Coal Combustion Residuals Recycling/Beneficial Use Assessment Business Plan

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Executive Summary

Dominion Energy Virginia (Dominion) requested proposals from qualified bidders to conduct recycling or beneficial use projects for coal combustion residuals (CCR) facilities in the Chesapeake Bay watershed. The objective of the Request for Proposals (RFP) was to provide the following information:

- Viable options for recycling of the ponded ash
- The quantity of CCR that may be suitable for recycling or beneficial use, including but not limited to encapsulated beneficial uses such as bricks or concrete
- The cost of recycling or beneficial use
- The potential market demand for material recycled or beneficially used

Five ash ponds at four Dominion power stations and other ash facilities at the Chesapeake Energy Center were considered in the RFP. Exhibit ES-1 shows the distribution of the CCR among these facilities; all quantities are shown in cubic yards (CY).

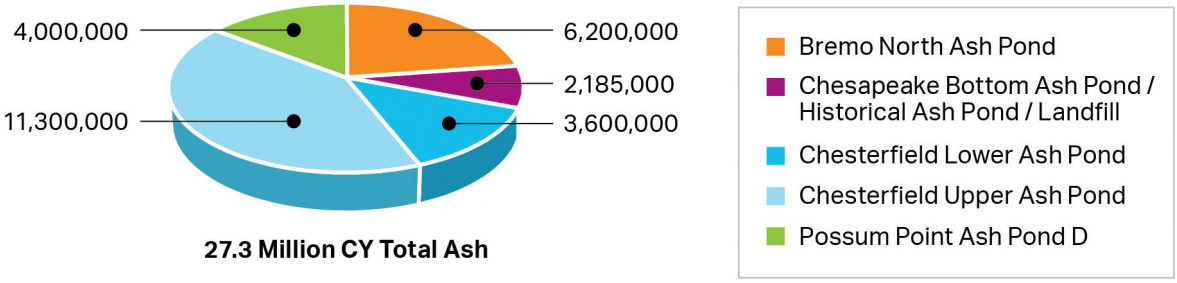

Exhibit ES-1: CCR Facilities Included in the Project

This Business Plan presents a discussion of the RFP process and summarizes the information received from the bidders, including viable options for recycling of the ponded ash, recycled/beneficiated product market demand, quantity of CCR that can be recycled/beneficiated, and related costs. As discussed in an earlier study (*SB 1398 CCR Ash Pond Closure Assessment Report*, November 2017), closure by removal and recycling the CCR material is one of several options to close the ash ponds in compliance with the CCR Rule. The decision to recycle should be considered along with other closure options, including closure-in-place (with groundwater remediation if necessary) or closure by removal and landfilling. Considerations including stakeholder input, time to achieve closure, regulatory compliance, risk, feasibility, and cost should all be taken into account in this decision process.

CCR Recycling/Beneficial Use Requirements

The Federal CCR Rule defines how CCR can be beneficially used (recycled), requiring beneficial use applications to meet the criteria shown in Exhibit ES-2.

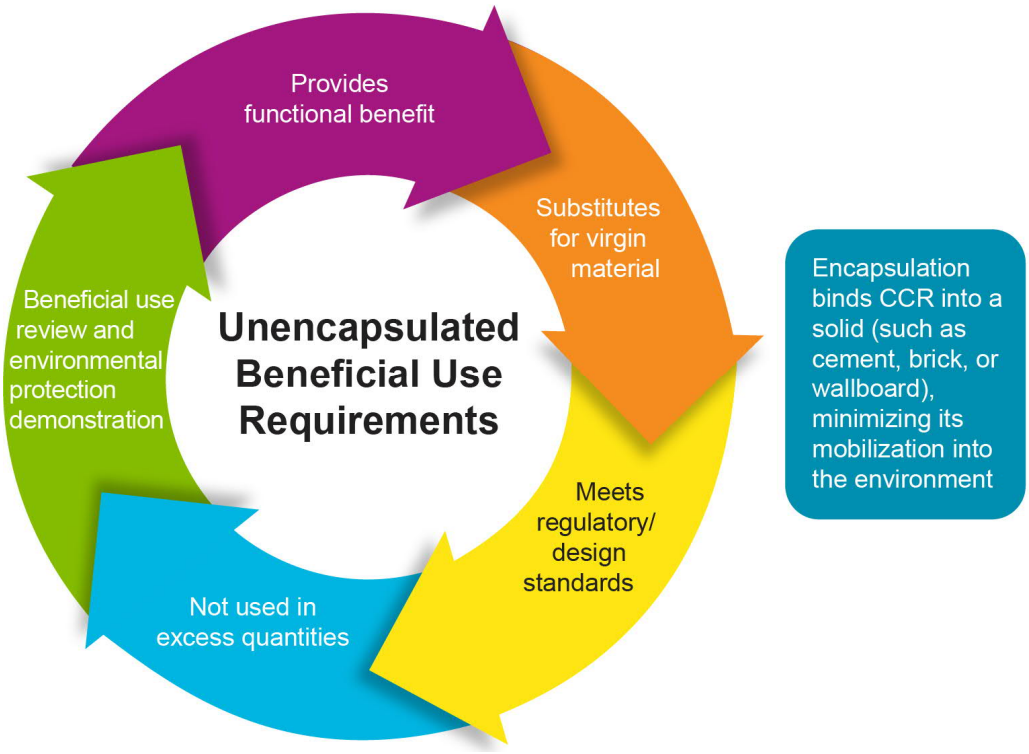

Exhibit ES-2: CCR Rule Beneficial Use Criteria

The RFP required the encapsulated beneficial use of CCR materials due to the increased environmental protections provided by encapsulation. The CCR Rule defines encapsulated beneficial use as "a beneficial use of CCR that binds the CCR into a solid matrix that minimizes its mobilization into the surrounding environment". The types of encapsulated recycling processes that may be appropriate for the ponded ash include the creation of building/construction products such as brick or aggregate, and processing of the CCR to meet fly ash standards for Portland cement (PC) substitute in concrete. Unprocessed ash can also be encapsulated when used as direct kiln feed for cement manufacturing.

RFP Process

Dominion developed a solicitation process to request bids from qualified contractors to perform this scope of work at each of the four CCR sites. The solicitation process included identifying and informing qualified contractors; preparing comprehensive RFP packages with the goal of obtaining accurate, competitive pricing and market conditions; evaluating the information provided by the bidders; and summarizing the market-driven responses in this Business Plan. The full scope of work required to complete the recycling/ beneficial use project comprises both civil/ construction and recycling/beneficial use tasks. The RFP defined specific project requirements to ensure environmental protection is provided for recycled/ beneficiated CCR materials while meeting the conditions of the CCR Rule and all other regulatory requirements. These project requirements included meeting the CCR Rule definition of encapsulated beneficial use, closure of the CCR facilities within the required timelines (7 years for the Chesapeake Bottom Ash Pond and 15 years for the other ash facilities), and achieving regulatory closure of all CCR facilities, to include landfilling of materials that are unable to be recycled/beneficiated within the project timeline.

The solicitation process and related timeline are summarized in Exhibit ES-3.

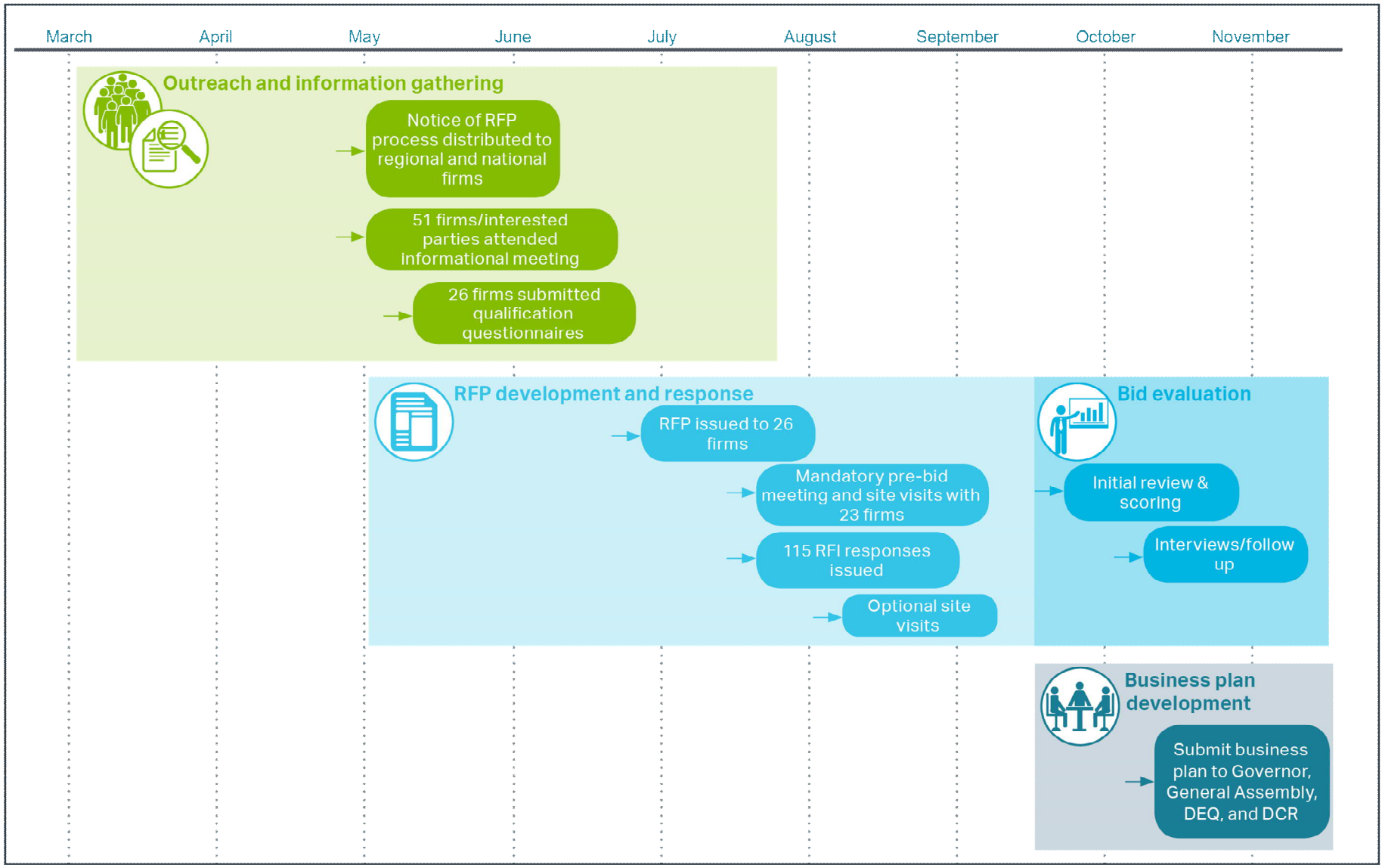

Exhibit ES-3: Solicitation Process Timeline

Following receipt of bidder proposals, a rigorous review of the offerings was conducted, incorporating the evaluation factors shown in Exhibit ES-4:

Exhibit ES-4: Bid Review Process

Table ES-1 provides a summary of CCR Rule beneficial use compliance criteria and whether the individual bidders meet each of the criteria. Four of the ten bidders provided complete responses which met the encapsulated beneficial reuse criteria required in the RFP.

Table ES-1: Bidder Compliance with CCR Rule Beneficial Use Criteria

	Does Bidder Meet CCR Rule Criteria?					
Bidder	Complete Proposal Response Received	Provides a Functional Benefit	Substitutes for a Virgin Material, Conserving Natural Resources	Meets Product Specifications, Regulatory/ Design Standards (if Available)	When Standards are not Available, not Used in Excess Quantities	Encapsulated Beneficial Use Binds CCR into a Solid Minimizing Mobilization into the Environment[(1)]
Boral Resources	Yes	Yes	Yes	Yes	N/A	Yes
Charah, LLC	Yes	Yes	Yes	Yes	N/A	Yes
Waste Management National Services, Inc. / The SEFA Group	Yes	Yes	Yes	Yes	N/A	Yes
ENTACT, LLC / RJ Smith Companies	Yes	Yes	Yes	Likely	N/A	Yes
Belden-Eco Products, LLC	No	Yes	Yes	Likely	N/A	Yes
EnCAP-IT Solutions of Virginia	Yes	Yes	Yes	No Relevant Standards	No	No
Krubera Management Group, LLC	Yes	Yes	Yes	No Relevant Standards	No	No
Thalle Construction Co., Inc. / Krubera	Yes	Yes	Yes	No Relevant Standards	No	No
MERG-PBCo	No	Yes	Yes	Yes	N/A	Yes
Heavy Metal Fix, LLC	No	Yes	Insufficient Information	No Relevant Standards	Insufficient Information	Insufficient Information

CCR = coal combustion residuals; N/A = not applicable

(1) Products will be bound in concrete to meet CCR Rule encapsulation definition; prior to implementation, bidders will be required to provide Leaching Environmental Assessment Framework (LEAF) testing results

Proposed Recycling/Beneficial Use Technologies and Products

Bidders proposed a range of recycling/beneficial use scenarios for each facility, including encapsulated products and unencapsulated alternative use approaches, as summarized in Exhibit ES-5.

Power Station	Encapsulated Recycling/Beneficial Use Products					Alternative Use Approach	
Bremo Power Station	●			●		●	●
Chesapeake Energy Center	●	●	●	●			
Chesterfield Power Station	●	●	●	●		●	●
Possum Point Power Station	●			●	●	●	●

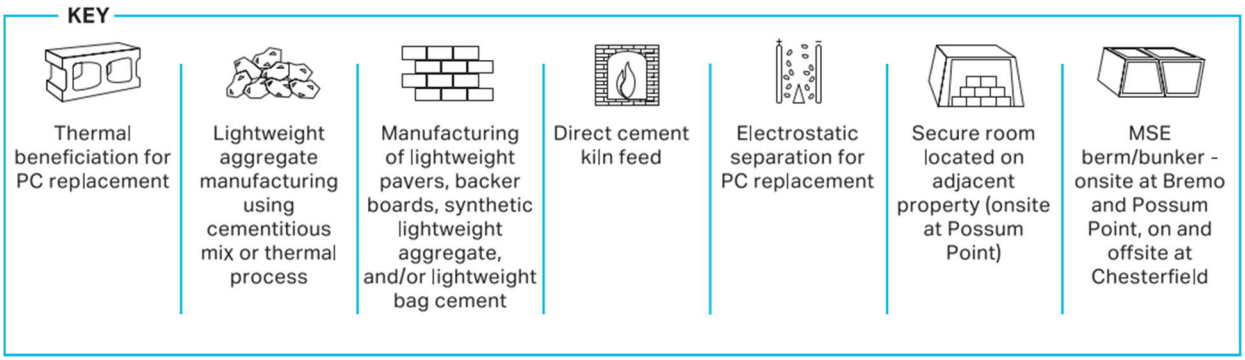

Exhibit ES-5: Recycling Technologies/Products Proposed per Facility

A flow diagram depicting the full scope of work that would typically be required to complete the recycling/ beneficial use project resulting in encapsulated beneficial use products is provided in Exhibit ES-6. The full scope of work required to complete the project comprises both civil/construction (Bid Item A) and recycling/beneficial use (Bid Item B) tasks, including ash excavation and preparation for recycling/ beneficial use (dewatering with water treatment, excavation, drying, screening, transporting to the recycling process, etc.), recycling/beneficial use processing as required, distribution of the final product to the market, landfill disposal of CCR that is unable to be beneficiated, and regulatory closure of all CCR facilities.

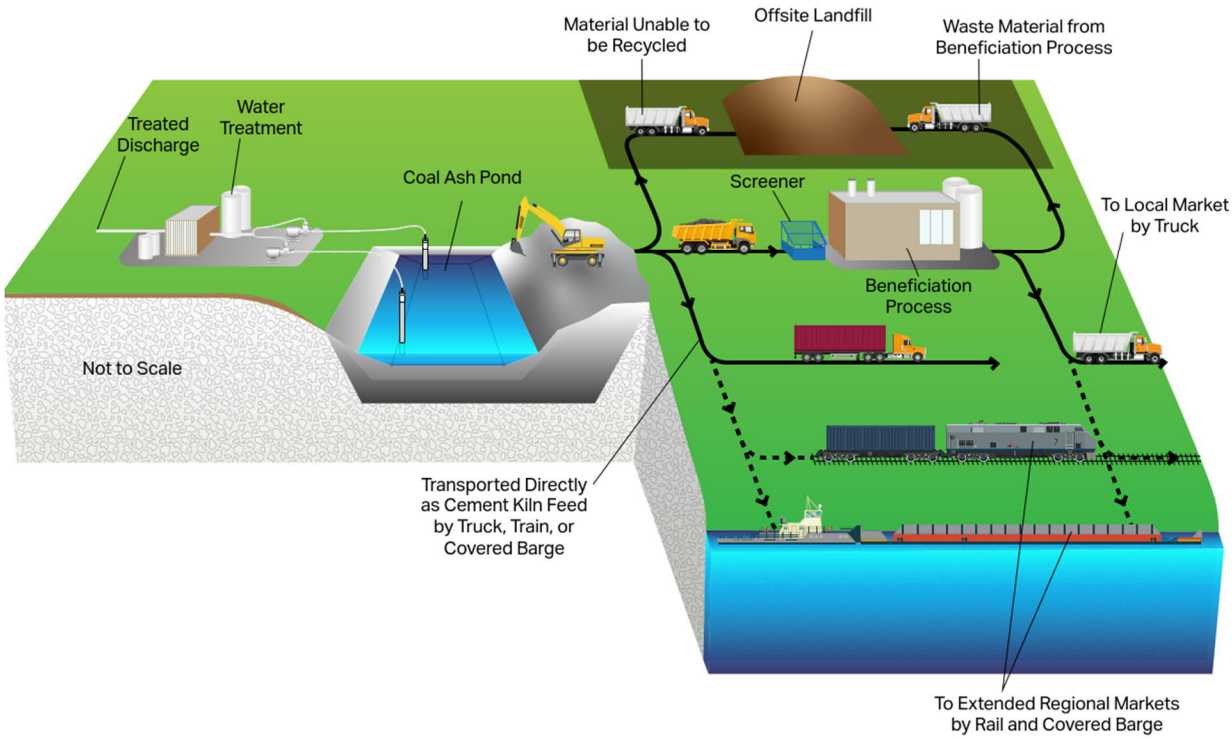

Exhibit ES-6: Recycling/Beneficial Use Process Flow Diagram

CCR Recycling/Beneficial Use Market Demand

The RFP asked for separate proposals for each individual power station, and also provided an opportunity for bidders to provide optional bids for a combination of all stations. Three bidders provided optional bids for combining multiple stations, with two bidders proposing to combine all four stations; a third bidder proposed combining either two or three power stations. These optimized approaches from established national ash beneficiation/marketing firms demonstrate the maximum regional product market for recycled/beneficiated ash. This includes the local market (generally defined as Virginia and a 200-mile radius from the power stations) and regional market (approximately 1,000 miles by rail or barge).

