April 23, 2019

BY HAND DELIVERY

Joel H. Peck, Clerk
c/o Document Control Center
State Corporation Commission
1300 East Main Street
Richmond, Virginia 23219

Re: Petition of Virginia Electric and Power Company
For approval of a rate adjustment clause designated
Rider E, for the recovery costs incurred to comply
with state and federal environmental regulations
pursuant to § 56-585.1 A 5 of the Code of Virginia
Case No. PUR-2018-00195

Dear Mr. Peck:

Please find enclosed for filing in the above-referenced case, an original and one copy of
the public redacted version of the Direct Testimony and Exhibits of Scott Norwood on behalf of
the Office of the Attorney General’s Division of Consumer Counsel. Material designated by the
Applicant to be Confidential or Extraordinarily Sensitive has been redacted in accordance with the
Commission’s Rule 5 VAC 5-20-170. An un-redacted version is being filed under seal, under
separate cover.

Thank you for your assistance in this matter.

Yours truly,

[Signature]

Katherine C. Creef
Assistant Attorney General

cc: Service List
CERTIFICATE OF SERVICE

I hereby certify that on this 23rd day of April 2019 a true copy of the foregoing was delivered by hand or mailed, first-class, postage prepaid, to the following:

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COMMONWEALTH OF VIRGINIA
STATE CORPORATION COMMISSION

PETITION OF
VIRGINIA ELECTRIC AND POWER COMPANY

For approval of a rate adjustment clause designated Rider E, for the recovery of costs incurred to comply with State and federal environmental regulations pursuant to § 56-585.1 A 5 e of the Code of Virginia Code

CASE NO. PUR-2018-00195

DIRECT TESTIMONY

OF

SCOTT NORWOOD

ON BEHALF OF
THE OFFICE OF THE ATTORNEY GENERAL
DIVISION OF CONSUMER COUNSEL

PUBLIC VERSION

APRIL 23, 2019
I address the results of Consumer Counsel’s review of Dominion’s application requesting approval of a rate adjustment clause designated as Rider E to recover projected and actual costs of certain projects ("Environmental Projects") necessary to comply with state and federal environmental regulations at the Chesterfield, Clover and Mt. Storm coal-fired generating stations pursuant to §56-585.1A 5 e of the Code of Virginia. My primary findings and conclusions are as follows:

- Dominion’s proposed Rider E charge is expected to result in a $2.15 monthly bill increase to residential customers, based on 1,000 kWh of usage.
- It is my understanding that the Company must show that the costs it is seeking recovery of under Rider E were necessary to comply with federal or state environmental laws or regulations applicable to generating facilities used to serve a utility’s native load obligation, and that such costs were reasonably and prudently incurred.
- The Chesterfield Integrated Ash ("CHIA") Project represents approximately 81% of the total cost of the Environmental Projects which Dominion seeks to recover through its proposed Rider E. The CHIA Project involved the retrofit of environmental systems to transport, treat and store ash and other pollutants produced from the continued operations of four relatively old cold-fired generating units at the Chesterfield Generating Station.
- My review indicates a number of serious deficiencies in Dominion’s decision-making related to the CHIA Project. These deficiencies included: 1) failing to evaluate alternatives before initially proceeding with the Project in June of 2015; 2) failing to maintain documentation to confirm the reasonableness of the evaluations that were conducted to support initiating and continuing the CHIA Project; and 3) failing to adequately consider the significant economic and environmental risks to continued operation of the Chesterfield coal units that existed at the time the Company’s decisions were made to proceed with the CHIA Project, and thereafter when PJM market prices continued to fall. As a result of these multiple decision-making failures, the Company’s $247 million CHIA Project will likely provide little or no value to customers since the Company has recently announced the planned retirements of Chesterfield Units 3 and 4 in 2020, and because it appears that Chesterfield Units 5 and 6 may also be retired by 2023.
- I conclude that it was imprudent for Dominion to pursue the CHIA Project related to Chesterfield Units 3 and 4 and I recommend that these costs be disallowed.
- I conclude that it may have been imprudent for Dominion to pursue the CHIA Project related to Chesterfield Units 5 and 6. I recommend that the Commission consider a disallowance of costs incurred on the CHIA Project after 2016, which have not been justified by Dominion, and that the Commission order the Company to prepare and maintain detailed modeling data necessary to support any future major environmental investments and present that data with all applications for cost recovery of such investments.

Public Version
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*Public Version*
I. INTRODUCTION

Q. PLEASE STATE YOUR NAME, TITLE, AND BUSINESS ADDRESS.
A. My name is Scott Norwood. I am President of Norwood Energy Consulting, L.L.C. My
business address is P.O. Box 30197, Austin, Texas 78755-3197.

Q. WHAT IS YOUR OCCUPATION?
A. I am an energy consultant specializing in the areas of electric utility regulation, resource
planning, and energy procurement.

Q. PLEASE SUMMARIZE YOUR EDUCATIONAL BACKGROUND AND
PROFESSIONAL EXPERIENCE.
A. I am an electrical engineer with over 35 years of experience in the electric utility
industry. I began my career as a power plant engineer for the City of Austin’s Electric
Utility Department where I was responsible for electrical maintenance and design
projects for the City’s three gas-fired power plants. In January 1984, I joined the staff of
the Public Utility Commission of Texas, where I was responsible for addressing resource
planning, fuel, and purchased power cost issues in electric rate and plant certification
proceedings before the Texas Commission. Since 1986 I have provided utility regulatory
consulting, resource planning, and power procurement services to public utilities, electric
consumers, industrial interests, municipalities, and state government clients. I have
tested in over 200 utility regulatory proceedings over the last 20 years, before state
regulatory commissions in Alaska, Arkansas, Florida, Georgia, Illinois, Iowa, Kentucky,
Louisiana, Michigan, Missouri, New Jersey, Ohio, Oklahoma, Texas, Virginia,
Washington, and Wisconsin.¹

Q. ON WHOSE BEHALF ARE YOU TESTIFYING IN THIS CASE?

¹ See Exhibit SN-1 for additional details on my background and experience.

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Q. HAVE YOU PREVIOUSLY TESTIFIED BEFORE THE STATE CORPORATION COMMISSION?
A. Yes. I have testified on behalf of Consumer Counsel in numerous past regulatory proceedings before the Virginia State Corporation Commission ("Commission"), including cases that involved electric restructuring, base rate, fuel recovery, power plant certification, and demand-side management matters. I have testified on behalf of Consumer Counsel in such cases involving Virginia Electric and Power Company, d/b/a Dominion Energy Virginia ("Dominion" or "Company").

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?
A. The purpose of my testimony is to present my findings and recommendations regarding Dominion's request for approval of rate adjustment clause to recover costs incurred to comply with state and federal environmental regulations ("Rider E") pursuant to §56-585.1 A 5 e of the Code of Virginia ("Application").

Q. HAVE YOU PREPARED ANY EXHIBITS TO SUPPORT YOUR TESTIMONY?
A. Yes. I have prepared 10 exhibits, which are attached to my testimony.

II. DOMINION'S RIDER E PROPOSAL

Q. PLEASE DESCRIBE DOMINION'S PROPOSED RIDER E.
A. Dominion’s Application requests approval of a rate adjustment clause designated as Rider E to recover projected and actual costs of certain projects ("Environmental Projects") necessary to comply with state and federal environmental regulations at the Chesterfield, Clover and Mt. Storm coal-fired generating stations pursuant to §56-585.1 A 5 e of the Code of Virginia. The costs requested by Dominion include actual costs to close existing ash ponds at the three plants, as well as actual and projected costs associated with new projects and related asset retirement obligations ("ARO") to

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continue to operate coal-fired generating units in compliance with environmental laws and regulations.

Q. WHAT IS THE TOTAL ESTIMATED COST OF THE ENVIRONMENTAL PROJECTS WHICH DOMINION SEEKS TO RECOVER THROUGH PROPOSED RIDER E?

A. As summarized in Table 1, the total estimated cost of the Environmental Projects is $302.5 million, excluding financing costs. As noted below, the Chesterfield Station projects represent approximately $247 million (81.6%) of the total investment for the Environmental Projects addressed by Dominion’s Rider E application.

<table>
<thead>
<tr>
<th></th>
<th>Cost</th>
<th>% of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chesterfield Station</td>
<td>$246.9</td>
<td>81.6%</td>
</tr>
<tr>
<td>Mt. Storm Station</td>
<td>$48.0</td>
<td>15.9%</td>
</tr>
<tr>
<td>Clover Station</td>
<td>$7.6</td>
<td>2.5%</td>
</tr>
<tr>
<td>Environmental Projects</td>
<td>$302.5</td>
<td></td>
</tr>
</tbody>
</table>

Q. WHAT ARE THE LAWS AND REGULATIONS THAT GAVE RISE TO THE ENVIRONMENTAL PROJECTS ADDRESSED BY DOMINION’S APPLICATION?

A. The environmental projects at issue were undertaken to comply with the United States Environmental Protection Agency’s (“EPA”) Coal Combustion Residuals Rule (“CCR”), which became effective on October 4, 2016, and was subsequently

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2 Sources for costs are the Direct Testimony of Dominion witness Mitchell, at 7-8, and the Direct Testimony of Dominion witness Boyd, at 10.

incorporated into Virginia’s Solid Waste Management Regulations (“SWMR”) on April 3, 2017. The CCR established new standards that require closure of existing ash ponds that are unsafe, exceed established groundwater protection standards, or are located in areas that threaten aquifers. The CCR also established standards for design and operation of new ash storage facilities that are required for continued operations of coal-fired generating facilities.

