

**PUBLIC SERVICE COMMISSION
OF WEST VIRGINIA
CHARLESTON**

Case No. 07-0508-E-CN

TRANS-ALLEGHENY INTERSTATE LINE COMPANY

**Application of Trans-Allegheny Interstate Line
Company for a certificate of public convenience
and necessity under W. Va. Code § 24-2-11a
authorizing the construction and operation of the
West Virginia segments of a 500 kV electric
transmission line and related facilities in Monongalia,
Preston, Tucker, Grant, Hardy, and Hampshire
Counties, and for related relief**

**REBUTTAL TESTIMONY OF
JOHN R. BODENSCHATZ, P.E.**

January 4, 2008

1 Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

2 A. My name is John R. Bodenschatz. My business address is 800 Cabin Hill Drive,
3 Greensburg, Pennsylvania 15601-1689.

4 Q. HAVE YOU PREVIOUSLY FILED TESTIMONY IN THIS PROCEEDING?

5 A. Yes. I have filed written direct testimony on behalf of Trans-Allegheny Interstate
6 Line Company (“TrAILCo”).

7 Q. PLEASE DESCRIBE THE PURPOSE OF YOUR REBUTTAL TESTIMONY.

8 A. My rebuttal testimony principally responds to the suggestions of several witnesses
9 concerning reconductoring and upgrading of existing or proposed facilities, from
10 my perspective of construction, operation, and maintenance. (Mr. Herling and Mr.
11 Hozempa will deal with these issues in the context of electrical need and
12 reliability.) I will then turn to construction and maintenance practices in the
13 context of some concerns expressed about siltation and runoff. Lastly, I will
14 address the issues of natural gas facilities and herbicides.

15 Q. WILL YOU BE USING THE SAME TERMS IN YOUR DIRECT TESTIMONY
16 AS SET FORTH IN THE TABLE OF NOMENCLATURE ATTACHED TO
17 THE APPLICATION?

18 A. Yes. In addition, I may define other specific terms in my rebuttal testimony.

1 Q. WHAT ISSUES HAVE BEEN RAISED CONCERNING
2 “RECONDUCTORING” OR OTHERWISE MODIFYING EXISTING OR
3 FUTURE FACILITIES?

4 A. Bhante Yogacavara Rahula on behalf of the Bhavana Society has attached to his
5 testimony (Exhibit No. 8) some correspondence with a man named Kirby Holte,
6 who purports to have calculated several alternatives to the horizontal configuration
7 described in my direct testimony that would reduce the effects of electromagnetic
8 fields (“EMF”).

9 Mr. Harris on behalf of the Consumer Advocate Division (“CAD”), citing some of
10 TrAILCo’s discovery responses, including those that I prepared, asserts (page 7)
11 that TrAILCo did not sufficiently consider reconductoring and double-circuiting
12 as alternatives to the acquisition of new right-of-way (“ROW”) for the location of
13 the West Virginia Segments of TrAIL. Mr. Harris proceeds to recommend (pages
14 9-10) that the Commission “require TrAILCo to investigate the feasibility of
15 double-circuiting for short distances to minimize the need for new [ROW] and to
16 solve site-specific landowner concerns.”

17 Mr. Lewis proposes (pages 18-27) reconductoring and/or double-circuiting as
18 feasible alternatives to TrAIL. He also recommends (pages 3, 26) that TrAIL
19 facilities be designed to accommodate future upgrading to 765 kV.

1 Q. LET'S START WITH THE SUGGESTIONS OF MR. HOLTE. WHAT
2 CONCERNS DO YOU HAVE FROM THE PERSPECTIVES OF
3 CONSTRUCTION, OPERATION, AND MAINTENANCE OF TRAIL?

4 A. Mr. Holte has done nothing more than calculate the effect on EMFs, based on
5 modeling assumptions about a variety of alternative designs. He has conducted no
6 actual tests, much less considered the practicalities.