Based upon the proposals received, the beneficiation firms will typically require Dominion to grant them exclusive rights for all of their ash when using it as a PC substitute. These rights prevent multiple firms from competing in the same marketplace with Dominion's ash, which could either drive the price down or oversupply the market (or both). Because of these rights, two firms manufacturing PC substitute could not be awarded beneficiation contracts. Rather, if multiple firms were to be awarded, they would have to provide different encapsulated products such as lightweight aggregate, direct cement kiln feed, brick pavers, etc.

When analyzing current and anticipated demand, the bidders generally avoided the North and South Carolina markets due to the uncertain impact of product supply from CCR beneficiation facilities currently under construction by utilities in those states. Some South Carolina utilities are beginning to see a market impact due to PC substitute production in North Carolina. A higher quantity of supply into the market could potentially decrease the sales price for beneficiated ash in the region.

Based on the responses from the bidders, the general quantity and geographic demand for recycled/ beneficially used products in the market are summarized in Exhibit ES-7.

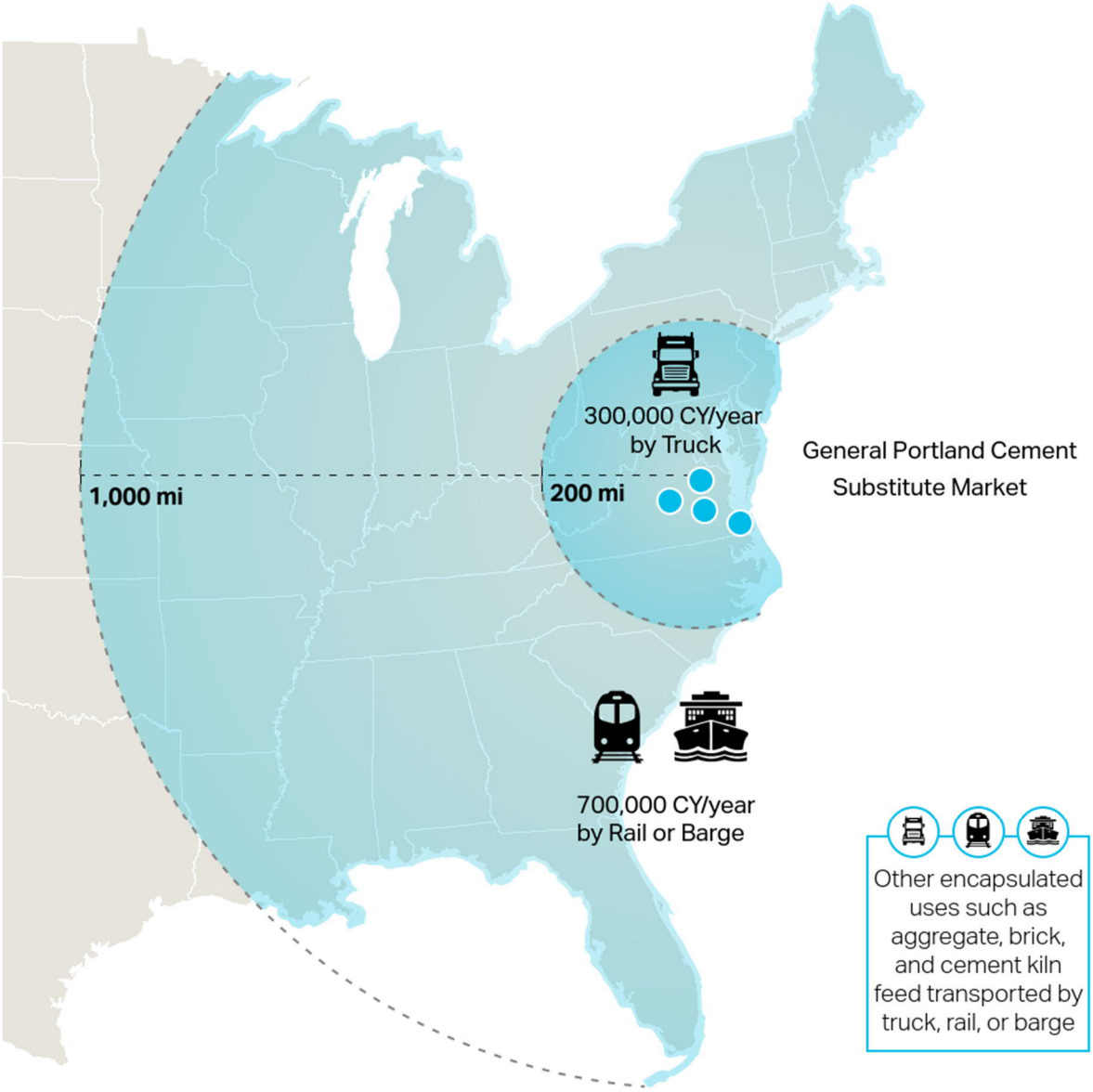

Exhibit ES-7: CCR Recycled Product Market Demand

CCR Recycling/Beneficial Use Quantity

The RFP requested stand-alone proposals for individual power stations, with an option to combine multiple stations into a bundled offering. Exhibit ES-8 shows the maximum portion of CCR material from Dominion's facilities that bidders declared could be recycled into an encapsulated beneficial use product, assuming they have exclusivity for the PC substitute component. For the purposes of this Business Plan, the remainder of the CCR that could not be beneficiated would be disposed of in landfills to achieve closure by removal.

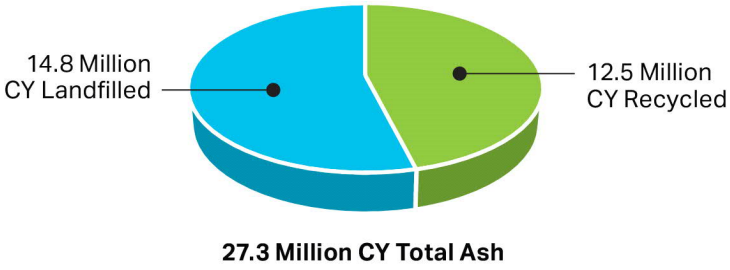

Exhibit ES-8: Maximum Quantity of CCR Recycled/Beneficially Used

Transportation Considerations

Bidders have proposed to transport recycled/beneficiated products to market and CCR as waste to landfills using a combination of truck, rail, and barge options with a range of project durations, as summarized in Exhibit ES-9.

Power Station	Transportation Options	Vehicle Volume	Project Duration (Years)
Bremo Power Station		124 to 161 Trucks/day	10 to 11
		270 Railcars/year	14
Chesapeake Energy Center		65 to 143 Trucks/day	5 to 11
		20 Trucks/day + 67 Railcars/year	11
		Up to 5 Barges/year	10
Chesterfield Power Station		278 to 300 Trucks/day	15
		34 Trucks/day + 260 Railcars/year	13
		2,500 to 3,750 Railcars/year	15
Possum Point Power Station		105 to 114 Trucks/day	7 to 11
		232 Railcars/year	10

Exhibit ES-9: Transportation Options

CCR Recycling/Beneficial Use Project Costs

A summary of the responsive and compliant bid offerings for each individual station is provided in Exhibit ES-10, including price, percentage of CCR able to be recycled, and duration proposed by each bidder. These proposals are based on executing each station individually; therefore, the individual station costs cannot be added together to determine an overall system-wide cost. Similarly, the recycling volumes/ percentages for individual stations cannot be added for a total volume able to be recycled. Combinations of multiple stations are presented after Exhibit ES-10.

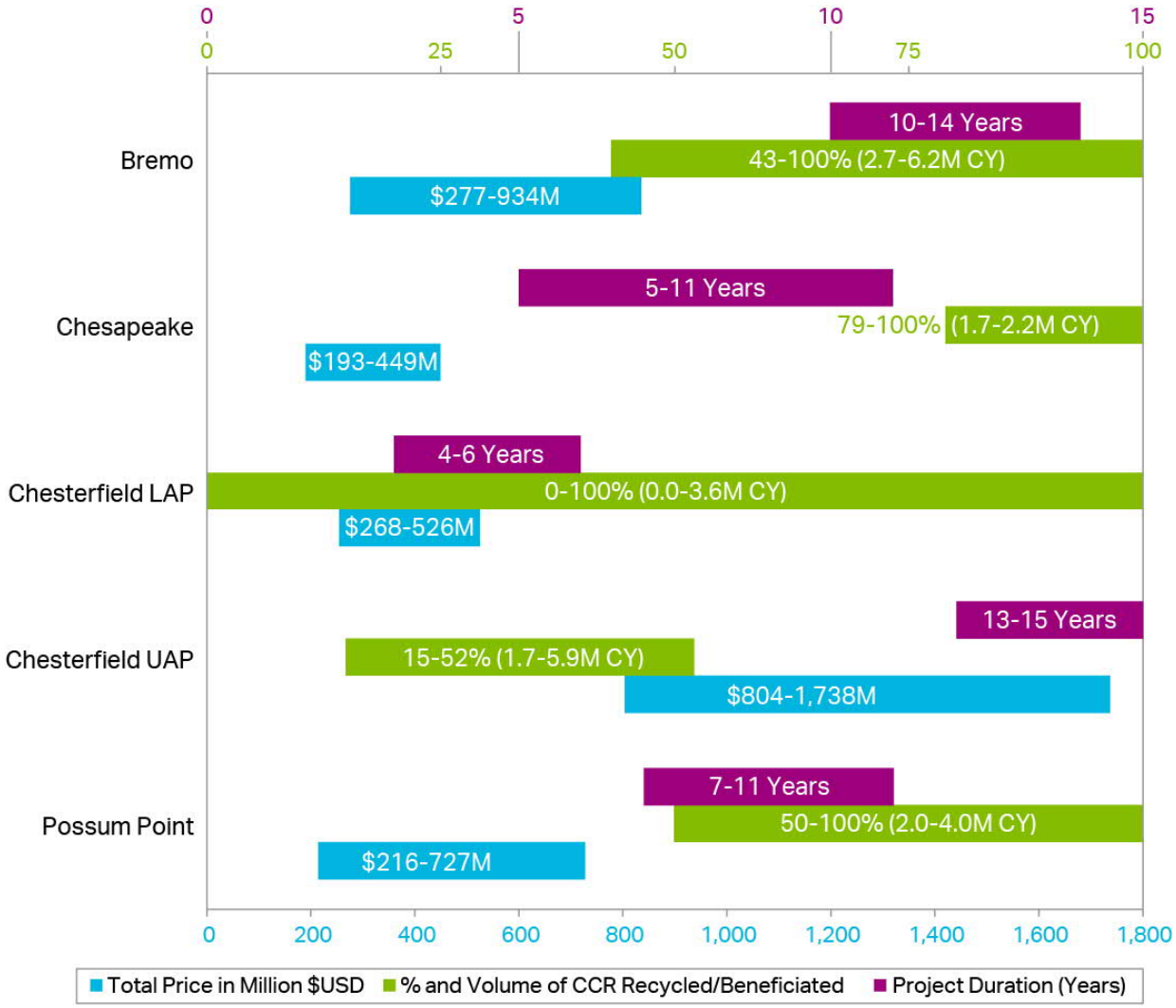

Exhibit ES-10: Summary of Bid Offerings

The RFP required bidders to include revenue from sales of the beneficiated products in their pricing, and to attain regulatory closure of the ash ponds within 15 years, including landfill disposal of CCR materials that are unable to be recycled within that timeframe. Based on the level of design provided in the RFP packages, the available information provided to the bidders, the proposed recycling/beneficiation technologies, and the uncertainty of predicting construction and market pricing as much as 15 years into the future, the pricing provided by the bidders should be considered as Class 4 estimates (approximately

+50%, -30%). Additionally, costs provided in this Business Plan are direct bidder prices and do not include Dominion costs for engineering and management of the projects.

Exhibit ES-11 indicates price ranges from qualified bidders who provided proposals to bundle the four stations and maximize the quantity of CCR that could be used to create encapsulated beneficial use products and placed into the market, including ranges for total project cost as well as cost per cubic yard of ponded ash.

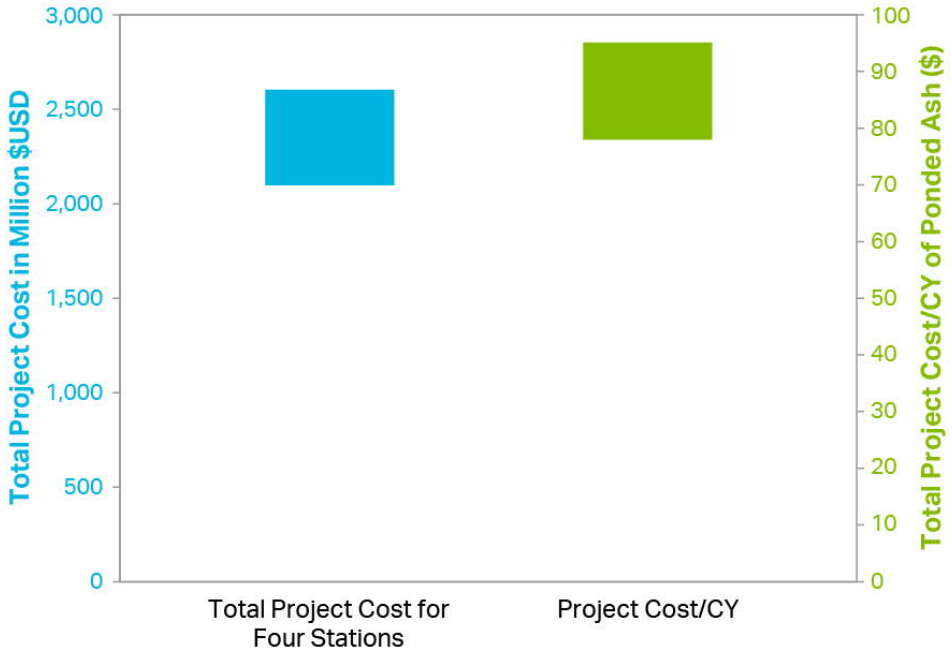

Exhibit ES-11: Optimized Pricing for All Four Power Stations Combined

The information presented in this Business Plan represents additional refinement of the recycling cost estimates and options that were evaluated during the previous study completed in November 2017 (presented in the *SB 1398 CCR Ash Pond Closure Assessment Report*). Recycling the CCR material is one option that should be considered to close the ash ponds in compliance with the CCR Rule, along with closure-in-place (with groundwater remediation if necessary) or closure by removal and landfilling. Considerations to be taken into account in this decision process include stakeholder input, time to achieve closure, regulatory compliance, risk, feasibility, and cost.

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Appendices

Tables

Exhibits

1. Introduction and Objective

Dominion Energy Virginia (Dominion) issued a request for proposals (RFP) to conduct recycling or beneficial use projects for coal combustion residuals (CCR) materials from five ash ponds at four Dominion power stations and other ash facilities at the Chesapeake Energy Center. The objective of the RFP is to provide the following information:

- Viable options for recycling of the ponded ash
- The quantity of CCR that may be suitable for recycling or beneficial use, including but not limited to encapsulated beneficial uses such as bricks or concrete
- The cost of recycling or beneficial use
- The potential market demand for material recycled or beneficially used

Table 1 provides information on the Dominion power stations and CCR facilities that were included in the RFP process.

Table 1: CCR Facilities Included in the Project

Power Station	CCR Facilities	Estimated CCR Volume (CY)	Area (acres)
Bremo Power Station	North Ash Pond	6,200,000	68
Chesapeake Energy Center	Bottom Ash Pond	60,000	5
	Historical Ash Pond	1,150,000	40
	Landfill	975,000	23
Chesterfield Power Station	Lower Ash Pond	3,600,000	101
	Upper Ash Pond	11,300,000	112
Possum Point Power Station	Ash Pond D	4,000,000	70
	Total Volume	**27,285,000**	

CCR = coal combustion residuals; CY = cubic yards

1.1 Objective

The objective of this project was to further refine the information presented in the *SB 1398 CCR Ash Pond Closure Assessment Report* (November 2017) related to recycling/beneficial use by requesting proposals from potential bidders who could execute the full scope of the project. AECOM provided support to Dominion throughout both projects.

This Business Plan presents a discussion of the RFP process and summarizes the information received from the bidders, including viable options for recycling the ponded ash, recycled/beneficiated product market demand, quantity of CCR that can be recycled/beneficiated, and related costs. As discussed in the November 2017 study, closure by removal and recycling the CCR material is one of several options to close the ash ponds in compliance with the CCR Rule. The decision to recycle should be considered along with other alternatives, including closure-in-place (with groundwater remediation if necessary) or closure by removal and landfilling. Considerations including stakeholder input, time to achieve closure, regulatory compliance, risk, feasibility, and cost should all be taken into account in this decision process.

1.2 CCR Rule Beneficial Use Criteria

The Federal CCR Rule defines how CCR can be beneficially used (recycled), requiring beneficial use applications to meet specific criteria as shown in Exhibit 1.

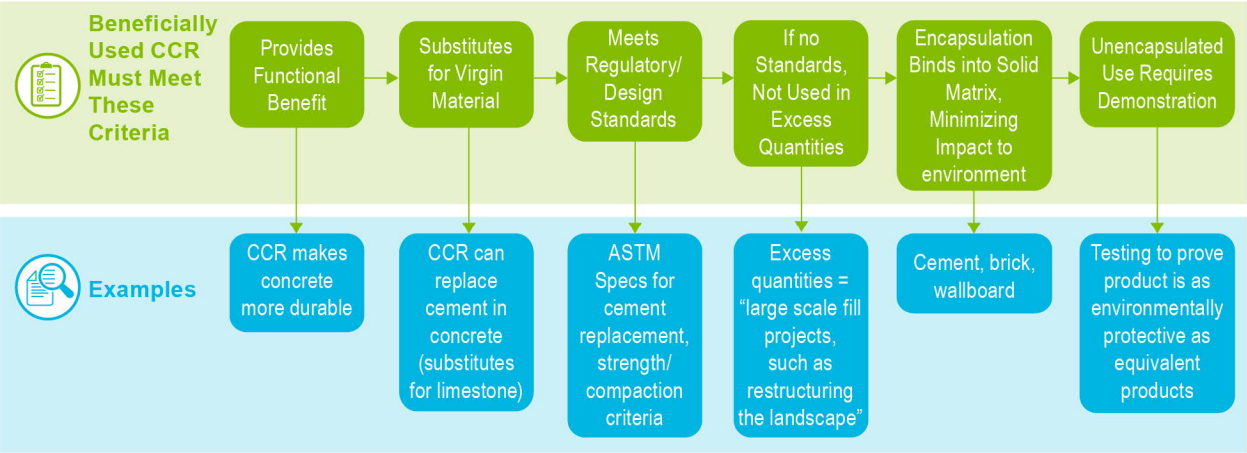

Exhibit 1: CCR Rule Beneficial Use Criteria

The RFP required beneficial use of CCR materials in encapsulated applications due to the environmental protections provided by encapsulation. The two types of encapsulated recycling processes that may be appropriate for the ponded ash are the creation of a building/construction product such as brick or aggregate, and processing of the CCR to meet fly ash standards for Portland cement (PC) substitute in concrete. Unprocessed ash can also be encapsulated when used as direct kiln feed for cement manufacturing.

