DIRECT TESTIMONY
OF
JAMES R. BAILEY
ON BEHALF OF
VIRGINIA ELECTRIC AND POWER COMPANY
BEFORE THE
STATE CORPORATION COMMISSION OF VIRGINIA
CASE NO. PUE-2007-____

Q. Please state your name and position with Virginia Electric and Power Company ("Dominion Virginia Power" or the "Company").

A. My name is James R. ("Ronnie") Bailey, and I am Manager – Electric Transmission Planning in the Electric Transmission Department of Dominion Virginia Power located at 120 Tredegar Street in Richmond, Virginia.

Q. What is your educational and professional background?

A. I am a graduate of West Virginia Institute of Technology in 1980 with a Bachelor of Science Degree in Electrical Engineering. I am also a Registered Professional Engineer in the State of Virginia. I joined Dominion Virginia Power in February 1981 and currently have over twenty-six years with the Company holding various positions. My specific experience has been in System Protection, Substations, District Operations and Transmission Planning. The System Protection experience involved the design, setting and operating analysis of relaying systems for the protection of the Company's generation, transmission and distribution facilities. My substation experience involved researching and engineering recommendations concerning substation electrical equipment application and operating practices. My district operations experience involved the supervision of servicemen, service coordinators, and technical employees. The main responsibilities were the restoration of service activities, switching of electrical facilities and engineering solutions to customer radio interference problems.

Q. What are your responsibilities as Manager – Electric Transmission Planning?

A. My responsibilities include the development of the long-range transmission expansion plan, which provides for orderly and timely modifications to the Company's transmission system in order to ensure an adequate, economical and reliable supply of electric power. As part of the planning process, my group is responsible for performing various reliability, stability and generation interconnection studies, and representing the Company on regional/interregional reliability study groups and various NERC, SERC, VACAR and PJM committees.

Q. What is the purpose of your direct testimony?

A. Dominion Virginia Power proposes to build in northern Virginia a new 500 kV electric transmission line beginning near Structure 56 of Dominion Virginia Power's existing 500 kV line #580 ("Structure 580/56"), located within the Company's existing right-of-way at a point in eastern Warren County approximately 16 miles southeast of Allegheny Power's ("Allegheny's" or "APS's") Meadow Brook Substation in Frederick County, and running approximately 65 miles within, or adjacent to, existing Dominion Virginia Power right-of-way through Warren, Fauquier, Rappahannock, Culpeper, Prince William and Loudoun Counties to the Company's existing Loudoun Substation in southeastern Loudoun County.

This new line is part of a larger project to construct a total of approximately 265 miles of new 500 kV lines to connect Allegheny's 502 Junction Substation in southern Pennsylvania with Dominion Virginia Power's Loudoun Substation, with intermediate connections at the Company's Mt. Storm Substation in West Virginia and Allegheny's Meadow Brook Substation (the "502 Junction – Loudoun Project"). Dominion Virginia

Power's portion of the 502 Junction – Loudoun Project will be to construct the 65 miles of new 500 kV line described above and make associated modifications at Loudoun Substation and at Mt. Storm Substation. Trans-Allegheny Interstate Line Company ("TrAILCo"), an Allegheny affiliate, will be constructing the remainder of the 502 Junction – Loudoun Project, including the new 500 kV lines in Pennsylvania and West Virginia and, in Virginia, the portion of the Mt. Storm-Meadow Brook circuit from the Virginia state line to Meadow Brook Substation, the installation of two new 500 kV breakers and associated equipment at Meadow Brook Substation and the construction of the portion of the Meadow Brook-Loudoun circuit from Meadow Brook Substation to Dominion Virginia Power's Structure 580/56.

I will describe the need for these new transmission facilities and discuss certain reliability aspects of the proposed line and its impact on economic development. In addition, I am sponsoring Sections I.A, I.B, I.C, I.E., I.F, I.H and I.I of the Appendix. Some of the information in I.C. has been provided to me by other Company personnel.

Q. Why do the new transmission facilities need to be built at this time?

A. The construction of the 502 Junction – Loudoun Project is necessary to relieve identified violations of North American Electric Reliability Corporation ("NERC") mandatory reliability standards ("NERC Reliability Standards") beginning in the Summer 2011 timeframe brought on by significant increases in electrical demand over the past 10 years as well as expected demand growth projected for the future. These reliability violations, if not relieved, will severely impact the transmission system's ability to provide reliable service to Dominion Virginia Power's and Allegheny Power's customers in the northern Virginia load area. These reliability violations also will

adversely impact reliable service to critical loads in the Washington, D.C. – Baltimore area and to a lesser extent a large portion of the eastern United States.

The NERC Reliability Standards constitute minimum criteria with which all utilities, including Dominion Virginia Power, must comply as components of the regional transmission system. The failure to address these projected NERC reliability violations by the Summer 2011 timeframe could lead to potential rolling blackouts in northern Virginia that would significantly impact the region's economy as well as service to critical government facilities. The August 14, 2003 blackout highlights the significant impact that a transmission event in one region can have over a much larger geographic area should the system be operated in a manner that violates NERC Reliability Standards. Moreover, the Energy Policy Act of 2005 mandates that electric utilities must follow these NERC Reliability Standards, and utilities could be fined up to $1 million a day per violation if found to be in non-compliance.

Q. Please describe the present 500 kV transmission system and its role in providing reliable service to customers in the northern Virginia area.