7 If, as suggested by Bhante Rahula, the Commission were to condition certification
8 of TrAIL on the performance of a study to be reported back to the Commission,
9 further proceedings would be required, delaying the in-service date of a facility the
10 need for which would have been demonstrated. If the Commission were to
11 determine that the study warranted a redesign any new tower series design would
12 require significantly more engineering design and testing time. A new tower
13 series would also require additional training and tooling for the crews that will be
14 maintaining TrAIL.

15 The proposed configuration for TrAIL uses the same geometry that has been
16 thoroughly tested and used on past 500 kV facilities throughout the Allegheny
17 Power service territory. Especially in light of the critical need for TrAIL, it makes
18 no sense to delay this particular project in order to conduct a study that, if
19 warranted, should apply to all utilities, not just TrAILCo. For now, I believe that

1 it is in the best interests of customers to stick with a design that has proven its
2 practicality and reliability over many years.

3 Q. HOW DO YOU RESPOND TO MR. HARRIS'S AND MR. LEWIS'S
4 SUGGESTIONS OF DOUBLE-CIRCUITING AND RECONDUCTORING AS
5 ALTERNATIVES?

6 A. I can only speak to this issue from a construction outage standpoint. I see no
7 reasonable way for TrAILCo to reconductor or double-circuit the existing Mt.
8 Storm-Meadow Brook 500 kV line within the outage limitations that have
9 previously been imposed. Whenever Allegheny has to perform work on the 500
10 kV line system within its operating territory, the engineering and construction
11 group is under constant pressure to return the line back to service as soon as
12 possible. Construction crews are often onsite, ready to perform 500 kV line work,
13 only to have the work postponed because of our inability to obtain the scheduled
14 outage due to system constraints. Most recently, in the fall of 2007, the new
15 Greenland Gap substation was being looped into the existing Mt. Storm-Meadow
16 Brook 500 kV line in West Virginia. A 22 day fall (off-peak) outage was planned
17 over a year in advance and granted as scheduled, but unanticipated system
18 conditions forced construction crews to expedite the work in order to get the line
19 back in service in less than thirteen days. Of course, these system constraints are
20 why we are now before the Commission in this proceeding. I estimate that

1 reconductoring the Mt. Storm-Meadow Brook 500 kV line would take from a
2 minimum 18 to 24 months, and possibly much longer, depending on the amount of
3 structure and foundation reinforcing that would be required along with the
4 expected limit on outage time to perform the necessary work.

5 An added concern of reconductoring the existing Mt. Storm-Meadow Brook 500
6 kV line is the requirement of a series of repeated outages during the off-peak
7 seasons for one single project. This requirement would undoubtedly hinder
8 maintenance outages on other transmission lines across the Allegheny Power and
9 PJM systems. The existing 500 kV system in the Allegheny Power service
10 territory is between 30 and 40 years old and many of the lower voltage
11 transmission lines are much older; therefore, the amount of maintenance required
12 continues to increase due to the age of the system. If maintenance on other
13 facilities can not be carried out as required during the suggested reconductoring
14 period, then this ultimately puts other transmission facilities at risk and reduces the
15 reliability of the system.

16 As for Mr. Lewis's suggestion that reconductoring the Mt. Storm-Doubs line is
17 possible, Mr. Herling's rebuttal testimony provides PJM's analysis of Dominion
18 Virginia Power's estimates of the time necessary to complete that work, as well as
19 the practical and financial constraints that make it infeasible to address the
20 identified reliability concerns. Given the length and critical nature of the Mt.

1 Storm-Doubs line, PJM's estimate of five years (incorporating DVP's construction
2 outage estimate, combined with the inability to remove the circuit from service for
3 extended periods) is reasonable from my perspective.

4 Q. DO YOU FORESEE PROBLEMS IN MR. HARRIS'S SUGGESTION TO USE
5 DOUBLE-CIRCUITING "FOR SHORT DISTANCES"?

6 A. Provided that the required outages are granted in order to perform the work
7 required, this suggestion is feasible from my construction, operation, and
8 maintenance perspective. However, being able to have the line out for at least 21
9 days, the minimum amount of time necessary for even the shortest conceivable
10 distance, is unusual. In the last five years, this line has never been out of service
11 for more than 14 days (the outage required for Greenland Gap was 13 days and 18
12 hours), with most other outages during this time period being from one to five
13 days or less; all outages have been during off-peak periods. Moreover, the system
14 constraints have only increased in recent years. I must also reiterate that delay in
15 receiving permission for such a scheduled outage threatens the required in service
16 date for TrAIL.

