

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

IN RE: APPLICATION OF TRANS-ALLEGHENY	:	
INTERSTATE LINE COMPANY FOR	:	
(I) A CERTIFICATE OF PUBLIC CONVENIENCE	:	
TO OFFER, RENDER, FURNISH AND/OR	:	
SUPPLY TRANSMISSION SERVICE IN THE	:	
COMMONWEALTH OF PENNSYLVANIA;	:	
(II) AUTHORIZATION AND CERTIFICATION	:	
TO LOCATE, CONSTRUCT, OPERATE AND	:	Docket Nos. A-110172
MAINTAIN CERTAIN HIGH VOLTAGE ELECTRIC	:	A-110172F0002
TRANSMISSION LINES AND RELATED ELECTRIC	:	A-110172F0003
SUBSTATION FACILITIES; (III) AUTHORITY	:	A-110172F0004
TO EXERCISE THE POWER OF EMINENT	:	G-00071229
DOMAIN FOR THE CONSTRUCTION AND	:	
INSTALLATION OF AERIAL ELECTRIC	:	
TRANSMISSION FACILITIES ALONG THE	:	
PROPOSED TRANSMISSION LINE ROUTES	:	
IN PENNSYLVANIA; (IV) APPROVAL OF AN	:	
EXEMPTION FROM MUNICIPAL ZONING	:	
REGULATION WITH RESPECT TO THE	:	
CONSTRUCTION OF BUILDINGS; AND	:	
(V) APPROVAL OF CERTAIN RELATED	:	
AFFILIATED INTEREST ARRANGEMENTS	:	

DIRECT TESTIMONY OF
SCOTT W. GASS

Re: Electrical Need for TrAIL

April 13, 2007

1 Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

2 A. My name is Scott W. Gass and my business address is 15 Shannon Way,
3 Royersford, Pennsylvania 19468.

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5

DUTIES AND RESPONSIBILITIES

6 Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?

7 A. I am employed by PowerGEM as a Principal Consultant.

8 Q. PLEASE DESCRIBE POWERGEM.

9 A. PowerGEM was founded in May 2000 to provide expert advice, analysis, and
10 software addressing the economic and technical impacts of transmission
11 congestion in competitive electricity markets.

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13

EXPERIENCE AND EDUCATION

14 Q. PLEASE DESCRIBE YOUR EDUCATIONAL BACKGROUND AND
15 PROFESSIONAL EXPERIENCE.

16 A. I graduated from Pennsylvania State University in 1987 with a Bachelor of
17 Science in Electric Engineering. In addition, I completed a two-year power
18 system operations and planning course provided by Power Technologies, Inc. in
19 1989.

20 Upon graduation from Pennsylvania State University, I joined GPU
21 Energy in June 1987. At GPU Energy, I was involved in transmission, sub-
22 transmission and distribution planning where I analyzed current and future
23 infrastructure to optimize system utilization and to ensure adequate and reliable
24 service to customers. I also completed operating studies to provide dispatchers

1 with expected problem areas and solutions. As a direct result of my work, I have
2 extensive experience with Mid-Atlantic Area Council reliability criteria, transient
3 analysis, load flow and short circuit analysis.

4 In October 1998, I joined PJM Interconnection, L.L.C. (“PJM”) as a
5 Senior Engineer in Transmission Planning with responsibility for coordinating all
6 generation interconnection and baseline studies, including completion of over one
7 hundred interconnection load flow and short circuit studies. In July 2003, I was
8 promoted to Manager Transmission Planning. In that position, I was responsible
9 for all aspects of the planning analysis conducted by PJM on its transmission
10 system, including the interconnection of new generation to the PJM transmission
11 system; working with transmission owners to develop system enhancements to
12 maintain future reliability of the PJM system; the integration of Allegheny Power,
13 Commonwealth Edison Company, American Electric Power Company, Dayton
14 Power & Light Company, Virginia Electric and Power Company (“Dominion
15 Virginia Power”) and Duquesne Light Company into PJM; and managing and
16 mentoring 18 transmission planning engineers.

17 While at PJM, I represented PJM on numerous stakeholder committees,
18 including the Regional Planning Process Working Group, the Reliability Planning
19 Criteria Working Group, the Planning Committee, the Economic Planning
20 Implementation Working Group, the Transmission Expansion Advisory
21 Committee and two Inter-Regional Planning Stakeholder Committee efforts, one
22 with the Independent System Operator of New England (“ISO-NE”) and New
23 York Independent System Operator and the other with the Midwest Independent

1 Transmission System Operator. In addition, I was involved in the development
2 and implementation of multiple standards and procedures followed by PJM
3 including, among others, the generation and merchant transmission
4 interconnection processes, the generation and load deliverability procedures, PJM
5 planning criteria, and cost allocation procedures for both baseline and network
6 upgrades for interconnection projects. I was also responsible for completing the
7 studies associated with the extension of the PJM planning horizon in 2006 from
8 five years to 15 years.

9 In November 2006, I joined PowerGEM as a Principal Consultant. My
10 work responsibilities have included completion of fatal flaw studies for potential
11 generation interconnection projects and the development of a Minimum
12 Interconnection Standard test and procedure for application in the recently
13 approved ISO-NE Forward Capacity Market.

