



CLOSURE PLAN

**St. Johns River Power Park
Byproduct Storage Area B
Phase I Development**

CLOSURE PLAN

Submitted to: St. Johns River Power Park
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Jacksonville, FL 32226 USA

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PROFESSIONAL ENGINEER CERTIFICATION

I, Samuel F. Stafford, being a registered Professional Engineer in the state of Florida, do hereby certify to the best of my knowledge, information, and belief, that the information contained in this Closure Plan dated October 11, 2016 meets the requirements of 40 CFR §257.102, is true and correct, and had been prepared in accordance with recognized and generally accepted good engineering practices.

S.F. Stafford
Samuel F. Stafford, P.E. 78648
Florida Professional Engineer No. 78648
Certificate of Authorization No. 1670
STATE OF
11 OCT 2016
Date



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1.0 INTRODUCTION

This Closure Plan was prepared for the Phase I development of Byproduct Storage Area B (Area B Phase I) at the St. Johns River Power Park (SJRPP). This plan was prepared in accordance with Title 40, Part 257, Subpart D of the Federal Regulations. Specifically, this plan was prepared to meet the requirements of §257.102(b) for closure of coal combustion residual (CCR) landfills. The information contained in this plan will be used to assist SJRPP in the closure of the Area B Phase I.

2.0 CLOSURE PLAN

2.1 Overview of Closure Approach

Area B Phase I will be closed leaving CCR in place and installing a final cover system, as required by §257.102(a). Closure will be conducted in a phased approach. Area B Phase I will be closed in accordance with the requirements of §257.102 and within the timeframes as stated in §257.102(e) and (f). The final cover system for Area B Phase I is designed to minimize the need for long term maintenance and to control the post-closure release of contaminants. Closure activities may be revised as appropriate for materials, specifications, technology advances or changes in regulations. Closure will be conducted in accordance with this Closure Plan, the Phase I Operations Plan, and the facility's Conditions of Certification.

The steps necessary to complete closure of Area B Phase I are as follows:

- Determine the area to receive final cover;
- Prepare construction contract documents and secure contractor;
- Secure independent professional engineer to provide construction quality assurance and closure certification;
- Prepare notification of intent to close the CCR unit and place in operating record as required by §257.102(g);
- Secure materials necessary for final cover system construction;
- Construct final cover systems; and
- Complete construction certification and notification of closure and place in operating record.

2.2 Estimated Maximum Inventory of CCR

The current Area B Phase I design provided approximately 3 million cubic yards of CCR storage capacity.

2.3 Largest Area Requiring Cover System

The Area B Phase I has total footprint of 35 acres that would require closure under this plan.



2.4 Final Cover System

The final cover system for Area B Phase I consists of separate designs for the side-slopes and top deck area in accordance with the Operations Plan. The final cover system has been designed to meet the requirement of §257.102(d)(3)(i), namely, to reduce infiltration, resist erosion, prevent contact water runoff, promote controlled drainage (limit impoundment of water) and minimize the need for future maintenance: The permeability of the final cover system will be no greater than 1×10^{-5} centimeters per second (cm/sec) since Area B Phase I is an unlined facility.

Minimal, if any, settlement is expected given (1) the type of materials placed in Area B, (2) the method of fill placement, and (3) the non-decomposable nature of the CCR materials. The final cover systems are expected to accommodate the minimal differential settlement that may occur in the waste during the post closure care period.

2.4.1 Performance Standard

Closure of the Area B Phase I will be conducted in a manner that minimizes the need for further maintenance and controls, minimizes, to the extent feasible, the post-closure escape of uncontrolled leachate, surface runoff, or waste decomposition products to the groundwater, surface water, or the atmosphere.

The final cover system consisting of a vegetative support layer with run-on and run-off controls will minimize the need for post-closure maintenance. The final slopes of the landfill will promote runoff. On side-slopes, 10-foot wide benches (backwardly inclined) will be constructed at approximate 20-foot vertical intervals. These bench ditches will convey runoff to downslope conveyance pipes. The top deck area will be graded to prevent ponding at a slope of approximately 2 percent towards the edges and a rim ditch that will convey runoff to downslope pipes. An adequate stand of vegetation will be established, which along with the benches and stormwater conveyance features, will minimize erosion of the final cover system.

A low-permeability final cover system will be constructed and maintained that minimizes the infiltration of liquids into the closed CCR unit. The permeability of the final cover systems will be less than the natural subsoil present and no greater than 1×10^{-5} cm/sec.

2.4.2 Side-Slope Final Cover

The side-slope final cover system will consist of the following from top to bottom:

- 6-inch vegetative support layer (erosion layer);
- 18-inch infiltration layer; and
- Byproduct (CCR materials).