17 Q. WHAT WOULD BE REQUIRED IN ORDER TO RECONDUCTOR?

18 A. Allegheny has never undertaken a project to reconductor an existing 500 kV line.

19 A complex and thorough engineering evaluation would be necessary to present a
20 detailed and comprehensive estimate of the work that would be required to

1 reconductor the Mt. Storm – Meadow Brook 500kV line. However, based on
2 Allegheny’s prior experience with reconductoring other lattice steel tower lines in
3 its system with lower voltages, several issues are raised by the suggestion.

4 The initial and perhaps most difficult hurdle for such a project would be the need
5 to obtain the authorization for a significant long-term outage of the existing Mt.
6 Storm to Meadowbrook line, very likely as long as 18 to 24 months. Such an
7 extended outage on this line would have significant reliability consequences for
8 the PJM system.

9 Second, a conductor configuration would need to be selected that would have the
10 ability to carry the combined electrical capacities of the existing line, plus the
11 capacity intended for the proposed line. To accomplish this, such a conductor
12 configuration would most likely be heavier and have greater sag than the existing
13 Mt. Storm to Meadow Brook line conductor. Increased weight and sag beyond
14 what was intended for the existing tower structure design and route geography
15 would likely present additional tower structure and foundation work, as described
16 below.

17 Third, after identifying a conductor configuration that could carry the required
18 combined capacity from a thermal standpoint, the actual transfer capability of the
19 transmission line would still be limited by line impedance. In order to permit the
20 full loading of the reconducted line near the maximum thermal rating of the

1 conductor, additional capacitive/reactive compensation along the line at existing
2 and possibly new substations would need to be installed.

3 Fourth, assuming that a conductor configuration is identified and the impedance
4 restrictions overcome by the addition of sufficient compensation along the line, the
5 existing line towers and foundations may need to be replaced or supplemental
6 towers installed between the existing structures to carry the increased weight of
7 the new conductor configuration, provide ground clearances sufficient to
8 accommodate increased sag, and to meet new NESC heavy wind loading
9 requirements. The new conductor configuration would also likely require the
10 replacement of the existing insulator strings and other related hardware.

11 Fifth, the conclusion of a thorough engineering evaluation could be that a
12 reconductoring of the existing Mt Storm to Meadowbrook line to provide the
13 additional electrical capacity intended by the TrAIL project could essentially
14 require rebuilding the existing line from the ground up on the existing ROW. In
15 addition, the design and installation of sufficient capacitive/reactive compensation
16 along the line (at existing and possibly new substations) would need to be
17 completed.

18 It will take two to two and a half years to build 114 miles of new line in West
19 Virginia based on the current Kenny Construction Company schedule for TrAIL.

20 Based on my own experience on past projects, it is estimated that the existing line

1 can be taken out for a maximum of 8 to 12 weeks a year. Once again, I must
2 qualify this estimate, because I am not as familiar as are others with the specific
3 system loading factors for reconductoring TrAIL. However, I am firmly
4 convinced that the reconductoring suggestion is not practicably possible in the
5 time frame required, given the anticipated outage restrictions.

6 Q. PLEASE ADDRESS MR. LEWIS'S ASSERTIONS (PAGES 24-25) ABOUT
7 SINGLE POLE TOWERS.

8 A. Mr. Lewis, at approximately \$64,000,000, has still underestimated the cost of
9 converting TrAIL to single pole structures. He acknowledges that the material
10 costs of tubular steel structures are substantially higher than those of lattice
11 towers, but he fails to consider that more structures would be required under his
12 proposal, given the physical limitations of tubular steel poles in mountainous
13 terrain, such as that along the route for TrAIL. A 500 kV line design will have
14 more single shaft tubular steel poles per mile than a comparable, self-supporting
15 lattice steel tower line.