A. Northern Virginia, like most major metropolitan areas, is extremely dependent on the EHV (345 kV and above) transmission system to transport electricity into the area to reliably meet its energy needs. Based on forecasted Summer 2007 peak loading conditions, there is only enough generation in this load area to supply 48% of the local needs. This ratio of generation to load is projected to decline to approximately 44% in 2011 and 40% in 2016. With the contingency loss of the largest generator (Possum Point Unit #5 – 736 MW) in this load area, the ratio of generation to load declines to 36% in 2007, 33% in 2011 and 30% in 2016. Evaluating the transmission system's

ability to reliably serve load for the contingency loss of a generation unit is a requirement of the NERC Reliability Standards. Dominion Virginia Power's transmission system, including the northern Virginia service area, is extremely reliant on a robust and reliable regional transmission system.

Dominion Virginia Power is part of the Eastern Interconnection transmission grid, meaning it is interconnected, directly or indirectly, with all of the other transmission systems in the U.S. and Canada between the Rocky Mountains and the Atlantic coast, excluding Quebec and most of Texas. All of the transmission systems in the Eastern Interconnection are dependent on each other for support in moving bulk power through the transmission system and for reliability support. The Company is also part of the PJM Interconnection, L.L.C. ("PJM") Regional Transmission Organization ("RTO") providing service to a large portion of the eastern United States. PJM is currently responsible for ensuring the reliability and coordinating the movement of electricity through all or parts of Delaware, Illinois, Indiana, Kentucky, Maryland, Michigan, New Jersey, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia and the District of Columbia. This service area has a population of about 51 million and in 2006 set a new summer peak demand of 144,796 MW, of which Dominion Virginia Power's load portion was approximately 19,375 MW serving 2.3 million customers. Dominion Virginia Power's load zone is the third largest area in PJM behind only American Electric Power Company and Commonwealth Edison.

Q. Please explain the role of the 500 kV facilities in supplying northern Virginia.

A. Attachment I.E.1 to the Appendix shows Dominion Virginia Power's transmission system serving northern Virginia. Attachment I.E.2 to the Appendix shows the existing

major 500 kV transmission facilities serving Dominion Virginia Power's and Allegheny's northern Virginia and Winchester load areas. Attachment I.E.3 to the Appendix shows the proposed 502 Junction – Loudoun Project facilities, including the portion to be constructed by the Company, in relation to the 500 kV system serving the region. The regional 500 kV Extra High Voltage ("EHV") transmission network is the major transportation system providing electrical energy to both companies' customers as well as a large portion of the eastern United States. Its primary purpose is to deliver bulk power needs from generation sources, which are located primarily outside northern Virginia, to major load centers. At these major load centers, bulk power flows from the 500 kV system to lower voltage lines to satisfy the distribution loads.

As shown in Appendix Attachments I.E.1, I.E.2 and I.E.3, Dominion Virginia Power's portion of northern Virginia is primarily served from four different 500 kV corridors, some of which are from neighboring systems. These corridors are as follows:

a. Black Oak - Bedington – Doubs

b. Mt. Storm – Doubs

c. Mt. Storm – Meadow Brook - Morrisville

d. Dooms - Cunningham – Elmont

These corridors are the main transportation lines from remote generation resources to Dominion Virginia Power's load centers connected to the 500 kV System at Bristers, Clifton, Loudoun, Morrisville, Pleasant View and Ox Substations via 500-230 kV transformers. See Appendix Attachment I.E.1. They are also the main source lines to APS load centers served from Bedington, Black Oak, Doubs and Meadow Brook

transformers. The transformers at these stations support over 7,000 MW of power flow from the 500 kV system to the underlying lower voltage transmission system.

Q. Can you provide some illustrations of northern Virginia's dependence on these 500 kV facilities?

A. Northern Virginia's dependence on the four 500 kV corridors described above and the interconnected transmission system in general can be highlighted by looking at Attachment I.B.1 to the Appendix. This figure highlights the change, or delta, in power flows on the 500 kV lines for an outage of Possum Point Unit #5. When this 736 MW of generation trips off-line, the other generating units in the region respond to this outage by increasing their output to make up for the loss of generation. The resulting net increase in power flow on all four of these lines is 246 MW, or 33% of the 736 MW loss in generation. Other 500 kV network lines to the north and east also respond, such as the Possum Point – Burches and Brighton – Doubs lines, with a net increase in power flow on these two lines of 228 MW, or 31%, of the 736 MW loss in generation. This study also shows that 82 MW, or 11%, of the 736 MW loss in generation is coming from sources south of Richmond. Adding the delta flows of the 500 kV system shows it is supplying 76% of the increased power requirements for northern Virginia for the contingency loss of 736 MW of internal generation. The remaining 24% is being supplied from lower voltage networks in the area.

Appendix Attachment I.B.2 provides another example of how the interconnected transmission system responds to the loss of one of these critical 500 kV lines providing service to northern Virginia. For this example, the Mt. Storm – Meadow Brook line is removed from service. Pre-contingency, the Summer 2011 power flow models show a

flow of approximately 1,762 MW on this line. When an outage to this line occurs, the power flow will automatically redistribute itself over the remaining networked facilities. Of the four corridors noted above, three corridors (Black Oak – Bedington – Doubs, Mt. Storm – Doubs and Dooms - Cunningham - Elmont) will account for 60% of the increased power flow into northern Virginia. The Possum Point – Burches 500 kV line accounts for 163 MW, or approximately 9%, of the redistributed power flow. The Mt. Storm – Doubs 500 kV line accounts for the single largest increase in power flows, which is approximately 561 MW (32%). This example further highlights the critical role of the interconnected 500 kV system in supporting the transportation of bulk power into northern Virginia.