The 18-inch thick infiltration layer will consist of earthen material that has a hydraulic conductivity of no greater than 1×10^{-5} cm/sec. The earthen material used for the infiltration layer will be free of rocks, clods,



debris, cobbles, rubbish, and roots that may promote preferential pathways thereby decreasing the hydraulic conductivity of the material. If locally available soils do not meet the hydraulic conductivity requirement, soil amendments (i.e. bentonite, lime, cement) may be mixed with local soils to meet the hydraulic conductivity requirements. The upper 6 inches of the final cover system will consist of soil which can support a healthy stand of grass to minimize erosion. The surface of the side-slope final cover system will be vegetated by installation of sod.

2.4.3 Top Deck Final Cover

The top deck final cover system will consist of the following from top to bottom:

- 6-inch vegetative support layer (erosion layer);
- 18-inch protective cover soil layer;
- Geomembrane barrier layer; and
- Byproduct (CCR materials).

The geomembrane barrier layer will consist of 40-mil thick liner low density polyethylene liner. The protective cover soil will consist of locally available earthen materials and will be free of rocks, clods, debris, and other deleterious materials which could damage the geomembrane. The upper 6 inches of the final cover system will consist of soil which can support a healthy stand of grass to minimize erosion. The surface of the top deck final cover system will be vegetated by installation of sod or seeded where slopes are less than 10 percent.

2.4.4 Stability

Area B Phase I will be closed in a manner that will provide adequate slope stability to prevent the sloughing or movement of the final cover system. The internal and interface friction angle of all the components must be greater than the slope angle to maintain stable final cover slopes.

Side-slopes are designed at a maximum slope of 3H:1V; therefore, only materials with friction angles greater than 26.6° will be used in order to provide a factor of safety of 1.5. To ensure the stability of the vegetative support layer in the final cover system, adequate drainage must be provided to prevent the soil from becoming saturated and subject to seepage forces. Global slope stability calculations are provided in the Hydrogeological and Geotechnical Site Evaluation (Golder, 2007).

2.4.5 Closure Time Frame

Construction of the final cover system will be completed within 180 days following the start of closure activities, as required by §257.102(f)(1)(i), unless an extension demonstration is completed in accordance with §257.102(f)(2).



2.5 Schedule

In accordance with §257.102(e), Area B Phase I closure activities will be initiated within 30 days after the final known receipt of CCR or removal of CCR for beneficial use. If Area B Phase I has remaining capacity and may receive or reclaim additional CCR materials sometime in the future, closure activities will be initiated no later than two years after the final receipt or removal of CCR. The final cover system will be completed within six months following the beginning of closure construction or by an approved deadline extension in accordance with §257.102(f).

No later than the date on which closure is initiated, SJRPP will prepare a notification of intent to close the unit in accordance with §257.102(g). This notification will include a certification by a qualified professional engineer that the final cover design meets the requirements of §257.102. This notification will be placed in the facility's operating record and the appropriate regulatory agency (Florida Department of Environmental Protection (FDEP)) will be notified.

Within 30 days of closure construction completion, SJRPP will prepare a notification of closure of the CCR unit and place it in the facility's operating record. The appropriate regulatory agency (FDEP) will also be notified in accordance with §257.106(i). The closure notification will include a closure construction certification by a qualified professional engineer in accordance with §257.102(f)(3).

Following completion of closure construction, SJRPP will record a notation on the deed of the property in accordance with §257.102(i) identifying that the land has been used as a CCR unit and its use is restricted under the Post-Closure Plan and post-closure care requirements. Within 30 days of recording the notation, SJRPP will prepare and place in the facility's operating record a notification stating that the notation has been recorded and notify the appropriate regulatory agency (FDEP).

An expected schedule for closure activities is as follows:

<u>Time</u>	<u>Activity</u>
Prior to last receipt or reclamation of CCRs	Permitting (if necessary), detailed design, construction documents, and contractor selection
Initial 30 days after last receipt of CCRs	Mobilization of contractor
Months 0-3 after beginning construction	Grading and construction of side-slope benches
Months 2-5 after beginning construction	Installation of geomembrane (top deck), Placement of infiltration layer (side-slope), placement of protective cover soil (top deck), placement of top soil and installation of final cover stormwater management features
Months 5-6	Placement of top soil and sod (or seed) to establish vegetative cover



3.0 CLOSING

This Closure Plan was prepared to meet the requirements of §257.102. If operational changes or unanticipated events that would necessitate a revision to the closure plan, this Closure Plan will be amended in accordance with §257.102(b)(3).

GOLDER ASSOCIATES INC.

A handwritten signature in blue ink, appearing to read "SFS".

Samuel F. Stafford, PE
Senior Project Engineer

A handwritten signature in blue ink, appearing to read "Gregory M. Powell".

Gregory M. Powell, PhD, PE
Practice Leader and Principal

SFS/GMP/ams

FN: G:\Projects\15-15-26356\Task 0700 Closure Plan\Final\SJRPP CCR Closure Plan.docx