WorleyParsons
resources & energy

EcoNomics

SANTEE COOPER
CROSS GENERATING STATION

Existing Bottom Ash Pond Closure Plan Narrative

Document: CROSS-0-LI-044-0011

Revision: 0

Date: 14 Oct 2016

WorleyParsons
2675 Morgantown Rd.
Reading, PA 19607
USA
Telephone: +1 610 855 2000
Facsimile: +1 610 855 2001
www.worleyparsons.com

© Copyright 2016 WorleyParsons

CROSS GENERATING STATION
EXISTING BOTTOM ASH POND CLOSURE PLAN NARRATIVE

Disclaimer

This Document has been prepared on behalf of and for the exclusive use of Santee Cooper, and is subject to and issued in accordance with the agreement between Santee Cooper and WorleyParsons Group, Inc. WorleyParsons Group, Inc. accepts no liability or responsibility whatsoever for it in respect of any use of or reliance upon this Document by any third party.

Copying this Document without the permission of Santee Cooper or WorleyParsons Group, Inc. is not permitted.

REV	DESCRIPTION	ORIGINATOR	REVIEWER	APPROVER	DATE
0	Issued for Use	Digitally signed by: Fletcher Wood Date: 2016.10.12 17:15:23 -06'00' F Wood	ben gordon@worleyparsons.com B Gordon	Digitally signed by: Fletcher Wood Date: 2016.10.14 11:20:09 -06'00' F Wood	14 Oct 2016

CONTENTS

1. INTRODUCTION 1
2. DISCUSSION 2
   2.1 Narrative of Closure by Removal 2
   2.2 Removal and Decontamination Procedures 2
   2.3 Final Cover System (NA) 4
   2.4 Maximum Inventory of CCR 4
   2.5 Largest Area Requiring Final Cover (NA) 5
   2.6 Schedule for Closure by Removal 5
3. CONCLUSIONS 7
4. CERTIFICATION 8
5. REFERENCES 9

SOUTH CAROLINA
WORLEY PARSONS GROUP INC.
No. 1505
CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA
LICENSED PROFESSIONAL ENGINEER
No. 24767
FLETCHER M. WOOD

14-OCT-2016

1. INTRODUCTION

The United States Environmental Protection Agency (EPA) promulgated new regulations regarding Coal Combustion Residuals (CCRs). These regulations (40 CFR Part 257) were published in the Federal Register on April 17, 2015. One of the requirements (§257.102(b)(1)) of the new regulations is to prepare a written closure plan that describes the steps necessary to close the CCR unit at any point during the active life of the CCR unit consistent with recognized and generally accepted good engineering practices. This written closure plan must be placed in the facility's operating record no later than October 17, 2016, as required by §257.102(b)(2).

This report presents the written closure plan for the existing Bottom Ash Pond at Cross Generating Station in Pineville, South Carolina.

2. DISCUSSION

Title 40 CFR §257.102(b)(1)(i) through (vi) specify the minimum required information that must be included in the written closure plan. Each requirement is stated below, along with the required information. The written closure plan must include, at a minimum, the following:

2.1 Narrative of Closure by Removal

Per §257.102(b)(1)(i), the closure plan must include: *a narrative description of how the CCR unit will be closed in accordance with this section.*

> The existing Bottom Ash Pond at Cross Generating Station in Pineville, South Carolina will be closed by removal of CCR. Prior to initiation of closure, numerous plant upgrades will be implemented that will allow all existing CCR and wastewater inflows to be either eliminated or diverted from entering the Bottom Ash Pond. All CCR in the Bottom Ash Pond will be dewatered to remove free water, and then will be hauled to and placed in the existing onsite lined Class Three CCR Landfill Area 1B. All dewatering effluent from within the Bottom Ash Pond will be pumped to the existing wastewater decant pond for treatment. All existing liner and revetment materials will be disposed of in an offsite landfill. After verification testing confirms that all waste has been removed, the dikes will be leveled, the area will be backfilled, and the entire area will be graded to provide positive drainage and permanently seeded.

2.2 Removal and Decontamination Procedures

Per §257.102(b)(1)(ii): *if closure of the CCR unit will be accomplished through removal of CCR from the CCR unit, a description of the procedures to remove the CCR and decontaminate the CCR unit in accordance with paragraph (c) of this section.*

Paragraph §257.102(c) states: *Closure by removal of CCR. An owner or operator may elect to close a CCR unit by removing and decontaminating all areas affected by releases from the CCR unit. CCR removal and decontamination of the CCR unit are complete when constituent concentrations throughout the CCR unit and any areas affected by releases from the CCR unit have been removed and groundwater monitoring concentrations do not exceed the groundwater protection standard established pursuant to §257.95(h) for constituents listed in appendix IV to this part.*

> The existing Bottom Ash Pond contains both CCR waste and wastewater. At present, numerous CCR and wastewater streams are pumped to the Bottom Ash Pond. Wastewater exits the pond via a shallow weir in the pond dike that is hydraulically connected to the Wastewater Decant Pond, where it is further treated prior to being discharged or recycled for plant use.