16 A single shaft, tubular design will also likely have more environmental impact,
17 due to the additional length of access roads associated with the additional structure
18 locations. Single shaft steel poles also have the potential to disturb more soil at
19 the base of each structure due to the required depth and diameter associated with
20 one single foundation, as opposed to four smaller foundations on a lattice tower.

1 This latter factor is particularly noteworthy, given the concerns expressed by
2 several witnesses about the effect of TrAIL on streams. Due to their physical
3 limitations and limited span lengths, in many cases the used of single shaft tubular
4 steel poles will most likely require structures down in the valleys, in closer
5 proximity to streams.

6 Q. MR. LEWIS ALSO PROPOSES (PAGES 25-27) THAT TRAIL SHOULD
7 EITHER BE DOUBLE CIRCUITED OR MODIFIED TO FACILITATE AN
8 UPGRADE TO 765 kV. DO HIS SUGGESTIONS RAISE CONCERNS FROM
9 YOUR PERSPECTIVE?

10 A. Yes. Mr. Lewis notes several of these complications on page 26 of his testimony:
11 respecification of ROW, “sag,” “blow-out requirements,” and the possible need
12 for additional protective measures for conductor noise and corona. The current
13 lattice steel structure design does not have sufficient electrical clearance between
14 the conductors and supporting structure to meet the requirements of the NESC for
15 765 kV facilities. In addition, the current structure design does not have sufficient
16 strength to carry a conductor bundle that would be required for 765 kV operation.
17 I disagree with Mr. Lewis’s assertion that, “[f]or an upgrading of TrAIL to 765
18 kV, the present tower design probably is suitable.” Moreover, tower heights
19 would have to be increased between 5 to 10 feet on average.

1 Q. PLEASE RESPOND TO THE CONCERNS OF MESSRS. HANSEN,
2 VESELKA, AND MCDANIEL AND DR. KOTCON ABOUT RUNOFF AND
3 SILTATION.

4 A. Dr. Kotcon (pages 9-10) says that the construction practices proposed for TrAIL
5 are inadequate, and will lead to soil erosion and stream sedimentation. Similarly,
6 at page 10 and elsewhere in their joint report, Mr. Hansen and Mr. Veselka on
7 behalf of the LRCWA assert that, “Clearing and construction of these access roads
8 will disturb the earth and will potentially result in erosion of streams and
9 wetlands.” Mr. McDaniel expresses (page 11) similar concerns, citing the
10 potential for ROW to create “different paths for water to flow into springs, wells,
11 and the stream.”

12 TrAILCo appreciates these as legitimate concerns, but the construction of TrAIL
13 will have very little impact on the flow of water. The only disturbance within the
14 ROW will be at the structure locations, which average over 1,100 feet apart, and
15 along the access roads to the structures, which will be restored as near as possible
16 to the original grade if requested by the landowner.

17 Q. PLEASE ADDRESS THE CONCERNS RAISED BY LIBERIO DALLAS
18 REGARDING NATURAL GAS FACILITIES.

19 A. Mr. Dallas (pages 6-7) says that he has “potential explosion concerns” arising
20 from a gas well and associated line on his property. Current mitigation procedures

1 for steel gas lines that will be adjacent to or crossed by a new electric transmission
2 line are readily available and are completely effective as a deterrent to any
3 corrosive effects on those steel lines. TrAILCo will cooperate with the owner of
4 any existing gas or other utility facility that may be crossed by TrAIL or situated
5 in close proximity to it to determine if any mitigation is necessary and, if so, to
6 reimburse the facility owner its reasonable costs for installing mitigation
7 measures.

8 TrAIL will conform to the NESC's 5 mA criteria in Rules 232 C.1.c and 232
9 D.3.c. These rules reflect the maximum allowable induced current for TrAIL's
10 ROW. Mr. Dallas does not specify the "close proximity" of the gas facilities to
11 the proposed location of TrAIL, but induced current at, for example, 300 feet
12 would be extremely low, if not undetectable. Moreover, I presume those gas
13 facilities have been properly grounded in accordance with applicable safety codes,
14 which provide further protection from any static discharge that might occur from
15 any other source.

