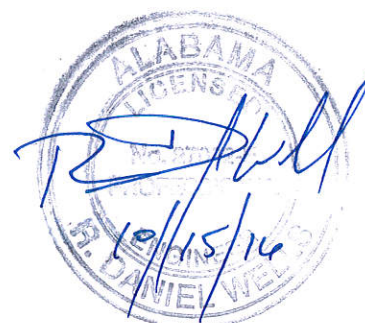


TABLE OF CONTENTS

1.0 PROJECT DESCRIPTION.....	2
2.0 DESCRIPTION OF FINAL COVER SYSTEM	2
2.1 Final Cover System Design	2
2.2 Procedures for Installation	3
3.0 STABILIZATION OF REMAINING CCR	3
4.0 FINAL COVER SYSTEM PERFORMANCE STANDARDS	3
4.1 Infiltration and Run-off	3
4.2 Water/Sediment/Surry Impoundment.....	4
4.3 Slope Stability	4
5.0 PROJECT SCHEDULE	4
6.0 POST-CLOSURE PLAN	4
6.1 Maintenance and Monitoring Activities	4
6.1.1 Final Cover Maintenance	4
6.1.2 Facility Maintenance	5
6.1.3 Maintenance of the Groundwater Monitoring System.....	5
6.2 Contact Information	5
6.3 Property Use during Post-Closure	5

APPENDIXES

Figure 1 – Scrubber Waste Pond Location Map

Figure 2 – Aerial Impoundment Map

Figure 3 – Scrubber Waste Pond Final Grading and Stormwater Control Plan

1.0 PROJECT DESCRIPTION

PowerSouth Energy Cooperative (PowerSouth) requested CDG Engineers and Associates, Inc. (CDG) to complete a Closure and Post-Closure Care Plan for the CCR Ponds at the Charles R. Lowman Power Plant as required by 40 CFR 257. This document describes the closure and post-closure care plan for the Scrubber Waste Bottom Ash Pond located at the Charles R. Lowman Power Plant, Leroy, Alabama.

The Scrubber Waste Pond is currently used as a settling pond for CCR wastes containing flue gas desulfurization, and other plant wastes and is approximately 33.93 acres. The maximum CCR inventory of the Scrubber Waste Pond is 1,040,000 cubic yards.

Following the last receipt of CCR waste, PowerSouth will initiate closure of the Pond as outlined in this report. It is expected that the Closure Plan will be amended at that time to address current site conditions and to develop detailed construction plans and specifications. Closure of the pond will generally consist of the follow activities:

1. Removal of free water from within the impoundments,
2. De-watering of interstitial water contained within the remaining CCR waste,
3. Grading of stabilized CCR waste mass to promote positive drainage, and
4. Installation of a Final Cover System and permanent Stormwater Control Systems

2.0 DESCRIPTION OF FINAL COVER SYSTEM

2.1 Final Cover System Design

As required by 40 CFR 257.102(b)(iii), the final cover system of the impoundment must meet, at a minimum, the following requirements:

- Have a permeability of the final cover system which is less than or equal to the permeability of the impoundment's bottom liner system or natural subsoils present, or a permeability no greater than 1×10^{-5} cm/sec, whichever is less.
- Minimize infiltration of liquids through the closed CCR unit by the use of an infiltration layer that contains a minimum of 18 inches of earthen material.
- Minimize erosion of the final cover system 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.
- Minimize disruption of the integrity of the final cover system through a design that accommodates settling and subsidence.

As allowed in in 257.102(d)(3)(ii) the Owner may select an alternate final cover system design, provided the alternative final cover system is designed and constructed to meet the criteria established in the Rule. It is anticipated that, at the time of closure, the Scrubber Waste Bottom Ash Pond will be closed in place utilizing an equivalent final cover system design, per 40 CFR 102(d)(3)(ii), consisting of a composite soil-geosynthetic final cover system which consists of (from bottom-up):

- A 12" Clay Infiltration Layer with a permeability less than or equal to 1×10^{-5} cm/sec;
- A 60-mil high density polyethylene (HDPE) flexible membrane liner;
- A bi-axial geocomposite drainage net;
- A 12" Drainage Layer consisting of naturally present soils; and,

- A 6" Erosion Layer consisting of topsoil to promote vegetative growth.

2.2 Procedures for Installation

Below is a general description of major construction tasks associated with the installation of the final cover system per section 40 CFR 257.102(b)(iii).

1. *Stabilization of Remaining CCR* - Prior to final cover system installation, the closure Contractor will dewater the in-place CCR material to stabilize the CCR waste mass. Section 3.0 below describes the de-watering plan in more detail.
2. *Landform grading of CCR Waste* – Following stabilization of the waste mass, the closure Contractor will perform grading within the stabilized zone to achieve design grades. Grading of the waste mass will be conducted to establish slope inclinations which minimize the effects of settlement and subsidence and promote stormwater run-off.
3. *Installation of Final Cover System* – Following the landform grading of CCR waste, the closure Contractor will install the soil, geosynthetics, and establish permanent vegetation.

