Prepared for:

Virginia Electric and Power Company
5000 Dominion Boulevard
Glen Allen, Virginia 23060

Coal Combustion Residuals (CCR) Closure Plan
Virginia Electric and Power Company
Chesterfield Power Station
Lower Ash Pond
Chesterfield County, Virginia

Project Number: MV1373

Prepared by:

Geosyntec consultants
9211 Arboretum Parkway
Richmond, Virginia 23236

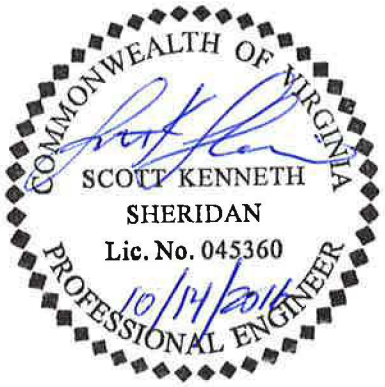
October 2016

TABLE OF CONTENTS

1. CERTIFICATION

This CCR Closure Plan (Closure Plan) for the Lower Ash Pond at the Dominion Chesterfield Power Station located in Chesterfield County, Virginia, dated August 2016 was prepared by Geosyntec Consultants (Geosyntec). This Certification is based on information available to Geosyntec at the time the Closure Plan was prepared and Geosyntec's technical understanding of the United States Environmental Protection Agency's (EPA's) "Disposal of Coal Combustion Residuals From Electric Utilities"" (CCR Rule) published in the Federal Register on April 17, 2015 (40 CFR 257) and incorporated into the Virginia Waste Management Regulations (VSWMR) on January 27, 2016 (9 VAC 20-81-800 et seq.) and public guidance and/or interpretation provided by the EPA. On the basis of and subject to the foregoing, it is my professional opinion as a Professional Engineer licensed in the Commonwealth of Virginia that the CCR Closure Plan has been prepared in accordance with good and accepted engineering practices exercised by other engineers practicing in the same discipline(s) under similar circumstances and at the time and place the Closure Plan was prepared. It is my professional opinion based on my understanding of the technical requirements of the CCR Rule and good and accepted engineering practices that the design of the final cover system as set forth in the Closure Plan meets the technical requirements and/or intent of the CCR Rule (40 CFR 257, Section 257.102(d)(3)(iii)). This Certification is not and shall not be interpreted or construed as a guarantee, warranty, or legal opinion.

Geosyntec Consultants



Scott Sheridan, PE

Principal

2. INTRODUCTION

This Closure Plan describes the method and design for closure of the Lower Ash Pond (LAP) impoundment located at the Chesterfield Power Station (Station) in Chesterfield County, Virginia.

The closure of the LAP will occur under the Virginia Solid Waste Management Program and be completed in accordance with a Virginia Solid Waste Closure Permit that meets the requirements of the EPA's CCR Rule and the Virginia Solid Waste Management Regulations (VSWMR). This Closure Plan conforms to the requirements of Section 257.102(b) of the CCR Rule and applicable sections of the VSWMR.

2.1 Regulatory Background

The LAP is classified as a dam (Inventory Number 00823) and is regulated by the Virginia Department of Conservation and Recreation (DCR), Division of Dam Safety and Floodplain Management, under 4 VAC-50-20. The LAP is operated under the Station's Virginia Pollutant Discharge Elimination System Permit No. VA0004146 (VPDES Permit).

The CCR Closure Plan generally follows the format guidelines for Solid Waste Disposal Facilities as described in the Virginia Department of Environmental Quality's (VDEQ) Submission Instruction No. 6 (Revised January 2012). This Plan also meets the requirements of Section 257.102(b) of the CCR Rule and applicable sections of the VSWMR.

2.2 Site Description

The Station, including the LAP, is owned by Virginia Electric and Power Company d/b/a Dominion Virginia Power (Dominion). The LAP is located on Dominion property at the Chesterfield Power Station in Chesterfield County, Virginia, and bounded by the Old Channel of the James River and Upper Ash Pond (UAP) on the south, Henricus Park Road and Aiken Swamp on the east, Coxendale Road to the north, and the Station's thermal channel to the west.

The LAP was constructed by Dominion in 1964 as a component of the facility's wastewater treatment system, serving as a settling pond for wastewater containing CCR. CCR settled in the LAP is excavated, temporarily stockpiled within the LAP to dewater, loaded onto dump trucks, and transferred to the Upper Ash Pond (UAP) for permanent storage consistent with the 2003 Closure Plan for the UAP. The LAP also currently receives low volume wastewaters from the Station along with stormwater runoff from drainage areas surrounding the LAP. The LAP is constructed of earthen dikes on the eastern, western, and southern sides, with a 20-foot minimum crest width that varies in approximate elevation between 18.5 and 20 feet. The northern side is a cut slope created by excavating soils for the purpose of building the dikes. The area bounded by the outer crest of the dikes is approximately 107 acres.