Although these examples do illustrate how the 500 kV system responds to the loss of critical elements, application of PJM's and the Company's criteria for meeting NERC Reliability Standards will yield much higher contingency loading impacts on the Mt. Storm – Doubs line, as will be demonstrated below. For example, applying Dominion Virginia Power's criteria for meeting NERC Reliability Standards requires analysis of the impacts of the contingency loss of the Mt. Storm – Meadow Brook 500 kV line with the largest generator in the study area (Possum Point Unit #5) unavailable.

Q. Have these 500 kV lines presented operational issues in the past?

A. The Black Oak – Bedington – Doubs, Mt. Storm – Doubs and Mt. Storm – Meadow Brook corridors have presented major operational issues for several years and in particular over the last two years. As a result of higher than expected system loads in 2005, an upgrade to increase the thermal capability of Dominion Virginia Power's Mt. Storm – Doubs 500 kV line was accelerated by the Company from 2010 to 2006. The

thermal capability of the Mt. Storm –Doubs 500 kV line was a limiting constraint for 555 hours in 2005. This upgrade increased the capability of this line from 2,200 MVA to its current rating of 2,598 MVA. The Black Oak – Bedington - Doubs corridor, while thermally limited to 3,502 MVA, is predominately voltage-limited to operation significantly below its thermal capability. This means the system must be operated to prevent contingency flows on this line from exceeding this voltage limit in order to prevent a voltage collapse in this load area, which includes northern Virginia. In 2005, this voltage limit was a limiting constraint for 2,017 hours.

Operating constraints are often viewed as indicators of future reliability problems because they force system operators to operate the system in an inefficient manner. They also can provide insight into how significant reliability issues may impact customers should a reliability problem occur on the interconnected system. Therefore, these operating constraints are consistent with the findings that the Mt. Storm – Doubs 500 kV line overload was identified in 2011 and that the region, including the northern Virginia area, would be subject to blackouts for this overload, since the northern Virginia area was subjected to voltage reduction in 2005 for a voltage constraint at Doubs 500 kV substation.

Q. Please discuss the growth in the demand for electric service in your service area.

A. Dominion Virginia Power's transmission system is responsible for providing transmission service to the Company's retail customers and also to the customers of Old Dominion Electric Cooperative, Virginia Eastern Municipal Association, Central Virginia Electric Cooperative and Craig-Botetourt Electric Cooperative in Virginia, as well as the customers in North Carolina of North Carolina Electric Membership

Cooperative and North Carolina Eastern Municipal Power Agency. As noted in the testimony of Phillip Powell, the demand for electric service has grown rapidly over the last five years in Dominion Virginia Power's service area, and during this time the Company's total electrical demand has grown by 2,387 MW, with 969 MW (40.6%) of this increase occurring in northern Virginia. Dominion Virginia Power's portion of the northern Virginia region includes the following counties: Arlington, Fairfax, Fauquier, Loudoun, Prince William, Spotsylvania and Stafford, and the cities of Alexandria, Falls Church, Vienna, Fairfax, Leesburg, Manassas and Warrenton. On August 3, 2006, Dominion Virginia Power's customers set a new system peak electrical demand of 19,375 MW, of which the northern Virginia portion of this load was approximately 6,368 MW. The testimony of Phillip Powell addresses this growth in more detail.

Q. Does the 2007 PJM Load Forecast project greater growth for the Dominion Virginia Power northern Virginia service area?

A. Yes. As shown in Attachment I.B.3 to the Appendix, the studies that initially identified the need for the new line were based on the 2006 PJM forecast, which projected a normal load in 2011 for the northern Virginia area of Dominion Virginia Power to be 6,532 MW. The 2007 PJM forecast now projects this northern Virginia area normal load to be 6,833 MW, which is 301 MW, or 4.6% higher, than the 2006 load estimate.

Q. What are the implications of this growth for transmission planning?

A. In a recent news release issued January 16, 2007 discussing the region's expected growth over the next 10 years, PJM stated as follows regarding this growth:

> The growth rate in PJM's Southern Region (Dominion's territory) is forecast to be 1.9 percent annually. Annual growth at that rate will result in approximately 4,000 megawatts of additional demand for electricity in 10 years.

> "The above average growth in the Southern Region helps drive the need to expand the power supply system there," said Michael J. Kormos, PJM senior vice president – Reliability Services. "In just five years, peak demand in the Dominion territory is forecast to grow by 1,756 megawatts. That's like adding more than a million houses to the system."

A study (The National Electric Transmission Congestion Study) conducted by the U.S. Department of Energy ("DOE") in August 2006 placed northern Virginia in one of two national "Critical Congestion Areas" for electricity transmission. The DOE report stated that the region requires "billions of dollars of investment in new transmission, generation and demand-side resources over the next decade to protect grid reliability and ensure the area's economic viability."

Q. Has Dominion Virginia Power constructed additions to its transmission system to address this increased demand for power?