In addition to the CCR, certain of the projects addressed by Dominion’s Rider E application were required to comply with provisions of the EPA’s Steam Electric Power Generating Effluent Guidelines (“Effluent Guidelines”) promulgated under the federal Clean Water Act (“CWA”), which have been incorporated into the Virginia State Water Control Board’s Virginia Pollutant Discharge Elimination System (“VPDES”) Permit regulations. These Effluent Guidelines prohibit the discharge of waters that were previously used to transport ash and air pollution control wastewaters to ash ponds, which effectively eliminated the use of ash ponds for water treatment prior to discharge.

Q. WHAT IS THE AGE AND OPERATING HISTORY OF THE CHESTERFIELD, MT. STORM AND CLOVER GENERATING STATIONS?
A. The age and operating history of the Chesterfield, Mt. Storm and Clover coal units at which the Environmental Projects were installed is presented in Table 2 below. As shown, the Chesterfield coal units are generally older and the Clover and Mt. Storm units and were operated during 2018, the year after the Environmental Projects were completed and placed in-service. I will address Dominion’s justification for investing such a large amount for environmental retrofits on the relatively old and Chesterfield coal units later in my testimony.

4 9 VAC 20-81-800 to-820 (2019).
5 Direct Testimony of Dominion witness Taylor, at 4-5.
7 9 VAC 25-31 -30 (2019).
Table 2

Age, Capacity Ratings and Operating Performance of Chesterfield, Clover and Mount Storm Coal Units

<table>
<thead>
<tr>
<th></th>
<th>Capacity Rating, MW</th>
<th>Commercial Operations Date</th>
<th>Age of Unit</th>
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<tbody>
<tr>
<td>Chesterfield 3</td>
<td>98</td>
<td>1952</td>
<td>66</td>
</tr>
<tr>
<td>Chesterfield 4</td>
<td>163</td>
<td>1960</td>
<td>58</td>
</tr>
<tr>
<td>Chesterfield 5</td>
<td>336</td>
<td>1964</td>
<td>54</td>
</tr>
<tr>
<td>Chesterfield 6</td>
<td>620</td>
<td>1969</td>
<td>49</td>
</tr>
<tr>
<td></td>
<td>1,267</td>
<td></td>
<td>57</td>
</tr>
<tr>
<td>Clover 1</td>
<td>440</td>
<td>1995</td>
<td>23</td>
</tr>
<tr>
<td>Clover 2</td>
<td>447</td>
<td>1996</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>887</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mount Storm 1</td>
<td>554</td>
<td>1965</td>
<td>53</td>
</tr>
<tr>
<td>Mount Storm 2</td>
<td>555</td>
<td>1966</td>
<td>52</td>
</tr>
<tr>
<td>Mount Storm 3</td>
<td>520</td>
<td>1973</td>
<td>45</td>
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<td>1,629</td>
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[BEGIN CONFIDENTIAL]

<table>
<thead>
<tr>
<th></th>
<th>2018 Capacity Factor</th>
<th>2018 Heat Rate MMBtu/MWh</th>
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<tbody>
<tr>
<td>Chesterfield 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chesterfield 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chesterfield 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chesterfield 6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clover 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clover 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mount Storm 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mount Storm 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mount Storm 3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

[END CONFIDENTIAL]

Q. WHAT IS THE TOTAL REVENUE REQUIREMENT THAT DOMINION SEEKS TO RECOVER THROUGH RIDER E IN THIS CASE?
A. Dominion is requesting a total revenue requirement of $113.6 million to be recovered through Rider E for the rate year beginning November 1, 2019. This amount includes a Projected Cost Recovery Factor amount of $94.6 million and an AFUDC Cost Recovery Factor of $19.0 million.

Q. WHAT IS THE ESTIMATED IMPACT OF DOMINION’S PROPOSED RIDER E ON RESIDENTIAL CUSTOMERS?
A. Dominion’s proposed Rider E charge is expected to result in a $2.15 monthly bill increase to residential customers, based on 1,000 kWh of usage.

8 Direct Testimony of Dominion witness Taylor, at 5-6.
9 SN-10 (Dominion’s responses to OAG 2-3 and OAG 2-5(confidential)).
10 Direct Testimony of Dominion witness Givens, at Summary.
11 Dominion’s Application, at 7.
Q. WHAT IS YOUR UNDERSTANDING OF THE STANDARDS FOR APPROVAL OF COSTS THAT MAY BE COLLECTED UNDER RIDER E?
A. It is my understanding that the Company must show that the costs it is seeking recovery of under Rider E were necessary to comply with federal or state environmental laws or regulations applicable to generating facilities used to serve a utility’s native load obligation, and that such costs were reasonably and prudently incurred.

III. PRUDENCE OF CHESTERFIELD INTEGRATED ASH PROJECT

Q. WHAT ARE THE COSTS THAT DOMINION SEeks TO RECOVER FOR THE CHESTERFIELD INTEGRATED ASH ("CHIA") PROJECT?
A. Dominion is requesting recovery of projected and actual costs associated with approximately $247 million the Company invested for the CHIA Projects, as summarized in Table 3 below.

Table 3
Estimated Cost of CHIA Projects
($Millions, Excluding Financing Costs)\(^{12}\)

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
<th>% of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wet-to-Dry Conversion</td>
<td>$124.2</td>
<td>50.3%</td>
</tr>
<tr>
<td>Ash Landfill and Haul Road</td>
<td>$66.8</td>
<td>27.1%</td>
</tr>
<tr>
<td>Low Volume Water Treatment</td>
<td>$55.9</td>
<td>22.6%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$246.9</strong></td>
<td></td>
</tr>
</tbody>
</table>

Q. WHY HAVE YOU FOCUSED YOUR ANALYSIS ON THE PRUDENCE OF DOMINION’S DECISION MAKING RELATED TO THE CHIA PROJECT?
A. The CHIA Project represents approximately 81% of the total cost of the Environmental Projects which Dominion seeks to recover through its proposed Rider E. The CHIA
Project involved the retrofit of environmental systems to transport, treat and store ash and other pollutants produced from the continued operations of four relatively old cold-fired generating units at the Chesterfield Generating Station. The CHIA Project was only necessary to the extent the Chesterfield coal units would be operated as coal units significantly beyond November of 2018, which was the deadline under the CCR and Effluent Guidelines to close the existing ash ponds at the Chesterfield Station. My review indicates a number of serious deficiencies in Dominion’s decision-making related to the CHIA Project. These deficiencies included: 1) failing to evaluate alternatives before initially proceeding with the Project in June of 2015; 2) failing to maintain documentation to confirm the reasonableness of the evaluations that were conducted to support initiating and continuing the CHIA Project; and 3) failing to adequately consider the significant economic and environmental risks to continued operation of the Chesterfield coal units that existed at the time the Company’s decisions were made to proceed with the CHIA Project, and thereafter when PJM market prices continued to fall. As a result of these multiple decision-making failures, the Company’s $247 million CHIA Project will likely provide little or no value to customers since the Company has recently announced the planned retirements of Chesterfield Units 3 and 4 in 2020, and because it appears that Chesterfield Units 5 and 6 may also be retired by 2023.

A. PRUDENCE OF DECISION IN JUNE OF 2015 TO PROCEED WITH THE CHIA PROJECT

Q. WERE THERE INDICATIONS BEFORE DOMINION DECIDED TO PROCEED WITH THE CHIA PROJECT IN JUNE OF 2015 THAT THE CHIA PROJECT MIGHT NOT BE NECESSARY OR PRUDENT?

A. Yes. Dating back to Dominion’s 2011 IRP, the Company and various interested parties questioned the economic viability of continued operation of the Company’s older coal-fired generating units, including the Chesterfield units. These questions were due to a

12 Direct Testimony of Dominion witness Mitchell, at 7-8.
13 SN-9 (Dominion’s response to Staff 12-57).
number of factors, including the increasing costs of compliance with emerging
environmental regulations of coal air emissions and coal combustion by-products. In
addition, as shown below in Figure 1, from 2008 to 2015, natural gas prices had dropped
by nearly 70%. This drop in gas prices, coupled with relatively low energy and demand
growth rates, and other factors, contributed to a trend of lower PJM market capacity and
energy prices and lower utilization levels (capacity factors) of older coal-fired units.

Figure 1

NYMEX Henry Hub Gas Prices ($/MMBtu)\textsuperscript{14}

\begin{figure}
\centering
\includegraphics[width=0.5\textwidth]{NYMEX_Henry_Hub_Gas_Prices}
\caption{NYMEX Henry Hub Gas Prices ($/MMBtu)\textsuperscript{14}}
\end{figure}

Q. WERE THERE ANY OTHER SIGNIFICANT CHANGES BEFORE JUNE OF
2015 THAT INDICATED THAT THE FUTURE OPERATIONS OF THE
CHESTERFIELD COAL UNITS MIGHT BE AT RISK?
A. Yes. In June of 2014 the EPA issued the proposed Clean Power Plan (“CPP”)\textsuperscript{15} to
regulate carbon emissions for existing coal-fired power plants under § 111(d) of the
federal Clean Air Act (“CAA”).