1.3 Project Requirements

The RFP defined specific project requirements to ensure environmental protection is provided for recycled/beneficiated CCR materials while meeting the conditions of the CCR Rule and all other regulatory requirements. These project requirements included meeting the CCR Rule definition of encapsulated beneficial use, closure of the CCR facilities within the timelines established by the CCR Rule (7 years for the Chesapeake Bottom Ash Pond and 15 years for the other ash facilities), and achieving regulatory closure of all CCR facilities, to include landfilling of materials that are unable to be beneficiated within the project timeline.

1.4 Business Plan Contents

This Business Plan describes the recycling/beneficial use solicitation process in Section 2, and then summarizes individual bid offerings in Section 3, including compliance with the CCR Rule and descriptions of incomplete bids and those that do not meet the CCR Rule encapsulated beneficial use definition. Section 4 summarizes the bidder responses to the RFP, including market demand, quantities suitable for recycling, transportation considerations, and cost, followed by station-specific summaries of each of the proposals received (Sections 5 through 8). A discussion of proposals received from three bidders for the award of multiple stations to the same firm is provided in Section 9. Appendix A includes supplemental information for this Business Plan, including an overview of the RFP solicitation process (A1), a brief description of the proposed recycling/beneficiation technologies and end products (A2), and a description of the elements of the scope of work for the proposed recycling/beneficial use project (A3).

2. Recycling/Beneficial Use Solicitation Process

Dominion developed an inclusive and thorough process to request and evaluate bids to perform a recycling/beneficial use project at each of the four power stations. This process included identifying and informing qualified contractors; preparing comprehensive RFP packages with the goal of obtaining accurate, competitive pricing and market conditions; evaluating the information provided by the bidders; and summarizing the market-driven responses in this Business Plan. The solicitation process and related timeline is summarized in Exhibit 2, and a comprehensive description of the solicitation process developed and implemented by Dominion is provided in Appendix A1.

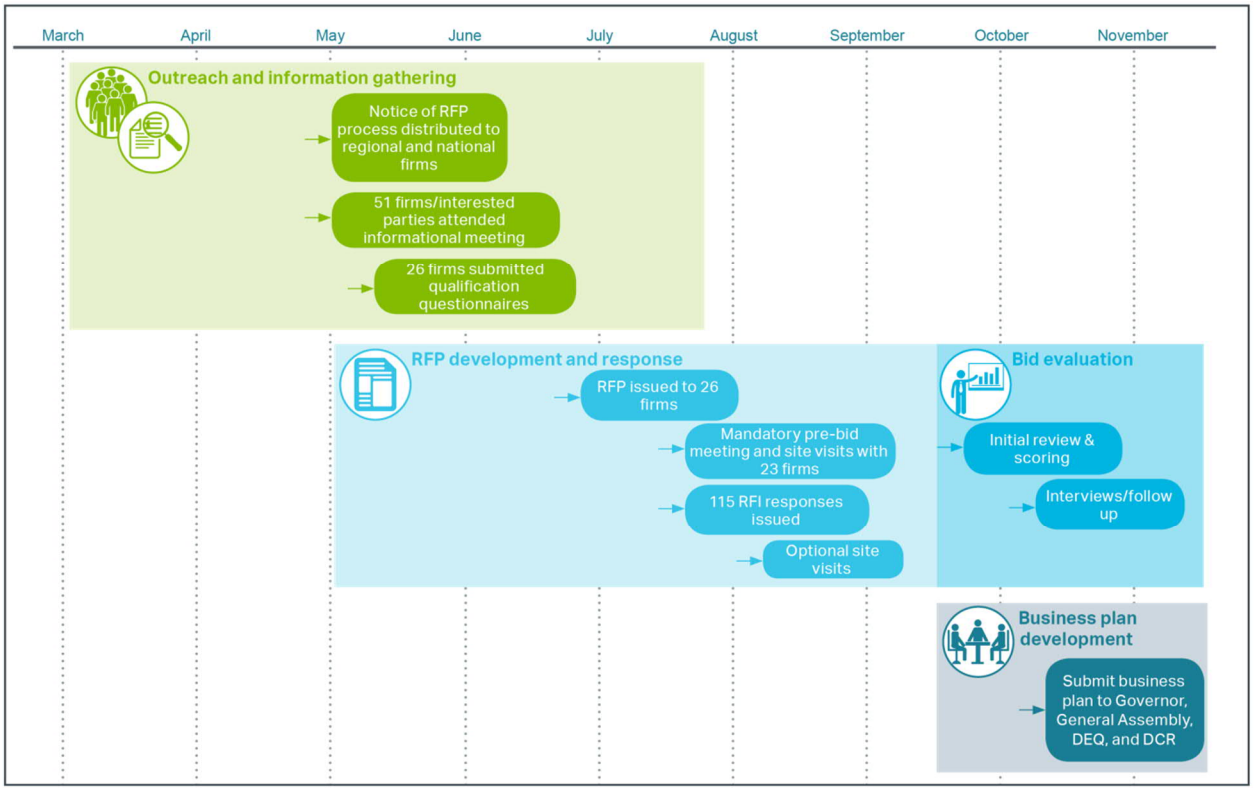

Exhibit 2: Solicitation Process Timeline

Following receipt of bidder proposals, a rigorous review of the offerings was conducted, incorporating the evaluation factors shown in Exhibit 3.

Exhibit 3: Bid Review Process

3. Recycling/Beneficial Use Bid Offerings

As described in detail in Appendix A, Dominion issued RFP packages to qualified bidders to obtain detailed information on quantity, market demand, and costs to recycle/beneficially use ponded ash. The RFP included a full-service offering to complete the project that comprises both civil/construction (Bid Item A) and recycling/beneficial use (Bid Item B) tasks, including ash excavation and preparation for recycling/ beneficial use (dewatering with water treatment, excavation, drying, screening, transporting to the recycling process, etc.), recycling/beneficial use processing as required, distribution of the final product to the market, landfill disposal of CCR that is unable to be beneficiated, and regulatory closure of all CCR facilities.

Table 2 provides a summary of the ten bidders who submitted proposals to Dominion. Seven bidders provided full-service RFP responses to perform recycling/beneficial use or alternative use projects using CCR materials from at least one of the four Dominion power stations, and one additional firm provided a bid for recycling/beneficial use only at one power station (they did not provide civil/construction pricing). Two bidders submitted incomplete proposals that did not include Bid Forms/pricing. Three of the bidders provided optional proposals for bundling multiple stations. As presented in this Business Plan, bids were evaluated holistically as comprehensive program-wide offers. Individual stand-alone bids from multiple bidders for each of the four power stations were also evaluated.

Table 2: Bidders Responding to Recycling/Beneficial Use RFP

Bidder/Team (Prime Listed First)	Bremo Power Station	Chesapeake Energy Center	Chesterfield Power Station	Possum Point Power Station	Optional Proposal Combining Multiple Stations
Boral Resources	Yes	Yes	Yes	Yes	Yes
Charah, LLC	Yes	Yes	Yes	Yes	Yes
Waste Management National Services, Inc. / The SEFA Group	Yes	Yes	Yes	Yes	Yes
ENTACT, LLC / RJ Smith Companies	No	Yes	Yes	No	No
Belden-Eco Products, LLC	No	Yes[1]	No	No	No
EnCAP-IT Solutions of Virginia	Yes	No	Yes	Yes	No
Krubera Management Group, LLC	No	No[2]	Yes	Yes	No
Thalle Construction Co., Inc. / Krubera	Yes	No	No	No	No
Maryland Environmental Restoration Group with PBCo (MERG-PBCo)	Yes[3]	No	No	No	No
Heavy Metal Fix, LLC[4]	No	No	No	No	No

[1] Belden-Eco Products provided a proposal for the Chesapeake Energy Center that did not cover the full scope of the project, only providing a bid for the recycling/beneficial use scope, without pricing the civil tasks required to perform the complete project

[2] Krubera provided a conceptual approach and conceptual pricing for the Chesapeake Energy Center without submitting a Bid Form for that facility

[3] MERG-PBCo provided an incomplete bid for the Bremo Power Station, omitting the Bid Form and excluding pricing for the civil tasks

[4] Heavy Metal Fix provided an incomplete bid for the Chesapeake Energy Center, omitting the Bid Form and submitting an alternative bid to perform a Feasibility Study

3.1 Options Proposed

The recycling options proposed include the technologies and end products summarized in Exhibit 4.

Power Station	Encapsulated Recycling/Beneficial Use Products					Alternative Use Approach	
Bremo Power Station	●			●		●	●
Chesapeake Energy Center	●	●	●	●			
Chesterfield Power Station	●	●	●	●		●	●
Possum Point Power Station	●			●	●	●	●

KEY

- Thermal beneficiation for PC replacement
- Lightweight aggregate manufacturing using cementitious mix or thermal process
- Manufacturing of lightweight pavers, backer boards, synthetic lightweight aggregate, and/or lightweight bag cement
- Direct cement kiln feed
- Electrostatic separation for PC replacement
- Secure room located on adjacent property (onsite at Possum Point)
- MSE berm/bunker - onsite at Bremo and Possum Point, on and offsite at Chesterfield

Exhibit 4: Recycling Technologies/Products Proposed per Facility

A flow diagram depicting the full scope of work required to complete the recycling/beneficial use project is provided in Exhibit 5, including Bid Item A (civil/construction scope) and Bid Item B (recycling/beneficial use scope) as defined in the RFP documents. More detail on these scope elements is included in Appendix A3.

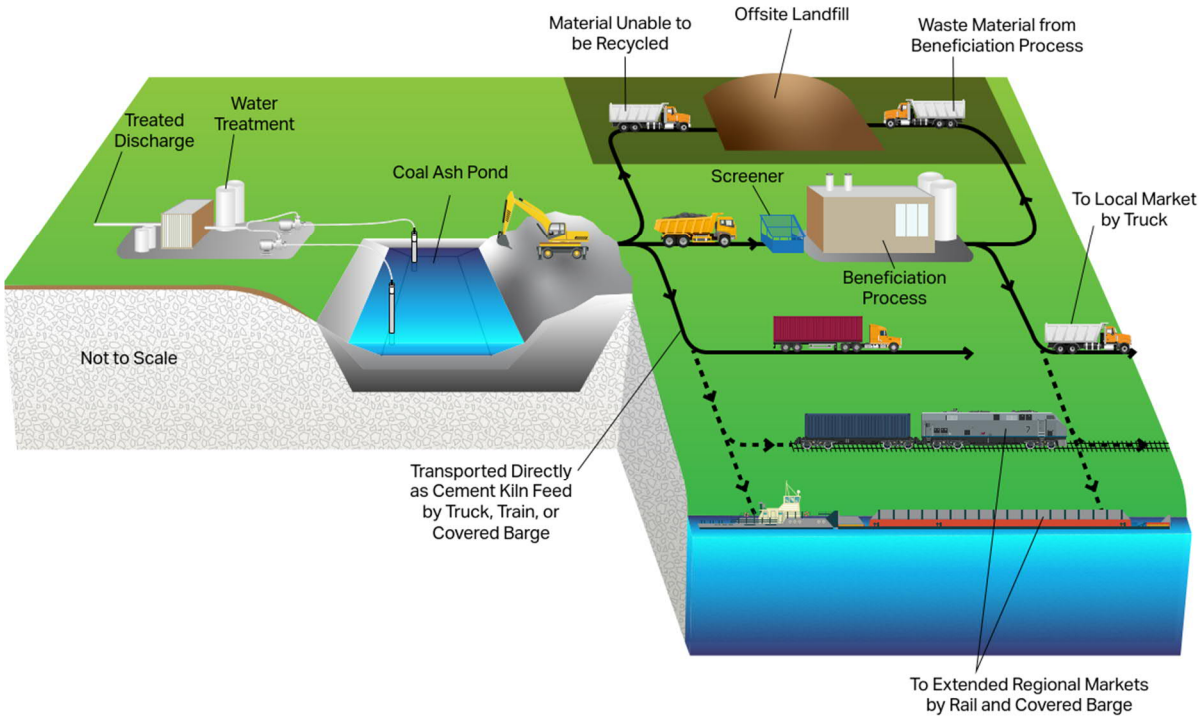

Exhibit 5: Recycling/Beneficial Use Process Flow Diagram

3.2 CCR Rule Compliance

Table 3 provides a summary of CCR Rule beneficial use compliance criteria and whether the individual bidders meet each of the criteria.

Table 3: Bidder Compliance with CCR Rule Beneficial Use Criteria

	Does Bidder Meet CCR Rule Criteria?					
Bidder	Complete Proposal Response Received	Provides a Functional Benefit	Substitutes for a Virgin Material, Conserving Natural Resources	Meets Product Specifications, Regulatory/ Design Standards (if Available)	When Standards are not Available, not Used in Excess Quantities	Encapsulated Beneficial Use Binds CCR into a Solid Minimizing Mobilization into the Environment[(1)]
Boral Resources	Yes	Yes	Yes	Yes	N/A	Yes
Charah, LLC	Yes	Yes	Yes	Yes	N/A	Yes
Waste Management National Services, Inc. / The SEFA Group	Yes	Yes	Yes	Yes	N/A	Yes
ENTACT, LLC / RJ Smith Companies	Yes	Yes	Yes	Likely	N/A	Yes
Belden-Eco Products, LLC	No	Yes	Yes	Likely	N/A	Yes
EnCAP-IT Solutions of Virginia	Yes	Yes	Yes	No Relevant Standards	No	No
Krubera Management Group, LLC	Yes	Yes	Yes	No Relevant Standards	No	No
Thalle Construction Co., Inc. / Krubera	Yes	Yes	Yes	No Relevant Standards	No	No
MERG-PBCo	No	Yes	Yes	Yes	N/A	Yes
Heavy Metal Fix, LLC	No	Yes	Insufficient Information	No Relevant Standards	Insufficient Information	Insufficient Information

CCR = coal combustion residuals; N/A = not applicable

(1) Products will be bound in concrete to meet CCR Rule encapsulation definition; prior to implementation, bidders will be required to provide Leaching Environmental Assessment Framework (LEAF) testing results

Incomplete and unencapsulated use bid offerings are described in the following sections. Information provided in the individual power station sections of this Business Plan (Sections 4 through 9) only includes data from bidders who provided a complete proposal for the entire scope of work that meets all CCR Rule beneficial use criteria. To maintain pricing confidentiality, each bidder was randomly assigned a number for each station (Bidder #1, Bidder #2, etc.) and bidder names are not used in the bid summary analysis.

3.3 Incomplete Bid Offerings

Three firms provided incomplete bids as described in the following sections.

3.3.1 Belden-Eco Products Summary of Offering

Belden-Eco Products, LLC only provided costs for recycling/beneficial use (Bid Item B), without providing any civil construction costs (Bid Item A) as required for a full-scope offering. They propose to recycle CCR from the Chesapeake Energy Center into brick and permeable paver building products by a ceramic kiln fired process using a mix of approximately 70% CCR and 30% imported clay/shale material. They propose to construct the recycling plant on the Chesapeake Energy Center site.

Approximately 20% of the ash will be disposed of as waste from the manufacturing process, although they did not propose a destination or pricing for waste disposal. Belden proposes to generate an average

of 96,000 tons of bricks and permeable pavers per year for 25 years, which they state is less than 2% of the existing paver and landscaping market. The permeable pavers, which Belden states are eligible for Leadership in Energy and Environmental Design (LEED) credits, can be used in the growing stormwater management and environmental sustainability markets. They propose to distribute the product to the market primarily by barge, and plan to upgrade the existing barge facility on the Elizabeth River. They also propose to upgrade the existing rail infrastructure to accommodate deliveries of clay/shale material as raw materials for their manufacturing process.

The offering appears to be compliant with the encapsulated beneficial use definitions of the CCR Rule as the ash would be substituted for virgin material (i.e. clay or shale) in the production of brick. Although they have never manufactured products using CCR material, the proposed production process has been used for many years with conventional raw materials. They propose to perform testing at their facilities in France and The Netherlands, including simulated industrial-level production trials, to be funded by Dominion. This testing will be necessary to verify that the product safely encapsulates the coal ash in accordance with industry standards. Although Belden plans to complete removal of the Bottom Ash Pond within the required seven-year duration, they do not meet the RFP requirement to complete closure of all CCR facilities within 15 years.

3.3.2 MERG-PBCo Summary of Offering

Maryland Environmental Restoration Group with PBCo (MERG-PBCo) submitted an incomplete bid which did not address the scope of the project, and they did not provide a Bid Form. They provided a three-page offering stating that they could truck approximately 60,000 tons of unprocessed ash annually from the Bremo Power Plant to a cement manufacturer in West Virginia as a raw material for manufacturing cement. The offering was limited to trucking and delivery, and requires exclusivity for the Bremo CCR (Dominion could not sell the material to any other cement manufacturer). The offering does appear to be compliant with the encapsulated beneficial use definitions of the CCR Rule as the ash would be used as direct cement kiln feed that produce a solid concrete material. The proposal is not compliant with the CCR Rule requirement to obtain closure with the CCR facility within 15 years, as removal at the proposed rate of 60,000 tons per year would take over 100 years to recycle all of the CCR from the Bremo North Ash Pond.

3.3.3 Heavy Metal Fix Summary of Offering

Heavy Metal Fix, LLC did not provide a proposal that responded to the scope of the project, and they did not provide a Bid Form. They provided an alternate bid to perform a feasibility study on ash from the Chesapeake Energy Center to extract rare earth and heavy metal elements, cenospheres, and unburned carbon from the CCR and sell them to the market. They stated that their proprietary process will remove contaminated components from the ash and resulting wastewater, and that after removing all of these materials, the remaining CCR material could be sold to the concrete, cement, road aggregate, and asphalt industries. They proposed a feasibility study to evaluate different methods of extraction and treatment, as well as studying the fly ash market. They did not provide enough information to demonstrate whether they have ever successfully used their various proposed technologies on commercial applications using coal ash, nor whether their proposal would meet CCR Rule requirements.

3.4 Unencapsulated Proposals

Bid offerings that are not compliant with the CCR Rule encapsulated beneficial use definition are provided in the following sections, including a discussion of compliance-related concerns for each bidder.