A. Yes. In order to meet the past demand growth as well as projected future growth, Dominion Virginia Power has completed or will complete many new internal expansion projects in the northern Virginia area. Some examples of projects to meet this demand are as follows:

Network Transmission Work in Northern Virginia

Year 2000

- New transmission line - 230 kV Morrisville to Remington CT
- Upgrade transmission line - 230 kV Line #2086 Remington CT to Warrenton

Year 2001

- New transmission line - 230 kV Ladysmith to Ladysmith CT

Year 2002

- New transmission line - 230 kV Clifton to Reston
- Upgrade transmission lines - 115 kV Lines #145 and #183 Remington to Possum Point

Year 2003

- New transmission transformers - Possum Point and Pleasant View 500-230 kV transformers
- Upgrade transmission lines - 230 kV Lines #225, #2074 and #2088 North Anna to Gordonsville

Year 2004

- Upgrade transmission lines - 230 kV Lines #2039 and #2040 Morrisville to Marsh Run

Year 2005

- New transmission line and station - 230 kV Beaumeade to Greenway & Greenway substation
- Upgrade transmission station - 230 kV ring bus Beaumeade substation

Year 2006

- New transmission transformer - Clifton 2nd 500-230 kV transformer
- Upgrade transmission line - 500 kV Line #551 Mt. Storm to Doubs
- New transmission voltage support - 6 transmission capacitor banks

Year 2007

- New transmission line and substation - 500 kV Morrisville to Bristers & Bristers substation
- Upgrade transmission line - 230 kV Line #2063 Clifton to Ox

Year 2008

- Upgrade transmission lines - 230 kV Lines #2045 and #2094 Loudoun to Brambleton
- Upgrade transmission line - 230 kV Line #251 Idylwood to Arlington
- New transmission line - 230 kV Brambleton to Greenway

Year 2009

- New transmission line and transformer - 230 kV Bristers to Gainesville and 500-230 kV transformer at Bristers
- New transmission transformer - Possum Point 2nd 230-115 kV transformer

Year 2010

- Upgrade transmission line - 230 kV Line #2097 Ox to Idylwood

The total cost of these projects is approximately $142 million.

Q. Are these projects sufficient to address the projected demand for power in the future?

A. No. With growth in the region coupled with the past and continued future load growth in northern Virginia, expansion projects on the Dominion Virginia Power system alone such as those indicated above, will not suffice after the 2010 timeframe. The identified future NERC violations (which take these existing and planned projects into account), if not corrected with the construction of the proposed 502 Junction – Loudoun Project, will severely impact Dominion Virginia Power's ability to provide reliable service to its customers in northern Virginia. To reliably serve future load growth and to avoid subjecting the area to potential rolling blackouts beginning in the Summer 2011 timeframe, this line must be constructed.

Q. Please explain how the specific need for the proposed 502 Junction – Loudoun Project, and Dominion Virginia Power's portion of it, has been determined.

A. Dominion Virginia Power, working with PJM and its member transmission owners through PJM's regional transmission expansion planning process ("RTEPP"), has identified both regional and local NERC reliability violations that will directly impact northern Virginia load areas beginning in Summer 2011. Under this coordinated RTEPP effort, PJM's load flow studies were validated by studies performed by Dominion Virginia Power and Allegheny. This planning process is described in more detail in the direct testimonies of Steven Herling of PJM and Scott Gass of PowerGEM (and formerly of PJM). These studies have confirmed that by Summer 2011 projected load growth will produce multiple contingency conditions that would overload the Mt. Storm – Doubs 500 kV line and also produce potential voltage collapse conditions in the

Winchester, Front Royal and Shenandoah Valley areas of Virginia. PJM, with the involvement of Allegheny and Dominion Virginia Power in the RTEP process, has determined that the 502 Junction – Loudoun Project, including the proposed transmission facilities described in this application, will provide the most comprehensive solution for resolving the projected NERC reliability violations by Summer 2011 as well as provide for future load growth. This project was one of many projects PJM presented at its May 23, 2006 Transmission Expansion Advisory Committee ("TEAC") meeting and subsequently approved by PJM as described in Mr. Herling's testimony. Copies of the TEAC presentation and approved plans are contained in Attachments I.A.1 and I.A.2 to the Appendix.

Q. Please discuss how the planning process that led to these determinations takes into account changes in system conditions.

A. As explained in the testimonies of Mr. Jeffrey Palermo of the Company's independent consultant KEMA, Incorporated ("KEMA"), Mr. Herling and Mr. Gass, the transmission planning process and the application of NERC Reliability Standards is a dynamic process that will often require modifications to projected plans from year to year. New generators, block load additions, generation retirements and changes to load forecasts (on both a Dominion Virginia Power and regional system basis) are some of the many factors that can impact projected transmission plans from year to year. For example, the 2003 Dominion Virginia Power system forecast used in the Company's Earnings Test and Annual Informational Filing for 2003, PUE-2004-00048, projected system loads in 2007 and 2011 to be 18,671 MW and 19,962 MW, respectively. The actual summer peaks in 2005 and 2006 were 18,897 MW and 19,375 MW, respectively.

Thus, the 2005 actual peak exceeded the level projected for 2007, and the 2006 actual peak approached the level projected for 2011. This actual higher-than-expected demand experienced in Summer 2005 contributed to an operating issue of low voltage on the 500 kV system. The region, including Dominion Virginia Power's northern Virginia load area, had to implement voltage reductions in order to maintain 500 kV voltages within acceptable operating limits. The Company's Mt. Storm Power Station was also required to reduce its output during this loading period to prevent the Mt. Storm – Doubs 500 kV Line #551 from overloading. As a result of these actual loading conditions in 2005, several upgrades in the region were implemented to provide relief. As discussed above, plans were accelerated to uprate the Mt. Storm to Doubs 500 kV Line #551 to its current rating, with the upgrade being moved up from the projected May 2010 need to May 2006, along with new projects adding capacitor banks in northern Virginia.