14
15 PURPOSE OF TESTIMONY

16 Q. PLEASE DESCRIBE THE PURPOSE OF YOUR TESTIMONY.

17 A. I am testifying on behalf of TrAILCo to demonstrate the electrical need for the
18 Prexy Facilities, the 502 Junction Substation and the Pennsylvania 502 Junction
19 Segment of the Trans-Allegheny Interstate Line (“TrAIL”). TrAILCo witnesses
20 Hozempa and Herling are also providing testimony relating to the electrical need
21 for these transmission line segments and the planning process that resulted in the
22 determination of that need.

1 Q. WILL THE USE OF VARIOUS TERMS IN YOUR TESTIMONY BE
2 CONSISTENT WITH THE DEFINITION ASSIGNED TO THE TESTIMONY
3 OF DAVID E. FLITMAN IN TRAILCO EXHIBIT DEF-1?

4 A. Yes. In addition, I may define other specific terms in my direct testimony.

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6

EXHIBITS

7 Q. PLEASE IDENTIFY THE EXHIBITS TO YOUR TESTIMONY.

8 A. I am sponsoring three exhibits with my direct testimony:

- 9 • TrAILCo Exhibit SWG-1 presents the electric reliability problems that
10 will occur if the Pennsylvania 502 Junction Segment is not
11 constructed;
12
13 • TrAILCo Exhibit SWG-2 presents the 2006 through 2015 projected
14 summer peak loads for the mid-Atlantic and northern Virginia areas;
15 and
16
17 • TrAILCo Exhibit SWG-3 presents the mid-Atlantic area and northern
18 Virginia area historical summer peak loads for 1995 through 2005.

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ELECTRICAL NEED FOR THE PREXY FACILITIES

21 Q. WHAT IS THE ELECTRICAL NEED FOR THE PREXY FACILITIES?

22 A. Based on system studies, PJM and Allegheny Power concluded that there are four
23 electric reliability problems that will occur beginning in 2009 if the Prexy
24 Facilities are not constructed. These problems are described in TrAILCo Exhibit
25 LAH-3 attached to the direct testimony of TrAILCo witness Hozempa.

1 Q. DID YOU HAVE A ROLE IN DETERMINING THE ELECTRICAL NEED
2 FOR THE PREXY FACILITIES WHILE WORKING FOR PJM?

3 A. Yes. In my role as PJM's Manager Transmission Planning, I directed the North
4 American Electric Reliability Corporation ("NERC") Category C3 ("N minus 2"
5 or "N-2") analysis conducted by the PJM transmission owners as part of the 2006
6 RTEP process for transmission facilities below 345 kV. Each transmission owner
7 was responsible for conducting the analysis for its transmission facilities,
8 reporting any reliability violations to PJM, and proposing solutions to PJM for
9 any potential violations identified.

10 Q. WHAT STUDIES DID YOU PERFORM OR SUPERVISE AS MANGER
11 TRANSMISSION PLANNING THAT DETERMINED THE NEED FOR THE
12 PREXY FACILITIES?

13 A. I supervised PJM's validation of the NERC Category C3 (N-2) potential
14 violations identified by the transmission owners and confirmed that the proposed
15 solutions were sufficient to address the potential violations reported by the
16 transmission owners to PJM.

17 Q. WHAT ROLE DID ALLEGHENY POWER HAVE WITH REGARD TO
18 THESE STUDIES?

19 A. Allegheny Power performed the NERC Category C3 (N-2) analysis and
20 developed proposed solutions to the potential violations identified. Allegheny
21 Power also notified PJM of the results of its analysis as required as part of the
22 2006 RTEP process.

1 Q. WHAT CONCLUSIONS WERE REACHED AS A RESULT OF PJM'S
2 STUDIES?

3 A. PJM validated the violations discovered by Allegheny Power in the Prexy area
4 and also confirmed the proposed solution. As a result of PJM's review, the
5 solution proposed by Allegheny Power to the potential reliability violations in the
6 Prexy area was incorporated into the 2006 Regional Transmission Expansion
7 Plan ("RTEP") baseline upgrades.

8
9 ELECTRICAL NEED FOR THE PENNSYLVANIA 502 JUNCTION FACILITIES

10 Q. DID YOU HAVE A ROLE IN DETERMINING THE ELECTRICAL NEED FOR
11 THE PENNSYLVANIA 502 JUNCTION FACILITIES WHILE WORKING FOR
12 PJM?

13 A. Yes. In my role as PJM's Manager Transmission Planning, I supervised the
14 creation of the base case for the 2011 RTEP and the power system studies that
15 determined the need for the 502 Junction Substation, the 502 Junction Segments,
16 the Mt. Storm Expansion, the Meadow Brook Expansion, the Loudoun Segment
17 and the Loudoun Expansion. The Pennsylvania 502 Junction Facilities consist of
18 the 502 Junction Substation and the portion of the 502 Junction Segments that
19 TrAILCo proposes to construct in Pennsylvania. Although I will be referring to
20 the need for the Pennsylvania 502 Junction Facilities, the need for those facilities
21 is the same as the need for the remainder of the 502 Junction Segments, the Mt.
22 Storm Expansion, the Meadow Brook Expansion, the Loudoun Segment and the
23 Loudoun Expansion.

1 Q. WHAT STUDIES DID YOU PERFORM OR SUPERVISE THE
2 PERFORMANCE OF AS MANAGER TRANSMISSION PLANNING THAT
3 DETERMINED THE NEED FOR THE PENNSYLVANIA 502 JUNCTION
4 FACILITIES?