The procedure to remove the CCR and decontaminate the CCR unit in accordance with paragraph (c) above is described as follows:

1. All existing waste streams currently pumped to the Bottom Ash Pond will be re-routed or eliminated.

2. The hydraulic connectivity between the Bottom Ash Pond and the Wastewater Decant Pond will be removed by raising the dike separating the two ponds to full height at the weir location.

3. The Bottom Ash Pond will be dewatered by pumping all wastewater to the Wastewater Decant Pond for treatment. Continual dewatering operations are anticipated throughout the duration of closure to minimize the amount of free water present within the CCR impoundment.

4. The CCR waste will be dewatered further using stacking and gravity decanting as required to remove all free water until the material is capable of passing EPA Method 9095B (paint filter test). All waste hauled to the onsite Class Three CCR Landfill Area 1B must first pass this test.

5. The CCR waste will be excavated using conventional equipment (e.g. track hoes), placed in off-road trucks, and hauled to (and compacted in) the onsite Class Three CCR Landfill Area 1B.

6. After the CCR waste is removed to expose the existing concrete erosion control revetment along the side slopes and the existing geosynthetic clay liner (GCL) across the pond bottom, the concrete revetment will be removed and hauled offsite for disposal in a suitable offsite landfill.

7. The existing GCL provides a physical barrier to prevent releases of CCR. Once exposed, the GCL will be observed to determine if there are any areas that appear compromised. Any such areas will be noted for further investigation after liner removal.

8. The existing GCL will be removed, working from the top of the pond dikes downward, then from the perimeter of the pond inward towards the low point in the bottom of the pond. This overall approach will prevent contact stormwater runoff from draining onto areas where the liner has already been removed. The work area will remain pumped down during closure. Care will be taken to ensure any CCR remnants on top of the GCL are removed with the GCL and not released to the surrounding area.

9. Soil and groundwater testing will be performed to verify decontamination of the CCR unit is complete. If test results do not indicate that decontamination of the CCR unit is complete, removal of a thin layer of liner subgrade soil may be required. Testing will be repeated until decontamination of the CCR unit is verified. This includes verification that concentrations of constituents within the groundwater do not exceed the groundwater protection standard established pursuant to §257.95(h) for constituents listed in appendix IV to this part.

10. Erosion and sediment controls will be installed prior to breaching or removing the pond dikes to ensure all non-contact construction stormwater is controlled in a manner to prevent erosion and sedimentation in areas surrounding the pond.

11. The Bottom Ash Pond dikes will be breached and the dikes leveled, with the dike material used to partially fill the pond excavation.

12. Additional soil fill material will be imported to the site and compacted within the pond to raise the overall grade. The area will be graded as required to provide positive drainage and to allow for mowing and maintenance access, and will be permanently seeded.

2.3 Final Cover System (NA)

Per §257.102(b)(1)(iii): *If closure of the CCR unit will be accomplished by leaving CCR in place, a description of the final cover system, designed in accordance with paragraph (d) of this section, and the methods and procedures to be used to install the final cover. The closure plan must also discuss how the final cover system will achieve the performance standards specified in paragraph (d) of this section.*

The above requirement is not applicable, as the closure will not be accomplished by leaving CCR in place.

2.4 Maximum Inventory of CCR

Per §257.102(b)(1)(iv), the closure plan must include: *An estimate of the maximum inventory of CCR ever on-site over the active life of the CCR unit.*

Per Reference 1, the estimated volume of CCR in the Bottom Ash Pond was approximately 1,200,000 cubic yards as of April 27, 2016. Approximately 96 acre-feet of bottom ash is produced in a given year with all four generating units running. Per the schedule in Section 2.6 of this closure plan, the inflow of CCR to the Bottom Ash Pond will cease by May of 2018. An estimate of the maximum inventory of CCR ever on-site in the Bottom Ash Pond is therefore approximately 1.5 million cubic yards. This maximum is expected to occur at the time the CCR

and wastewater inflows to the Bottom Ash Pond cease, immediately prior to the start of closure by removal of CCR.

2.5 Largest Area Requiring Final Cover (NA)

Per §257.102(b)(1)(v), the closure plan must include: *An estimate of the largest area of the CCR unit ever requiring a final cover as required by paragraph (d) of this section at any time during the CCR unit's active life.*

The above requirement is not applicable, as the closure will not be accomplished by leaving CCR in place.

