



# CLOSURE PLAN

## CLOSURE PLAN

**Bremo Power Station CCR Surface Impoundment:  
North Ash Pond**



**Dominion**

**Submitted To:** Bremo Power Station  
1038 Bremo Bluff Road  
Bremo Bluff, VA 23022

**Submitted By:** Golder Associates Inc.  
2108 W. Laburnum Avenue, Suite 200  
Richmond, VA 23227

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## 1.0 CERTIFICATION

This Closure Plan for the Bremo Power Station's North Ash Pond was prepared by Golder Associates Inc. (Golder). The document and Certification/Statement of Professional Opinion are based on and limited to information that Golder has relied on from Dominion and others, but not independently verified, as well as work products produced by Golder.

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 this document has been prepared in accordance with good and accepted engineering practices as exercised by other engineers practicing in the same discipline(s), under similar circumstances, at the same time, and in the same locale. It is my professional opinion that the document was prepared consistent with the requirements in §257.102 of the United States Environmental Protection Agency's "Standards for the Disposal of Coal Combustion Residuals in Landfills and Surface Impoundments," published in the Federal Register on April 17, 2015, with an effective date of October 19, 2015 (40 CFR §257.102).

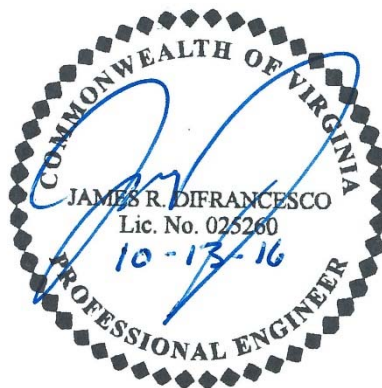
The use of the word "certification" and/or "certify" in this document shall be interpreted and construed as a Statement of Professional Opinion, and is not and shall not be interpreted or construed as a guarantee, warranty, or legal opinion.

James R. DiFrancesco, P.E.  
Print Name

Principal and Practice Leader  
Title

  
Signature

10/13/2016  
Date



## 2.0 INTRODUCTION

This Closure Plan was prepared for the Bremo Power Station's (Station) existing Coal Combustion Residuals (CCR) surface impoundment known as the North Ash Pond (NAP). This Closure Plan was prepared in accordance with 40 CFR Part §257, Subpart D and is consistent with the requirements of 40 CFR §257.102 for closure of CCR surface impoundments.

The Station, owned and operated by Virginia Electric and Power Company d/b/a Dominion Virginia Power (Dominion), is located in Fluvanna County, Virginia at 1038 Bremo Road, east of Route 15 (James Madison Highway) and north of the James River. The Station includes an existing CCR surface impoundment, the NAP, as defined by the Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule (40 CFR Part §257; the CCR rule).

The impoundment is being closed as a CCR surface impoundment under the CCR rule provisions at 40 CFR §257. The NAP will be closed in place with a final cover system pursuant to 40 CFR §257.102(d).

## 3.0 CLOSURE PLAN

### 3.1 Overview of Closure Approach

The purpose of this Closure Plan is to outline the steps necessary to close the existing surface impoundment consistent with recognized and generally accepted good engineering practices. Closure is designed to minimize the need for long-term maintenance and to control the post-closure release of contaminants. The NAP will achieve closure in accordance with 40 CFR §257.102(d). Closure will occur within the time frames set out in 40 CFR §257.102(f). This Closure Plan may be amended in accordance with the requirements of 40 CFR §257.102(b)(3).

### 3.2 CCR Material Estimate

The NAP covers approximately 67.5 acres, has a dam approximately 96 feet tall, and contains approximately 4,000,000 cubic yards (CY) of CCR. An additional estimated 262,500 CY of CCR will be relocated to the NAP subsequent to the closure of the on-site, inactive West Ash Pond.

### 3.3 Closure Performance Standard

#### 3.3.1 Final Cover

The final cover system is designed in accordance with 40 CFR §257.102(d)(3)(i), including the use of a geomembrane liner to minimize the infiltration of liquids into the CCR surface impoundment. The final cover system is designed to prevent the future impoundment of water, and includes measures to prevent sloughing, minimize erosion, and prevent excessive hydraulic head build-up. The final cover system is

designed to minimize the need for maintenance after closure. The largest area requiring a final cover is estimated at approximately 67.5 acres.

The engineered final cover system will consist of the following minimum components, listed from top to bottom.

- 6-inch vegetative support layer
- 18-inch protective cover layer
- 250-mil geocomposite drainage layer
- 40-mil geomembrane liner material
- Liner subgrade

The geomembrane liner will consist of 40-mil, dual-textured, High Density Polyethylene (HDPE) geomembrane, or equivalent, with a maximum hydraulic conductivity of  $1 \times 10^{-12}$  centimeter per second (cm/s).