3.0 STABILIZATION OF REMAINING CCR

Prior to installation of the final cover system, the following standards must be achieved per 40 CFR 257.102(d)(2)

- (i) "Free liquids must be eliminated by removing liquid waste or solidifying the remaining wastes and waste residues"
- (ii) "Remaining wastes must be stabilized sufficient to support the final cover system"

The facility will dewater the impoundments in a two-stage manner. The first stage will consist of removal of "free" liquids within the impoundment using suction lifts pumps, or similar. Following the removal of "free" liquids, a de-watering Contractor will remove interstitial water in the upper zones as necessary to achieve stability. It is anticipated that enhanced gravity, vacuum extraction, and other similar mechanical dewatering methods will be implemented during the second stage of de-watering efforts.

The final closure of the impoundment will be designed and constructed in a manner to achieve long-term post-closure stability of the remaining CCR. Stability during closure will be accomplished through the implementation of a Ground Control Plan combined with construction monitoring of the CCR waste mass. The final closure of the impoundment will be designed to meet the post-closure stability requirements outlined in the CCR Rule including the minimum factors of safety as stated in 40 CFR 257.73(e)(1)(i) through (e)(1)(iv).

4.0 FINAL COVER SYSTEM PERFORMANCE STANDARDS

4.1 Infiltration and Run-off

As required by 40 CFR 257.102(d)(i) the final cover system will "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".

This standard is achieved by construction of the final cap per Section 2.0. Through landform grading, the CCR waste mass will be sloped at a sufficient grade to minimize infiltration of stormwater and to direct rainfall to downstream hydraulic structures via stormwater diversion ditches. A conceptual site

design including proposed slope configurations and stormwater management systems is provided in Appendix A.

4.2 Water/Sediment/Slurry Impoundment

As required by 40 CFR 257.102(d) (ii) the final cover system will “preclude the probability of future impoundment of water, sediment, or slurry”.

The facility will be closed, with no new CCR or slurry introduced into the impoundments. As a step to be taken during final closure, the Contractor will remove free water and de-water the CCR waste mass. Following stabilization of the upper zones, the CCR waste mass will be graded in a manner to prevent ponding, and convey stormwater at a rate and volume to prevent impoundment of rainwater above the final cover system.

4.3 Slope Stability

As required by 40 CFR 257.102(d)(iii) the final cover system will “Include measures that provide for major slope stability to prevent the sloughing or movement of the final cover system during the closure and post-closure care period”.

During final closure, the CCR waste mass will be de-watered using a variety of techniques to improve the stability of the materials and its ability to support construction equipment. Following stabilization, the remaining CCR material will be graded to eliminate any overly steep slopes. Slopes will generally be limited to flatter than a 4(H) to 1(V) slope inclination, with a minimum 1% slope to minimize settling and subsidence.

5.0 PROJECT SCHEDULE

As required by 40 CFR 257.102(b)(vi), “a project schedule is provided below that outlines the necessary steps to closed the CCR Unit and the estimated time frames associated with each step.”

Table 6.1 – Project Schedule

Task	Timeframe
Geotechnical Investigation, Development of Construction Plans	12 months
Dewatering and Stabilization of Material	20 months
Landform Grading of Waste Mass	6 months
Final Cover System Installation	10 months
Total Project Time	48 months

6.0 POST-CLOSURE PLAN

6.1 Maintenance and Monitoring Activities

6.1.1 Final Cover Maintenance

The Facility will maintain the integrity and effectiveness of the final cover system. This includes making repairs to the final cover as necessary to correct the effects of settlement, subsidence, and erosion.

The final cover system will be inspected on a monthly basis and after major storm events in accordance with the Plant's CCR Impoundment Inspection Plan to identify problems with erosion, cracks, ponding, settlement, and other deficiencies such as tears or punctures to the flexible membrane liner.

Eroded areas shall be filled with suitable soil cover, compacted, graded, and revegetated. Areas that experience settlement will be repaired, filled, and graded. Following grading activities a supplemental geosynthetic cap will be placed over the additional fill. Extensive surface cracks will be identified and corrected to prevent the infiltration of surface water.

In order to allow for inspections at the frequency identified in the Facility's CCR Impoundment Inspection Plan. The vegetative layer should be mowed at least semi-annually to minimize the growth of deep rooted vegetation. The voluntary growth of any trees should be prevented on the final cover. An inspection immediately following mowing will be conducted to identify the shallow erosion or the settlement of the cover. Erosion problems that are identified will be repaired to prevent damage to the final cover system.

6.1.2 Facility Maintenance

The facility will also inspect all groundwater monitoring wells, access control structures and stormwater control structures including concrete inlets, storm sewers, culverts, berms, ditches, and terraces to insure the integrity of the surface water control system remains intact. Any damage due to settlement, erosion, or caused by maintenance equipment shall be promptly repaired.