2.3 Closure Description

The LAP will be closed with the remaining CCR material left in place and soil fill placed to construct final design grades. After final design grades are achieved, the area will be capped with a 40-mil linear low-density polyethylene (LLDPE) geomembrane and covered with a final cover consisting of an 18-inch thick

soil protective cover layer and 6-inch thick vegetative support layer (collectively referred to as the engineered cover system). The total area of the LAP under final cover is approximately 100.8 acres.

Closure will be performed in a phased or sequenced approach with areas sectioned off and closure performed in the isolated areas while remaining areas continue to operate and support the Station's wastewater treatment needs. Closure of the final areas will proceed once replacement wastewater treatment and solid waste disposal facilities are constructed and placed into operation.

2.4 Maintenance and Runoff Minimization

The CCR Closure Plan will minimize maintenance, runoff, and the potential for release of waste materials by closing the LAP through the construction of an engineered cover system (see Section 6.1).

The engineered cover system will minimize the exposure of CCR to the environment. Runoff from the closed LAP will be directed to lined drainage channels and discharged through a storm drainage system, minimizing the potential for erosion of the cover system. With the exception of lined drainage channels and gravel access roads, the closed LAP will be covered with a vegetative soil layer to minimize the runoff volume released from the site. Stormwater runoff from the closed LAP will not come into contact with or contain CCR material.

3. CLOSURE TIMEFRAME

As mentioned previously, sequenced construction is necessary to allow the LAP to continue to receive CCR and low volume wastewaters through 2017 while replacement low volume waste treatment facilities are under construction. The major project milestones include:

Milestone	Expected Date
Commence Area 1 closure activities	May 2017
Cease receiving CCR sluice water and low volume wastewaters from the Station and begin dewatering	October 2017
Complete the installation of the engineered cover system over the active placement area	April 2019
Complete closure of entire LAP area	December 2019

The timing of the milestones listed above may vary based upon weather conditions, contractor productivity, and coordination with other Station construction projects or other unforeseen circumstances.

4. PREPARATION FOR CLOSURE OF SURFACE IMPOUNDMENT

4.1 Site Configuration

4.1.1 Final Closure Grades

CCR remaining in the LAP after cessation of ash sluice activities will remain in place, and soil will be imported to use as fill material to construct the final closure grades.

The LAP is designed with 33 percent maximum slopes and a two percent minimum top slope (to prevent ponding). The LAP will be graded to allow for construction of the stormwater conveyance channel network to direct flow to a stormwater basin that will discharge through a general construction stormwater outfall.

4.1.2 Estimated CCR Volume

The total volume of CCR in the LAP at the time of final closure is estimated at approximately 2.35 million cubic yards. However, the total volume of CCR that will remain in the LAP is variable and is dependent upon Station operations, outages, electricity demand, weather, fuel, and other factors.

4.2 Stabilization and Free Liquids

The dewatering process will be regulated under the Station's VPDES permit and may occur through a variety of measures, including but not limited to, removal of surface water, rim ditching, or well points, followed by treatment of dewatering water. The CCR will be dewatered to a depth determined by a qualified professional engineer necessary to provide a stable surface for subgrade construction and the installation of the engineered cover system.

4.3 Structures and Equipment

Demolished structures and equipment that are removed from the unit will be disposed of at an off-site permitted waste facility. Other debris will be abandoned in place. Debris abandoned in place will be processed to prevent the occurrence of voids and will be buried at least four feet below the subgrade of the cap.

4.4 Geotextile Tube Wall Construction

A geotextile tube wall will be utilized in the initial stages of closure preparation for the purpose of isolating site preparation activities from active portions of the impoundment. The geotextile tube wall will provide a physical barrier to minimize the risk of construction stormwater runoff to Outfall 004. In addition, as the geotextile tube wall is constructed it will consolidate and strengthen underlying ash and subsurface soils.

5. LAP CLOSURE

The following sections provide a description of the designed components of the LAP closure.

5.1 Engineered Cover System

This CCR Closure Plan includes the installation of two types of engineered cover systems, both meeting the requirements of Section 257.102(d)(3) of the CCR Rule.

The first type of engineered cover system is located over the vast majority of the LAP and consists of the following (listed from bottom to top):

- A prepared CCR or soil subgrade;
- A 40-mil LLDPE geomembrane, meeting the requirements of CCR Rule Section 257.102(d)(3), which will serve as the infiltration layer;
- A Geocomposite Drainage Net (GDN) with non-woven, needle punched geotextile heat bonded to both sides;
- Eighteen inches of a soil protective cover layer; and
- Six inches of soil vegetative support layer.

Subgrade drains, consisting of perforated 4-inch diameter HDPE pipes, will be installed on top of the geocomposite drainage net along the drainage channels to provide drainage of water collected in the geocomposite drainage net. Water collected in the subgrade drains will be conveyed to the stormwater basin.

Protective linings such as concrete, fabric-formed concrete drainage channels, or crushed stone will be installed in specific locations where hardening is required to mitigate potential erosive forces. At these locations, the thickness of the protective covering will contribute towards the overall thickness of the final cover. Vegetation is not necessary in locations where a protective covering is installed.

The second type of engineered cover system will be located within the stormwater basin and will consist of the following (listed from bottom to top):

- A prepared soil subgrade;
- Eighteen inches of a soil infiltration layer; and
- Six inches of a soil erosion control and vegetative support layer.