5 A. I supervised all of the analyses conducted with the 2011 RTEP case, including
6 model adjustments, identifying reliability criteria violations, and formulating
7 solutions to the violations. Specifically with regard to the electrical need for the
8 Pennsylvania 502 Junction Facilities, the remaining 502 Junction Segments, the
9 Mt. Storm Expansion, the Meadow Brook Expansion, the Loudoun Segment and
10 the Loudoun Expansion, I supervised the generator deliverability, load
11 deliverability and NERC Category C studies.

12 Q. WHAT ROLE DID ALLEGHENY POWER HAVE WITH REGARD TO THESE
13 STUDIES?

14 A. Allegheny Power provided the electrical model data for the Allegheny Power
15 transmission zone of PJM (“Allegheny Power Zone”) and the contingency files
16 used in the analyses. In addition, Allegheny Power reviewed the model once it
17 was created by PJM. Allegheny Power worked closely with my staff at PJM in
18 validating reliability criteria violations and formulating the Pennsylvania 502
19 Junction Facilities, the remaining 502 Junction Segments, the Mt. Storm
20 Expansion, the Meadow Brook Expansion, the Loudoun Segment and the Loudoun
21 Expansion as the overall solution to the identified violations.

1 Q. WHAT CONCLUSIONS WERE REACHED AS A RESULT OF THOSE
2 STUDIES?

3 A. Based on the studies performed by PJM, Dominion Virginia Power and
4 Allegheny Power, PJM concluded that there are 11 electric reliability problems
5 that are likely to occur beginning in 2011 and one electric reliability problem that
6 is likely to occur beginning in 2014 if these facilities are not constructed.

7 Q. WHAT ARE THOSE ELECTRIC RELIABILITY PROBLEMS?

8 A. The problems are identified on Chart A attached to my testimony as TrAILCo
9 Exhibit SWG-1. In the same exhibit, Chart B identifies the current ownership of
10 facilities referred to in Chart A.

11 Q. PLEASE EXPLAIN CHART A.

12 A. The left column identifies possible electric occurrences or “contingencies” and
13 the right column identifies the electrical result of the occurrence if the occurrence
14 occurs any time after June 2011 for occurrences 1 through 8 and 10 through 12
15 and after June 2014 for occurrence 9. Using #1 as an example, if there is an
16 outage on Line #572A (e.g. unscheduled due to a storm or equipment
17 malfunction, or scheduled due to the need for maintenance), Line #512 will be
18 called upon to provide back-up transmission capacity. However, due to the
19 growing consumer loads served by these lines, it is projected that by Summer
20 2011, Line #512 will not have enough capacity to deliver all of the electricity
21 needed by the consumers ordinarily served by the two lines together. As a
22 consequence, while Line #572A is not operational due to the outage, Line #512
23 will overload. As another example using #10 on Chart A, outages on Line #580

1 and Line #572B at the same time will cause the 138 kV system voltage level
2 around Meadow Brook Substation to drop below acceptable limits and could lead
3 to a voltage collapse in the area.

4 Q. CHART A REFERS TO “EMERGENCY RATING,” “OVERLOADS” AND
5 “ACCEPTABLE LIMITS.” WHAT DO THESE TERMS MEAN?

6 A. “Acceptable limits” in the context of Chart A refers to the voltage limits that are
7 considered acceptable in the planning and operation of the PJM transmission
8 system. “Emergency rating” refers to the equipment loading limit that should not
9 be exceeded after the outage of other power system equipment. As an example,
10 the loading on Line A should not be above its emergency rating for the outage of
11 Line B. The term “overload” is used to describe the condition when the
12 equipment loading exceeds the applicable rating.

13 Q. PLEASE EXPLAIN THE CONCEPT OF “ELECTRIC RELIABILITY.”

14 A. “Electric reliability” or “reliability,” as used by industry experts, refers to the
15 delivery of electricity to customers in the amounts desired and within accepted
16 standards for the frequency, duration and magnitude of outages and other adverse
17 conditions or events. “Load pockets” are created when a major electric load
18 center (*i.e.*, an area where there is a highly concentrated use of electricity) has too
19 little local generation of electricity relative to its electric load and must import
20 much of its electricity via transmission lines from neighboring regions. Because
21 it is very difficult to site and build new generation within an urban area, these
22 areas become load pockets. As a result, transmission lines delivering electricity
23 into the load pocket from distant generating plants will often experience reliability

1 problems. In other words, these lines become “overloaded” and do not have the
2 capacity to deliver to the load pocket as much electricity as is needed to meet
3 consumer demand. Reliability problems occur when the lines become
4 overloaded. Importantly, these reliability problems are not limited to the load
5 pockets themselves; frequently they can adversely affect the areas surrounding the
6 transmission facilities needed to carry that generation to the load pockets.

7 Q. HOW ARE RELIABILITY PROBLEMS AVOIDED?

8 A. New or upgraded transmission lines must be constructed before the reliability
9 problems occur. Alternatively, new generating plants can be constructed within
10 the load pocket, or consumers can reduce their demand. As indicated previously,
11 it is very difficult to build a new generating plant in an urban area. Because
12 demand reduction initiatives are largely voluntary – making mandatory
13 compliance problematic – they cannot guarantee the mitigation of the relevant
14 reliability risks. Thus, even if demand reduction is being encouraged and new
15 generation is being explored, construction of new or upgraded transmission lines
16 is often essential to prevent identified reliability problems from occurring while
17 those alternatives are pursued and to account for the probability that those
18 alternatives will not materialize in sufficient quantity to eliminate the reliability
19 problem. However, transmission planning is not a “one time” activity. Instead, it
20 is dynamic and involves an ongoing review of changes in the transmission system
21 that result from the decommissioning of existing plants, the addition of new
22 plants, changes in load patterns and other events that affect the topology of the
23 transmission system.