\textsuperscript{14} Source is eia.gov.
\textsuperscript{15} Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility
Q. HOW DID DOMINION RESPOND TO THE ISSUANCE OF THE PROPOSED CPP?

A. As reflected in Dominion’s 2015 IRP report in response to the CPP the Company studied a number of CPP-compliant scenarios that included early retirement or gas conversion of the Chesterfield units and other older coal units. The Company further recognized that the uncertainty regarding the CPP required Dominion to pause and fully reevaluate its system demand- and supply-side options for compliance with the CPP:

Because of this period of uncertainty, the Company's 2015 Plan includes no long-term recommendations beyond the Short-Term Action Plan discussed in Chapter 7. The Company maintains that the proposed Clean Power Plan requires Dominion, its regulators, and other stakeholders to pause and fully reevaluate the Company's strategic path forward once the Clean Power Plan is made final. Given the long lead times necessary to implement electric system demand- and supply-side alternatives, the Company, at this time, has chosen to carefully and fully examine its options for compliance with the Clean Power Plan and continue this study until the final rule is issued by the EPA.  

Q. WHAT EVALUATION WAS REQUIRED FOR DOMINION TO DETERMINE WHETHER IT WAS NECESSARY AND PRUDENT TO PROCEED WITH THE CHIA PROJECT IN LIGHT OF THE PROPOSED CPP?

A. The evaluation required to determine whether it was reasonable and prudent to proceed with the CHIA Project basically involves comparing the cost of future operations of the Chesterfield units to other available alternatives in light of proposed CPP requirements and with due consideration of the risks of each alternative.

Q. WHAT WERE THE AVAILABLE ALTERNATIVES TO THE CONTINUED OPERATION OF THE CHESTERFIELD COAL UNITS IN EARLY 2015 BEFORE THE DECISION TO PROCEED WITH THE CHIA PROJECT WAS MADE?

A. The primary alternatives to conducting the CHIA Project and continued operations of the Chesterfield units as coal units included: 1) retirement of the units by November 2018;
2) conversion of the units to burn natural gas; 3) placing the units in cold storage for a
period of time and then either retiring or continuing to operate them as coal units; and 4)
delaying the decision to proceed with the CHIA Project by 9-12 months since the Project
was completed in the Fall of 2017, nearly a year before the November 2018 compliance
deadline.17

Q. DID DOMINION CONSIDER RETIREMENT, CONVERSION OR COLD
STORAGE ALTERNATIVES BEFORE PROCEEDING WITH THE CHIA
PROJECT INVESTMENTS IN JUNE OF 2015?
A. Dominion claims that it did not consider retirement, conversion or cold storage
alternatives to the CHIA Project before proceeding with the CHIA Project because the
Chesterfield Units were economically serving the Company’s native load at the time of
the CHIA Project decision.18 However, Dominion did evaluate early retirement and gas
conversion alternatives to continued operation of the Chesterfield coal units in the
Company’s 2015 IRP, which was filed with the Commission on July 1, 2015, less than a
month after the decision to proceed with the CHIA Project. Presumably the 2015 IRP
analysis was completed, or near completion, before the CHIA Project decision was made.

Q. DID DOMINION’S 2015 IRP EVALUATE CONTINUED OPERATION OF THE
CHESTERFIELD COAL UNITS?
A. Yes. However, the only plan evaluated in Dominion’s 2015 IRP that assumed continued
operation of all four Chesterfield units beyond 2020 was a “least-cost plan” that would
not comply with the CPP. The Company noted this non-compliant least-cost plan was
provided only for reference purposes. The remaining four “CPP-Compliant” plans
analyzed in the 2015 IRP assumed early retirement of Chesterfield Units 3 and 4 by 2020
in three plans, and gas conversion of all four Chesterfield coal units by 2020 in the fourth
plan.19

17 SN-9 (Dominion’s response to Staff 12-57).
18 Exhibit SN-3 (Dominion’s responses to OAG 2-15, 2-16 and 2-17).
19 Exhibit SN-4.
Q. HAS DOMINION PROVIDED INFORMATION TO CONFIRM ITS ASSERTION THAT IT WAS NOT NECESSARY TO CONSIDER ALTERNATIVES TO THE CHIA PROJECT BECAUSE THE CHESTERFIELD UNITS WERE ECONOMICALLY SERVING CUSTOMERS AT THE TIME THE DECISION WAS MADE TO PROCEED WITH THE CHIA PROJECT?

A. No. In response to a discovery request seeking analysis supporting these conclusions, Dominion provided a one page summary of results of a May 2015 Retirement Study that evaluated continued operations of the Chesterfield coal units in comparison to the alternative of early retirement of the units in 2018.\textsuperscript{20} Dominion stated in response to discovery that it has not maintained any annual modeling details to confirm the reasonableness of the analysis underlying the one page summary provided for the May 15 Retirement Study.\textsuperscript{21} As shown in Table 4 below, the May 15 Retirement Study indicates that continued operations of all four Chesterfield coal units was estimated to provide total benefits of approximately [BEGIN EXTRAORDINARILY SENSITIVE] [END EXTRAORDINARILY SENSITIVE], or roughly [BEGIN EXTRAORDINARILY SENSITIVE] [END EXTRAORDINARILY SENSITIVE] of the total modeled production cost on a cumulative net present value basis over the 2018-2030 study period when compared to the alternative of retirement and replacement of the units.

\textsuperscript{20} Extraordinarily Sensitive Exhibit SN-5, Dominion's response to OAG 7-95.

\textsuperscript{21} Public Version
Table 4
Results of May 2015 Chesterfield Coal Unit Retirement Study
($1000s, NPV)

[TABLE ENTIRELY EXTRAORDINARILY SENSITIVE]

It would be extremely difficult to determine whether the above results are based on reasonable assumptions and analysis without the underlying modeling details; however, the level of estimated benefits is a relatively small percentage of the total modeled costs (particularly for Chesterfield Units 3 and 4) and very uncertain given the declining trend in market prices and the environmental uncertainty that existed at the time of the analysis. Moreover, the May 15 Retirement Study analysis only considered the options of continued operations or retirement of the Chesterfield coal units; it did not address gas conversion, cold storage, or project delay options that could have provided even greater benefits to customers without incurring the risky $247 million CHIA Project investment.

Q. PLEASE SUMMARIZE YOUR CONCLUSIONS REGARDING THE PRUDENCE OF DOMINION'S DECISION TO INITIATE THE CHIA PROJECT IN JUNE OF 2015.

A. I conclude that it was imprudent for Dominion to pursue the CHIA Project related to Chesterfield Units 3 and 4 and that it may have been imprudent for Dominion to pursue the CHIA Project related to Chesterfield Units 5 and 6. Ultimately, it is my understanding that Dominion bears the burden of proving that the costs it is seeking recovery of were reasonably and prudently incurred. To assist the Commission in its

21 Exhibit SN-6, Dominion's response to OAG 8-101.
evaluation, I note the following. First, Dominion’s decision to initiate the CHIA Project in June of 2015 without first studying alternatives to avoid or delay the project was risky because of the declining trend in PJM market prices, and the uncertainty regarding the final compliance costs and deadlines of the CPP, CRR and Effluent Guidelines at the time of the decision. Moreover, proceeding with the $247 million CHIA Project, which was only necessary and justified if the Chesterfield coal units were operated for another 10-15 years, was inconsistent with conclusions presented in Dominion’s 2015 IRP that it was prudent for Dominion to plan for compliance with the CPP, since the IRP analysis did not indicate that continued operations of all four Chesterfield coal units would be CPP-compliant. In fact, the 2015 IRP indicated that: 1) Chesterfield Units 3 and 4 would either be retired or converted to burn natural gas by 2020 in all compliant plans, and 2) Chesterfield Units 5 and 6 would be converted to burn natural gas by 2020 in one of the four compliant plans. In light of the lack of analysis of available alternatives (including delay), high market and environmental risk, and likelihood that continued operation of Chesterfield Units 3 and 4 on coal beyond 2020 would not be CPP compliant or cost effective, I conclude that Dominion’s decision to initiate the CHIA Project in June of 2015 related to Chesterfield Units 3 and 4 was imprudent and that its decision related to Chesterfield Units 5 and 6 may have been imprudent.

B. PRUDENCE OF DECISION TO CONTINUE THE CHIA PROJECT
AFTER THE DECEMBER 2015 RETIREMENT ANALYSIS

Q. WERE THERE FURTHER INDICATIONS THAT THE CHIA PROJECT WOULD NOT BE NECESSARY OR PRUDENT AFTER DOMINION INITIATED THE PROJECT IN JUNE OF 2015?
A. Yes. Beginning in the fall of 2015, and in each of the next two years, Dominion’s PJM market energy and capacity price forecasts dropped significantly from the Company’s Spring 2015 Forecast, which was relied on to support its decision to initiate the CHIA Project in June of 2015. As shown in Figure 2 below, Dominion’s Fall 2015 Forecast of PJM energy prices was approximately 19% lower than the Spring 2015 Forecast over the 2018-2022 period; the Fall 2016 Forecast was approximately 27% lower than the Fall
2015 Forecast; and the Fall 2017 Forecast was approximately 13% lower than the Fall 2016 Forecast. Dominion’s PJM market capacity price forecasts also dropped significantly in the Company’s Fall 2015 Forecast, as well as the Fall 2016 and Fall 2017 Forecasts.