3.4.1 EnCAP-IT Solutions Summary of Offering

EnCAP-IT Solutions of Virginia provided similar bid offerings for the Bremo and Possum Point Power Stations, with a different scenario for addressing the CCR at Chesterfield, as discussed in the following sections.

3.4.1.1 EnCAP-IT – Bremo and Possum Point Power Stations

At Bremo and Possum Point Power Stations, EnCAP-IT is proposing an alternative use approach to beneficially reuse CCR in an unencapsulated application as a structural fill, which is proposed to consist of CCR materials placed within mechanically stabilized earth (MSE) berms and lined bunkers to enclose the CCR in the ash pond footprint. They would then construct an estimated 16 Megawatt (MW) solar farm on the resulting graded area at Bremo and a 14 MW solar farm at Possum Point. They propose that ownership of the solar generation facilities and responsibility for solar operations will transfer to Dominion and that Dominion would own all energy generated by the facilities. They also assume that Dominion would enter into an operation and maintenance contract with a solar vendor at the project end date.

The U.S. Environmental Protection Agency (EPA) considers CCR structural fills to be unencapsulated beneficial use and therefore a site-specific demonstration would be required to prove that all four criteria of the CCR Rule could be met. Specifically, the CCR Rule Beneficial Use third criterion prohibits CCR from being used in excess quantities (greater than necessary for a specific project); otherwise, the application is not a beneficial use, but rather disposal. In addition, these applications have not been approved as unencapsulated beneficial use since the CCR Rule was enacted in 2015.

The proposed approach includes constructing lined bunkers on natural soils at the bottom of the existing ash pond. This approach may have several significant construction challenges and additional costs associated with stabilizing the pond bottom to adequately support the new lined bunkers. These potential costs and risks do not appear to be reflected in the bidder's pricing.

Table 4 provides a summary of CCR Rule beneficial use compliance criteria and whether EnCAP-IT meets each of the criteria for their proposals at Bremo and Possum Point Power Stations.

Table 4: EnCAP-IT CCR Rule Beneficial Use Compliance – Bremo and Possum Point

CCR Beneficial Use Criteria	Does Bidder Meet Criteria?	Explanation
Provides a functional benefit	Yes	Structural fill creates platform for solar farm
Substitutes for a virgin material, conserving natural resources	Yes	CCR substitutes for soil or aggregate used as structural fill
Meets product specifications, regulatory/ design standards (if available)	No relevant standards	General guidance available for CCR structural fills; however, no design standards available for this specific use
When standards are not available, not used in excess quantities	No	CCR structural fill proposed in greater quantities than necessary, when smaller quantities or non-CCR materials could be considered or different (non-CCR) locations could be chosen for solar farm
Encapsulated beneficial use binds CCR into a solid matrix that minimizes its mobilization into the surrounding environment	No	The EPA considers CCR structural fill to be unencapsulated beneficial use and requires a demonstration
Unencapsulated use requires demonstration	No demonstration	No demonstration that the amended CCR is as environmentally protective as equivalent products; testing and DEQ/EPA approval required

CCR = coal combustion residuals; EPA = Environmental Protection Agency; DEQ = Department of Environmental Quality

3.4.1.2 EnCAP-IT – Chesterfield Power Station

EnCAP-IT proposes a multipronged approach at the Chesterfield Power Station, including the following:

- Construction of an unencapsulated CCR structural fill, using a patented process to create MSE berms and lined bunkers; this process would be used to create a graded surface on a neighboring property, on which the bidder would construct two beneficiation systems, including:
  - A thermal beneficiation system to create PC substitute
  - A manufacturing facility that would create lightweight pavers, backer boards, synthetic lightweight aggregate, and lightweight bag cement from the CCR that is not able to be processed into a PC substitute for a period of 12 years; they state that the regional marketing area is 200 miles for aggregates and 400 miles for other products
- Transportation of ponded ash to another active thermal beneficiation facility in Maryland to produce additional PC substitute
- Use of MSE berms to expand the existing ash landfill located adjacent to the Chesterfield Power Station on Reymet Road; in order to expand the landfill, the bidder would be required to modify the Solid Waste Permit and the Chesterfield County Conditional Use Permit (CUP) to allow for placement of ponded ash in the landfill, expansion of the landfill, and trucking of the ash on public roads
- Creating a lined bunker system in the Lower Ash Pond footprint using MSE berms and liners to store the remaining CCR material, which could then be "mined for future reuse by Beneficiation Facilities as needed to meet market demands for their beneficiated products" beyond the 15-year CCR Rule closure timeframe (estimated 25-year operation to deplete all of the stored ash)

EnCAP-IT is proposing an alternative use approach that includes beneficial reuse of CCR in an unencapsulated application as a structural fill in MSE berms and lined bunkers. The EPA considers CCR structural fills to be unencapsulated beneficial use and therefore a site-specific demonstration would be required to prove that all four criteria of the CCR Rule could be met. Specifically, the CCR Rule Beneficial Use third criterion prohibits CCR from being used in excess quantities (greater than necessary for a specific project); otherwise, the application is not a beneficial use, but rather disposal. In addition, these applications have not been approved as unencapsulated beneficial use since the CCR Rule was enacted in 2015.

It is also unknown whether the proposed beneficial use application of pavers and backer boards will meet the CCR Rule criteria for encapsulation. Additional testing will be necessary to verify that the product safely encapsulates the CCR in accordance with industry standards.

The proposed approach includes constructing lined bunkers on natural soils at the bottom of the existing ash pond. This approach may have several significant construction challenges and additional costs associated with stabilizing the pond bottom to adequately support the new lined bunkers. These potential costs and risks do not appear to be reflected in the pricing.

EnCAP-IT proposes to store approximately 4.9 million CY of CCR in a lined bunker constructed in the 3.6 million CY Lower Ash Pond footprint, excavating and beneficiating (“mining”) the ash between 2033 and 2044. However, the costs to manage the CCR and close the bunker system do not appear to have been included in their proposal (no costs included beyond 2032). Required tasks will include management and treatment of rainwater and other water from inside the bunker, pumping and treatment of groundwater as the excavation proceeds below current groundwater levels, excavation of CCR from the bunker, transport to the beneficiation facility located on the adjacent property as well as to the facility located in Maryland, operation and maintenance of the thermal beneficiation systems, demolition/removal of the approximately two-inch thick liner system over 100 acres, transportation and offsite landfill disposal of the liner (estimated at greater than 30,000 CY of material), importing and placement of approximately 3.2 million CY of clean fill, and final grading and restoration as required by the RFP. The estimated cost for these tasks is greater than $500 million, which would add a significant cost to the pricing provided by the bidder.

Table 5 provides a summary of CCR Rule beneficial use compliance criteria and whether EnCAP-IT meets each of the criteria.

Table 5: EnCAP-IT CCR Rule Beneficial Use Compliance – Chesterfield

CCR Beneficial Use Criteria	Does Bidder Meet Criteria?	Explanation
Provides a functional benefit	Yes	Structural fill creates platform for beneficiation systems; beneficiation systems process CCR into products such as PC substitute, bricks, pavers, aggregate
Substitutes for a virgin material, conserving natural resources	Yes	CCR substitutes for soil or aggregate used as structural fill; beneficiation systems substitute CCR for PC in cementitious products
Meets product specifications, regulatory/ design standards (if available)	No relevant standards for structural fill; meets standards for PC substitute/ cementitious uses	General guidance available for CCR structural fills; however, design standards not available for this specific use; PC substitute/cementitious uses have specific product specifications that materials purport to meet
When standards are not available, not used in excess quantities	No	CCR structural fill proposed in greater quantities than necessary, when smaller quantities or non-CCR materials could be considered; no current requirement to increase Reymet Road landfill capacity
Encapsulated beneficial use binds CCR into a solid matrix that minimizes its mobilization into the surrounding environment	No for MSE/bunker; yes for PC replacement; unclear for backer board and pavers	MSE walls and liners do not meet CCR Rule definition of encapsulation as a solid matrix; PC substitute meets encapsulation requirements; brick/aggregate production requires testing and approval
Unencapsulated use requires demonstration	No demonstration	No demonstration that the amended CCR is as environmentally protective as equivalent products; testing and DEQ/EPA approval required

CCR = coal combustion residuals; PC = Portland cement; MSE = mechanically stabilized earth; DEQ = Department of Environmental Quality; EPA = Environmental Protection Agency

Exhibit 6 shows a general conceptual flow diagram of the proposed scope of work for EnCAP-IT's alternative use approach to use CCR as structural fill to construct MSE berms and lined bunkers within the ash pond to create a platform for a solar farm at Bremo and Possum Point and for storage of CCR for future excavation for potential encapsulated beneficiation at Chesterfield. This exhibit is conceptual in nature, intended to depict the general layout and construction flow for the proposed alternative use scenario.

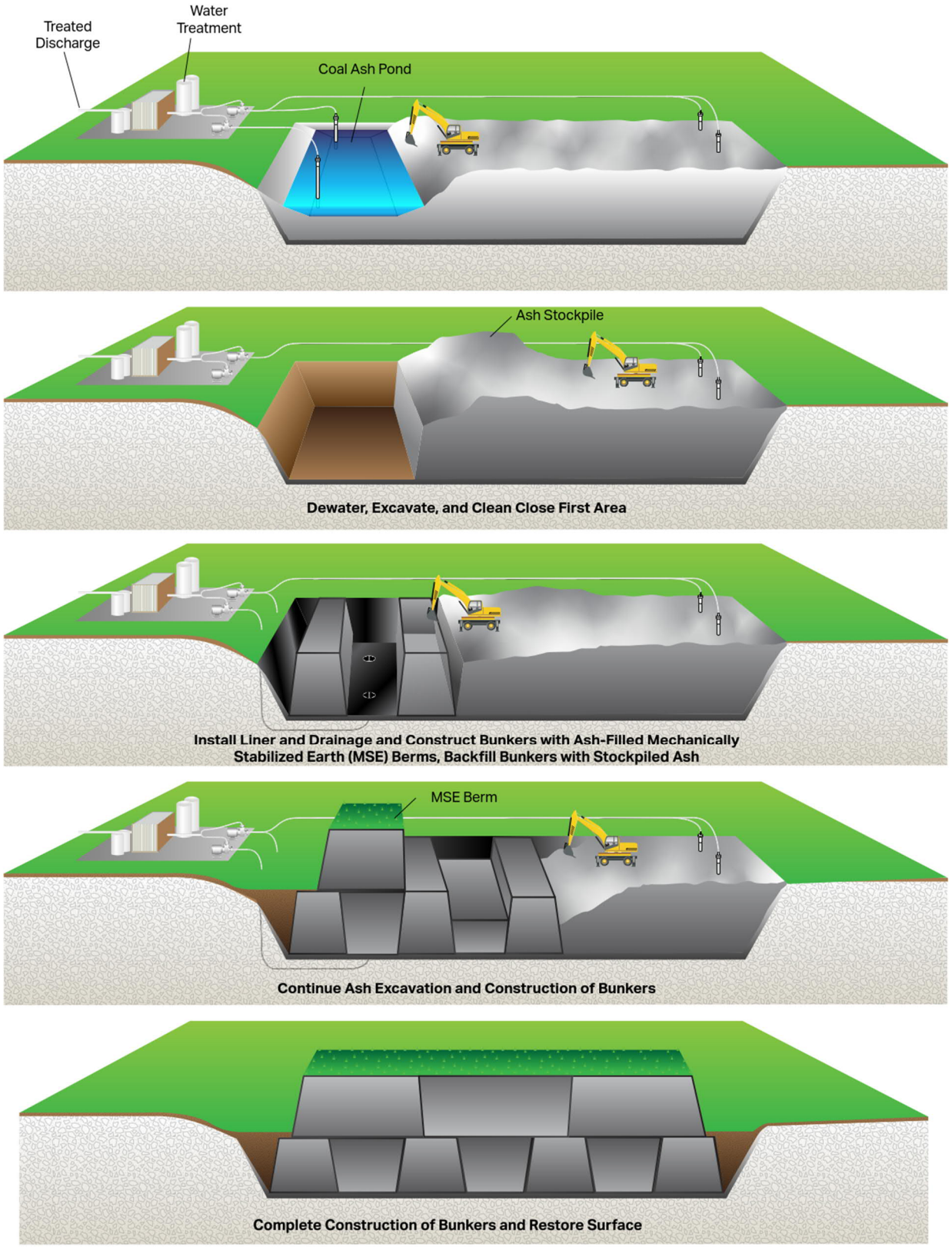

Exhibit 6: CCR Fill for MSE Berms and Lined Bunkers Process Flow Diagram

3.4.2 Krubera/Thalle Summary of Offering

Krubera Management Group, LLC / Thalle Construction Co., Inc. are proposing an alternative use approach to beneficially reuse CCR in an unencapsulated application as a structural fill, which is proposed to consist of amended CCR. Thalle submitted a prime bid for Bremo Power Station using Krubera's technology, and Krubera submitted as prime for Chesterfield and Possum Point Power Stations partnering with other civil construction firms. At all three sites, the bidders propose to beneficially use ponded CCR by constructing a patented "Total Protective Structure" which is proposed to serve as a secure structure for the data center market. The secure room building structure would be protected with a waterproof membrane, and then covered with 150 feet of CCR that is treated with quicklime and other materials to assist with binding of metals. A geosynthetic clay liner would be installed over the top of the CCR to prevent rainwater infiltration, followed by a vegetative soil cover. Structure sizes and locations are proposed as follows:

- Structure of unspecified footprint on property adjacent to the Bremo Power Station
- 600,000 square foot (SF) secure room on property adjacent to the Chesterfield Power Station
- 100,000 SF secure room on the Possum Point Power Station property adjacent to Ash Pond D

The offerings purport to be compliant with either encapsulated or unencapsulated beneficial use definitions of the CCR Rule, as the amended CCR material is proposed to be placed over the "Total Protective Structure" as a structural fill. Krubera believes that amending the CCR by adding quicklime and other materials (admixtures) will meet the CCR Rule encapsulation requirements; however, verifying this will require additional testing. The EPA considers CCR structural fills to be unencapsulated beneficial use and therefore a site-specific demonstration would be required to prove that all four criteria of the CCR Rule could be met. Specifically, the CCR Rule Beneficial Use third criterion prohibits CCR from being used in excess quantities (greater than necessary for a specific project); otherwise, the application is not a beneficial use, but rather disposal.

The bidder would need to reach an agreement with tenant(s) to build out, occupy, and lease the structure, and would also be responsible for the long-term use and ownership of the structure.

Table 6 provides a summary of CCR Rule beneficial use compliance criteria and whether Krubera's "Total Protective Structure" meets each of the criteria.

Table 6: Krubera CCR Rule Beneficial Use Compliance

CCR Beneficial Use Criteria	Does Bidder Meet Criteria?	Explanation
Provides a functional benefit	Yes	CCR structural fill used to produce a 150-foot high secure room structure
Substitutes for a virgin material, conserving natural resources	Yes	CCR substitutes for soil or aggregate as structural fill to construct the secure room
Meets product specifications, regulatory/ design standards (if available)	No relevant standards	General guidance available for CCR structural fills; however, no design standards available for this specific use
When standards are not available, not used in excess quantities	No	CCR structural fill proposed in greater quantities than necessary, when smaller quantities or non-CCR materials could be considered – the design for each secure room proposes to use all of the ash from the ponds (ranging from 4M to 14.9M CY) to construct 150-foot high structures
Encapsulated beneficial use binds CCR into a solid matrix that minimizes its mobilization into the surrounding environment	No	The EPA considers CCR structural fill to be unencapsulated beneficial use and requires a demonstration
Unencapsulated use requires demonstration	No demonstration	No demonstration that the amended CCR is as environmentally protective as equivalent products; testing and DEQ/EPA approval required

CCR = coal combustion residuals; M = million; CY = cubic yards; EPA = Environmental Protection Agency; DEQ = Department of Environmental Quality

Exhibit 7 shows a conceptual flow diagram of the proposed scope of work for Krubera's alternative to use amended CCR as structural fill to construct a secure room structure. This exhibit is conceptual in nature, intended to depict the general layout and construction flow for the proposed alternative use scenario.

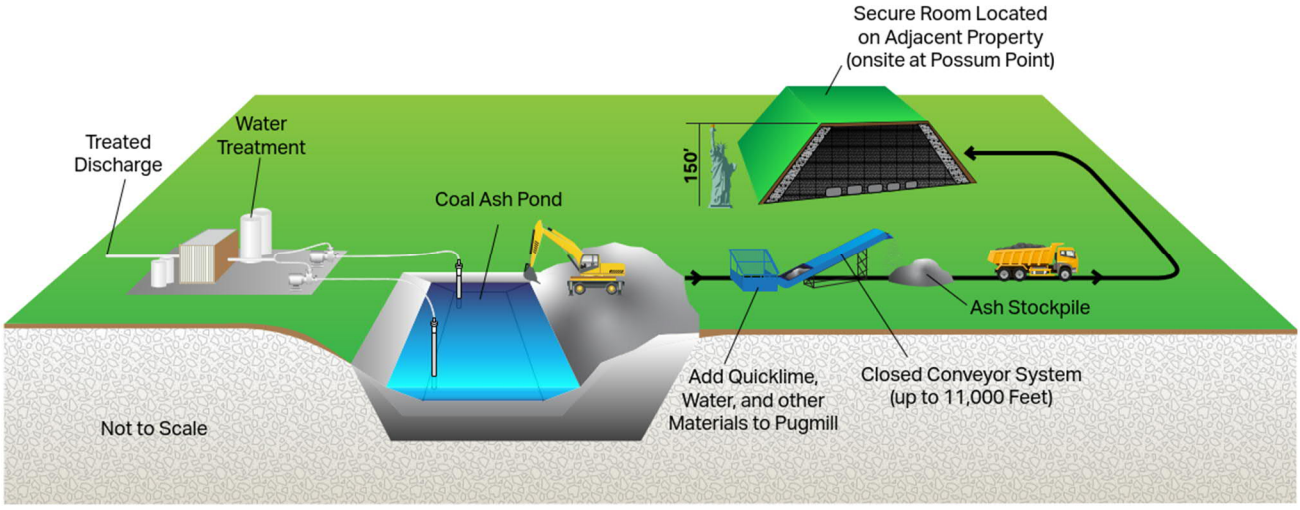

Exhibit 7: Amended CCR Fill for Secure Room Structure Process Flow Diagram

4. Summary of Recycling/Beneficial Use Bidder Responses

4.1 CCR Recycling/Beneficial Use Market Demand

The RFP asked for separate proposals for each individual power station, and also provided an opportunity for bidders to provide optional bids combining multiple stations. Three bidders provided proposals for a combination of multiple stations, with two bidders proposing to combine all four stations, and a third proposal combining either two or three power stations. These optimized approaches from established national ash beneficiation/marketing firms demonstrate the maximum regional product market for recycled/beneficiated ash. This includes the local market (generally defined as Virginia and a 200-mile radius from the power stations) and regional market (approximately 1,000 miles by rail or barge). Based on the responses from the bidders, the general quantity and geographic demand for recycled/beneficially used products in the market can be summarized in Exhibit 8.