1 Q. HOW DO TRANSMISSION PLANNERS DETERMINE IF, AND WHEN,
2 RELIABILITY PROBLEMS WILL OCCUR IF CORRECTIVE ACTION ON
3 THE TRANSMISSION SYSTEM IS NOT TAKEN?

4 A. NERC has been designated by the Federal Energy Regulatory Commission
5 (“FERC”) as the Electric Reliability Organization for the United States.
6 Mandatory reliability standards developed by NERC and approved by FERC are
7 used by transmission planners to measure the need for new transmission lines or
8 upgrades to existing lines. In addition, transmission owners and PJM have
9 developed planning reliability standards to supplement the NERC reliability
10 standards. The FERC, transmission owner and PJM planning reliability
11 standards (collectively, “Reliability Standards”) were the criteria used to
12 determine that the Pennsylvania 502 Junction Facilities, as parts of the overall
13 reliability solution, are needed to prevent these electric reliability problems from
14 occurring.

15 Q. HOW ARE THE RELIABILITY STANDARDS USED TO DETERMINE
16 WHEN NEW TRANSMISSION LINES OR UPGRADES TO EXISTING
17 LINES ARE NEEDED?

18 A. PJM, in conjunction with transmission owners such as Allegheny Power, conducts
19 studies of the PJM transmission system that apply the Reliability Standards to
20 specific conditions on the transmission system. When the studies show an
21 inability of the transmission system to meet a specific Reliability Standard under
22 these conditions, construction of one or more new transmission lines or one or
23 more enhancements to existing transmission facilities is necessary.

1 Q. WHAT TYPES OF STUDIES ARE USED TO DETERMINE IF
2 TRANSMISSION SYSTEM UPGRADES ARE NECESSARY?

3 One type of study is a Load Deliverability Study. This study examines defined
4 load zones within the PJM region and considers the ability of the transmission
5 system to deliver adequate power to the load zone during a generation capacity
6 emergency. A generation capacity emergency occurs when there is high load
7 (*i.e.*, high consumer demand) on the electric system and insufficient generation
8 capacity within the load zone.

9 A Generation Deliverability Study is also conducted. This study tests the
10 system to assure that capacity resources can be delivered to the remainder of the
11 PJM system at peak load.

12 Both types of studies are conducted by simulating the transmission system
13 as it is expected to exist during future time periods. The simulation includes
14 expected load growth (for the load deliverability test this includes the anticipated
15 benefits of demand side management and conservation activities), the addition of
16 new generating plants and the retirement of existing generation plants, and
17 planned transmission construction projects.

18 Q. WHAT TIME PERIOD WAS CONSIDERED FOR PURPOSES OF THE LOAD
19 DELIVERABILITY AND GENERATION DELIVERABILITY STUDIES
20 ASSOCIATED WITH THE PENNSYLVANIA 502 JUNCTION FACILITIES?

21 A. The studies supporting the need for these line segments were based on a five-year
22 timeframe, thereby making it critical that the line comprised of these segments be
23 constructed and placed into service by June 2011.

1 Q. WHAT HAPPENS WHEN A TRANSMISSION LINE OVERLOADS OR
2 EXCEEDS ITS LOADING CAPABILITY?

3 A. When a transmission line overloads, the conductor, the conductor clamps, and the
4 line terminal equipment begin to overheat. Overheating the conductor may cause
5 the line to sag low enough to bring the line into contact with whatever is
6 underneath it. Under these conditions, the metal in the conductor may become
7 brittle, rendering the line useless. In addition, the line may break and fall to the
8 ground, causing a potentially dangerous situation for those near the line as well as
9 the crews required to respond to the event. Overheating of the conductor clamps
10 and line terminal equipment may cause similar results. In short, overloading
11 transmission lines may cause permanent damage to transmission infrastructure
12 and catastrophic power outages.

13 Q. WHAT ACTION IS REQUIRED TO PREVENT THESE RESULTS?

14 A. To prevent the consequences of a potential transmission line overload, immediate
15 action must be taken by system operators before the line or related equipment
16 fails or is permanently damaged. The action may include turning specific
17 generating plants off or on, opening or closing specific transmission lines, or
18 discontinuing electric service to certain customers or groups of customers in
19 specific areas. However, these are emergency and temporary measures only.
20 They prevent a specific breakdown on that occasion, but do not solve the
21 underlying problem. On a long-term basis, construction of one or more new
22 transmission lines or one or more enhancements to existing transmission lines is
23 necessary.

1 Q. WHAT HAPPENS WHEN THE VOLTAGE DROPS AT A SUBSTATION?

2 A. The severity of the consequences depends on the severity of the voltage drop at
3 the substation. Voltage drops can occur when large loads are turned on and when
4 faults or short circuits occur on the system. Voltage drops of less than 3% are
5 usually not significant. However, when the voltage drop at a substation exceeds
6 3%, the consequences can range from annoying dimming of lights in homes and
7 businesses to a voltage collapse.