Figure 2
Dominion’s 2015, 2016 and 2017 PJM Market Energy Forecasts
($/MWh, Average Price)\(^{22}\)

Q. HOW DID DOMINION RESPOND TO THE SIGNIFICANT DROP IN THE COMPANY’S FALL 2015 FORECAST OF PJM MARKET PRICES?

A. Dominion re-evaluated the alternatives of continued operations and potential retirement of the Chesterfield coal units, and certain other existing oil-fired and coal-fired generating facilities in late 2015. The results of this analysis were summarized in a confidential draft presentation, dated December 16, 2015 ("December 2015

\(^{22}\) Sources of forecasts are Appendix 4A of Dominion’s 2015, 2016, 2017 and 2018 IRPs.
Q. WHAT WERE THE RESULTS AND RECOMMENDATIONS PRESENTED IN THE DECEMBER 2015 PRESENTATION WITH REGARD TO FORECASTED COSTS AND BENEFITS OF FUTURE OPERATIONS OF THE CHESTERFIELD UNITS?

A. [BEGIN CONFIDENTIAL]

[...]

[END CONFIDENTIAL]


A. No. The Company states that detailed results for the analysis summarized in the December 2015 Presentation "are not available." It is highly unusual and not good practice for a utility to fail to maintain detailed documentation for a study that is critical to support its decision-making for a major investment such as the CHIA Project, particularly when there was good reason for Dominion to expect that the CHIA Project would be closely scrutinized by its customers and the Commission.

23 Exhibit SN-7, (Dominion’s confidential response to OAG 4-58, Attachment 3). Notably, the December 2015 Presentation indicates that [BEGIN CONFIDENTIAL]

[...]

[END CONFIDENTIAL]

24 Exhibit SN-7 (Dominion’s confidential response to OAG 4-58, Attachment 3), at 8 - 9.

25 Exhibit SN-5 (Dominion’s response to OAG 7-95).
information, it would be extremely difficult to confirm the reasonableness of Dominion’s December 2015 decision to proceed with the CHIA Project.

Q. DID DOMINION RE-EVALUATE WHETHER IT SHOULD CONTINUE THE CHIA PROJECT AFTER THE COMPANY’S PJM MARKET PRICE FORECAST DROPPED AGAIN IN THE FALL OF 2016?

A. No. Despite a forecasted drop of nearly 27% in near-term market energy prices from the level reflected in the Company’s Fall 2015 Forecast, Dominion did not re-evaluate its decision to continue operating the Chesterfield coal units and to complete the CHIA Project until November of 2017. As summarized in Table 5 below, by that time approximately [BEGIN EXTRAORDINARILY SENSITIVE] [END EXTRAORDINARILY SENSITIVE] of the $247 million CHIA Project had been incurred and, therefore, it was no longer possible to avoid costs of the project.

Table 5
Chesterfield Integrated Ash Project Cashflows ($Millions)26
[TABLE ENTIRELY EXTRAORDINARILY SENSITIVE]


A. Dominion’s failure to include quantified benefits estimates or to maintain modeling
details supporting the December 2015 Presentation conclusions and recommendations to continue operating its Chesterfield coal units and complete the CHIA Project was imprudent. Dominion also failed to cease investments in the CHIA Project for Chesterfield Units 3 and 4 despite the recommendations in the December 2015 Presentation that the Company should [BEGIN CONFIDENTIAL] [END CONFIDENTIAL] Moreover, Dominion failed to re-evaluate its justification for continuing the CHIA Project after a 27% drop in the Company’s PJM market energy price forecasts in the Fall of 2016, until November of 2017, at which time the CHIA Project was nearly completed. As a result of these multiple decision-making failures, Dominion’s $247 million CHIA Project will likely provide little value to customers since the Company has recently announced it plans to retire Chesterfield Units 3 and 4 in 2020, and has studied the retirement of Chesterfield Units 5 and 6 by 2023 in its 2018 IRP.

C. RECOMMENDATIONS REGARDING CHIA INVESTMENTS

Q. PLEASE SUMMARIZE YOUR FINDINGS AND RECOMMENDATIONS REGARDING THE PRUDENCE OF DOMINION’S CHIA PROJECT INVESTMENTS.

A. Related to Chesterfield Units 3 and 4, it was imprudent for Dominion to make CHIA Project investments when the units were already very old and had been determined to be likely candidates for either early retirement or conversion to gas in all CPP-compliant scenarios of the 2015 IRP.

Related to Chesterfield Units 5 and 6, based on the record at this time, I conclude that it may have been imprudent to pursue the CHIA Project. I note the following for the Commission’s consideration. First, Dominion failed to evaluate or consider available alternatives to delay or avoid the CHIA project before initiating the CHIA Project in June

26 Source of cost data is Extraordinarily Sensitive Application Schedule 46A, Statement 2A.
of 2015. The Company failed to maintain details necessary to demonstrate the reasonableness of the critical May 2015 Retirement Study and December 2015 Presentation, which were relied upon by Dominion to support the decisions to initially proceed with the CHIA Project and to continue the CHIA Project after a much lower market price forecast was released in the Fall of 2015. Finally, Dominion failed to re-evaluate the CHIA Project after the Company’s Fall 2016 Forecast of market prices dropped by nearly 27% from the Fall 2015 Forecast.

Q. WHAT ARE YOUR RECOMMENDATIONS TO ADDRESS UNJUSTIFIED COSTS OF THE CHIA PROJECT INCURRED FOR CHESTERFIELD UNITS 3 AND 4 AS A RESULT OF DOMINION’S IMPRUDENT DECISIONS?

A. Dominion indicates that approximately [BEGIN CONFIDENTIAL] [END CONFIDENTIAL] of the total CHIA Project investment was incurred for Chesterfield Units 3 and 4.27 I recommend that these costs be disallowed due to Dominion’s imprudent decision to incur CHIA Project costs for these older units for the reasons stated above.

Q. WHAT ARE YOUR RECOMMENDATIONS TO ADDRESS DOMINION’S DECISIONS WITH REGARD TO CHIA PROJECT INVESTMENTS FOR CHESTERFIELD UNITS 5 AND 6?

A. Dominion’s failures to evaluate alternatives to avoid or delay the CHIA Project, and to maintain the detailed modeling data necessary to confirm the reasonableness of the results of the May 2015 Retirement Study and December 2015 Presentation were imprudent. Dominion’s failure to re-evaluate the CHIA Project expenditures for Chesterfield Units 5 and 6 after the Company’s market price forecast dropped again in the Fall of 2016 was also imprudent. Based on the record developed so far in this case, and because of Dominion’s failure to maintain supporting analyses, I do not have the information necessary to determine the extent to which those decisions resulted in unjustified costs to customers. Accordingly, I recommend that the Commission consider

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27 Exhibit SN-8 (Dominion’s confidential supplemental response to SCC Staff 11-55).
a disallowance of costs incurred on the CHIA Project after 2016, which have not been justified by Dominion, and that the Commission order the Company to prepare and maintain detailed modeling data necessary to support any future major environmental investments and present that data with all applications for cost recovery of such investments.

Q. DOES THAT CONCLUDE YOUR TESTIMONY?
A. Yes.
Exhibit SN-1

Background and Experience of Scott Norwood
SUMMARY

Scott Norwood is an energy consultant with over 37 years of utility industry experience in the areas of regulatory consulting, resource planning and energy procurement. His clients include government agencies, publicly-owned utilities, public service commissions, municipalities and various electric consumer interests. Over the last 15 years Mr. Norwood has presented expert testimony on electric utility ratemaking, resource planning, and electric utility restructuring issues in over 200 regulatory proceedings in Arkansas, Georgia, Iowa, Illinois, Michigan, Missouri, New Jersey, Oklahoma, South Dakota, Texas, Virginia, Washington and Wisconsin.

Prior to founding Norwood Energy Consulting in January of 2004, Mr. Norwood was employed for 18 years by GDS Associates, Inc., a Marietta, Georgia based energy consulting firm. Mr. Norwood was a Principal of GDS and directed the firm’s Deregulated Services Department which provided a range of consulting services including merchant plant due diligence studies, deregulated market price forecasts, power supply planning and procurement projects, electric restructuring policy analyses, and studies of power plant dispatch and production costs.

Before joining GDS, Mr. Norwood was employed by the Public Utility Commission of Texas as Manager of Power Plant Engineering from 1984 through 1986. He began his career in 1980 as Staff Electrical Engineer with the City of Austin’s Electric Utility Department where he was in charge of electrical maintenance and design projects at three gas-fired power plants.

Mr. Norwood is a graduate of the college of electrical engineering of the University of Texas.