Some settlement is expected to occur due to additional load resulting from CCR grading and final cover placement during closure activities, as well as drainage and dewatering of the CCR during and after closure. Laboratory test results and conventional consolidation theory from Golder's March 2016 Virginia Department of Conservation and Recreation (DCR) Impounding Structure Geotechnical Design Report Supporting Documents (Golder 2016) show settlements up to 6 feet for portions of the NAP. The grading design has taken these settlements into account, such that adverse slopes should not occur on the final cover in the event such settlement occurs. The anticipated settlement amounts are not expected to inhibit the proper functioning of the proposed final cover.

### **3.3.2 Performance Standard**

Closure of the impoundment will be conducted in a manner that minimizes the need for further maintenance and controls, and minimizes or eliminates, to the extent necessary to protect human health and the environment, the post-closure escape of uncontrolled surface runoff or waste products to the groundwater, surface water, or the atmosphere. Drainage, dewatering, and stabilization of the CCR in the NAP will meet the performance standards specified in 40 CFR §257.102(d)(2) to support the final cover system.

The final cover system, consisting of a vegetated soil layer with run-on and run-off controls, will minimize the need for post-closure maintenance. The final grades of the impoundment will promote runoff. Drainage channels and underdrains will convey surface runoff to the final cover's stormwater run-off control system. Vegetation will be established and, along with the drainage channels, will minimize erosion of the final cover system.

A low permeability final cover system will be constructed and maintained to minimize the infiltration of precipitation into the CCR impoundment.

The minimum post-settlement slope for the final cover system is 2% to ensure positive drainage of the surface and subsurface (interflow) stormwater. The maximum pre-settlement slope for the final cover system is 3:1 (33.3%) to provide long-term slope stability to prevent sloughing or movement of the final cover system.

Both global and veneer stability analyses were performed in Golder 2016 in order to determine the minimum factors of safety against failure. The minimum factors of safety for global static stability and seismic global stability were found to be greater than 1.5 and 1.0, respectively, in accordance with sound engineering practices for surface impoundment cover design. The minimum factors of safety for static veneer stability and seismic veneer stability were found to be greater than 1.5 and 1.0, respectively, in accordance with sound engineering practices for surface impoundment cover design.

### 3.4 Schedule

Activities necessary to complete closure of the NAP are outlined in the tentative time table below.

**Table 1: Tentative Construction Time Table**

Surface Impoundment	End CCR Placement	Begin Dewatering	Begin Closure Activities	End Closure Activities
North Ash Pond	April 2017	April 2016	May 2017	December 2018

In accordance with 40 CFR §257.102(g), no later than the date on which closure of the CCR unit is initiated, Dominion will prepare a notification of intent to close the unit, which includes the certification by a qualified professional engineer for the design of the final cover system required by 40 CFR §257.102(d)(3)(iii).

In accordance with 40 CFR §257.102(h), within 30 days following completion of closure of the CCR unit, Dominion shall record a notation on the property deed stating that the property has been used as a surface impoundment and the property's use is restricted under the Post-Closure Plan and the post-closure care requirements as provided by 40 CFR §257.104(d)(1)(iii).

Within 30 days of recording the notation, Dominion shall prepare a notification stating that the notation has been recorded and placed in the facility's operating record. Pursuant to 40 CFR §257.106(d), Dominion shall send to the appropriate regulatory agency the notification of intent to close, notification of closure completion, and notification of deed notation, within 30 days of placing each notification in the operating record.

In addition, one sign will be posted at the site entrance to the NAP notifying all persons of the final closure and prohibition against further receipt of CCR. Unauthorized access to the site will be controlled by fencing and lockable gates across the access roads.

### 3.5 Cost Estimate

The estimated cost for closure of the NAP is \$16,490,585.

Established in 1960, Golder Associates is a global, employee-owned organization that helps clients find sustainable solutions to the challenges of finite resources, energy and water supply and management, waste management, urbanization, and climate change. We provide a wide range of independent consulting, design, and construction services in our specialist areas of earth, environment, and energy. By building strong relationships and meeting the needs of clients, our people have created one of the most trusted professional services organizations in the world.

Africa	+ 27 11 254 4800
Asia	+ 852 2562 3658
Australasia	+ 61 3 8862 3500
Europe	+ 356 21 42 30 20
North America	+ 1 800 275 3281
South America	+ 56 2 2616 2000

[solutions@golder.com](mailto:solutions@golder.com)  
[www.golder.com](http://www.golder.com)

**Golder Associates Inc.**  
**2108 W. Laburnum Avenue, Suite 200**  
**Richmond, VA 23227 USA**  
**Tel: (804) 358-7900**  
**Fax: (804) 358-2900**



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