8 Q. WHAT HAPPENS WHEN THERE IS A VOLTAGE COLLAPSE ON THE
9 TRANSMISSION SYSTEM?

10 A. A voltage collapse occurs when the voltage on the system drops to a critically low
11 level and the system is unable to support power transfers across the system and
12 customers' load connected to the system. This condition usually results in a
13 blackout or a brownout. The area affected could be a single community or several
14 communities, or the blackout or brownout could be much more widespread and
15 encompass an entire region.

16 Q. WHEN TRANSMISSION LINES OVERLOAD, VOLTAGES DROP AT
17 SUBSTATIONS, OR THE VOLTAGE COLLAPSES ON A 138 KV SYSTEM,
18 IS THE RESULT A BLACKOUT LIKE THE ONE EXPERIENCED IN A
19 LARGE PART OF THE EASTERN UNITED STATES AND EASTERN
20 CANADA IN AUGUST 2003?

21 A. Yes, that is possible. Just before that massive blackout occurred, several
22 transmission lines began to overload due to system conditions. As the overloaded
23 transmission lines were disconnected from the grid, voltage on parts of the

1 transmission system in the eastern United States and eastern Canada began to
2 collapse, causing generating plants to automatically shut down and additional
3 transmission lines to overload and subsequently disconnect from the grid. This
4 process, often called “cascading,” continued until over 50 million people from the
5 east coast to Ohio and north into Canada were without power.

6 Q. ARE THE PENNSYLVANIA 502 JUNCTION FACILITIES, AS A PART OF
7 THE OVERALL RELIABILITY SOLUTION YOU HAVE DESCRIBED,
8 NECESSARY TO HELP AVOID THIS TYPE OF BLACKOUT FROM
9 OCCURRING AGAIN?

10 A. Yes. These facilities, along with the remainder of the 502 Junction Segments, the
11 Mt. Storm Expansion, the Meadow Brook Expansion, the Loudoun Segment and
12 the Loudoun Expansion, will significantly enhance the electric reliability of a
13 major portion of the eastern United States, particularly the area from northern
14 Virginia to northern New Jersey. It will also help to relieve the possibility of
15 outages to the west of the Allegheny Mountains, including the service territory of
16 Allegheny Power in southwestern Pennsylvania.

17 Q. PLEASE IDENTIFY AND DESCRIBE THE RELIABILITY STANDARDS
18 THAT WILL BE VIOLATED BY EACH OF THE RELIABILITY PROBLEMS
19 IDENTIFIED IN CHART A IF THE PENNSYLVANIA 502 JUNCTION
20 FACILITIES ALONG WITH THE REMAINDER OF THE 502 JUNCTION
21 SEGMENTS, THE MT. STORM EXPANSION, THE MEADOW BROOK
22 EXPANSION, THE LOUDOUN SEGMENT AND THE LOUDOUN
23 EXPANSION ARE NOT CONSTRUCTED.

1 A. Electrical occurrences 1 through 9 are violations of NERC Reliability Standard
2 TPL-002-0. This standard requires that the bulk electric system be able to meet
3 customer demands and maintain firm transmission with the loss of a single bulk
4 electric system element. Electrical occurrences 1 through 3 are also violations of
5 the PJM Generator and Load Deliverability Procedure, while electrical occurrence
6 4 is a violation of the PJM Load Deliverability Procedure and electrical
7 occurrence 9 is a violation of the PJM Generator Deliverability Procedure.
8 Electrical occurrences 5 through 8 are violations of Dominion Virginia Power's
9 planning criteria. Electrical occurrences 10 through 12 are violations of NERC
10 Reliability Standard TPL-003-0, which is the loss of two or more bulk electric
11 system elements. This standard requires the bulk electric system to meet
12 customer demand under these conditions without cascading outages; however,
13 under this standard, controlled load loss or reduction of transfers is permitted.

14 If the Pennsylvania 502 Junction Facilities, along with the remainder of
15 the 502 Junction Segments, the Mt. Storm Expansion, the Meadow Brook
16 Expansion, the Loudoun Segment and the Loudoun Expansion are not
17 constructed, PJM as the regional planning authority, Allegheny Power and
18 Dominion Virginia Power will be in violation of these Reliability Standards.

19 Q. DID THESE STUDIES IDENTIFY ANY LOAD ZONES AFFECTED BY
20 THESE RELIABILITY PROBLEMS?

21 A. Yes. The studies indicate that the loads (*i.e.*, consumer demand) in the mid-
22 Atlantic and northern Virginia areas within the PJM region will reach a high
23 enough level by 2011 that electric reliability to these areas will be significantly

1 jeopardized if these facilities are not constructed. For study purposes, the mid-
2 Atlantic area consists of the area along the Atlantic seaboard from the District of
3 Columbia to Northern New Jersey and includes the metropolitan areas of
4 Washington, Baltimore, Philadelphia and Newark. The northern Virginia area
5 includes the service territories of both Allegheny Power and Dominion Virginia
6 Power. The mid-Atlantic and northern Virginia areas were identified by the U. S.
7 Department of Energy in its *National Electric Transmission Congestion Study*
8 issued in August 2006 as parts of a “Critical Congestion Area” and in need of
9 immediate attention through the construction of new transmission facilities. The
10 Pennsylvania 502 Junction Facilities, along with the remainder of the 502
11 Junction Segments, the Mt. Storm Expansion, the Meadow Brook Expansion, the
12 Loudoun Segment and the Loudoun Expansion, have been identified by PJM as
13 the most viable solution to this problem.