EXPERIENCE

The following summaries are representative of the range of projects conducted by Mr. Norwood over his 30-year consulting career.

Regulatory Consulting

*Oklahoma Industrial Energy Consumers* - Assisted client with technical and economic analysis of proposed EPA regulations and compliance plans involving control of air emissions and potential conversion of coal-to-gas conversion options.

*Cities Served by Southwestern Electric Power Company* – Analyzed and presented testimony regarding the prudence of a $1.7 billion coal-fired power plant and related settlement agreements with Sierra Club.
New York Public Service Commission - Conducted inter-company statistical benchmarking analysis of Consolidated Edison Company to provide the New York Public Service Commission with guidance in determining areas that should be reviewed in detailed management audit of the company.

Oklahoma Industrial Energy Consumers - Analyzed and presented testimony on affiliate energy trading transactions by AEP in ERCOT.

Virginia Attorney General – Analyzed and presented testimony regarding distribution tap line undergrounding program proposed by Dominion Virginia Power Company.

Cities Served by Southwestern Electric Power Company – Analyzed and presented testimony regarding the prudence of the utility’s decision to retire the Welsh Unit 2 coal-fired generating unit in conjunction with a litigation settlement agreement with Sierra Club.

Georgia Public Service Commission - Presented testimony before the Georgia Public Service Commission in Docket 3840-U, providing recommendations on nuclear O&M levels for Hatch and Vogtle and recommending that a nuclear performance standard be implemented in the State of Georgia.

Oklahoma Industrial Energy Consumers - Analyzed and presented testimony addressing power production and coal plant dispatch issues in fuel prudence cases involving Oklahoma Gas and Electric Company.

Georgia Public Service Commission - Analyzed and provided recommendations regarding the reasonableness of nuclear O&M costs, fossil O&M costs and coal inventory levels reported in GPC's 1990 Surveillance Filing.

City of Houston - Analyzed and presented comments on various legislative proposals impacting retail electric and gas utility operations and rates in Texas.

New York Public Service Commission - Conducted inter-company statistical benchmarking analysis of Rochester Gas & Electric Company to provide the New York Public Service Commission with guidance in determining areas which should be reviewed in detailed management audit of the company.

Virginia Attorney General – Analyzed and presented testimony regarding an accelerated vegetation management program and rider proposed by Appalachian Power Company.

Oklahoma Attorney General – Analyzed and presented testimony regarding fuel and purchased power, depreciation and other expense items in Oklahoma Gas & Electric Company’s 2001 rate case before the Oklahoma Corporation Commission.

City of Houston - Analyzed and presented testimony regarding fossil plant O&M expense levels in Houston Lighting & Power Company's rate case before the Public Utility Commission of
Texas.

City of El Paso - Analyzed and presented testimony regarding regulatory and technical issues related to the Central & Southwest/El Paso Electric Company merger and rate proceedings before the PUCT, including analysis of merger synergy studies, fossil O&M and purchased power margins.


City of El Paso - Analyzed and developed testimony regarding Palo Verde operations and maintenance expenses in El Paso Electric Company's 1991 rate case before the Public Utility Commission of Texas.

City of Houston - Analyzed and developed testimony regarding the operations and maintenance expenses and performance standards for the South Texas Nuclear Project, and operations and maintenance expenses for the Limestone and Parish coal-fired power plants in HL&P's 1991 rate case before the PUCT.

City of El Paso - Analyzed and developed testimony regarding Palo Verde operations and maintenance expenses in El Paso Electric Company's 1990 rate case before the Public Utility Commission of Texas. Recommendations were adopted.

Energy Planning and Procurement Services

Virginia Attorney General – Review and provide comments or testimony regarding annual integrated resource plan filings made by Dominion Virginia Power and Appalachian Power Company.

Dell Computer Corporation – Negotiated retail power supply agreement for Dell's Round Rock, Texas facilities producing annual savings in excess of $2 million.

Texas Association of School Boards Electric Aggregation Program – Serve as TASB's consultant in the development, marketing and administration of a retail electric aggregation program consisting of 2,500 Texas schools with a total load of over 300 MW. Program produced annual savings of more than $30 million in its first year.

Oklahoma Industrial Energy Consumers - Analyzed and drafted comments addressing integrated resource plan filings by Public Service Company of Oklahoma and Oklahoma Gas and Electric Company.
S.C. Johnson - Analyzed and presented testimony addressing Wisconsin Electric Power Company's $4.1 billion CPCN application to construct three coal-fired generating units in southeast Wisconsin.

Oklahoma Industrial Energy Consumers - Analyzed wind energy project ownership proposals by Oklahoma Gas and Electric Company and presented testimony addressing project economics and operational impacts.

City of Chicago, Illinois Attorney General, Illinois Citizens’ Utility Board - Analyzed Commonwealth Edison's proposed divestiture of the Kincaid and State Line power plants to SEI and Dominion Resources.

Georgia Public Service Commission - Analyzed and presented testimony on Georgia Power Company's integrated resource plan in a certification proceeding for an eight unit, 640 MW combustion turbine facility.

South Dakota Public Service Commission - Evaluated integrated resource plan and power plant certification filing of Black Hills Power & Light Company.

Shell Leasing Co. - Evaluated market value of 540 MW western coal-fired power plant.

Community Energy Electric Aggregation Program – Served as Community Energy’s consultant in the development, marketing and start-up of a retail electric aggregation program consisting of major charitable organizations and their donors in Texas.

Austin Energy – Conducted competitive solicitation for peaking capacity. Developed request for proposal, administered solicitation and evaluated bids.

Austin Energy - Provided technical assistance in the evaluation of the economic viability of the City of Austin's ownership interest in the South Texas Project.

Austin Energy - Assisted with regional production cost modeling analysis to assess production cost savings associated with various public power merger and power pool alternatives.

Sam Rayburn G&T Electric Cooperative - Conducted competitive solicitation for peaking capacity. Developed request for proposal, administered solicitation and evaluated bids.

Rio Grande Electric Cooperative, Inc. - Directed preparation of power supply solicitation and conducted economic and technical analysis of offers.

Virginia Attorney General – Review and provide comments or testimony regarding annual demand-side management program programs and rider proposals made by Dominion Virginia Power and Appalachian Power Company.

Austin Energy – Conducted modeling to assess potential costs and benefits of a municipal power
pool in Texas.

Electric Restructuring Analyses

_Electric Power Research Institute_ - Evaluated regional resource planning and power market dispatch impacts on rail transportation and coal supply procurement strategies and costs.

_Arkansas House of Representatives_ – Critiqued proposed electric restructuring legislation and identified suggested amendments to provide increased protections for small consumers.

_Virginia Legislative Committee on Electric Utility Restructuring_ – Presented report on status of stranded cost recovery for Virginia’s electric utilities.

_Georgia Public Service Commission_ – Developed models and a modeling process for preparing initial estimates of stranded costs for major electric utilities serving the state of Georgia.

_City of Houston_ – Evaluated and recommended adjustments to Reliant Energy’s stranded cost proposal before the Public Utility Commission of Texas.

_Oklahoma Attorney General_ – Evaluated and advised the Attorney General on technical, economic and regulatory policy issues arising from various electric restructuring proposals considered by the Oklahoma Electric Restructuring Advisory Committee.

_State of Hawaii Department of Business, Economics and Tourism_ – Evaluated electric restructuring proposals and developed models to assess the potential savings from deregulation of the Oahu power market.

_Virginia Attorney General_ - Served as the Attorney General’s consultant and expert witness in the evaluation of electric restructuring legislation, restructuring rulemakings and utility proposals addressing retail pilot programs, stranded costs, rate unbundling, functional separation plans, and competitive metering.

_Western Public Power Producers, Inc._ - Evaluated operational, cost and regional competitive impacts of the proposed merger of Southwestern Public Service Company and Public Service Company of Colorado.

_Iowa Department of Justice, Consumer Advocate Division_ - Analyzed stranded investment and fuel recover issues resulting from a market-based pricing proposal submitted by MidAmerican Energy Company.


_City of El Paso_ - Evaluated merger synergies and plant valuation issues related to the proposed
acquisition and merger of El Paso Electric Company and Central & Southwest Company.


**Power Plant Management**

*City of Austin Electric Utility Department* - Analyzed the 1994 Operating Budget for the South Texas Nuclear Project (STNP) and assisted in the development of long-term performance and expense projections and divestiture strategies for Austin's ownership interest in the STNP.

*City of Austin Electric Utility Department* - Analyzed and provided recommendations regarding the 1991 capital and O&M budgets for the South Texas Nuclear Project.

*Sam Rayburn G&T Electric Cooperative* - Developed and conducted operational monitoring program relative to minority owner's interest in Nelson 6 Coal Station operated by Gulf States Utilities.

*KAMO Electric Cooperative, City of Brownsville and Oklahoma Municipal Power Agency* - Directed an operational audit of the Oklaunion coal-fired power plant.

*Sam Rayburn G&T Electric Cooperative* - Conducted a management/technical assessment of the Big Cajun II coal-fired power plant in conjunction with ownership feasibility studies for the project.

*Kamo Electric Power Cooperative* - Developed and conducted operational monitoring program for client's minority interest in GRDA Unit 2 Coal Fired Station.