The current PJM 2007 System Load Forecast now indicates that the forecasted Summer 2007 and Summer 2011 peaks for the Company are estimated to be 19,392 MW and 20,985 MW, respectively, which are significantly higher than originally projected by the Company in 2003. The Dominion Virginia Power system that was initially planned three years ago when lower peaks were anticipated must now reliably serve this additional 1,023 MW of system load in the new forecast for 2011. These changes help highlight why the transmission planning process will always be a dynamic and not a static process.

Q. What role do the NERC Reliability Standards play in the planning process?

A. Mr. Herling addresses this subject in detail. In summary, NERC Reliability Standards mandate that the maximum loading for any transmission facility should stay within its "Applicable Rating" for both thermal and voltage operating conditions, both pre-contingency and post-contingency. NERC Reliability Standards were developed to reduce the likelihood that system disturbances would result in large scale service interruptions (blackouts). The net result of evaluating the performance of the transmission system over this wide range of contingency conditions is to provide the system operators with a system that can be expected to operate within safe operating limits.

Dominion Virginia Power's planning criteria, which reflect NERC Reliability Standards, provide that, for the loss of a transmission line or for the loss of the most critical transmission line while the largest generating unit in the area is also not available, no facility should be loaded above 94% of its thermal rating. Dominion Virginia Power's criteria for the 500 kV system (which actually operates around 515 kV in order to reliably move bulk power across the system) for these same outages sets a minimum criterion of 1% above the 500 kV nominal voltage, or 505 kV. As noted in numerous cases before the Commission, the Company builds a 6% margin (which is not weather-normalized) into its thermal ratings and a 1% tolerance into its voltage criteria. These margins are designed to take into account variations from normal weather and load forecast uncertainty.

Q. What do Dominion Virginia Power's planning studies show regarding the transmission system's ability to meet NERC Reliability Standards for the facilities on which northern Virginia depends?

A. Load growth projections show that by Summer 2011 Dominion Virginia Power will not be able to meet projected growth in a reliable manner consistent with NERC Reliability Standards, resulting in transmission facility overloads and potential loss of transmission service. In coming to this conclusion, PJM, Dominion Virginia Power and Allegheny performed independent studies to assess the system's ability to meet the NERC Reliability Standards. A violation of the NERC Reliability Standards occurs under Dominion Virginia Power's planning criteria when a Dominion Virginia Power transmission facility exceeds 94% of its thermal capability under simulated contingencies. A summary of the Company's power system simulations and resulting violations of NERC TPL-002-0 (for an event resulting in the loss of the most critical transmission line while the largest generating unit in the area is also not available) for expected Summer 2011 operating conditions based on the 2006 PJM Load Forecast are shown below for the following contingencies:

1. For the loss of Line #572A (Mt. Storm – Greenland Gap) while Possum Point Unit #5 is unavailable, Line #551 (Mt. Storm – Doubs) loads to 102% of its rating.

2. For the loss of Line #572B (Meadow Brook – Greenland Gap) while Possum Point Unit #5 is unavailable, Line #551 (Mt. Storm – Doubs) loads to 102% of its rating.

3. For the loss of Line #542 (APS) (Hatfield – Black Oak) while Possum Point Unit #5 is unavailable, Line #551 (Mt. Storm – Doubs) loads to 100% of its rating.

4. For the loss of Line #554 (APS) (Black Oak – Bedington) while Possum Point Unit #5 is unavailable, Line #551 (Mt. Storm – Doubs) loads to 100% of its rating.

5. For the loss of Line #572A (Mt. Storm – Greenland Gap) while Possum Point Unit #5 is unavailable, Endless Caverns 230-115 kV loads to 109% of its rating.

6. For the loss of Line #572B (Meadow Brook – Greenland Gap) while Possum Point Unit #5 is unavailable, Endless Caverns 230-115 kV Transformer loads to 108% of its rating.

7. For the loss of Line #572A (Mt. Storm – Greenland Gap) while Possum Point Unit #5 is unavailable, Line 128 (Edinburg – Mount Jackson) loads to 115% of its rating.

8. For the loss of Line #572B (Meadow Brook – Greenland Gap) while Possum Point Unit #5 is unavailable, Line 128 (Edinburg – Mount Jackson) loads to 114% of its rating.

As noted above, the NERC reliability violations above were based on the 2006 PJM Load Forecast. The revised 2007 PJM forecast projects a higher demand for the northern Virginia load area for the 2011 timeframe, meaning the problem is getting worse. Appendix Attachments I.B.4 and I.B.5 provide a summary of all the projected overloads based on Dominion Virginia Power's analysis for both the 2006 and 2007 load forecasts as well as projected future years.

Q. Were there any additional NERC reliability violations identified by Dominion Virginia Power that will impact its northern Virginia service area?

A. Yes. In addition to thermal violations discussed above, Dominion Virginia Power's studies also show that there is the potential for a voltage collapse to occur in 2016 without the proposed line for various TPL-002-0 contingency conditions. These various contingencies cause system voltages to drop below 85% of nominal voltage on the majority of the substations in the northern Virginia area, including the 500 kV substations. This would present an unacceptable operating condition and one which could lead to cascading outages should this contingency condition occur. This same system study shows that when the proposed transmission line is modeled in 2016, no

500 kV substation busses will be less than 85% of nominal voltage for any contingency condition.