16 Q. HOW WILL TRAILCO DEAL GENERALLY WITH INSTALLING TRAIL
17 FACILITIES NEAR EXISTING NATURAL GAS PIPELINES?

18 A. Allegheny Power's past and current practice is to investigate and determine the
19 need for any alternating current ("AC") or direct current ("DC") mitigation
20 measures for any existing natural gas pipeline facilities that may come into close

1 proximity with a planned Allegheny Power transmission line. Allegheny Power
2 has typically addressed any need for mitigation as soon as any existing natural gas
3 facilities are identified during the detailed design process for that new electric
4 transmission line. TrAILCo has adopted and will continue this same practice with
5 respect to TrAIL.

6 At this point, final routing and design are incomplete, and TrAILCo has identified
7 no specific need for AC or DC mitigation at this time. If detailed ground surveys
8 identify natural gas or other utility facilities near the final route, then TrAILCo
9 will work with their owners to determine whether TrAIL will affect those facilities
10 and, if so, how to best mitigate those effects. Typical AC or DC mitigation
11 measures include facilities that are retrofitted onto existing natural gas pipelines or
12 above-ground facilities. For in-ground gas facilities, these measures can include
13 cathodic isolation to protect natural gas pipelines from ground fault currents or
14 sacrificial magnesium or zinc anode systems with a bentonite backfill to protect
15 against corrosion of the existing gas pipeline. For above-ground facilities,
16 equipment such as zinc ribbon spiral systems to protect pipeline employees and
17 other third parties from the effects of induced electrostatic charge on above-
18 ground pipeline facilities have been installed on existing natural gas or other utility
19 facilities during past transmission line projects initiated by Allegheny Power.

1 To my knowledge, Allegheny Power has never failed to reach agreement with the
2 owner of an existing gas pipeline.

3 Q. WHO WOULD PAY FOR THE COSTS OF THE STUDIES AND THE
4 RESULTING INSTALLATION OF ANY MITIGATION MEASURES?

5 A. Consistent with current Allegheny Power practices, TrAILCo would attempt to
6 reach agreement with the gas facility owner on the costs for the studies and any
7 mitigation measures. Then, TrAILCo would reimburse the owner for its actual
8 reasonable costs for developing, or having an outside consultant prepare, the
9 studies that determine the need for any mitigation measures. TrAILCo would also
10 reimburse the owner for the actual reasonable costs for installing any necessary
11 mitigation measures.

12 In the unlikely event of gas facility relocation, TrAILCo would attempt to
13 negotiate an agreement with the owner, to include developing procedures and
14 designs for the relocation and a related cost estimate, under which TrAILCo would
15 reimburse the owner for the reasonable, actual costs of relocation.

16 Q. DR. KOTCON (PAGE 16) SAYS THAT YOUR DIRECT TESTIMONY
17 CONCERNING HERBICIDES IS “MISLEADING AND INCORRECT.” DO
18 YOU AGREE?

1 A. No, I stand by my testimony. However, I believe that any further discussion about
2 herbicides on behalf of TrAILCo should be left to Mr. McLoughlin, an expert
3 whom we retained to deal with these issues in greater depth.

4 Q. ARE THERE PROGRAMS AVAILABLE THAT WOULD ALLOW MR.
5 MCDANIEL AND OTHERS CONCERNED ABOUT HERBICIDES TO
6 ADDRESS THEIR CONCERNS?

7 A. Yes. Allegheny Power already has in place a program under which landowners
8 can agree to maintain ROW without the application of herbicides. Under this
9 program, the landowner is paid an amount per acre of maintained ROW equivalent
10 to the “avoided cost” that Allegheny Energy would normally expect to incur
11 performing vegetation management work necessary to meet the requirements for
12 reliable, safe electric service. The LRCWA itself could consider such an
13 arrangement, if it can obtain the cooperation of its members and others in the
14 community.

15 Q. DOES THIS CONCLUDE YOUR REBUTTAL TESTIMONY?

16 A. Yes, it does.