*Northeast Texas Electric Cooperative* - Developed and conducted operational monitoring program concerning NTEC's interest in Pirkey Coal Station operated by Southwestern Electric Power Company and Dolet Hills Station operated by Central Louisiana Electric Company.

*Corn Belt Electric Cooperative/Central Iowa Power Cooperative* - Perform operational monitoring and budget analysis on behalf of co-owners of the Duane Arnold Energy Center.

**PRESENTATIONS**

*Quantifying Impacts of Electric Restructuring: Dynamic Analysis of Power Markets*, 1997 NARUC Winter Meetings, Committee on Finance and Technology.


Exhibit SN-2
Excerpt from Dominion's 2015 IRP Report
July 1, 2015

Joel H. Peck, Clerk
Virginia State Corporation Commission
c/o Document Control Center
1300 E. Main Street
Richmond, VA 23219

Re: Case No. PUE-2015-00035

Dear Mr. Peck:

Dominion Virginia Power ("the Company" or "Dominion") is pleased to submit to the Commission its 2015 Integrated Resource Plan ("the 2015 Plan" or "the Plan") for the planning period of 2016-2030. The Plan is submitted in accordance with §56-599 of the Code of Virginia, as amended by Senate Bill 1349 (Chapter 6 of the Virginia Acts of Assembly – 2015), effective July 1, 2015. Simultaneously, the Plan is being filed as an update in North Carolina, where the Company does business as Dominion North Carolina Power, with the North Carolina Utilities Commission ("NCUC"). This filing is in accordance with §62.2 of the North Carolina General Statutes and Rule R8-60 of the Rules and Regulations of the NCUC.

The 2015 Plan recognizes that the electric utility industry and Dominion are in a period of change and uncertainty, due in large measure to emerging federal environmental regulations, particularly limitations on carbon emissions from existing power stations. The proposed rule regulating these emissions was issued in June 2014 by the U.S. Environmental Protection Agency ("EPA") under the authority of §111(d) of the federal Clean Air Act and is termed the Clean Power Plan ("CPP") by the agency. The EPA is expected to issue the final rule this summer.

The proposed Clean Power Plan contains carbon intensity reduction targets for the electric generation fleets of the individual states. Carbon intensity measures the amount of carbon dioxide released, on average, for each net megawatt-hour ("MWh") of electricity generated. Two of the most aggressive carbon intensity reduction goals have been assigned to Virginia and North Carolina. The proposed rule would require a 38 percent reduction in fleet-wide carbon intensity for Virginia by 2030 and a 40 percent reduction for North Carolina by the same date. By 2030, fleet-wide carbon intensity would be reduced to 810 pounds/MWh for Virginia and 992 pounds/MWh for North
Carolina. Interim goals for carbon intensity reduction must be met starting in 2020 under the draft rule. State implementation plans must be filed beginning in 2016.

The Company has taken significant steps over the past decade to reduce its emissions and lower the carbon intensity of its generation portfolio. These steps include closure or conversion of coal-fired units, expansion of cost-effective demand-side management programs, uprates to existing nuclear stations, increased investment in facilities using renewable resources, and development of energy efficient combined-cycle natural gas units. The Company’s low starting point for carbon emissions resulting from steps already taken makes additional emissions reductions all the more challenging.

The importance of developing resources with low or no carbon emissions has been elevated by the Clean Power Plan. This and other regulations place coal-fired and oil-fired units at risk, especially those with limited environmental controls.

While the Clean Power Plan has not yet been issued in its final form, the Company believes it is prudent to begin planning now for implementation of a final rule substantially similar to the proposed plan released in 2014. However, Dominion recognizes that considerable uncertainty remains regarding the scope of the final rule, and that the final rule and resulting state implementation may change from the currently proposed rule.

Dominion also believes it is appropriate for the Company, along with regulators and other stakeholders, to take this opportunity to evaluate options for compliance with the Clean Power Plan. The need for such evaluation was recognized by the Virginia General Assembly in Senate Bill 1349. Among other provisions, the legislation requires the annual filing of an Integrated Resource Plan with this Commission and further directs the Commission to report to the Governor and General Assembly by December 1 of each year an assessment of the Integrated Resource Plan for each investor-owned utility. This report will include the Commission’s analysis of the generation facilities available to meet customer demand now and in the future, in light of market conditions and pending state and federal environmental regulations.

Because of this period of uncertainty, the Company’s 2015 Plan includes no long-term recommendations beyond the Short-Term Action Plan discussed in Chapter 7. The Company maintains that the proposed Clean Power Plan requires Dominion, its regulators, and other stakeholders to pause and fully reevaluate the Company’s strategic path forward once the Clean Power Plan is made final. Given the long lead times necessary to implement electric system demand- and supply-side alternatives, the Company, at this time, has chosen to carefully and fully examine its options for compliance with the Clean Power Plan and continue this study until the final rule is issued by the EPA.

Therefore, the 2015 Plan submitted by the Company does not contain a “Preferred Plan” or recommended path forward (through a combination of plans), as have previous filings. Instead, the Company offers four alternative plans that represent long-term plausible paths for compliance with the Clean Power Plan.
These alternatives are collectively known as the CPP-Compliant Alternative Plans. A least-cost plan, which would not comply with the Clean Power Plan emissions standards, is also included for reference purposes, but only for comparison to the CPP-Compliant Alternative Plans. The four plans in the CPP-Compliant group include:

- Plan A: Solar, characterized by a high concentration of utility-scale solar resources;
- Plan B: Co-fire, including using natural gas to partially fire eight Dominion-owned coal-powered units to reduce carbon intensity;
- Plan C: Nuclear, designed to include construction and operation of North Anna Unit 3, providing an additional 1,453 MW of nuclear-powered generation at the Company’s North Anna Power Station; and
- Plan D: Wind, including significant on-shore and offshore wind development.

Some of these alternative plans utilize proven technology that the Company considers reliable. Others have a heavier emphasis on technologies that need further evaluation given the magnitude of generation required. For example, Plan A: Solar requires an additional 4,000 MW (nameplate capacity) of photovoltaic generating resources by the conclusion of a study period in 2040. This includes the 400 MW (nameplate capacity) of utility scale solar-powered facilities the Company has already committed to placing in service by 2020. Another of the alternatives, Plan D: Wind, includes 247 MW (nameplate capacity) of onshore wind facilities and 2,016 MW (nameplate capacity) of offshore wind generation by 2040. Dominion will continue to assess these four CPP-Compliant plans over the coming year.

While these alternative plans represent plausible future compliance paths, they are by no means exhaustive. Based on this continuing evaluation of technologies and the evolution of environmental regulations, the Company anticipates that future Integrated Resource Plans, to be filed annually with the Commission on May 1 beginning in 2016, will contain a more definitive view of a recommended long-term path forward.

**Common Elements of Alternative Plans**

Over the short-term (2016-2020), however, the CPP-Compliant Alternative Plans have much in common, focusing on the addition of low or zero-carbon generation, especially from natural gas and solar resources. The alternative plans also call for the retrofitting or retirement of oil and coal-fired units that lack advanced environmental controls. Major common elements include:

- Completion of the natural-gas fired, combined cycle Brunswick Power Station, with a generating capacity of approximately 1,368 MW, by 2016.
- The addition of a second combined-cycle facility in Greensville County, Virginia, by 2019, with a generating capacity of approximately 1,585 MW.
• The completion of 400 MW (nameplate capacity) of company-owned solar capacity, including 20 MW Remington Solar facility now pending before the Commission, by 2020.

• The addition of 400 MW (nameplate capacity) of solar non-utility generation (NUG) capacity by 2017.

• Company-owned solar capacity of 16 MW (nameplate capacity) installed on customers' property through the Solar Partnership Program.

• Completion of the 12 MW (nameplate capacity) Virginia Offshore Wind Technology Advancement Project (VOWTAP) by 2019.

• Retrofitting the 786 MW oil-fired Unit 5 at Possum Point Power Station with selective non-catalytic reduction (SNCR) technology by 2018 to control oxides of nitrogen (NOx) emissions.

• Retiring Yorktown Power Station's two coal-fired generating units, Units 1 and 2, with a combined generating capacity of 323 MW, by 2016.

• Implementation of currently approved and future demand-side management programs capable of reducing peak demand by 611 MW and annual energy consumption by 3,008 gigawatt-hours (GWh). These reductions would be accomplished by 2030, the conclusion of the 15-year planning period.

Additionally, all of the CPP-Compliant Alternative Plans call for retirement of Yorktown Unit 3, the station's single oil-fired unit with a generating capacity of 790 MW, during the planning period. Three of the CPP-Compliant Plans (Plan A: Solar; Plan C: Nuclear; Plan D: Wind) also model retirement of four additional coal-fired units during the planning period. These include the two units at Mecklenburg Power Station, with a combined capacity of 138 MW, and Units 3 and 4 at Chesterfield Power Station, with a combined capacity of 261 MW.

While three of the CPP-Compliant Alternative Plans model the closure of additional coal-fired units, the Company recognizes that the Virginia General Assembly, by enacting Senate Bill 1349, endorsed a goal of keeping coal as a significant part of the generation portfolio serving the Commonwealth for as long as possible, given the regulatory uncertainties posed by the Clean Power Plan. Dominion will continue to analyze the role of coal units as part of a diverse mix of generation resources once the EPA's carbon regulation takes its final form.