14 Q. DO YOU HAVE ANY EXHIBITS THAT DEMONSTRATE THIS LOAD
15 GROWTH?

16 A. Yes. TrAILCo Exhibit SWG-2 shows the 2006 through 2015 projected summer
17 peak loads for the mid-Atlantic and northern Virginia areas based on the 2006
18 PJM load forecast. The mid-Atlantic area 2011 peak summer load is 63,777
19 megawatts (“MW”). The northern Virginia area 2011 peak summer load for the
20 Dominion Virginia Power zone is 6,532 MW and the northern Virginia area 2011
21 peak summer load for the Allegheny Power Zone is 693 MW. These load
22 forecasts formed the basis of the load models that were applied to the RTEP 2011
23 power system studies that identified the need for the West Virginia Segments, the

1 502 Junction Substation, the remaining 502 Junction Segments, the Mt. Storm
2 Expansion, the Meadow Brook Expansion, the Loudoun Segment and the
3 Loudoun Expansion.

4 Q. PLEASE IDENTIFY THE MAJOR UTILITIES IN THE MID-ATLANTIC AND
5 NORTHERN VIRGINIA AREAS THAT PROVIDE ELECTRIC SERVICE TO
6 CUSTOMERS IN THOSE AREAS.

7 A. The major utility service areas constituting the mid-Atlantic area for the purposes
8 of my direct testimony are Rockland Electric Company; Public Service Electric &
9 Gas Company; Jersey Central Power & Light Company; Atlantic City Electric
10 Company; Delmarva Power & Light Company; PECO Energy Company; PPL
11 Energy Plus, LLC; Metropolitan Edison Company; Pennsylvania Electric
12 Company; Baltimore Gas and Electric Company; Potomac Electric Power
13 Company and UGI Utilities. The major utilities in the northern Virginia area are
14 Dominion Virginia Power and Allegheny Power. The Dominion Virginia Power
15 service territory in northern Virginia consists of Arlington, Fairfax, Fauquier,
16 Loudoun, Prince William, Spotsylvania and Stafford Counties and the cities of
17 Alexandria, Falls Church, Vienna, Fairfax, Leesburg, Manassas and Warrenton.
18 The Allegheny Power service territory in northern Virginia includes Clarke,
19 Fauquier, Frederick, Greene, Madison, Page, Rappahannock, Shenandoah and
20 Warren Counties.

21 Q. WHAT IS THE PRIMARY FACTOR CAUSING THE ELECTRICAL NEED
22 FOR THE PENNSYLVANIA 502 JUNCTION FACILITIES, THE
23 REMAINDER OF THE 502 JUNCTION SEGMENTS, THE MT. STORM

1 EXPANSION, THE MEADOW BROOK EXPANSION, THE LOUDOUN
2 SEGMENT AND THE LOUDOUN EXPANSION?

3 A. Consumer demand in the mid-Atlantic and northern Virginia areas is the main
4 factor causing the electrical need for these facilities. There are primarily two
5 components to consumer demand, the increase in the number of consumers using
6 electricity and the increase in the amount of electricity each consumer uses.
7 Naturally as the population increases, the demand for electricity increases as well.
8 Also, consumers are adding more equipment that uses electricity, thereby
9 increasing the amount that each consumer uses.

10 Q. HOW HAS CONSUMER DEMAND IN THE MID-ATLANTIC AND
11 NORTHERN VIRGINIA AREAS INCREASED DURING THE PAST TEN
12 YEARS?

13 A. TrAILCo Exhibit SWG-3 contains the mid-Atlantic area and northern Virginia
14 area historical summer peak loads for 1995 through 2005. During this period, the
15 mid-Atlantic area load grew by over 20% while the northern Virginia area load
16 grew by over 40% in the Dominion Virginia Power service territory and over 60%
17 in Allegheny Power service territory.

18 Q. WHAT ARE PJM'S PROJECTIONS FOR CONSUMER DEMAND IN THE
19 MID-ATLANTIC AND NORTHERN VIRGINIA AREAS FOR THE FIVE-
20 YEAR PERIOD OF 2007 THROUGH 2011?

21 A. TrAILCo Exhibit SWG-2 shows the mid-Atlantic area and northern Virginia area
22 projected summer peak loads for 2006 through 2015. The annual projections for
23 consumer demand in the mid-Atlantic area for 2007 to 2011 are 59,611 MW;

1 60,965 MW; 61,966 MW; 62,850 MW; and 63,777 MW, respectively, for each of
2 these five years. These projections are based on the 2006 PJM Load Forecast
3 Report that was used as the basis for the load flow models that identified the need
4 for the Pennsylvania 502 Junction Facilities, the remainder of the 502 Junction
5 Segments, the Mt. Storm Expansion, the Meadow Brook Expansion, the Loudoun
6 Segment and the Loudoun Expansion. The annual projections for consumer
7 demand in Dominion Virginia Power portion of the northern Virginia area for
8 2007 through 2011 are 6,037 MW; 6,205 MW; 6,316 MW; 6,411 MW; and 6,532
9 MW, respectively, for each of the five years. The annual projections for
10 consumer demand in the Allegheny Power portion of the northern Virginia area
11 for 2007 through 2011 are 721 MW, 646 MW, 661 MW, 678 MW and 693 MW,
12 respectively, for each of the five years.