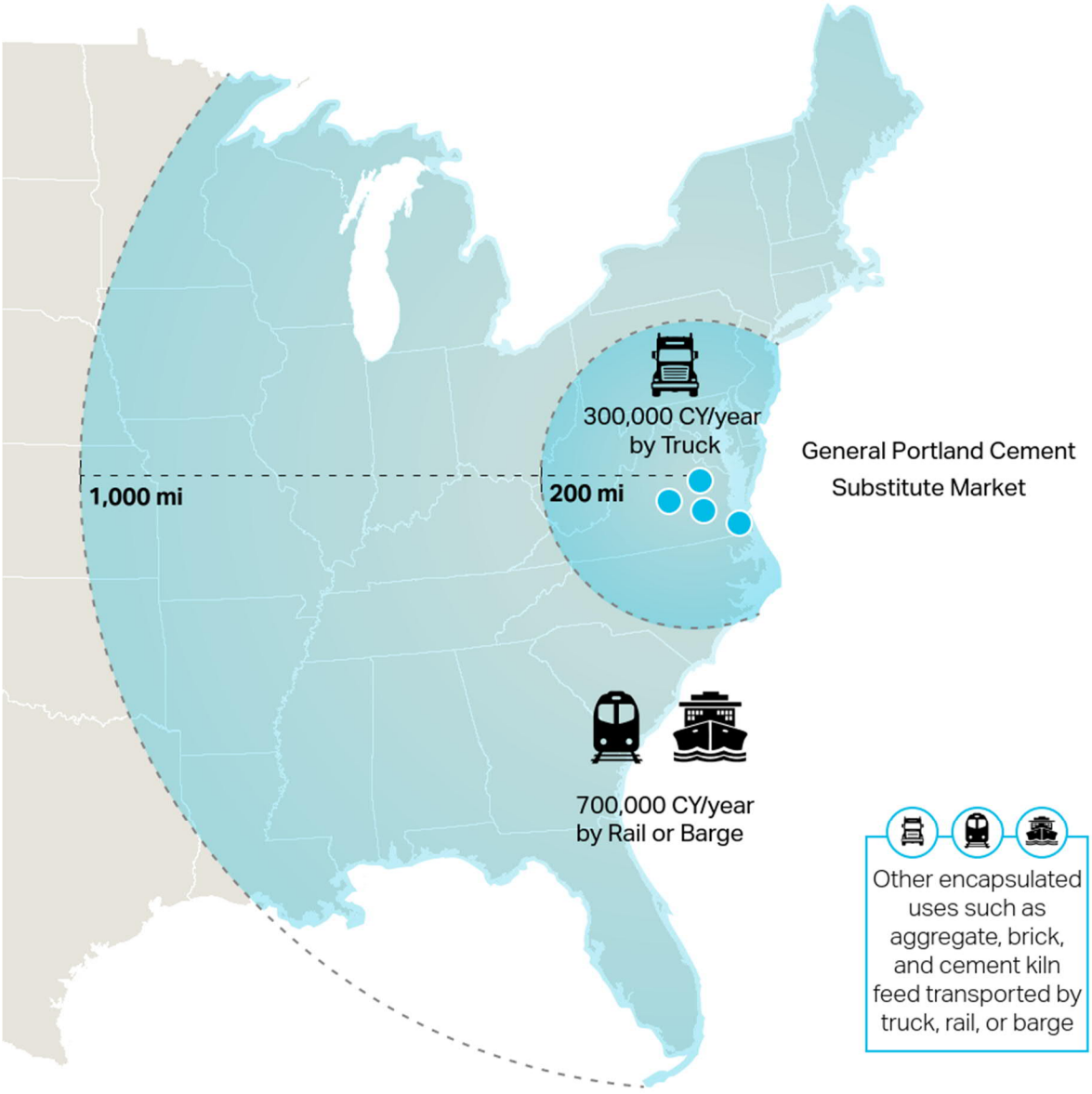

Exhibit 8: CCR Recycled Product Market Demand

Based upon the proposals received, the beneficiation firms will typically require Dominion to grant them exclusive rights for all of their ash when using it as a PC substitute. These rights prevent multiple firms from competing in the same marketplace with Dominion's ash, which could either drive the price down or oversupply the market (or both). Because of these rights, two firms manufacturing PC substitute could not be awarded beneficiation contracts. Rather, if multiple firms were to be awarded, they would have to provide different encapsulated products such as lightweight aggregate, direct cement kiln feed, brick pavers, etc. Several firms provided proposals that included a range of different beneficiated products at various power stations.

When analyzing current and anticipated demand, the bidders generally avoided the North and South Carolina markets due to the uncertain impact of product supply from CCR beneficiation facilities currently under construction by utilities in those states. Some South Carolina utilities are beginning to see a market impact due to PC substitute production in North Carolina.

The optional bid offerings that propose optimized production and marketing combined with minor price reductions if Dominion would award all four stations to the same bidder are summarized in Table 7. More details regarding these optional proposals are provided in Section 9.

Table 7: Bidder-Declared Maximum Annual Market Demand

Proposed End Product	Optional Bid #1 - Maximum Market Demand (CY of Recycled/ Beneficiated Ponded Ash per Year)	Optional Bid #2 - Maximum Market Demand (CY of Recycled/ Beneficiated Ponded Ash per Year)	Optional Bid #3 - Maximum Market Demand (CY of Recycled/Beneficiated Ponded Ash per Year)
Portland Cement Substitute	470,000	748,501	502,050
Cement Kiln Feed (Unprocessed Ash)	423,125	-	-
Cementitious Product – Brick, Block, Aggregate	-	273,125	-
Maximum Annual Totals (CY)	893,125	1,021,626	502,050
Project Totals (CY)	12,385,000[1]	12,664,000[2]	10,040,999[3]
Overall Pond Volume Recycled (%)	45%	46%	37%
Project Cost Range[4]	$2,118,944,855 to $2,583,295,888		
Project Cost/CY (Range)[4]	$77.66 to $150.49		
Project Duration (Years)	15	14	20[3]

CY = cubic yards

[1] Optional Bidder #1 proposes to produce PC substitute using approximately 470,000 CY annually for 8 years, then 421,428 CY for 7 more years; will also transport approximately 423,125 CY for direct cement kiln feed for 8 years, then 150,000 CY for 7 more years

[2] Optional Bidder #2 proposes to produce PC substitute for 14 years, and lightweight aggregate for 8 years

[3] Optional Bidder #3 proposes a PC substitute manufacturing process (thermal beneficiation) that would occur at a landfill owned by the bidder; bidder would also store CCR materials in a monofill cell at the landfill, proposed to be processed to create PC substitute for a 20-year duration

[4] All costs were provided by individual bidders and should be considered Class 4 estimates (+50%, -30%)

The following four bidders provided complete bids for CCR Rule compliant encapsulated beneficial use applications and are included in the data provided in the following sections:

- Boral Resources
- Charah, LLC
- ENTACT, LLC (partnered with RJ Smith Companies)
- Waste Management National Services, Inc. (partnered with The SEFA Group)

Table 8 provides the individual market demand for recycled/beneficially used CCR materials provided by the bidders for each of the four stations using the bidders' stand-alone pricing per station (assuming awards would be made on an individual station basis). The market demand is not additive/cumulative for all of the stations due to the finite local and regional market for recycled CCR products as described above, leading beneficiation firms to require Dominion to grant them exclusive rights for all of their ash in Virginia.

Table 8: Station-Specific Market Demand for Recycling/Encapsulated Beneficial Use Material

Power Station	CCR Facilities	Estimated CCR Volume (CY)	Minimum Annual Market Demand for Recycled Material (CY/Year)	Maximum Annual Market Demand for Recycled Material (CY/Year)
Bremo Power Station	North Ash Pond	6,200,000	189,429	620,000
Chesapeake Energy Center	Bottom Ash Pond/Historical Ash Pond/Landfill	2,185,000	102,564	273,125
Chesterfield Power Station	Lower/Upper Ash Ponds	14,900,000	376,143	449,544
Possum Point Power Station	Ash Pond D	4,000,000	102,564	571,428

CCR = coal combustion residuals; CY = cubic yards

4.2 Proposed Quantity of CCR Suitable for Recycling/Beneficial Use

Exhibit 9 shows the maximum portion of CCR material from Dominion's facilities that bidders declared could be recycled into an encapsulated beneficial use product, assuming they have exclusivity for the PC substitute component. For the purposes of this Business Plan, the remainder of the CCR that could not be beneficiated would be disposed of in landfills to achieve closure by removal. As discussed previously, closure by removal and recycling the CCR material is one of several options to close the ash ponds in compliance with the CCR Rule. The decision to recycle should be considered along with other alternatives, including closure-in-place (with groundwater remediation if necessary) or closure by removal and landfilling.

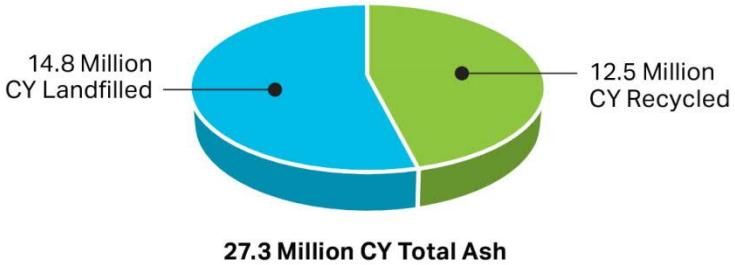

Exhibit 9: Maximum Quantity of CCR Recycled/Beneficially Use

4.3 Transportation Considerations

Bidders have proposed to transport recycled/beneficiated products to the market and CCR as waste to landfills using a combination of truck, rail, and barge options with a range of project durations, as summarized in Exhibit 10.

Power Station	Transportation Options	Vehicle Volume	Project Duration (Years)
Bremo Power Station		124 to 161 Trucks/day 270 Railcars/year	10 to 11 14
Chesapeake Energy Center		65 to 143 Trucks/day 20 Trucks/day + 67 Railcars/year Up to 5 Barges/year	5 to 11 11 10
Chesterfield Power Station		278 to 300 Trucks/day 34 Trucks/day + 260 Railcars/year 2,500 to 3,750 Railcars/year	15 13 15
Possum Point Power Station		105 to 114 Trucks/day 232 Railcars/year	7 to 11 10

Exhibit 10: Transportation Options

4.4 Cost of Recycling/Beneficial Use

Table 9 summarizes the cost range provided by bidders for recycling/beneficial use of CCR materials at each of the four individual stations.

Table 9: Cost of Recycling/Beneficial Use Project

Power Station	CCR Facilities	Estimated CCR Volume (CY)	Cost for Recycling Project per CY (Range) [1]	Total Estimated Project Cost Range[1]
Bremo Power Station	North Ash Pond	6,200,000	$45 - $151	$277M - $934M
Chesapeake Energy Center	Bottom Ash Pond/ Historical Ash Pond/Landfill	2,185,000	$89 - $206	$193M - $449M
Chesterfield Power Station	Lower Ash Pond	3,600,000	$75 - $146	$268M - $526M
	Upper Ash Pond	11,300,000	$71 - $154	$804M - $1,738M
Possum Point Power Station	Ash Pond D	4,000,000	$54 - $182	$216M - $727M

CCR = coal combustion residuals; CY = cubic yards, M = million

[1] Costs assume single station award and do not include optional bids for award of multiple power stations; costs are not additive/ cumulative for all stations; all costs provided by individual bidders and should be considered Class 4 estimates (+50%, -30%)

Costs are inclusive of the full scope of work required to complete the recycling/beneficial use project, incorporating both civil/construction and recycling/beneficial use tasks, to include ash excavation and preparation for recycling/beneficial use (dewatering with water treatment, excavation, drying, screening, transporting to the recycling process, etc.), recycling/beneficial use processing as required, distribution of the final product to the market, landfill disposal of CCR that is unable to be beneficiated, and regulatory closure of all CCR facilities. These proposals are based on executing each station individually; therefore, the individual station costs cannot be added together to determine an overall system-wide cost. Similarly, the recycling volumes/percentages for individual stations cannot be added for a total volume able to be recycled. Combinations of multiple stations are presented in Section 9.

As required by the RFP, bidders were directed to include revenue from sales of the beneficiated products in their pricing. Based on the level of design provided in the RFP packages, the available information provided to the bidders, the proposed recycling/beneficiation technologies, and the uncertainty of predicting construction and market pricing as much as 15 years into the future, the pricing provided by the bidders should be considered as Class 4 estimates (approximately +50%, -30%). Additionally, costs provided in this Business Plan are direct bidder prices and do not include Dominion costs for engineering and management of the projects.

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5. Bremo Power Station

The Bremo Power Station is located in Fluvanna County, VA at 1038 Bremo Bluff Road in Bremo Bluff. The station was first operational in 1931. In 2014, the Bremo Power Station converted its boilers from coal-fired to natural gas-fired and decommissioned the coal and coal ash handling infrastructure.

Three on-site surface impoundments (North Ash Pond, West Ash Pond, and East Ash Pond) are subject to the requirements of the CCR Rule. CCR materials are being consolidated in the North Ash Pond. Materials from the West Ash Pond have been transferred to the North Ash Pond, and CCR from the East Ash Pond is actively being moved to the North Ash Pond. Once the consolidation is completed, approximately 6.2 million CY of CCR will be stored in the North Ash Pond, which is impounded by an earthen berm approximately 96 feet tall and covers approximately 68 acres.

A summary of bid offerings provided for the Bremo Power Station is provided in Table 10, with individual bid offerings described in the following sections.

Table 10: Bremo Power Station Bidder Response Summary

Bid Offering Summary	Bremo North Ash Pond (6,200,000 CY)		
	Bidder #1	Bidder #2	Bidder #3
Process/Technology:	Thermal beneficiation	Thermal beneficiation	Thermal beneficiation
End Product:	PC replacement	PC replacement	PC replacement, direct cement kiln feed
Volume of CCR Recycled/ Beneficially Used (CY):	2,652,000	5,580,000	6,200,000
% of CCR to be Recycled/ Beneficially Used:	43%	90%	100%
Product Market for Recycled CCR (CY/Year):	189,429	452,855	620,000
Product Market for Recycled CCR (Tons/Year):	167,143	387,839	620,000
Geographic Product Market:	Boston, Louisiana, FL	Within 150 miles	VA, Northeast corridor, FL
Product Transportation Method:	Rail	Truck	Truck
# of Trucks/Railcars:	150 railcars/year	161 trucks/day	124 trucks/day
Project Duration (Years):	14	11[(1)]	10
Meets Duration Requirements?	Yes	Yes	Yes
CCR Unable to be Recycled in Timeframe			
Volume of CCR to be Landfilled (CY):	3,548,000	620,000	0
% of CCR to be Landfilled:	57%	10%	0%
Transportation Method to Landfill:	Rail	Truck	N/A
# of Trucks/Railcars:	120 railcars/year	Incl. in Product Transport[(2)]	0
Bid Pricing Summary[(3)]			
Bid Item A (Civil):	$249,886,867 to $635,903,577		
Bid Item B (Recycling):	$26,722,376 to $297,832,665		
Total Price (A+B):	$276,609,243 to $933,736,242		
Total Price/CY Pond Volume:	$44.61 to $150.60		

CCR = coal combustion residuals; CY = cubic yards; PC = Portland cement; N/A = not applicable; FL = Florida, VA = Virginia

(1) Bidder #2 proposes to continue to beneficiate CCR material stored in their offsite landfill for a total duration of 15 years

(2) Bidder #2 proposes to transport all CCR material to offsite landfill where beneficiation process will be co-located

(3) All costs provided by individual bidders and should be considered Class 4 estimates (+50%, -30%)

5.1 Bremo Bidder #1 Summary of Offering

Bidder #1 proposes to construct a thermal beneficiation plant on the Bremo Power Station property to recycle ponded CCR into a PC substitute. They propose to upgrade the onsite rail network by installing approximately 6,000 feet of new track and refurbishing approximately 3,000 feet of existing track to distribute the product to the market and waste to Subtitle D landfills in Illinois, Tennessee, or Georgia.

5.2 Bremo Bidder #2 Summary of Offering

Bidder #2 proposes to recycle ponded CCR into a PC substitute using thermal beneficiation, constructing the recycling plant on property that they own located within 50 miles of the Bremo Power Station. They plan to transport and store CCR material in a segregated monofill cell on the same property, proposing to continue processing recycled ash for a total duration of 20 years to maximize the recycled quantity. Beneficiated product will be shipped from the offsite beneficiation plant at a rate of 60 trucks per day. The costs to manage and beneficiate the ash beyond the 14-year duration of excavation and trucking are not included in this proposal, nor are any revenues generated from selling the final product beyond 14 years.

In order to optimize throughput and take advantage of the Washington, DC Metro market, they propose to screen and dry a portion of the ash at the offsite property and then truck that material to an existing thermal beneficiation facility in Maryland, which will process approximately 12,000 tons of dried ash per month.

5.3 Bremo Bidder #3 Summary of Offering

Bidder #3 proposes to construct a thermal beneficiation plant on the Bremo Power Station property to recycle ponded CCR into a PC substitute. The bidder proposes to produce 470,000 tons of PC substitute per year, while sending an additional 150,000 CY per year of unprocessed CCR as direct feed to a cement kiln. As all beneficial use product is proposed to be transported by truck, they anticipate upgrading the bridge on Route 656 immediately west of the site to accommodate truck traffic.

6. Chesapeake Energy Center

The Chesapeake Energy Center is located at 2701 Vepco Street, in the City of Chesapeake, VA, along the western bank of the South Branch of the Elizabeth River. All four coal-fired generation units were retired in 2014. There are three coal ash facilities located on a peninsula in the southern portion of the Chesapeake Energy Center. The 5-acre Bottom Ash Pond, which contains approximately 60,000 CY of CCR, is located just south of a 23-acre landfill that contains 975,000 CY of CCR. Temporary covers have been installed over both the lined landfill and the unlined Bottom Ash Pond, which were developed within the footprint of a historical 40-acre, unlined ash pond that houses approximately 1,150,000 CY of CCR.

A summary of bid offerings provided for the Chesapeake Energy Center is provided in Table 11, with individual bid offerings described in the following sections.