Cost Analysis of Compliance Plans

The 2015 Plan submitted today by Dominion analyzed the net present value (NPV) cost of complying with the federal carbon rules through each of the four alternative plans, in comparison to the least-cost, CPP non-compliant plan. The analysis determined that compliance costs range from approximately $4.3 billion for Plan A: Solar, to approximately $15.3 billion for Plan D: Wind,
calculated on a NPV basis throughout the study period concluding in 2040. However, as these technologies continue to evolve, the relative cost of each of these plans could change, and the Company’s annual integrated resource planning process will take into account the further development of these technologies and changes in their costs and other assumptions.

However, several of these CPP-Compliant alternatives will require significant additional study to determine their ultimate feasibility. This is particularly true for Plan A: Solar. While it has the lowest NPV compliance cost among the four CPP-Compliant Alternative Plans, its reliance on large quantities of photovoltaic resources within the power production portfolio could induce operational challenges since solar is non-dispatchable, hour-to-hour intermittent generation. The Company must conduct additional studies to better understand all system upgrades that would be necessary to accommodate such large amounts of solar or other non-dispatchable and intermittent resources.

Dominion’s Commitment

The 2015 Plan reflects Dominion’s longstanding commitment to operate in an environmentally responsible manner and, at the same time, provide its customers with reliable, reasonably priced electric service. The Company is also committed to maintaining a diverse generating portfolio using as broad a mix of resources as feasible; this will prevent over-dependence on any single fuel source and help avoid price shocks and supply disruptions that could cause significant harm to customers. These commitments will remain strong as the Company develops its strategy for compliance with the federal carbon regulations and presents future Integrated Resource Plans to the Commission.

Sincerely,

Robert M. Blue
Senior Vice President
Regulation, Law, Energy Solutions and Policy
Exhibit SN-3
Dominion’s Responses to
OAG 2-15, 2-16 and 2-17
The following response to Question No. 15 of the Second Set of Interrogatories and Requests for Production of Documents Propounded by the Office of the Attorney General received on February 1, 2019 has been prepared under my supervision.

Joshua J. Bennett
Vice President Technical Services
Dominion Energy Services, Inc.

Bradley M. Hanks
Manager Construction Services
Dominion Energy Services, Inc.

Ted Fasca
Manager - Generation System Planning
Virginia Electric and Power Company

Question No. 15

Was cold storage considered as an alternative to the environmental investments proposed for Chesterfield, Mount Storm, and Clover coal units that the Company is seeking to recover through Rider E? If so, provide the results of these alternative analyses and explain why cold storage was not selected as the preferred option. If not, explain why not.

Response:

Cold storage was not considered as an alternative to the Environmental Projects because at the time the decisions were made to implement those projects in order to ensure compliance with environmental law and regulations, the coal units at the Power Stations economically were serving the Company’s native load. See the Company’s responses to AG Set 2-18 and 2-19.
Virginia Electric and Power Company
Case No. PUR-2018-00195
Office of the Attorney General
Second Set

The following response to Question No. 16 of the Second Set of Interrogatories and Requests for Production of Documents Propounded by the Office of the Attorney General received on February 1, 2019 has been prepared under my supervision.

Joshua J. Bennett
Vice President Technical Services
Dominion Energy Services, Inc.

Bradley M. Hanks
Manager Construction Services
Dominion Energy Services, Inc.

Ted Fasca
Manager - Generation System Planning
Virginia Electric and Power Company

Question No. 16

Was early retirement considered as an alternative to the environmental investments proposed for Chesterfield, Mount Storm, and Clover coal units that the Company is seeking to recover through Rider E? If so, provide the results of these alternative analyses and explain why early retirement was not selected as the preferred option. If not, explain why not.

Response:

Early retirement was not considered as an alternative to the Environmental Projects because at the time the decisions were made to implement those projects in order to ensure compliance with environmental law and regulations, the coal units at the Power Stations economically were serving the Company's native load. See the Company's responses to AG Set 2-18 and 2-19.
The following response to Question No. 17 of the Second Set of Interrogatories and Requests for Production of Documents Propounded by the Office of the Attorney General received on February 1, 2019 has been prepared under my supervision.

Joshua J. Bennett
Vice President Technical Services
Dominion Energy Services, Inc.

Bradley M. Hanks
Manager Construction Services
Dominion Energy Services, Inc.

Ted Fasca
Manager - Generation System Planning
Virginia Electric and Power Company

Question No. 17

Was conversion of the existing coal units to burn natural gas considered as an alternative to the environmental investments proposed for Chesterfield, Mount Storm, and Clover coal units that the Company is seeking to recover through Rider E? If so, provide the results of these alternative analyses and explain why gas conversion was not selected as the preferred option. If not, explain why not.

Response:

Conversion of the existing coal units to burn natural gas was not considered as an alternative to the Environmental Projects because at the time the decisions were made to implement those projects in order to ensure compliance with environmental law and regulations, the coal units at the Power Stations economically were serving the Company’s native load. See the Company’s responses to AG Set 2-18 and 19.
Exhibit SN-4
Excerpt from Dominions 2015 IRP Report,
Figure 1.4.1
Figure 1.4.1- 2015 Studied Plans

<table>
<thead>
<tr>
<th>Year</th>
<th>Least Cost Non-Compliant Plan</th>
<th>Compliant with Clean Power Plan</th>
<th>Renewables, Retrofits, Retirements, and DSM included in all Plans (resources only in CPP-Compliant Plans)</th>
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<tr>
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<td>Brunswick</td>
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<td>SLR NUC (200 MW)</td>
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<td>Greensville</td>
<td>SLR* (100 MW)</td>
</tr>
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<td>Co-fire MB 1-2, CH 3-4-5-6 and Cl 1-2</td>
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<tr>
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<td>CC</td>
<td>SLR (200 MW)</td>
</tr>
</tbody>
</table>

Key: Retrofit: Additional environmental control reduction equipment; Retire: Remove a unit from service; Brunswick: Brunswick County Power Station; CC: Combined-Cycle; CH: Chesterfield Power Station; CL: Clover Power Station; CT: Combustion Turbine (2 units); Greensville: Greensville County Power Station; OFF: Offshore Wind; MB: Mecklenburg Power Station; NA3: North Anna 3; PP5: Possum Point Unit 5; RSLR: Remington Solar Facility; SCT: Solar-Paired CT; SNCR: Selective Non-Catalytic Reduction; SLR: Generic Solar; SLR NUC: Solar NUC; SLR TAG: Solar PV unit at a brownfield site; SPP: Solar Partnership Program; VOWTAP: Virginia Offshore Wind Technology Advancement Project; WND: Onshore Wind; YT: Yorktown Unit.

Note: 1) DSM capacity savings continue to increase throughout the Planning Period.
2) Earliest possible in-service date for North Anna 3 is September 2027, which is reflected as a 2028 capacity resource.
3) SPP and SLR NUC started in 2014.
4) The potential retirement of Yorktown 3 is modeled in all Plans subject to the EPA's CPP. The potential retirements of Chesterfield Units 3-4 and Mecklenburg Units 1-2 are modeled in Plans A, C, and D.
5) The Co-fire Plan retains the 400 MW of coal units by co-firing with natural gas instead of retiring.
Exhibit SN-5
Dominion's Extraordinarily
Sensitive Response to OAG 7-95
The following response to Question No. 95 of the Seventh Set of Interrogatories and Requests for Production of Documents Propounded by the Office of the Attorney General received on March 28, 2019 has been prepared under my supervision.

Ted Fasca
Manager, Generation System Planning
Virginia Electric and Power Company

Question No. 95

Reference page 9 of Confidential Attachment 3 to the response to AG 4-58. Provide the annual modeling results supporting the conclusions contained in the first bullet point and the first sub-bullet point under "Recommendation," along with underlying assumptions and calculations, comparable in detail to the information provided in the two spreadsheet files attached to the Company’s response to AG 5-75.

Response:

Annual modeling results similar to those provided in the Company’s response to AG Set 5-75 are not available. However, please see Extraordinarily Sensitive Attachment AG 7-95 (TF) for total system NPV results that support the recommendation on page 9 of Attachment 3 to the Company’s response to AG Set 4-58. This analysis shows that retiring various combinations of units, including the Chesterfield coal units, increased system costs as compared to not retiring those units.

All of the information in Extraordinarily Sensitive Attachment AG Set 7-95 (TF) is extraordinarily sensitive, and is being provided to the Office of the Attorney General pursuant to the protections set forth in 5 VAC 5-20-170 and the Hearing Examiner’s Second Protective Ruling Providing Additional Protective Treatment for Extraordinarily Sensitive Information issued on February 15, 2019 in Case. No. PUR-2018-00195.
Exhibit SN-6
Dominion's Response to OAG 8-101
The following response to Question No. 101 of the Eighth Set of Interrogatories and Requests for Production of Documents Propounded by the Office of the Attorney General received on April 5, 2019 has been prepared under my supervision.