13 Q. HOW WILL ELECTRIC SERVICE CUSTOMERS WITHIN THE
14 ALLEGHENY POWER ZONE BE AFFECTED IF THE PENNSYLVANIA 502
15 JUNCTION FACILITIES, THE REMAINDER OF THE 502 JUNCTION
16 SEGMENTS, THE MT. STORM EXPANSION, THE MEADOW BROOK
17 EXPANSION, THE LOUDOUN SEGMENT AND THE LOUDOUN
18 EXPANSION ARE NOT CONSTRUCTED?

19 A. The customers served by Allegheny Power in northern Virginia will be at risk for
20 Electrical Occurrences 1 through 8 and 10 through 12 listed in Chart A. The load
21 in the Allegheny Power Zone that is located to the east of the overloaded
22 transmission lines could be affected in one of two ways if these facilities are not
23 constructed by 2011. First, for any of Electrical Occurrences 1 through 8 listed in

1 Chart A, load may need to be disconnected in order to reduce the loading on the
2 Mt. Storm-Doubs 500 kV line, a major transmission line that originates at the Mt.
3 Storm Substation in Grant County, West Virginia and continues to the Doubs
4 Substation in Frederick County, Maryland. It is likely that a portion of any
5 disconnected load would be located in the Allegheny Power Zone east of the
6 overloaded facility since this load has a direct impact on the overloaded facility.
7 The Allegheny Power Zone also could be impacted due to the low voltages or
8 voltage collapse resulting from Electrical Occurrences 10 through 12 listed in
9 Chart A.

10 Q. EARLIER IN YOUR TESTIMONY YOU STATED THAT THE
11 PENNSYLVANIA 502 JUNCTION FACILITIES, THE REMAINDER OF THE
12 502 JUNCTION SEGMENTS, THE MT. STORM EXPANSION, THE
13 MEADOW BROOK EXPANSION, THE LOUDOUN SEGMENT AND THE
14 LOUDOUN EXPANSION HAVE BEEN IDENTIFIED AS THE MOST
15 VIABLE SOLUTION TO RESOLVE THE POTENTIAL RELIABILITY
16 PROBLEMS YOU HAVE IDENTIFIED IN CHART A. PLEASE EXPLAIN
17 WHY THESE SEGMENTS ARE THE MOST VIABLE SOLUTION TO
18 RESOLVE THESE PROBLEMS.

19 A. PJM recommended the construction of these facilities collectively as the most
20 viable solution based on its review of all the alternatives considered. This
21 solution solves multiple reliability violations in a cost-effective manner and is
22 completed with the construction of one line at an estimated cost of \$850 million.

1 Q. WHAT SPECIFIC ELECTRICAL ALTERNATIVES DID PJM STUDY
2 AND/OR CONSIDER TO THE CONSTRUCTION OF THESE FACILITIES?

3 A. A second Mt. Storm-Doubs 500 kV line was considered as an alternative. This
4 alternative did not resolve the overload on the Pruntytown-Mt. Storm 500 kV line
5 (another critical major transmission line originating in Taylor County, West
6 Virginia and extending to the Mt. Storm Substation) and caused the overload to
7 advance from 2014 to 2011. A new Mt. Storm-Loudoun 500 kV line was
8 considered as another alternative. This alternative also did not resolve the
9 overload on the Pruntytown-Mt. Storm 500 kV line and caused the overload to
10 advance from 2014 to 2011. Allegheny Power's original TrAIL proposal, as
11 described by Mr. Hozempa, was considered as an alternative as well. This
12 alternative relieved the overloads; however, the transfer capability increase was
13 less by 750 MW and the cost was more by \$450 million than the Pennsylvania
14 502 Junction Facilities, the remainder of the 502 Junction Segments, the Mt.
15 Storm Expansion, the Meadow Brook Expansion, the Loudoun Segment and the
16 Loudoun Expansion.

17 Q. WERE ANY ELECTRICAL ALTERNATIVES THAT INVOLVED
18 UPGRADING OR EXPANDING EXISTING TRANSMISSION FACILITIES
19 CONSIDERED?

20 A. Yes. Consideration was given to reconductoring the Mt. Storm-Doubs 500 kV
21 line, but this was not a practical alternative since the line could not be removed
22 from service for the estimated two-year period required to complete the work.

1 Also, there would be a significant risk to the reliability of the mid-Atlantic and
2 northern Virginia areas while this line was being rebuilt.

3 Q. WHY DID PJM SELECT THE PENNSYLVANIA 502 JUNCTION
4 FACILITIES, THE REMAINDER OF THE 502 JUNCTION SEGMENTS, THE
5 MT. STORM EXPANSION, THE MEADOW BROOK EXPANSION, THE
6 LOUDOUN SEGMENT AND THE LOUDOUN EXPANSION FOR
7 CONSTRUCTION OVER THESE ALTERNATIVES?

8 A. PJM selected these facilities for construction because all of the overloads in the
9 southern portion of the Allegheny Power Zone identified in Chart A were
10 resolved with this alternative. In addition, these facilities together provide the
11 greatest transfer capability increase of the studied alternatives, placement of these
12 facilities in-service by June 2011 is feasible and they constitute the most cost-
13 effective solution.