Table 11: Chesapeake Energy Center Bidder Response Summary

Bid Offering Summary	Chesapeake Bottom Ash Pond/Historical Pond/Landfill (2,185,000 CY)			
	Bidder #1	Bidder #2	Bidder #3	Bidder #4
Process/Technology:	Thermal beneficiation	Mix with cementitious binders and crush	Thermal aggregate manufacturing	None
End Product:	PC replacement	Lightweight aggregates for concrete	Ceramic lightweight aggregate	Direct cement kiln feed
Volume of CCR Recycled/ Beneficially Used (CY):	1,966,500	1,730,769	2,185,000	2,185,000
% of CCR to be Recycled/ Beneficially Used:	90%	79%	100%	100%
Product Market for Recycled CCR (CY/Year):	102,564	192,308	273,125	273,125
Product Market for Recycled CCR (Tons/Year):	87,739	250,000	239,687	273,125
Geographic Product Market:	Within 150 miles	Hampton Roads region	Local market, DC and Philadelphia	Florida
Product Transportation Method:	Truck	Truck, rail, or barge (TBD)	Truck local; rail DC/Philadelphia	Barge
# of Trucks/Railcars:	143 trucks/day	50 trucks/day	20 trucks/day; 67 railcars/year	TBD
Project Duration (Years):	5[(1)]	11	11	10
Meets Duration Requirements?	Yes	Yes	Yes	Yes
CCR Unable to be Recycled in Timeframe				
Volume of CCR to be Landfilled (CY):	218,500	454,231	0	0
% of CCR to be Landfilled:	10%	21%	0%	0%
Transportation Method to Landfill:	Truck	Truck	N/A	N/A
# of Trucks/Railcars:	Incl. in Product Transport[(2)]	15 trucks/day	0	0
Bid Pricing Summary[(3)]				
Bid Item A (Civil):	$86,958,708 to $365,199,027			
Bid Item B (Recycling):	$33,029,597 to $146,606,425			
Total Price (A+B):	$193,405,182 to $449,455,702			
Total Price/CY Pond Volume:	$88.51 to $205.70			

CCR = coal combustion residuals; CY = cubic yards; PC = Portland cement; TBD = to be determined; N/A = not applicable

(1) Bidder #1 proposes to continue to beneficiate CCR material stored in their offsite landfill for a total duration of 20 years

(2) Bidder #1 proposes to transport all CCR to offsite landfill location, where some of the CCR will be dried and transported to another beneficiation location

(3) All costs provided by individual bidders and should be considered Class 4 estimates (+50%, -30%)

6.1 Chesapeake Bidder #1 Summary of Offering

Bidder #1 proposes to recycle CCR from the Chesapeake Energy Center into a PC substitute using thermal beneficiation technology. They plan to transport ponded ash by truck to an owned landfill property located within 35 miles of the Chesapeake Energy Center, where they will screen and dry approximately 12,000 tons of ash per month, which will then be transported to an existing thermal beneficiation facility in Maryland. CCR material will be stored in a separate monofill cell at the landfill, and will continue to be dried and trucked to the Maryland thermal beneficiation facility for a total duration of 20 years. Product is expected to be transported from the beneficiation location at a rate of approximately 12 trucks per day. The costs to manage and beneficiate the ash beyond the 14-year duration of excavation and trucking are not included in this proposal, nor are any revenues generated from selling the final product beyond 14 years.

6.2 Chesapeake Bidder #2 Summary of Offering

Bidder #2 proposes to construct a recycling plant on the Chesapeake Energy Center site to produce a lightweight aggregate product that can be used as a substitute for crushed stone in concrete and other masonry products. The process mixes CCR with proprietary binders, encapsulating the ash into a cementitious product before being crushed into aggregate. The bidder states that the estimated production of 250,000 tons of aggregate per year represents less than 1% of the overall market total in the central Virginia and Hampton Roads areas. They plan to transport product by truck, rail, or barge (to be determined) and ship CCR waste by truck to a Subtitle D landfill in Virginia.

The offering appears likely to be compliant with the encapsulated beneficial use definitions of the CCR Rule as the production process includes mixing of CCR with cementitious materials to produce aggregate designed to meet the requirements of a VDOT # 57 aggregate, and includes secondary encapsulation into a concrete/masonry product. Additional testing will be necessary to verify that the product safely encapsulates the CCR in accordance with industry standards.

6.3 Chesapeake Bidder #3 Summary of Offering

Bidder #3 proposes to recycle CCR from the Chesapeake Energy Center into a lightweight aggregate using a high heat process in a rotary kiln to manufacture the product, which would be used as aggregate in a concrete mix, meeting the CCR Rule encapsulation definition. They propose to construct the recycling plant on the Chesapeake Energy Center property, and plan to upgrade the onsite rail network by installing approximately 9,800 feet of new track and refurbishing approximately 600 feet of existing track. They plan to distribute 67% of the product to the local market (within 200 miles) by truck, with the remainder of the product delivered to the Washington, DC and Philadelphia, Pennsylvania markets by rail.

6.4 Chesapeake Bidder #4 Summary of Offering

Bidder #4 proposes to recycle CCR from the Chesapeake Energy Center by sending it to a cement manufacturing plant in Florida as direct cement kiln feed. They propose to upgrade the onsite barge/dock systems and load CCR into covered barges using hoppers and conveyor belts to ship to Florida. They plan to get the marketable CCR designated as Beneficially Used Materials that would be exempt from the regulatory definition of a solid waste in Virginia in order to be transported by water.

7. Chesterfield Power Station

The Chesterfield Power Station is located at 500 Coxendale Road, Chesterfield, VA, approximately 20 miles south of Richmond, on the southern bank of the James River. The Chesterfield Power Station is a coal-fired power plant that started operations in 1944. Along with being the largest fossil-fueled power station in Virginia with four active coal combustion units, Chesterfield houses two combined cycle units that burn natural gas and distillate oil. In October 2017, the station converted its ash handling processes to generate dry fly ash, in preparation for ash pond closure.

Two on-site surface impoundments (Lower Ash Pond and Upper Ash Pond) are subject to the requirements of the CCR Rule. The 100-acre Lower Ash Pond was constructed in 1964 and the 112-acre Upper Ash Pond in 1983. Both ponds are unlined storage units that have received CCR and associated coal combustion process waste for disposal.

A summary of bid offerings is provided for the Chesterfield Power Station Lower and Upper Ash Ponds in Table 12, with individual bid offerings described in the following sections.

Table 12: Chesterfield Power Station Bidder Response Summary

Bid Offering Summary	Chesterfield Lower Ash Pond (3,600,000 CY) and Upper Ash Pond (11,300,000 CY)			
	Bidder #1	Bidder #2	Bidder #3	Bidder #4
Process/Technology:	Mix CCR with cementitious binders and crush	Thermal Beneficiation	Thermal beneficiation	Thermal beneficiation
End Product:	Lightweight aggregates for concrete/masonry products	PC Replacement	PC replacement	PC replacement, cement kiln feed
Volume of CCR Recycled/ Beneficially Used (CY):	5,000,000	7,723,850	5,252,000	6,743,160
% of Lower Ash Pond CCR to be Recycled/Beneficially Used:	0%	52%	100%	62%
% of Upper Ash Pond CCR to be Recycled/Beneficially Used:	44%	52%	15%	40%
Product Market for Recycled CCR (CY/Year):	384,615	422,645	376,143	449,544
Product Market for Recycled CCR (Tons/Year):	500,000	356,516	334,268	349,544
Geographic Product Market:	Richmond, Northern Virginia, North Carolina	Within 150 miles	Local market, Florida	Virginia, Northeast corridor, Florida
Product Transportation Method:	Truck or rail (TBD)	Truck	Truck and rail	Truck and rail
# of Trucks/Railcars:	100 trucks/day	278 trucks/day	34 trucks/day; 34 railcars/year	Trucks TBD; 10-15 railcars/day
Project Duration (Years):	15	15[1]	13	15
Meets Duration Requirements?	Yes	Yes	Yes	Yes
CCR Unable to be Recycled in Timeframe				
Volume of CCR to be Landfilled (CY):	9,900,000	7,176,150	9,648,000	8,156,840
% of CCR to be Landfilled:	66%	48%	65%	55%
Transportation Method to Landfill:	Truck	Truck	Rail	Trucks on site haul road
# of Trucks/Railcars:	200 trucks/day	Included in Product Transport[2]	226 railcars/ year	N/A
Lower Ash Pond Bid Pricing Summary[3]				
Bid Item A (Civil):	$175,583,467 to $513,227,108			
Bid Item B (Recycling):	$0 to $93,146,896			
Total Price (A+B):	$268,271,29 to $525,902,090			
Total Price/CY Pond Volume:	$74.52 to $146.08			
Upper Ash Pond Bid Pricing Summary[3]				
Bid Item A (Civil):	$683,722,591 to $1,445,826,703			
Bid Item B (Recycling):	$120,229,038 to $452,442,500			
Total Price (A+B):	$803,951,629 to $1,738,204,425			
Total Price/CY Pond Volume:	$71.15 to $153.82			

CCR = coal combustion residuals; CY = cubic yards; PC = Portland cement; TBD = to be determined; N/A = not applicable

[1] Bidder #2 proposes to continue to beneficiate CCR material stored in their offsite landfill for a total duration of 20 years

[2] Bidder #2 proposes to transport all CCR to offsite landfill location where beneficiation process will be co-located

[3] All costs provided by individual bidders and should be considered Class 4 estimates (+50%, -30%)

7.1 Chesterfield Bidder #1 Summary of Offering

Bidder #1 proposes to recycle ponded CCR from the Upper Ash Pond only into a lightweight aggregate product that can be used as a substitute for crushed stone in concrete or other masonry products. The process mixes CCR with proprietary binders, encapsulating the ash into a cementitious product before being crushed into aggregate. They propose to construct the recycling plant on the Chesterfield Power Station site, adjacent to the ash ponds. The bidder proposes to generate an estimated 500,000 tons of aggregate per year, which they state represents less than 1% of the overall market total in the central Virginia and Hampton Roads areas. They plan to transport product by truck or rail (to be determined) and ship CCR waste by truck to a Subtitle D landfill in Virginia.

The offering appears likely to be compliant with the encapsulated beneficial use definitions of the CCR Rule as the production process includes mixing of CCR with cementitious materials to produce aggregate designed to meet the requirements of a VDOT # 57 aggregate, and includes secondary encapsulation into a concrete/masonry product. Additional testing will be necessary to verify that the product safely encapsulates the CCR in accordance with industry standards.

7.2 Chesterfield Bidder #2 Summary of Offering

Bidder #2 proposes to recycle ponded CCR into a PC substitute using thermal beneficiation, constructing the recycling plant on property they own located within 30 miles of the Chesterfield Power Station. They plan to transport and store CCR material in a segregated monofill cell on the same property, proposing to continue processing recycled ash for a total duration of 20 years to maximize the recycled quantity. Beneficiated product will be shipped from the offsite beneficiation plant at a rate of 55 trucks per day. The costs to manage and beneficiate the ash beyond the 14-year duration of excavation and trucking are not included in this proposal, nor are any revenues generated from selling the final product beyond 14 years.

In order to optimize throughput and take advantage of the Washington, DC Metro market, they propose to screen and dry a portion of the ash at the offsite property and then truck that material to an existing thermal beneficiation facility in Maryland, which will process approximately 12,000 tons of dried ash per month.

7.3 Chesterfield Bidder #3 Summary of Offering

Bidder #3 proposes to construct a thermal beneficiation plant on the Chesterfield Power Station property to recycle ponded CCR into a PC substitute. The bidder proposes to upgrade the onsite rail network by installing approximately 38,500 feet of new track and refurbishing approximately 1,500 feet of existing track. They plan to distribute approximately 83% of the product to the local market (within 200 miles) by truck, with the remainder delivered to Florida by rail. Waste will also be transported by rail to landfills located in Illinois, Tennessee, or Georgia.

7.4 Chesterfield Bidder #4 Summary of Offering

Bidder #4 proposes to construct a thermal beneficiation plant on the Chesterfield Power Station property to recycle ponded CCR into a PC substitute. In order to complete the project within the 15-year CCR rule timeframe, they propose to use soil to construct an MSE wall within the existing ash landfill located adjacent to the power station on Reymet Road and then transport approximately 8 million CY of ponded ash to that landfill, concurrent with the recycling process. In order to expand the landfill, the bidder would be required to modify the Solid Waste Permit and the Chesterfield County CUP. The bidder also proposes

to send 100,000 tons per year of unprocessed ash to a cement kiln in Virginia as feed material. They propose to upgrade the onsite rail network or install a bypass line to a new small onsite railyard. They plan to distribute the product to the local market by truck, with product to destinations greater than 200 miles delivered by rail.

8. Possum Point Power Station

The Possum Point Power Station is located at 19000 Possum Point Road, Dumfries, VA (Prince William County), at the southern tip of Possum Point peninsula, adjacent to the western bank of the Potomac River and the northern bank of Quantico Creek. The station began operating in 1948 and ceased coal-burning operations in 2003; no CCR has been generated since that time. Two active units burn natural gas, one unit burns oil, and two additional combined cycle units burn a combination of natural gas and oil to generate power.

Five on-site surface impoundments (Ponds A, B, C, D, and E) are subject to the requirements of the CCR Rule. CCR materials have been substantially removed from four of the five ash ponds at the station (Ponds A, B, C, and E) and consolidated in clay-lined Ash Pond D, which was constructed in 1988 to replace an unlined ash pond at the same location. During construction, a slurry wall was installed as a barrier between the deposits of the pre-existing ash pond and the adjacent groundwater-bearing zone. Ash Pond D is lined with a low-permeability clay liner consisting of a compacted clay liner along the pond slopes and a clay bottom over the previous impoundment. Ash Pond D has an approximate footprint of 70 acres and is up to 120 feet deep, containing approximately 4 million CY of CCR materials.

A summary of bid offerings provided for the Possum Point Power Station is provided in Table 13, with individual bid offerings described in the following sections.

Table 13: Possum Point Power Station Bidder Response Summary

Bid Offering Summary	Possum Point Ash Pond D (4,000,000 CY)		
	Bidder #1	Bidder #2	Bidder #3
Process/Technology:	Thermal beneficiation	Thermal beneficiation	Electrostatic separation
End Product:	PC replacement	PC replacement	PC replacement, direct cement kiln feed
Volume of CCR Recycled/ Beneficially Used (CY):	2,000,000	2,561,000	4,000,000
% of CCR to be Recycled/ Beneficially Used:	50%	64%	100%
Product Market for Recycled CCR (CY/Year):	102,564	182,929	571,428
Product Market for Recycled CCR (Tons/Year):	91,759	167,143	571,428
Geographic Product Market:	Within 150 miles	Florida	Virginia, Northeast corridor, Florida
Product Transportation Method:	Truck	Rail	Truck
# of Trucks/Railcars:	105 trucks/day	103 railcars/year	114 trucks/day
Project Duration (Years):	11[(1)]	10	7
Meets Duration Requirements?	Yes	Yes	Yes
CCR Unable to be Recycled in Timeframe			
Volume of CCR to be Landfilled (CY):	2,000,000	1,439,000	0
% of CCR to be Landfilled:	50%	36%	0%
Transportation Method to Landfill:	Truck	Rail	N/A
# of Trucks/Railcars:	Included in Product Transport[(2)]	129 railcars/year	0
Bid Pricing Summary[(3)]			
Bid Item A (Civil):	$180,322,901 to $619,732,957		
Bid Item B (Recycling):	$35,201,434 to $225,495,833		
Total Price (A+B):	$215,524,335 to $726,878,776		
Total Price/CY Pond Volume:	$53.88 to $181.72		

CCR = coal combustion residuals; CY = cubic yards; MSE = mechanically stabilized earth; PC = Portland cement

(1) Bidder #1 proposes to continue to beneficiate CCR material stored in their offsite landfill for a total duration of 20 years

(2) Bidder #1 proposes to transport all material to offsite landfill location where beneficiation process will be co-located

(3) All costs provided by individual bidders and should be considered Class 4 estimates (+50%, -30%)

8.1 Possum Point Bidder #1 Summary of Offering

Bidder #1 proposes to recycle ponded CCR into a PC substitute using thermal beneficiation technology. They propose to screen and dry the ash at the Possum Point Power Station, and then transport the processed material by truck to an existing thermal beneficiation facility in Maryland. They would truck the remainder of the ash to an owned landfill property located approximately 100 miles from the Possum Point Power Station, where the CCR material will be stored in a separate monofill cell, and would continue to be dried and trucked to the Maryland thermal beneficiation facility for a total duration of 20 years. Beneficiated product will be shipped from the offsite beneficiation plant at a rate of 14 trucks per day. The costs to manage and beneficiate the ash beyond the 14-year duration of excavation and trucking are not included in this proposal, nor are any revenues generated from selling the final product beyond 14 years.

8.2 Possum Point Bidder #2 Summary of Offering

Bidder #2 proposes to construct a thermal beneficiation plant on the Possum Point Power Station property to recycle ponded CCR into a PC substitute. They propose to upgrade the onsite rail network by refurbishing approximately 7,000 feet of existing track in order to distribute the product to the market and transport waste to landfills located in Illinois, Tennessee, or Georgia.

8.3 Possum Point Bidder #3 Summary of Offering

Bidder #3 proposes to recycle ponded CCR into a PC substitute using electrostatic separation technology constructed on the Possum Point Power Station property. The bidder proposes to supplement the PC substitute market by trucking approximately 150,000 tons of unprocessed ash per year to a regional cement kiln as feed material.

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9. Optional Proposals for Multiple Power Stations

Three of the bidders provided an optional proposal to maximize the quantity of CCR that can be used to create encapsulated beneficial use products and placed into the market. Their offerings are described in the following sections.

9.1 Optional Proposal #1

Optional proposal #1 assumes that if all four sites were awarded to the bidder, they would recycle/ beneficiate all of the ponded CCR from Bremo, Chesapeake, and Possum Point to fulfill market needs in Virginia, the Northeastern United States, and Florida for both PC substitute and cement kiln feed. Product would be transported to the local market by truck and to regional markets by rail; closed-top barges will be used to transport CCR from Chesapeake to a cement kiln in Florida. To optimize production and the product market while completing closure at all ponds within the CCR Rule timeframe, the bidder plans to operate two recycling/beneficial use production facilities, one at Chesapeake for a seven-year duration, and the second at Bremo for eight years which will then move to Possum Point for an additional seven years.

At Chesterfield, the bidder proposes to increase the capacity of the Dominion landfill located on Reymet Road adjacent to the station by approximately 16 million CY in order to house the CCR from the Lower and Upper Ash Ponds and maintain the current permitted capacity for ash that continues to be produced by the power station. This would require design and permitting to construct MSE walls using soil to increase the landfill footprint by approximately 30 to 40 acres, and obtaining a variance to allow the setback between the landfill and the road to be reduced from 500 to 100 feet. The height of the expanded landfill would not exceed the current permit requirements. The bidder would need to modify the Solid Waste Permit and the Chesterfield County CUP to allow for placement of ponded ash in the landfill, expansion of the landfill, and trucking of the ash on public roads

Table 14 shows the proposed recycling production data for optional proposal #1, which will result in the recycling of 12,385,000 CY of ponded CCR (approximately 45% of the total volume across the four stations). This optimized approach provides an approximately 2.8% savings from the combined stand-alone station prices.