Ted Fasca
Manager, Generation System Planning
Virginia Electric and Power Company

Question No. 101

Reference the response to AG 7-95, explain why annual results are not available and how total study period NPV results were determined without having annual cost and market revenues for each plant.

Response:

The analysis completed in May 2015, as shown in Extraordinarily Sensitive Attachment AG Set 7-95 (TF), used the Strategist modeling software to determine the customer value for various combinations of unit retirements. By comparing the NPV results from each scenario, one can determine the customer value of individual units or groups of units being placed in retirement. Annual results were not required to determine each plan’s customer value; therefore, only each plan’s NPV results were extracted from the model.
Exhibit SN-7
Dominion's Confidential Response
to OAG 4-58, Attachment 3
The following response to Question No. 58 of the Fourth Set of Interrogatories and Requests for Production of Documents Propounded by the Office of the Attorney General received on March 13, 2019 has been prepared under my supervision.

Ted Fasca
Manager, Generation System Planning
Virginia Electric and Power Company

Question No. 58

Reference the responses to AG 2-15, AG 2-16, and AG 2-17, provide the analyses which support the claim that at the time the decisions were made to implement the Chesterfield, Mount Storm and Clover environmental projects the coal units were economically serving the Company's native load, including the underlying commodity price assumptions and assumptions regarding costs of the environmental compliance projects that were included in the analysis.

Response:

Please see Confidential Attachment AG Set 4-58-1 (TF), Confidential Attachment AG Set 4-58-2 (TF), and Confidential Attachment AG Set 4-58-3 (TF) for information responsive to this request.

Confidential Attachment AG Set 4-58-1 (TF) provides an analysis supporting the environmental compliance projects that was conducted in 2011 when the MATS and Clean Water Act 316 b rules were proposed. At the time, the units that were identified as being potentially impacted by these pending environmental regulations were Chesapeake Energy Center units 1-4, Yorktown units 1-3, Chesterfield unit 3, Mecklenburg units 1-2, Bremo units 3-4, and Possum Point unit 5. The analysis at the time indicated that it would be more economical to retire Chesapeake units 1-4 and Yorktown units 1-2 rather than move forward with retrofitting additional environmental equipment. The analysis indicated that it would be more economical to retrofit or repower the remaining units based on the commodity forecast in 2011. Please see Confidential Attachment AG Set 4-58-2 (TF) for an analysis of the economics impacting Chesterfield unit 3, which also took place in 2011.
Chesterfield units 4-6, as well as the Mount Storm and Clover coal units, were determined not to be at risk based on actual and projected capacity factors at the time the decisions were made to implement those projects. At the time of this analysis, these units were serving the Company's native load, as evidenced by their historical capacity factors ranging from 51% to 88%, and were forecasted to continue to operate in the same range well into the future. Please see Appendix 3D of the 2011 IRP for additional details on capacity factors and Section 4.4 of the 2011 IRP for commodity price assumptions.

In addition, please see Confidential Attachment AG Set 4-58-3 (TF) for a life extension analysis that was performed in 2015 for Chesterfield, Mount Storm, and Clover that indicated continued near term operation for each of these units was still economical at that time.

Confidential Attachment AG Set 4-58-1 (TF), Confidential Attachment AG Set 4-58-2 (TF), and Confidential Attachment AG Set 4-58-3 (TF) are confidential in full and are being provided pursuant to the protections set forth in 5 VAC 5-20-170 and the Hearing Examiner's Protective Ruling and Additional Protective Treatment for Extraordinarily Sensitive Information entered on January 11, 2019.
Exhibit SN-8
Dominion's Confidential Supplemental
Response to SCC Staff 11-55
The following supplemental response dated April 11, 2019 to Question No. 55 of the Eleventh Set of Interrogatories and Requests for Production of Documents Propounded by the Virginia State Corporation Commission Staff received on March 15, 2019 has been prepared under my supervision.

Bradley M. Hanks
Manager - Construction Services
Dominion Energy Services, Inc.

Question No. 55
Please refer to Company witness Givens' Schedule 1, page 3, line 1. Please provide a schedule showing the Chesterfield Power Station's Integrated Ash Project construction costs of $246.8 million split by unit (Units 3 through 6 and common plant).

Supplemental Response:
The Wet to Dry Project ("WTD Project") is the only project that would have been affected by the shutdown of Units 3 and 4 prior to construction. The Company considers the WTD Project to be common to the operation of Units 3 through 6 and therefore has not recorded the cost of the project in a manner that assigns a cost to each unit. That said, upon request of the Staff, the Company has prepared an estimate of a portion of the overall project costs that can be reasonably associated with “tying in” Units 3 and 4.

The estimated cost of tying in Units 3 and 4 into the WTD Project is approximately [BEGIN CONFIDENTIAL] [END CONFIDENTIAL]. This estimate was determined by using final bid prices from AMEC Foster Wheeler. AMEC provided two bids for the wet to dry work, one for Units 5 and 6 and one for Units 3, 4, 5 and 6. The Company used the [BEGIN CONFIDENTIAL] [END CONFIDENTIAL] difference in cost as the basis for the estimate. Additionally the project incurred approximately [BEGIN CONFIDENTIAL] [END CONFIDENTIAL] in change orders. The Company took the change order value and divided it by the weighted average capacity of each unit, which was approximately [BEGIN CONFIDENTIAL] [END CONFIDENTIAL] for Units 3 and 4. These two values total the estimated [BEGIN CONFIDENTIAL] [END CONFIDENTIAL].
Additionally, see Supplemental Confidential Attachment Staff Set 11-55 (1) (BMH) and Supplemental Extraordinarily Sensitive Attachment Staff Set 11-55 (2) (BMH) for information utilized in the estimate.

All of the information in Supplemental Confidential Attachment Staff Set 11-55 (1) (BMH) noted above is confidential and all of the information in Supplemental Extraordinarily Sensitive Attachment Staff Set 11-55 (2) (BMH) noted above is extraordinarily sensitive “Contracts and Prices” information, and is being provided to the Staff pursuant to the protections set forth in 5 VAC 5-20-170 and the Hearing Examiner’s Protective Ruling and Additional Protective Treatment for Extraordinarily Sensitive Information issued on January 11, 2019 in Case No, PUR-2018-00195.
Exhibit SN-9
Dominion's Response
to SCC Staff 12-57
Question No. 57

Please provide a table that includes the following data: (i) each project that cost recovery is being requested for within this proceeding; (ii) the specific law and/or regulation that requires the project; (iii) the date the applicable law and/or regulation was proposed; (iv) the date the applicable law and/or regulation was approved; (v) the date by which compliance was required under the approved law or regulation; (vi) the month and year the decision was made to complete the project; and (vii) the month and year the project was completed, or is expected to be completed.

Response:

See Attachment Staff Set 12-57 (BMH).
<table>
<thead>
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<th>Project</th>
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<th>Environmental Law</th>
<th>Proposed Rule</th>
<th>Final Rule</th>
<th>Compliance Date¹</th>
<th>Contract Date</th>
<th>Project Completion</th>
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<td>Wet to Dry Conversion</td>
<td>Chesterfield</td>
<td>CCR/ELG</td>
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<td>April 2015/November 2015</td>
<td>November 2018</td>
<td>June 2015</td>
<td>December 2017</td>
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<td>CCR</td>
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<td>April 2019</td>
<td>June 2016</td>
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</tr>
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</table>

CCR - Coal Combustion Residuals Rule
ELG - Effluent Limit Guidelines

¹Clover Power Station and Mt. Storm Power Station completion dates are driven by the date that no additional CCR material could be placed in the pond.
Exhibit SN-10
Dominion’s Responses to OAG 2-3
and 2-5 (Confidential)
The following response to Question No. 3 of the Second Set of Interrogatories and Requests for Production of Documents Propounded by the Office of the Attorney General received on February 1, 2019 has been prepared under my supervision.

![Signature]

Jarad L. Morton  
Business Performance Consultant  
Virginia Electric and Power Company

**Question No. 3**

Provide the commercial operation date, net dependable capacity, and planned retirement date for each Chesterfield, Mount Storm, and Clover coal unit.

**Response:**

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<th>Net Dependable Capacity (MW)</th>
<th>Planned Retirement Date</th>
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<td>August 1964</td>
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<td>Chesterfield 6</td>
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<td>March 1996</td>
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<td>September 1965</td>
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The following response to Question No. 5 of the Second Set of Interrogatories and Requests for Production of Documents Propounded by the Office of the Attorney General received on February 1, 2019 has been prepared under my supervision.

Jarad L. Morton  
Business Performance Consultant  
Virginia Electric and Power Company

Question No. 5

Provide the net generation, equivalent availability factor, net capacity factor, and average net heat rate for each Chesterfield, Mount Storm, and Clover coal unit for each of the last four calendar years.

Response:

Please see the response in Confidential Attachment AG Set 2-5(JLM)

All of the information in Confidential Attachment AG Set 2-5(JLM) noted above is confidential, and is being provided to the AG pursuant to the protections set forth in 5 VAC 5-20-170 and the Hearing Examiner's Protective Ruling and Additional Protective Treatment for Extraordinarily Sensitive Information issued on January 11, 2019 in Case No. PUR-2018-00195.