Q. What were the results of PJM's studies?

A. These are discussed in detail in the direct testimony of Mr. Gass. Independently, PJM performed a broader assessment of the regional system's ability to meet the NERC Reliability Standards on a 15-year planning horizon. To perform this assessment, PJM evaluates member systems based on PJM Generator and Load Deliverability studies. Generator Deliverability studies assure that capacity resources (generator MW) can be delivered to the remainder of the PJM system at peak load. Load Deliverability studies examine defined load zones (for example the Dominion Virginia Power zone) within the PJM region and consider the ability of the transmission system to deliver adequate power to the load zone during a generation capacity emergency. A generation capacity emergency occurs when there is high load (i.e., high consumer demand) on the electric system and insufficient generation capacity within the load zone.

PJM's 2006 15-year assessment identified several major reliability violations beginning in 2011, and extending out to 2021, that will require new transmission expansion. The near term problems identified by PJM were in 2011 and occur in the Maryland, Virginia and West Virginia geographic area, which will impact both the Allegheny and Dominion Virginia Power northern Virginia service areas. For expected system operating conditions in 2011, this PJM analysis identified the following near term deficiencies on the 500 kV systems of Allegheny and Dominion Virginia Power:

1. The Mt. Storm – Doubs 500 kV Line #551 would load to 101% of the emergency rating for an outage of Mt. Storm – Greenland Gap 500 kV Line #572A for the PJM Generator Deliverability study for Summer 2011.

2. The Mt. Storm – Doubs 500 kV Line #551 would load to 101% of the emergency rating for an outage of Meadow Brook – Greenland Gap 500 kV Line #572B for the PJM Generator Deliverability study for Summer 2011.

3. The Mt. Storm – Doubs 500 kV Line #551 would load to 100% of the emergency rating for an outage of Hatfield – Black Oak 500 kV Line #542 (APS) for the PJM Generator Deliverability study for Summer 2011.

4. The Mt. Storm – Pruntytown 500 kV Line #554 (APS #510) would load to 100% for an outage of Hatfield – Black Oak Line #542 (APS) for the PJM Generation Deliverability study starting Summer 2014.

5. The Mt. Storm – Doubs 500 kV Line #551 would load to 106% of the emergency rating for an outage of Mt. Storm – Greenland Gap Line #572A for a mid-Atlantic region Load Deliverability study for Summer 2011.

6. The Mt. Storm – Doubs 500 kV Line #551 would load to 106% of the emergency rating for an outage of Meadow Brook – Greenland Gap Line #572B for a mid-Atlantic region Load Deliverability study for Summer 2011.

7. The Mt. Storm – Doubs 500 kV Line #551 would load to 104% of the emergency rating for an outage of Hatfield – Black Oak 500 kV Line #542 (APS) for a mid-Atlantic region Load Deliverability study for Summer 2011.

8. The Mt. Storm – Doubs 500 kV Line #551 would load to 104% of the emergency rating for an outage of Bedington – Black Oak 500 kV Line #544 (APS) for a mid-Atlantic region Load Deliverability study for Summer 2011.

The longer term reliability violations extending out to 2021 were in central Pennsylvania and northern New Jersey. Mr. Gass's testimony explains how these results of PJM's studies relate to the result of the Company's analyses.

Q. Were other NERC Reliability Standards implicated?

A. NERC Reliability Standard TPL-003-0 also requires that, for an event resulting in the loss of any two transmission circuits, the remaining facilities should be within acceptable thermal and voltage limits. Allegheny Power also validated this analysis since the violations directly impact their northern Virginia load area fed out of Meadow

Brook Substation. The projected load growth also will cause this reliability standard to be violated beginning in Summer 2011, when:

1. For the loss of the Morrisville – Meadow Brook 500 kV Line #580 and the Meadow Brook – Greendland Gap Line #572B, a voltage collapse will occur on the 138 kV system out of Meadow Brook Substation.

2. For the loss of the Hatfield – Black Oak 500 kV Line #542 (APS) and Mt. Storm – Doubs Line #551 the 500 kV voltage at Meadow Brook will drop to 91.7% of nominal.

3. For the loss of the Black Oak – Bedington 500 kV Line #544 (APS) and Mt. Storm – Doubs Line #551 the 500 kV voltage at Meadow Brook will drop to 91.0% of nominal.

Q. Why was the 502 Junction – Loudoun Project chosen to address these NERC violations?

A. PJM, with the involvement of Allegheny and Dominion Virginia Power working through the PJM RTEP process, evaluated several alternatives to resolve these identified NERC reliability violations. The proposed new 265-mile 502 Junction – Loudoun Project was determined to be the best solution to resolve these reliability violations in the 2011 timeframe. The analyses of the Company, PJM and KEMA clearly show that this line is needed to meet demand beginning in the Summer 2011 timeframe and that significant operating problems will occur, including potential rolling blackouts in northern Virginia, if this line is not in service.