6.1.3 Maintenance of the Groundwater Monitoring System

During the post-closure care period, the Facility will maintain the groundwater monitoring system and perform monitoring activities in accordance with the Groundwater Monitoring and Corrective Action requirements as outlined in 40 CFR parts 257.90 through 257.98.

6.2 Contact Information

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Phone Number: 251-246-8126
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6.3 Property Use during Post-Closure

Post-closure land uses will be limited to purposes that rely on the use of short rooted grasses and those that will not disturb the integrity of the final cover system.

Appendix A

Figure 1- Scrubber Waste Pond Location Map

Figure 2 –Aerial Map of Impoundments

Figure 3 – Scrubber Waste Pond Final Grading and Stormwater Control Plan

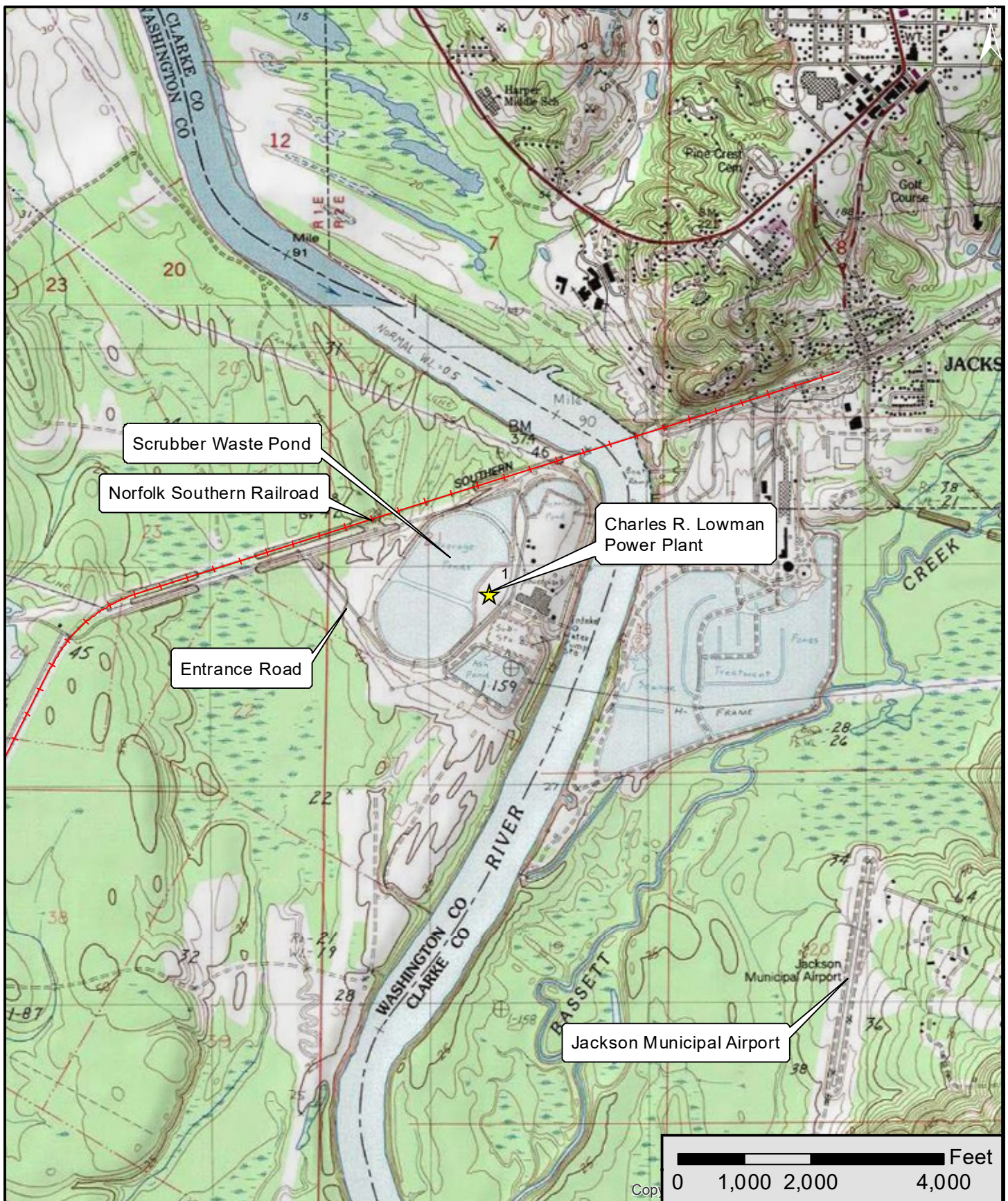


Figure 1 - Scrubber Waste Pond Location Map

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Figure 2 - Aerial Map of Impoundments
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Figure 3 -Scrubber Waste Pond
Final Grading and Stormwater Control Plan
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Sheet No.

Fig. 3

Drawn By: JRA

Checked by: RDW

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