Table 14: Optional Proposal #1 for Multiple Stations

	Annual Production (CY of Ponded Ash)			Project Summary				
Power Station	PC Substitute (CY)	Kiln Feed (CY)	Total (CY)	Project Totals (CY)	Percentage of Pond Volume Recycled	Percentage of Pond Volume Landfilled	Transportation	Duration (Years)
Bremo Power Station	470,000	150,000	620,000	6,200,000	100%	0%	124 trucks/day	8
Chesapeake Energy Center	-	273,125	273,125	2,185,000	100%	0%	Up to 5 barges/year	7
Chesterfield Power Station[(1)]	-	-	-	-	0%	100%	Trucks onsite	15
Possum Point Power Station	421,428	150,000	571,428	4,000,000	100%	0%	114 trucks/day	7
Annual Total, Years 1-8	470,000	423,125	893,125					
Annual Total, Years 9-15	421,428	150,000	571,428					
PROJECT GRAND TOTALS				**12,385,000**	**45%**	**55%**		

CY = cubic yards

(1) If awarded all four stations, proposes to place all of the Chesterfield CCR material in the existing Reymet Road landfill adjacent to the station

(2) Combined price represents a 2.8% savings from the stand-alone station prices; all costs should be considered Class 4 estimates (+50%, -30%)

9.2 Optional Proposal #2

Optional proposal #2 assumes that if all four sites were awarded to the bidder, they would construct recycling/ beneficiation systems to produce PC substitute at Bremo, Chesterfield, and Possum Point over a 14-year duration to fulfill market needs in the regional market (within 200 miles of Chesapeake and Chesterfield); the Boston, Massachusetts area; and Florida. They would also construct a lightweight aggregate manufacturing system at Chesapeake to serve the regional (up to 200 miles, to include Washington, DC) and Philadelphia, Pennsylvania area markets, which would operate for approximately eight years. Product would be distributed to local markets by truck and regional markets by rail.

In order to complete the project within the 15-year CCR rule timeframe, the bidder proposes to transport approximately 14.6 million CY of ponded ash from Bremo, Chesterfield, and Possum Point by rail to Subtitle D landfills concurrent with the recycling process.

Table 15 shows the proposed recycling production data for optional proposal #2, which will result in the recycling of 12,664,000 CY of ponded CCR (approximately 46% of the total volume across the four stations). This proposal represents an approximately 6.7% savings from the combined stand-alone station prices.

Table 15: Optional Proposal #2 for Multiple Stations

	Annual Production (CY of Ponded Ash)			Project Summary				
Power Station	PC Substitute (CY)	Lightweight Aggregate (CY)	Total (CY)	Project Totals (CY)	Percentage of Pond Volume Recycled	Percentage of Pond Volume Landfilled	Transportation	Duration (Years)
Bremo Power Station	189,429	-	189,429	2,652,000	43%	57%	270 railcars/year	14
Chesapeake Energy Center	-	273,125	273,125	2,185,000	100%	0%	20 trucks/day + 67 railcars/year	11
Chesterfield Power Station	376,143	-	376,143	5,266,000	35%	65%	30 trucks/day + 260 railcars/year	13
Possum Point Power Station	182,929	-	182,929	2,561,000	64%	36%	232 railcars/year	10
Annual Total, Years 1-8	**748,501**	**273,125**	**1,021,626**					
Annual Total, Years 9-14	**748,501**	**-**	**748,501**					
PROJECT GRAND TOTALS				**12,664,000**	**46%**	**54%**		

CY = cubic yards

(1) Combined price represents a 6.7% savings from the stand-alone station prices; all costs should be considered Class 4 estimates (+50%, -30%)

9.3 Optional Proposal #3

The bidder that provided optional proposal #3 for the management of recycling/beneficial use for multiple power stations provided two optional bids, one that combines Chesterfield and Chesapeake, where they would only recycle/beneficiate CCR from Chesterfield, sending Chesapeake CCR to a landfill; the other bid combines Bremo, Chesapeake, and Possum Point, where they only propose to recycle/beneficiate CCR at Bremo and would landfill the CCR from the other two stations. They state that in any scenario they would only propose to construct one thermal beneficiation system in Virginia to produce PC substitute; this new system would be located off Dominion property. To complete the project within the 15-year CCR rule timeframe, the bidder proposes to transport and dispose of approximately 19 million CY of ponded ash by truck to Virginia Subtitle D landfills concurrent with the recycling process. As the recycling plant will be co-located with one of these landfills, they propose to continue processing recycled ash for a total duration of 20 years to maximize the recycled quantity. The costs to manage and beneficiate the ash beyond the 14-year duration of excavation and trucking are not included in this proposal, nor are any revenues generated from selling the final product beyond 14 years. All product and waste will be transported by truck.

In order to maximize throughput and take advantage of the Washington, DC Metro market, they also propose to screen and dry a portion of the ash at the newly constructed beneficiation system site and then truck that material to an existing thermal beneficiation facility in Maryland, which will process approximately 12,000 tons of dried ash per month.

Table 16 shows the proposed recycling production data for optional proposal #3, which will result in the recycling of 10,040,999 CY of ponded CCR (approximately 37% of the total volume across the four stations). As the Chesterfield/Chesapeake combination produces the highest total volume of recycled/ beneficiated CCR, that option is presented in this table.

Table 16: Optional Proposal #3 for Multiple Stations

	Annual Production (CY of Ponded Ash)		Project Summary				
Power Station	PC Substitute (CY)	Total (CY)	Project Totals (CY)	Percentage of Pond Volume Recycled	Percentage of Pond Volume Landfilled	Transportation	Duration (Years)
Bremo Power Station	N/A	N/A	N/A	0%	0%	N/A	-
Chesapeake Energy Center	-	-	-	0%	100%	Included with Chesterfield[(1)]	-
Chesterfield Power Station	502,050	502,050	10,040,999	84%	16%	421 trucks/day[(1)]	14
Possum Point Power Station	N/A	N/A	N/A	0%	0%	N/A	-
Annual Total, Years 1-18	**502,050**	**502,050**					
PROJECT GRAND TOTALS			**10,040,999**	**37%**	**N/A**		

CY = cubic yards; N/A = not available

Bidder #3 provided 2 optional bids – one for Chesterfield and Chesapeake, where they only recycle/beneficiate Chesterfield CCR and landfill Chesapeake; the other was for Bremo, Chesapeake, and Possum Point, where they only recycle/beneficiate Bremo and landfill the other two; the Chesterfield/Chesapeake combination produces the highest total volume of recycled/beneficiated CCR and is shown in this table

(1) Truck count includes both Chesapeake and Chesterfield and was not broken out by the bidder

(2) The total cost is only for two of the four stations, and excludes costs for closure by removal at Bremo and Possum Point Power Stations; all costs should be considered Class 4 estimates (+50%, -30%)

(3) The cost per CY accounts for the volume of ash at the two stations that were priced

10. Abbreviations

ACAA	American Coal Ash Association
CCR	coal combustion residuals
CFR	Code of Federal Regulations
CUP	Conditional Use Permit
CY	cubic yard(s)
DCR	Department of Conservation and Recreation
DEQ	Department of Environmental Quality
Dominion	Dominion Energy Virginia
EMR	Experience Modification Rate
EPA	Environmental Protection Agency
GA	General Assembly
LEAF	Leaching Environmental Assessment Framework
LEED	Leadership in Energy and Environmental Design
M	million
MSE	Mechanically Stabilized Earth
MW	megawatt
N/A	Not Applicable
PC	Portland Cement
OSHA	Occupational Safety and Health Administration
RFI	Request for Information
RFP	Request for Proposal
SB	Senate Bill
SF	square feet
VPDES	Virginia Pollutant Discharge Elimination System

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Appendix A:
Background and Supplementary Information

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A1 Recycling/Beneficial Use Solicitation Process

In March 2018, Dominion and AECOM began developing a solicitation process designed to obtain proposals from qualified contractors to determine the market for the recycling of ponded ash from Dominion's facilities, including the quantity of CCR materials suitable for recycling, the price for such recycling, and the actual market for the recycled materials. This process included identifying and informing qualified contractors; preparing comprehensive RFP packages with the goal of obtaining accurate, competitive pricing and market conditions; evaluating the information provided by the bidders; and summarizing the market-driven responses in this Business Plan. The solicitation process is described in the following sections.

In order to capture all of the lifecycle tasks and costs required to complete closure of the ash ponds by recycling/beneficial use, the full offering was defined as removing all of the CCR materials from one or more ash ponds and either recycling or disposing in a properly permitted landfill such that the ash pond meets the Federal CCR Rule Closure by Removal definition, 40 Code of Federal Regulations (CFR) 257, by 2034. In order to evaluate the viability and cost of recycling ponded ash, two primary components of a recycling project were identified: the materials handling/civil component of the work and the physical processing of the ash to obtain a recycled material. The civil components include dewatering with water treatment, excavation, drying, screening, transportation, loading, and/or any other handling requirements to get the ash to the recycling/beneficiation process. Additional civil components may include loading and transport of CCR that is unable to be recycled within the CCR Rule timeframe and restoration after final closure has been documented. The recycling portion of the project includes design, permitting, construction, furnishing, installing, operating, and maintaining of all buildings, systems, and infrastructure required to manufacture the recycled/beneficiated product, which must meet the Federal CCR Rule definition of encapsulated beneficial use. The recycling scope also includes the marketing, distributing, and selling of the final recycled product.

A1.1 Initial Outreach

A prospective bidder list was developed, to include firms known to have experience with recycling projects, and those who had expressed interest to members of the General Assembly or the Administration. Included on the list were recycling/beneficial use firms, civil contractors experienced in ash excavation/handling services, and specialty firms such as dewatering and water treatment contractors. Dominion also worked with the American Coal Ash Association (ACAA) to advertise the potential recycling/beneficial use project to its members, which include most regional and national contractors/firms involved or interested in management of CCR materials.

A dedicated email address (Recycling@aecom.com) was established on May 15, 2018, for communication with interested parties. The email was monitored on a daily basis and responses to questions were issued within two business days of receipt. The email address remained active for communication until the RFP package was issued, after which all prospective bidder communication was directed through Dominion Supply Chain management.

A1.2 Informational Meeting and Questionnaire

Dominion held an Informational Meeting on June 5, 2018, for suppliers and contractors interested in bidding on the potential excavation and recycling (beneficial use) of CCR from ash ponds. An

announcement of the Informational Meeting was sent via email on May 15, 2018, to prospective bidders and distributed to all ACAA members. Interested firms were asked to RSVP to attend, and attendance was limited to three personnel per firm.

Eighty-six individuals from 51 different firms attended the Informational Meeting as prospective bidders. Bidders received hard copies of a general information fact sheet, which included site maps for the ash ponds to be included in this project. Poster boards with the site maps were placed throughout the meeting room for reference. During the Informational Meeting, Dominion went through a presentation that provided a general project summary, presented basic information about each station and ash pond included in the potential project, and described the procurement process and schedule. The RFP structure and requirements were reviewed, along with the requirements for the Qualification Questionnaire. At the end of the presentation, Dominion responded to Contractor questions as appropriate. Contractors were also encouraged to submit written questions using the forms and boxes provided during the session, though no written questions were submitted at the time.

A follow-up Qualification Questionnaire was sent to all Informational Meeting invitees and attendees on June 6, 2018, as well as distributed electronically to ACAA members. Also provided were the meeting attendee list and a copy of the presentation. Contractors interested in being included in the ongoing RFP process were instructed to return the mandatory Section I – Pre-Screening Criteria by June 18, 2018. Completing Section II – Additional Information was optional, but highly encouraged to be returned with Section I submittals. Required Section I information included bidder contact data, information about the bidder's recycled end product including whether the product meets CCR Rule encapsulation requirements and resulting waste products. Optional Section II included information such as a description of the recycling process, anticipated environmental impacts and permit requirements, a statement of interest including which stations the bidder intended to bid and potential teaming arrangements, annual throughput and market demand data, space/layout/infrastructure requirements, and ash quality specifications for raw material into the recycling process.

Twenty-six suppliers returned Qualification Questionnaires indicating continued interest in bidding on this project. All 26 executed the follow-up Nondisclosure Agreement that was required by Dominion for issuance of RFPs. Based on the strong response of interest in bidding this project (at least 10 teams indicated a plan to bid the full scope at all four facilities), it was determined that bids would require a full-service offering for ash excavation and preparation for recycling/beneficial use (dewatering with water treatment, excavation, drying, screening, transporting to the recycling process, etc.), recycling/beneficial use processing, and distribution of the final product to the market.

A1.3 Request for Proposal

A full RFP package was developed to obtain accurate, competitive, and comparable pricing for the full scope of services, including the following documents:

- RFP Invitation Letter, including the following attachments:
  - Attachment A: Bid Form
  - Attachment B: Technical Specifications, with appendices including relevant permits, data, and site-specific information
  - Attachment C: Supplemental Terms and Conditions

  - Attachment D: Dominion Supplier Diversity Requirements
  - Attachment E: Contractor Safety Data Sheet
  - Attachment F: Supplier Information Form
  - Attachment G: Bidder Financial Evaluation Form
- Drawing set for each of the four stations

The RFP was issued to the 26 interested bidders on June 29, 2018, through a secure Dominion eRoom that was established for posting all RFP-related information.

As outlined on the Bid Form, the Base Bid is for a full-service offering to complete pond closure by removal of all CCR while maximizing recycling/beneficial use of CCR and sale in the market. Firms providing full-service offerings were also allowed to provide an optional bid proposition, as long as they provided a complete Base Bid. Optional bids required a detailed explanation of the scope, offering, pricing model, and any other details necessary to clearly demonstrate the benefits of the option.

Bidders were required to complete the Bid Form and the other Dominion forms as part of their bid response, along with providing a Project Plan for each facility that they are proposing. The Project Plan was intended to include project implementation strategies and Bidder's vision of how the project would progress from design and permitting through completion. Bidders were encouraged to describe how their unique experience would help this project avoid pitfalls that may have been experienced by others.

A1.4 Pre-Bid Meeting and Site Visits

A mandatory Pre-Bid Meeting was held for all prospective bidders on July 16, 2018, at the Chesterfield Power Station. Dominion personnel delivered a presentation that summarized the project scope and objectives, clarified bidder qualifications and requirements, described the procurement process and schedule, outlined proposal evaluation criteria and bid response requirements (including Project Plan requirements), and summarized the individual stations and ash ponds included in the project. Bidder questions were also answered as practical. Attendance included 57 personnel from 23 different firms.

Immediately following the Pre-Bid Meeting, site visits were held at each of the four stations: Chesterfield and Bremo Power Stations on July 16, Possum Point Power Station on July 17, and Chesapeake Energy Center on July 18. All 23 firms had representatives attend at least one of the site visits. Bidders were transported around the sites by Dominion-provided buses, including a tour of the ash ponds, potential laydown areas, and other site features, and Dominion representatives answered questions as appropriate. Bidders were asked to submit questions in writing to ensure that all bidders received the same information in written responses from Dominion.

Dominion also scheduled optional supplementary site visits to each site on the following schedule: Chesterfield on July 30, Bremo July 31, Possum Point August 1, and Chesapeake on August 2. Bidder feedback was used to determine the site visit agenda and areas viewed, with particular focus on ash ponds, potential laydown/recycling system construction areas, access roads, and existing transportation infrastructure such as rail spurs/sidings and barge docking/loading areas. Attendance included 16 personnel from 3 teams at both Chesterfield and Bremo, 11 personnel from 2 teams at Possum Point, and 15 personnel from 4 teams at Chesapeake.

A1.5 RFI Questions and Answers

Bidders submitted questions via Requests for Information (RFI) throughout the RFP process, with the final questions due to Dominion by August 17. Responses were issued on a weekly basis as received, with the final responses provided to bidders on August 31. A total of 115 RFI questions were asked and responded to, with an additional 12 Dominion clarifications provided to ensure that bidders were provided with consistent, clear direction to finalize their bid responses.

A1.6 Bid Responses

A total of 10 bidders provided responses to the RFP on September 14, 2018. A summary of bid responses is described within the body of this Business Plan.

A1.7 Bid Analysis Process

As part of the RFP development, the Dominion/AECOM team developed a process to review bidder proposals. In accordance with the RFP Invitation Letter, proposal evaluation criteria included the following items for "Bidder Proposals that are complete, credible, and timely on the basis of each Bidder's ability to work with Owner to develop a safe, reliable, and cost effective Project":

(a) Required Factors (Pass/Fail):

(i) Whether the proposed end product meets the Federal CCR Rule encapsulation requirements

(ii) Whether the Project meets the Federal CCR requirements as outlined in 40 CFR 257 and 261

(b) Additional Required Factors:

(i) Overall best value that complies with the Project Scope of Work

(ii) Safety Record and Safety Program – Proposals must demonstrate compliance with the following minimum safety requirements:

A. Contractor/subcontractor has a written safety & health program;

B. Contractor has an experience modification rate (EMR) of 1.0 or less for the current and each of the past three (3) years;

C. Contractor has an Occupational Safety and Health Administration (OSHA) Recordable Incidence Rate of 4.0 or less for the current and each of the past three (3) years;

D. Contractor has a OSHA Recordable DART Rate of 3.0 or less for the current and each of the past three (3) years;

E. Contractor has not been issued any Serious, Willful, or Repeat OSHA citations during the current year or past three (3) years; and

F. Contractor has no work related fatalities during the current year or past three (3) years.

(iii) Environmental Record and Environmental Program

(iv) Past experience with recycling/beneficiating coal ash and documentation of proven viability of the process/technology

(v) Demonstrated financial viability to perform the Project over the full lifespan

(vi) Ability to provide a full-service offering (self-perform or teaming arrangement)

(vii) Terms and Conditions Acceptance or Exceptions

(viii) Project Execution Criteria, including:

- Project Execution Team
- Project Plan to include:
  - Materials Handling Plan, including process throughput and distribution/transportation plan
  - Waste Management Plan, including quantities of ash that must be disposed of offsite
  - Labor Strategy
  - Risk Mitigation Strategy

Bidder responses were reviewed by a panel of Dominion and AECOM personnel consisting of representatives from the RFP project team, supply chain, operations, risk management, safety, environment, legal, finance, and transportation groups. The responses were aggregated by supply chain representatives and the panel convened to discuss this evaluation and determine follow-up questions/ responses needed from the bidders to clarify their technical and cost proposals. In-person, follow-up meetings were held with each of the responsive bidders between October 1 and 3, 2018, to discuss questions and solicit clarifications. A list of general questions was provided to the responsive bidders one week before the meetings, and specific follow-up questions were provided the following day. Bidders were given one week to provide written responses and any additional clarifications that could help the Dominion team understand the bid offerings and prepare this Business Plan.