The overall impact this solution has on meeting the demands of northern Virginia and the region and resolving the NERC reliability violations can be shown by comparing Attachments I.B.4, I.B.5, I.B.6 and I.B.7 to the Appendix. Attachments I.B.4 and I.B.5 to the Appendix show the violations in various years without the 502 Junction – Loudoun Project. Attachments I.B.6 and I.B.7 to the Appendix show the impact this line

has on resolving the overloads. Although a few minor overloads show up, they have been significantly reduced with the worst not showing up until the 2016 timeframe. As explained by Mr. Herling, those 2016 overloads will be resolved during the 2007 RTEPP analysis dealing with other regional issues affecting the mid-Atlantic region. Both the 502 Junction – Loudoun Project, as well as the next expansion project to be announced later in 2007 by PJM, are needed for the region to meet future demand.

Q. Why is Loudoun Substation the best place to terminate the eastern end of the overall project?

A. Construction of the 502 Junction – Loudoun Project, including the new line proposed in this application, will relieve all identified NERC reliability violations and provide this high growth area access to much needed generation resources. Dominion Virginia Power's Loudoun Substation is centrally located in the middle of some of the fastest growing counties in Virginia, including Fauquier, Loudoun and Prince William. As reported by the U.S. Census Bureau, Loudoun has been the fourth fastest growing county in the United States during 2000-2006, with a population growth rate of 58.5%, compared to a growth rate of 8% for Virginia during that period. Over that same period, the population of Prince William County grew at a rate of 31.5%, and Fauquier County's growth rate was 17.2%. In comparison, Virginia's overall population growth rate during the period was 8%.

As indicated earlier, this high growth area is highly dependent on the regional 500 kV system to meet current and future load demands. The NERC violations that will impact the northern Virginia load area of Dominion Virginia Power are on Dominion Virginia Power and Allegheny 500 kV facilities located mostly outside of Virginia. A key line,

the Mt. Storm – Doubs 500 kV line, is vital to maintaining reliable service in northern Virginia. Bringing a new line directly into the Loudoun Substation will relieve this area's dependence on those facilities and provide the needed capacity to maintain reliability and meet future expected growth.

Q. Has the Company sought independent verification that the proposed project is needed and provides the best solution for meeting the need identified by Dominion Virginia Power and PJM?

A. Yes. In order to further validate the need for this proposed line, Dominion Virginia Power hired KEMA, a leading expert in transmission and distribution solutions, to independently investigate the need and proposed solution. KEMA's resulting report, which is included in this application, verifies that there is a need that must be addressed based on the identified reliability violations and that a 500 kV 502 Junction – Loudoun transmission line provides the best means for avoiding these violations. KEMA concluded that the planned system, without additional system improvements, will experience overloads by 2011 on the Mt. Storm – Doubs, Hatfield – Black Oak and Black Oak – Bedington 500 kV lines and by 2016 on these three key lines and on the Dooms – Lexington, Bristers – Morrisville, Cunningham – Elmont and Bristers – Ox 500 kV lines and that, based on the applicable planning criteria, these violations indicate a need that must be addressed in plans for the future. KEMA also considered a total of 10 possible solutions to meet the identified need, including generation and demand side management as well as a number of transmission solutions, and concluded that the Company's Proposed and Alternate Routes are the best technical solutions.

Q. Has the Company considered whether there are any feasible alternatives to construction of the proposed line?

A. Yes. These alternatives are described and considered in Section I.C of the Appendix. For the reasons expressed therein, the proposed Project is superior to all of these alternatives. As also explained in Appendix Section I.C, generation and demand side management are not feasible alternatives to construction of the proposed project.

Q. Did the Company always consider the Proposed Route to meet the electrical needs that had been identified?

A. No. In its evaluation, Dominion Virginia Power compared the ability of both the shorter, cross-country route and the longer southern route (now the Proposed Route) to meet the needs identified by both the Company and PJM through the 2016 timeframe. Those assessments, which were based on the 2006 PJM Load Forecast as well as other forecasted future system conditions, identified 31 overloads that would impact Dominion Virginia Power and the region beginning in the year 2011 and extending out to 2021. Based on those assessments and assuming construction of the 502 Junction – Loudoun Project, the next major PJM regional transmission expansion was not needed until 2016 or later. Therefore, Dominion Virginia Power's assessment of the route for the Meadow Brook – Loudoun portion of the project was attempting to assure the robustness of the upgrade until at least 2016. The Company found that both routes met the need in 2011, but the Proposed Route failed to satisfy the 2016 criteria. The greater electrical impedance of the longer Proposed Route rendered it unable to relieve the NERC Reliability violations impacting Dominion Virginia Power and the region beginning in the 2013-2014 timeframe.

Q. What caused the Company to re-evaluate the Proposed Route from an electrical perspective?

A. Two significant planning assumptions changed. Changes were made in the project's design parameters that affected the impedance of this portion of the 502 Junction – Loudoun line. More importantly, the new 2007 PJM Load Forecast showed greater demand in the northern Virginia load area, along with a number of other system changes discussed in Mr. Herling's testimony that increased the west-to-east flows, including these on the Mt. Storm – Doubs 500 kV line. The 2007 forecast showed northern Virginia demand to be 301 MW, or 4.6%, higher than the 2006 forecast demand and to have a direct impact on increasing the west-to-east flows. As indicated in Mr. Herling's testimony, the revised 2007 load forecast also showed additional changes to the broader region that increased the west-to-east flows much sooner than expected and demonstrated the need for further regional system upgrades in addition to the 502 Junction – Loudoun Project.