5.2 Final Slopes

Final slopes at the closed LAP will generally be 4.5 percent and 2.3 (minimum) percent after anticipated settlement. Short sections of slope around the perimeter are 33 percent maximum.

5.3 Run Off Controls

During closure activities, runoff from within the LAP will be conveyed through a drainage channel system to a stormwater management basin and ultimately to a general construction stormwater outfall. The

LAP is classified as a dam (Inventory Number 00823) and is regulated by the Virginia DCR, Division of Dam Safety and Floodplain Management, under 4 VAC-50-20. The drainage channels and spillway to the outfall will be designed to meet the appropriate dam design storm as required by DCR. Stormwater channels will be lined with a combination of fabric-formed concrete and vegetated turf reinforcement mat. Stormwater channels will convey the runoff to the stormwater management basin prior to discharge to the thermal channel.

Contact stormwater will be managed through the dewatering system until all ash has been covered and contact stormwater is no longer being generated. Non-contact stormwater will be managed under a Virginia Stormwater Management Program (VSMP) general construction stormwater permit. Once the LAP is closed and stabilized, stormwater runoff will be managed under the Station's general industrial stormwater permit.

5.4 Stormwater Basin Construction

The stormwater management basin will be located on the western side of the LAP and will be utilized to manage non-contact construction stormwater runoff. To construct the stormwater basin, a sheet pile wall will be installed to provide separation from the remainder of the LAP and to allow the removal of CCR within the footprint of the basin. After CCR is removed, the subgrade will be prepared and the area will be capped with 24 inches of compacted soil with a coefficient of permeability less than $1x10^{-5}$ cm/sec. The bottom 18 inches will comprise the infiltration layer, and the top 6 inches will comprise the erosion control layer.

After the final cap has been stabilized with vegetation the discharge structure in the stormwater basin will be breached such that the basin will no longer impound water. The surface of the basin will be regraded as needed and seeded to establish vegetation for erosion control.

5.5 Settlement, Subsidence, Stability, and Displacement

Geotechnical design and analyses will be performed in accordance with the requirements of Section 257.73(e)(1) of the CCR Rule.

5.6 Universal Soil Loss Demonstration

The LAP will be stabilized after closure with vegetation or with durable surfaces such as concrete, fabric-formed concrete channel linings and gravel road surfacing. The Revised Universal Soil Loss Equation was used to estimate soil loss after closure. Based on the characteristics of the soils planned for use in the LAP closure, soil loss after stabilization of the final cap was estimated to be 1.12 tons per acre per year for the most erodible soil available, which is less than the USEPA recommended maximum soil loss of 2 tons per acre per year.

5.7 Toe Drain System

The LAP will utilize a toe drain system to collect water at the outside toe of the western LAP dike. Water collected in the toe drain system will be routed to a Low Volume Wastewater Treatment System (LVWWTS) for treatment prior to discharge under the Station's VPDES permit.

6. CCR CLOSURE IMPLEMENTATION

6.1 Security

Unauthorized entrance to the LAP will be prohibited. The perimeter along the north, east, and south sides is fenced and access will be controlled with locking gates. Signs will be posted indicating that waste is no longer being accepted in the LAP. Vehicle access to the restricted areas of the site will be controlled by bar gates secured with lock and key. Vehicle access adjacent to the gate will be denied by physical barriers (surface water channels, post barricades, or severe slopes).

6.2 Notification

Within 30 days of DEQ's final approval of the LAP closure, a deed restriction will be placed on the area pursuant to Section 257.102(i) of the CCR Rule and Section 160.D.5 of the VSWMR. Within 30 days of recording the deed restriction, a notification stating that the deed notation has been recorded will be prepared, submitted to the Director – Virginia Department of Environmental Quality, placed in the Facility's operating record, and posted on Dominion's publicly accessible internet site.

6.3 Certification

Within 30 days of the completion of the closure activities, certification that closure occurred in accordance with this CCR Closure Plan and 9 VAC 20-81-160.D.5.d will be provided to the Director – Virginia Department of Environmental Quality, placed in the Facility's operating record, and posted on Dominion's publicly accessible internet site.

7. OPINION OF PROBABLE ESTIMATED COST FOR THE CCR CLOSURE PLAN

An opinion of probable estimated cost for the LAP CCR Closure is $69,676,128.

8. REFERENCES

Kavazanjian, E. (1999). "Seismic Design of Solid Waste Containment Facilities," Proceedings of the 8th Canadian Conference on Earthquake Engineering, Vancouver, BC, June, pp. 51-89.

40CFR257, Subpart D—Standards for the Disposal of Coal Combustion Residuals in Landfills and Surface Impoundments, 2015

9VAC20-81, Solid Waste Management Regulations, 2011.

9VAC50-20, Impounding Structure Regulations, 2012.

Virginia Department of Environmental Quality. Closure and Post-Closure Care Plans for Solid Waste Disposal and Management Facilities, 2012.

Virginia Department of Environmental Quality. Virginia Pollutant Discharge Elimination System Permit No. VA0004146