2.6 Schedule for Closure by Removal

Per §257.102(b)(1)(vi), the closure plan must include: *A schedule for completing all activities necessary to satisfy the closure criteria in this section, including an estimate of the year in which all closure activities for the CCR unit will be completed. The schedule should provide sufficient information to describe the sequential steps that will be taken to close the CCR unit, including identification of major milestones such as coordinating with and obtaining necessary approvals and permits from other agencies, the dewatering and stabilization phases of CCR surface impoundment closure, or installation of the final cover system, and the estimated timeframes to complete each step or phase of CCR unit closure. When preparing the written closure plan, if the owner or operator of a CCR unit estimates that the time required to complete closure will exceed the timeframes specified in paragraph (f)(1) of this section, the written closure plan must include the site-specific information, factors, and considerations that would support any time extension sought under paragraph (f)(2) of this section.*

A project is currently underway to upgrade plant equipment that will allow for all current CCR and wastewater inflows to the Bottom Ash Pond to cease in 2018. The Bottom Ash Pond is scheduled to begin closure by removal of CCR at that time, within 30 days of final receipt of waste / wastewater. It is estimated that all closure activities will be completed within 5 years. The schedule for completing all activities required to close the Bottom Ash Pond is shown as follows:

Final Closure Schedule for Existing Bottom Ash Pond

Activity	Completion Date
SCDHEC Closure plan review / approval	December 2017 - February 2018
Procure final closure contractor	February 2018 - April 2018
Final receipt of waste / wastewater flows	May 2018
[1]Notification of intent to initiate closure	May 2018
[2,3]Commence closure by removal	May 2018
Isolation of Bottom Ash Pond from Decant Pond	May 2018
Dewater CCR waste	May 2018 - May 2022
Remove CCR waste and dispose in Class Three Landfill 1B	July 2018 - May 2022
Borrow source investigation	March 2020 - November 2020
Obtain borrow source permits	December 2020 - March 2021
SCDHEC SWPPP review / approval	February 2021 - May 2021
Borrow source site development	June 2021 - September 2021
Remove existing liner and revetment and dispose offsite	March 2022 - June 2022
Confirmation testing	June 2022 - September 2022
Install E&S measures outside pond and breach dike	August 2022 - September 2022
Stockpile and compact fill, remove dikes, grade area to drain	October 2021 - April 2023
Permanent seeding	February 2023 - May 2023
[3,4]Notification of closure completion	May 2023

All dates are approximate and are provided to convey the overall sequence and scope of closure activities, and to demonstrate their approximate duration. Activities may commence and/or complete earlier or later than shown. However, the estimated initiation of closure by removal is in 2018, with the estimated completion of closure by removal in 2023. In no case will the duration of final closure by removal of CCR exceed five years, and as such the closure plan schedule satisfies the requirements of §257.102(f)(1)(ii).

[1]Per §257.102(g), *no later than the date the owner or operator initiates closure of a CCR unit, the owner or operator must prepare a notification of intent to close a CCR unit*

[2]Per §257.102(e)(1)(i), *the owner or operator must commence closure of the CCR unit no later than 30 days after the date of which the CCR unit receives the known final receipt of waste*

[3]Per §257.102(f)(1)(ii), *the owner or operator must complete closure of the CCR unit, for existing and new CCR surface impoundments and any lateral expansion of a CCR surface impoundment, within five years of commencing closure activities*

[4]Per §257.102(h), *within 30 days of completion of closure of the CCR unit, the owner or operator must prepare a notification of closure of a CCR unit*

3. CONCLUSIONS

This report satisfies the written closure plan requirements outlined in Title 40 CFR §257.102 for the Bottom Ash Pond at Cross Generating Station in Pineville, South Carolina. The Bottom Ash Pond will be closed by removing all CCR material. Closure by removal is expected to commence in 2018 and be completed in 2023.

4. CERTIFICATION

I, the undersigned Professional Engineer registered in good standing in the State of South Carolina, do hereby certify under penalty of law that I have personally examined and am familiar with the information submitted in this demonstration, and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. I certify, for the above-referenced CCR Impoundment, that the written closure plan contained herein is in accordance with the requirements of Title 40 CFR §257.102.

SOUTH CAROLINA
WORLEY PARSONS GROUP INC.
No. 1505
CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA
LICENSED PROFESSIONAL ENGINEER
No. 24767
FLETCHER M. WOOD

14-OCT-2016

Fletcher Wood
Printed Name of Professional Engineer

Signature of Professional Engineer

24767
South Carolina License #

5. REFERENCES

1. WorleyParsons Document CROSS-0-LI-044-0009, Bottom Ash Pond Initial Structural Stability Assessment