Based on this revised information, the need to bridge the gap between the 502 Junction – Loudoun Project with the next future PJM expansion changed significantly. Assessments of this revised data now show that additional upgrades beyond the current project are now expected as early as the 2013 timeframe, meaning the Segment Overhead Route is no longer electrically superior to the Proposed Route. That new assessment now shows that the Segment Overhead Route and the Proposed Route provide similar electrical benefits in the 2011 timeframe and sufficiently beyond to maintain system reliability until other regional improvements now required outside the State of Virginia can be developed in the 2013 timeframe. PJM also concurs that the

Company Proposed Route effectively meets the increased needs of the northern Virginia area.

Q. Did KEMA make a similar assessment?

A. Yes. KEMA was hired by Dominion Virginia Power to independently assess the need for this project for its northern Virginia area. KEMA's assessment of need for this project centers on the original 2006 PJM Load Forecast. KEMA's assessment demonstrates that both the Alternate Route and Proposed Route will resolve the NERC Reliability violations in the year 2011 but in 2016 the Mt. Storm – Doubs line overloads if either is built. This led KEMA to conclude that both routes are viable options because, even with a new line, they recognize that additional regional system expansion will be needed and is currently being developed by the PJM RTEPP. The primary difference between Dominion Virginia Power's initial assessment and the KEMA assessment can be attributed to design changes in the project that affected the electrical impedance parameters of the line along with the knowledge of additional regional system expansion now required and being developed by the PJM RTEPP. The Company's original assessment predated this information, but it was available for inclusion in the KEMA report. If KEMA had assessed the Alternate and Proposed Routes using the same information as the Company, they would have come to a similar conclusion.

Q. In determining the Company Proposed Route, Company consultant Burns & McDonnell Engineering Company, Inc. ("Burns & McDonnell") was given a parameter to limit the length of line where both 500 kV circuits were placed within the existing 150' wide right-of-way to less than one continuous mile. Please address this limitation.

A. As previously discussed, Dominion Virginia Power's transmission system is extremely reliant on a robust and reliable regional 500 kV transmission system. The northern Virginia area is primarily served by four critical 500 kV transmission corridors with the proposed 502 Junction - Loudoun line becoming the fifth corridor needed in order to meet future demand growth. The Company Proposed Route for the Meadow Brook – Loudoun portion of this line will be within, or adjacent to, existing right-of-way, including the existing Meadow Brook - Morrisville 500 kV line. The Meadow Brook – Morrisville 500 kV line is one of the existing four primary corridors providing service to northern Virginia. Therefore, it is important that the new line be constructed in a manner that minimizes the likelihood that an event causing an outage on one line would cascade into the second.

Dominion Virginia Power minimizes this risk by its standard design practices. The Company's typical right-of-way width is 150 feet for one 500 kV line and 240 feet for two parallel 500 kV lines. The additional width for the second line reduces the risk of a cascading event taking out both lines. Failure to provide this construction width for the majority of the line would reduce reliability and potentially require additional expansion to prevent rolling blackouts. It is reasonable for Dominion Virginia Power to make exceptions for this line in a few limited locations. The Proposed Route does have a few

areas where there will be two 500 kV lines within the existing 150 foot right-of-way in order to get through confined areas (tight residential areas and open space easement areas). However, to minimize the risk and concerns of a cascading event, Burns & McDonnell was tasked with keeping these confined areas to a minimum with no one section exceeding one mile in length. Keeping the distances of these sections at a mile or less will enable Dominion Virginia Power to treat these lines as individual lines for contingency events, which will reduce the likelihood of requiring additional system re-enforcements in the future. This approach is consistent with NERC Reliability Standards regarding tower line outages, which make exceptions for short distances. Although NERC does not define short distances, Dominion Virginia Power has traditionally used this one mile threshold in its analysis. PJM also requires its member transmission owners to consistently apply this one-mile threshold as part of its NERC compliance program.

Q. Would Dominion Virginia Power still need to construct this line if we were not in PJM?

A. Yes. Regardless of whether Dominion Virginia Power is a member of PJM, the fact remains that the Dominion Virginia Power system, including the northern Virginia area, is part of the Eastern Interconnection transmission system. Dominion Virginia Power's dependence on that system does not change with entrance into an RTO. As already discussed, Dominion Virginia Power's own separate analysis, applying Dominion Virginia Power criteria, identified a number of thermal and voltage NERC reliability violations that will impact its ability to meet the growing demand in the northern Virginia service territory. This same analysis would have been performed by Dominion

Virginia Power regardless of its participation in PJM. Additionally, KEMA was hired to independently evaluate the need for this project from a Dominion Virginia Power only perspective. They have independently concluded the line is required in order to reliably serve the northern Virginia area.

Q. Will construction of the 502 Junction – Loudoun Project, including the facilities to be constructed by Dominion Virginia Power, improve the reliability of the Company's service, and, if so, how would it affect economic development in Virginia?

A. As I have indicated, the proposed facilities are needed to assure the future reliability of the Company's transmission system. A robust and reliable transmission system is an important part of economic development in Virginia because all businesses need reliable energy, and many make expansion decisions on the basis of energy availability. For example, Attachment I.A.3 to the Appendix contains resolutions from the Vienna-Tysons Regional Chamber of Commerce, the Arlington Chamber of Commerce, the Fairfax County Chamber of Commerce, the City of Manassas Utility Commission and the Prince William Regional Chamber of Commerce supporting the need for the proposed new transmission facilities. This new line is vital to sustaining economic development in northern Virginia.

Q. Does this complete your prepared direct testimony?

A. Yes, it does.