14 Q. IF, FOR REASONS BEYOND THE CONTROL OF TRAILCO, THE
15 MEADOW BROOK SEGMENT AND THE LOUDOUN SEGMENT CANNOT
16 BE CONSTRUCTED IN VIRGINIA, WILL RELIABILITY BENEFITS BE
17 PROVIDED IF THE LINE TERMINATES AT MEADOW BROOK
18 SUBSTATION?

19 A. Yes. The Pruntytown-Mt. Storm overload will be resolved as well as the voltage
20 violations around the Meadow Brook Substation. However, the Mt. Storm-
21 Doubs overload will still exist.

22 Q. IF, FOR REASONS BEYOND THE CONTROL OF TRAILCO, THE WEST
23 VIRGINIA SEGMENTS CANNOT BE CONSTRUCTED EAST OF THE MT.

1 STORM SUBSTATION IN WEST VIRGINIA, WILL RELIABILITY
2 BENEFITS BE PROVIDED IF THE WEST VIRGINIA SEGMENTS
3 TERMINATE AT THE MT. STORM SUBSTATION?

4 A. Yes. The Pruntytown-Mt. Storm overload will be resolved. However, the
5 voltage violations around the Meadow Brook Substation will not be resolved and
6 the overload of the Mt. Storm-Doubs line will not be resolved. Another line will
7 still have to be built to resolve these violations.

8 Q. DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?

9 A. Yes, it does. However, I reserve the right to file such additional testimony as
10 may be necessary or appropriate.

Chart A

**Electric Reliability Problems
(Facility ownership shown in Chart B)**

	Electrical Occurrence	Electrical Result
1	Outage of Mount Storm – Greenland Gap Line #572A.	Mount Storm – Doubs 500 kV Line #512 exceeds its emergency rating and overloads.
2	Outage of Meadowbrook – Greenland Gap Line #572B.	
3	Outage of Hatfield – Black Oak 500 kV Line # 542.	
4	Outage of Bedington – Black Oak 500 kV Line # 544.	
5	Outage of Mount Storm – Greenland Gap 500 kV Line # 572A while Possum Point Unit #5 is unavailable.	
6	Outage of Meadowbrook – Greenland Gap Line #572B while Possum Point Unit #5 is unavailable.	
7	Outage of Hatfield – Black Oak 500 kV Line # 542 while Possum Point Unit #5 is unavailable.	
8	Outage of Bedington – Black Oak 500 kV Line # 544 while Possum Point Unit #5 is unavailable.	
9	Outage of Hatfield – Black Oak 500 kV Line # 542.	Mount Storm – Pruntytown 500 kV Line #510 exceeds its emergency rating and overloads.
10	Outage of Morrisville – Meadow Brook 500 kV Line #580 and the Meadow Brook – Greenland Gap Line #572B.	The 138 kV system voltage level around Meadow Brook Substation drops below acceptable limits and could lead to a voltage collapse in the area.

	Electrical Occurrence	Electrical Result
11	Outage of the Hatfield – Black Oak 500 kV Line #542 and Mount Storm – Doubs Line #512.	The 500 kV and 138 kV system voltage levels around Meadow Brook Substation drops below acceptable limits.
12	Outage of the Black Oak – Bedington 500 kV Line #544 and Mount Storm – Doubs Line #512.	

Chart B

Facility Ownership

Facility	Owner
Line #510	Allegheny Power
Line #512	Dominion
Lines #572A and #572B	Jointly owned by Allegheny Power and Dominion
Line #542	Allegheny Power
Line #544	Allegheny Power
Line #580	Jointly owned by Allegheny Power and Dominion
Meadow Brook Substation	Allegheny Power
138 kV system around Meadow Brook Substation	Allegheny Power
500 kV system around Meadow Brook Substation	Allegheny Power and Dominion

TrAILCo Exhibit SWG-2

Projected Summer Peak Loads (MW)

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Cumulative
Mid-Atlantic Region	58742	59611	60965	61966	62850	63777	64648	65798	66845	67725	
% Growth		1.5%	2.3%	1.6%	1.4%	1.5%	1.4%	1.8%	1.6%	1.3%	15.3%
Northern Virginia - Dominion	5936	6037	6205	6316	6411	6532	6656	6780	6911	7035	
% Growth		1.7%	2.8%	1.8%	1.5%	1.9%	1.9%	1.9%	1.9%	1.8%	18.5%
Northern Virginia - APS	711	721	646	661	678	693	710	728	748	768	
% Growth		1.4%	-10.4%	2.3%	2.6%	2.2%	2.5%	2.5%	2.7%	2.7%	8.0%

TrAILCo Exhibit SWG-3

Historical Summer Peak Loads (MW)

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Cumulative
Mid-Atlantic Region	48524	44302	49406	48397	51700	49430	54072	55569	53566	52049	59042	
% Growth		-8.7%	11.5%	-2.0%	6.8%	-4.4%	9.4%	2.8%	-3.6%	-2.8%	13.4%	21.7%
Northern Virginia - Dominion	4321	3939	4562	4618	5022	4688	5244	5399	5323	5143	6067	
% Growth		-8.8%	15.8%	1.2%	8.7%	-6.7%	11.9%	3.0%	-1.4%	-3.4%	18.0%	40.4%
Northern Virginia - APS	406	386	429	453	469	493	554	566	564	580	654	
% Growth		-4.9%	11.1%	5.6%	3.5%	5.1%	12.4%	2.2%	-0.4%	2.8%	12.8%	61.1%