A1.8 Business Plan

This Business Plan was prepared to summarize the information received from the bidders in response to Senate Bill (SB) 807, with submittal to the Governor; the General Assembly (GA), specifically the House Committee on Agriculture, Chesapeake and Natural Resources, the House Committee on Commerce and Labor, the Senate Committee on Agriculture, Conservation and Natural Resources, and the Senate Committee on Commerce and Labor; the DEQ; and the Department of Conservation and Recreation (DCR) by November 15, 2018.

A2 Description of Bid Offerings

In general, the two types of encapsulated recycling processes that may be appropriate for the ponded ash are the creation of a building/construction product such as brick or aggregate, and processing of the ash to meet fly ash standards for Portland cement (PC) substitute in concrete. Unprocessed ash can also be used as direct kiln feed for cement manufacturing.

The proposed methods for producing PC substitute include thermal beneficiation and combining thermal treatment with electrostatic separation. Cementitious product manufacturing processes include mixing the CCR with binders/reagents and thermal production of materials such as brick, block, or aggregate.

Bidders also provided alternative use solutions including the creation of a secure room structure built under 150 feet of chemically treated ash and the use of ash to create mechanically stabilized earth (MSE) berms proposed to either increase landfill capacity or to be used in conjunction with a liner system to create an encapsulated means of containing ash. The resulting MSE wall/encapsulation structure could then be used as a base for a solar farm or conventional beneficiation technology process plants, where the bidder defines the creation of reclaimed land as beneficial use. The bidder also proposes to use an MSE wall/encapsulation structure to temporarily store ponded ash for recycling/beneficial use processing beyond the 15-year ash pond closure timeline required by the CCR Rule.

General descriptions of these recycling/beneficiation processes are provided in the following sections, starting with traditional technologies that produce an end product for the market (thermal beneficiation, electrostatic separation, cementitious product manufacturing, cement kiln feed) and then describing the alternative use approaches of mechanically stabilized earth bunker construction and large structure (secure room) construction.

A2.1 Thermal Beneficiation

Thermal beneficiation uses heat/combustion to burn off carbon from the ash, increasing uniformity and particle fineness by releasing small particles that are trapped within the carbon matrix. The most widely proven technology for beneficiating CCR, thermal processes can also eliminate ammonia from the ash.

A2.2 Electrostatic Separation

Electrostatic separation exploits the differences in electrical properties between carbon (positively charged) and silicate (negatively charged) in ash. Electrodes of opposite charges attract and separate the particulates, which are then sent in different directions by a moving belt.

A2.3 Brick, Block, Aggregate Products

Due to the cementitious properties of CCR materials, coal ash can be used as primary material in manufacturing concrete/ceramic products such as blocks, bricks, permeable pavers, backer boards, and aggregate material. In one proposed thermal manufacturing process, the ponded ash would be mixed with other materials such as clay or shale and fired in a kiln or similar manufacturing process, resulting in an encapsulated end product that would be sold to the construction market. A second proposed thermal process uses a dryer and a high-temperature rotary kiln to convert the CCR into spherical pellets (ceramic aggregate material). A third proposed process involves mechanically mixing the CCR with binders/reagents to create a cementitious matrix, which would be crushed after curing to produce

lightweight aggregate materials. The bidder who proposes creating 150 foot secure room structures also plans to mechanically mix the CCR with binders/reagents to encapsulate the CCR materials.

A2.4 Cement Kiln Feed

Unprocessed CCR material can be used as an alternate raw material to be directly fed into the cement kiln manufacturing process. Based on available information, there is only one cement manufacturing plant (cement kiln) in Virginia (Roanoke Cement Company).

A2.5 Mechanically Stabilized Earth (MSE) Bunkers

Mechanically stabilized earth (MSE) is defined as soil constructed with artificial reinforcement. The bidders propose to use CCR materials as fill within MSE berms, although the process for reinforcing is not described within the proposals. The MSE berms would either be used to increase the operating capacity of Dominion's existing lined CCR landfill located on Reymet Road adjacent to the Chesterfield Power Station, or to create bunkers within current ash pond footprints to contain quantities of CCR material.

The bunker design includes a combination of MSE berms and liner materials that the bidder compares to constructing a lined landfill. CCR material would be removed from the ash pond in sections, and each section would be certified "clean" of ash before constructing a bunker in that area, after which ash would be placed within the bunker. Once completed, the full bunker system would be capped with a geomembrane liner, and the "reclaimed land" could then be used for proposed purposes such as a solar farm. The bidder also proposes using this bunker system at the Chesterfield Power Station for temporarily storing ash that could be beneficiated using conventional thermal technologies to produce a PC substitute without being subject to the 15-year CCR Rule timeline. For the Chesterfield project, they also propose to use the MSE berm concept to develop land on an adjacent property in order to construct conventional beneficiation process systems (thermal and paver/backer board/aggregate manufacturing plants).

A2.6 Secure Room Structures

One proposal was to construct secure rooms to be used as data centers/office space at onsite and/or offsite locations. The proposal includes a 100,000 to 600,000 square foot structure topped with a waterproofing membrane and then covered with a 150-foot mound of CCR blended with quicklime and other materials (admixtures). An HDPE or geosynthetic clay liner topped with one foot of soil and grass/vegetation would complete the structure.

A3 CCR Recycling/Beneficial Use Project Scope of Work

The RFP Invitation Letter defines the project as a "full-service offering to complete pond closure by removal of all CCR while maximizing recycling/beneficial use of CCR and sale in the market." The full offering at each facility includes removing all of the CCR materials from the ash ponds and either recycling or disposing in a properly permitted landfill such that the ash pond meets the Federal CCR Rule Closure by Removal definition by 2034. That scope generally includes the following tasks:

- Dewatering of the ash pond
- Treating the resulting water prior to discharge
- Excavating the ash
- Loading, hauling from the ash ponds to the beneficial use process area, and stockpiling CCR for the selected recycling/beneficiation process
- Processing the ash to make it suitable for recycling/beneficial use as required (e.g., drying, screening)
- Recycling and/or beneficiation of CCR materials using the selected technology/process
- Loading and transporting the recycled material to the market
- Disposal of unused or unsuitable CCR, recycling/beneficiation waste products, and CCR that is unable to be recycled/beneficiated within the 15-year CCR timeframe
- Excavation completed such that the ash pond meets the intent of the Federal CCR Rule Closure by Removal definition by 2034
- Regrading all impacted areas to promote positive drainage/sheet flow and performing site restoration, including vegetation

A flow diagram depicting the full scope of work required to complete the recycling/beneficial use project is provided in Exhibit 5 of this Business Plan, including Bid Item A (civil/construction scope) and Bid Item B (recycling/beneficial use scope) as defined in the RFP documents. General on-site activities are discussed below.

A3.1 Site Infrastructure to Support Removal Activities

To support the logistics of closure by removal, infrastructure would need to be constructed at each power station based on specific site constraints and chosen mode of off-site transportation. Infrastructure improvements could include on-site road networks, CCR staging areas, truck handling areas, rail yards for staging trains and loading rail cars, barge docking and support facilities, support areas, intersection improvements, traffic control measures, or other improvements based on site conditions.

A3.2 Dewatering and Water Treatment

Dewatering of the CCR impoundments and water treatment will be required to implement closure by removal for CCR recycling/beneficial use as well as landfill disposal. Dewatering will be necessary before and during excavation of CCR to remove free water (surface water) from the ash pond and interstitial (pore) water from CCR, and to control stormwater run-on/runoff and groundwater infiltration.

Dewatering would typically be implemented using a combination of deep wells to penetrate the full CCR thickness and temporary trenches to direct water to low points within the impoundments before CCR removal. Dewatering systems will also include a network of pumps, collection piping, temporary storage tanks, and transfer stations to gather water and pump it to a central location for treatment. Dewatering activities will likely be initiated before excavation work and will continue on a 24/7 basis or as long as necessary to ensure workable site conditions.

Water treatment will typically consist of pre-treatment storage, chemical mixing, suspended solids removal, pH adjustment, metals precipitation, solids handling, filtration, post-treatment storage, and discharge through a piping system and associated automation and controls. Depending on dewatering flow rates, water treatment may occur on a continuous or batch basis. Discharge parameters would be regulated through a Virginia Pollutant Discharge Elimination System (VPDES) permit.

A3.3 CCR Excavation

Closure by removal would involve removing accumulated CCR from the ash ponds such that no residual materials remain visible, followed by over-excavating the removal footprints by approximately 6 inches. Typically, the excavation is performed in successive benches to safely step down to the pond bottom depths. Excavation would be performed with excavators and other approved equipment as designated by a licensed contractor.

CCR excavation activities should be performed in compliance with the requirements of 29 CFR §§ 1926.651 and 1926.652 for excavation and trench safety. CCR remains stable when the water content of the excavated material is below 25%, allowing for tracked equipment, such as excavators and bulldozers, as well as rubber-tired off-road dump trucks to perform the excavation work safely.

Access to and egress from the excavation area is typically maintained through a series of ramps strategically placed to allow for continuous work.

A3.4 On-Site Materials Management

Once excavated, CCR would be loaded into off-road dump trucks and hauled from the excavation area on dedicated haul routes either to an on-site staging area within the current impoundment or a dedicated on-site stockpile area with proper containment, dust control, and water collection and treatment systems. On-site haul routes will likely need to be constructed or improved at each site to provide sufficient widths and turn radii for efficient and safe operation of large off-road dump trucks. Water trucks will be necessary onsite full time to reduce fugitive dust for the duration of hauling.

Mobile conveyor systems could also be used to transfer CCR on site depending on available space and site limitations. Conveyor systems may require additional dust control measures.

A3.5 Ash Processing

CCR materials typically require some processing prior to either being beneficiated or transported offsite, reducing the moisture content and/or material size. The CCR would typically be temporarily stockpiled to gravity drain and/or air dry to meet acceptable moisture content, typically between 25% and 35% moisture content for either beneficial use processing or transport offsite. Mechanical drying methods such as blades, discs, or dozers and excavators can also be used to turn and dry the material.

Wind rows, with water diversion channels, are also a standard method for drying CCR. Wind rows increase surface area exposed to the atmosphere and allow greater evaporation potential through exposure to wind and sun. Wind rows should be oriented to limit fugitive dust emissions. Wind-rowed CCR may require re-handling several times to rotate CCR for maximum drying potential and to achieve desired moisture content prior to loadout.

Some of the recycling/beneficiation processes that produce PC substitute or products such as brick or aggregate require the CCR to be screened to remove materials larger than a certain diameter. This process is typically performed using mechanical screening devices.

A3.6 Recycling/Beneficial Use Process

The scope of this proposed project involves maximizing the recycling/beneficial use of CCR currently stored in ash ponds. Recycling process systems could either be constructed on the power station property, or as proposed by several bidders on offsite properties owned by others. Recycling/beneficial use process technologies are described in Section A2.

Some of the bid offerings propose to use some or all of the CCR without treating or processing, such as transporting the material as a direct feed (raw product) in cement manufacturing processes, or placing the material within MSE berm bunkers.

A3.7 Loadout and Off-Site Transportation

Loadout and off-site transport will be performed for the following materials:

- Raw CCR sent offsite for recycling/beneficiation purposes, typically either thermal processing or as direct cement kiln feed
- Recycled product (PC substitute, brick, block, aggregate) transported to the market for sales and distribution
- CCR that cannot be recycled to be sent to a permitted offsite landfill

Transportation may be performed by truck, rail, or barge, depending upon the location and bid offering. Designated loadout areas would be established adjacent to truck, rail car, and/or barge staging areas for efficient loading operations. CCR would typically be loaded into trucks, rail cars, or barges using rubber-tired loaders or conveyors. Truck loadout would include an onsite one-way loop road to provide safe exit from the adjacent public road, and areas for stacking and loading trucks, replacing covers, weight scaling, tire washing, and safe re-entry to adjacent public road. Rail loadout would generally involve using new or existing rail sidings and spur tracks to receive empty unit trains (85 gondola cars), splitting unit trains into smaller groups of gondola cars for on-site handling using a locomotive, installing disposable liners and loading gondolas, re-assembling trains of filled gondola cars, and staging on the adjacent siding for pickup by a freight rail firm.

Barge loading would be performed based on the requirements of the shipping firm. Transporting ash by barge in Virginia must comply with 9VAC20-170, Transportation of Solid and Medical Wastes on State Waters, which requires use of watertight containers meeting strict specifications to prevent the release of wastes in the event of an incident. Containers must comply with the testing and certification requirements by the U.S. Coast Guard, including the International Convention for Safe Containers standards for ocean

shipping containers, and the American Bureau of Shipping general specifications for weather tightness, and all associated testing initially and at 6-month intervals thereafter. Transporting of recycled products by barge would not be subject to the same requirements.

A3.8 Landfill Disposal

Materials to be disposed of in an offsite landfill include CCR that is unsuitable for recycling/beneficial use, CCR materials that are unable to be recycled within the 15-year CCR Rule timeline, recycling/ beneficiation waste products, and water treatment waste. Materials would typically be placed in a lined, permitted municipal solid waste landfill, where CCR waste is managed separately in a monofill (segregated from other types of waste). In this way, the operations could be streamlined and concerns regarding landfill gas, vector control, and post-closure settlement normally associated with municipal solid waste landfilling could be avoided.

A3.9 Pond Closure and Restoration

Excavation will be completed such that the ash ponds meet the intent of the Federal CCR Rule Closure by Removal definition by 2034, to include excavation until visual determination that all ash has been removed, verification of visual removal by the DEQ, and six inches of over-excavation below the visually clean surface.

Restoration of the former ash ponds will include grading to promote positive drainage/sheet flow and installing vegetation and any other required erosion and sediment controls. The impoundment dams will be decommissioned and de-classified to remove them from regulatory oversight. This would involve breaching or completely removing the earthen embankment so that it can no longer impound water. Spillway structures could be abandoned in place by grouting or other approved means, or completely removed. Remaining soil removed from the embankments will be used to restore pre-development lines and grades and to promote efficient surface water runoff. Allowable slopes will be between 2% and 10% grade, and the graded surface will result in no impounded or standing water.

At the Chesapeake Energy Center and Chesterfield Power Station sites, minimum restoration elevations are required to maintain the final grades above floodplain levels, which will require importing of clean fill materials.

Restoration activities will result in a site that requires minimum long-term maintenance. Establishment of vegetation, restoration of effective surface water conveyance, and providing for erosion and sediment control are key elements of any restoration project.

A4 CCR Recycling/Beneficial Use Project Scope of Work

The RFP process described in this Business Plan was intended to refine the recycling cost estimates and options that were evaluated during the previous study completed in November 2017 (presented in the *SB 1398 CCR Ash Pond Closure Assessment Report*). A comparison of the cost estimates for full-scope recycling projects at each power station is provided in Exhibit A1.

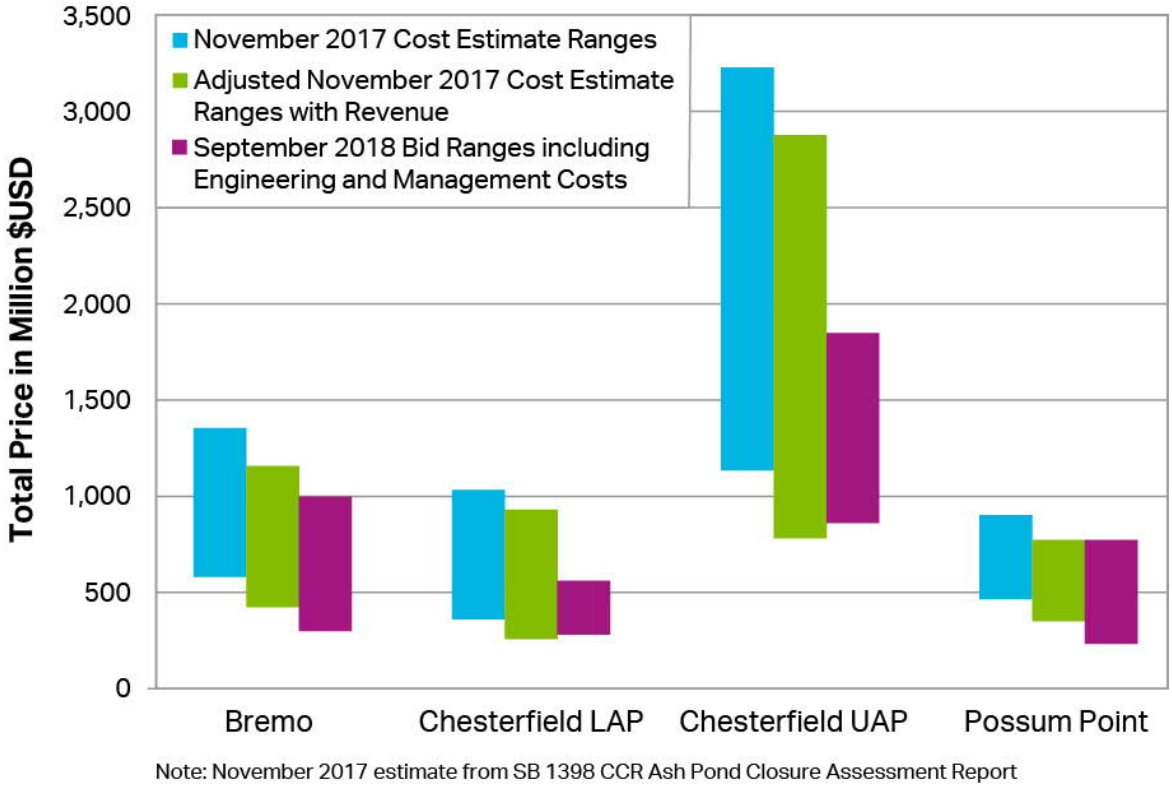

Exhibit A1: Comparison of Cost Estimates

As stated in the SB 1398 Report, the November 2017 estimates were Class 5 estimates (+100%, -50%) that included contingency and other costs "to reflect potential market values for the corresponding closure options over their full durations. The estimates are preliminary and represent AECOM's opinion of the probable costs based on information available at the time of this study. Actual costs may vary significantly if market conditions and pricing assumptions change." The beneficial use cost estimates were based on the assumption of 100% recycling of all CCR materials from each ash pond, with no time limitation and no landfill disposal included. Project durations were estimated to be up to 27 years at Bremo, 53 years at Chesterfield, and 17 years at Possum Point, with annual escalation adding significant additional costs beyond the 15-year maximum duration assumed by the bidders in the September 2018 costs. 2017 estimates also excluded transportation of the product and revenue generated from product sales. The Chesapeake Energy Center is not included in this comparison as the 2017 project only considered the 60,000 CY Bottom Ash Pond at that facility.

The costs provided in this Business Plan require regulatory closure of the ash ponds within 15 years, including landfill disposal of CCR materials that are unable to be recycled within that timeframe. They are considered Class 4 estimates (approximately +50%, -30%).

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