

**STATE OF VERMONT
PUBLIC SERVICE BOARD**

Joint Petition of Vermont Transco, LLC,)
Vermont Electric Power Company, Inc.)
("VELCO"), City of Burlington Electric)
Department ("BED") and Green Mountain)
Power Corporation for a certificate of public)
good, pursuant to 30 V.S.A. Section 248,)
authorizing the construction of the so-called)
East Avenue Loop Project in Williston, South)
Burlington, Colchester, Winooski and)
Burlington, Vermont, which consists of: (1))
the replacement of 4.8 miles of an existing)
single 115 kV line between VELCO's Essex)
Substation and its East Avenue Substation)
with two new 115 kV lines within the same)
corridor; (2) expansion of the East Avenue)
Substation; (3) installation of a new 1.5-mile)
34.5 kV line from the East Avenue Substation)
to BED's McNeil Substation; (4) construction)
of a new substation at the McNeil Generating)
Station; (5) installation of new and relocated)
equipment from BED's Lake Street)
Substation to the McNeil Substation; and (6))
removal of several circuits connected to)
BED's Lake Street Substation)

Docket No. 7314

**PREFILED REBUTTAL TESTIMONY OF
DEAN L. LAFOREST
ON BEHALF OF
PETITIONERS**

November 26, 2007

Summary: The purpose of Mr. LaForest's testimony is to respond to a recommendation made by City of South Burlington witness Juli Beth Hinds, that a single-pole, double-circuit line design configuration be utilized in the Country Club Estates and Valley Ridge neighborhoods in the City of South Burlington. Mr. LaForest also responds to concerns expressed by the Department of Public Service regarding ISO-NE approval.

TABLE OF CONTENTS

1. Introduction.....	1
2. Overview.....	2
3. Use of Single-Pole, Double-Circuit Design.....	2
4. Approval of Phase I and II by ISO-NE.....	8
5. Conclusion	11

EXHIBITS

None

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- 1 **1. Introduction**
- 2 Q1. Please state your name.
- 3 A1. My name is Dean L. LaForest.
- 4

1 Q2. Have you previously filed testimony in this proceeding?

2 A2. Yes. I submitted direct prefiled testimony on behalf of the Petitioners in this
3 docket.

4

5 **2. Overview**

6 Q3. What is the purpose of your rebuttal testimony?

7 A3. My rebuttal testimony responds to the October 12, 2007 testimony submitted by
8 Juli Beth Hinds on behalf of the City of South Burlington (Q8 & A8), which
9 suggests that the East Avenue Loop Project (“Project”) line design be modified in
10 the Country Club Estates and Valley Ridge neighborhoods to a single-pole,
11 double-circuit steel pole 115 kV line design.

12

13 **3. Use of Single-Pole, Double-Circuit Design**

14 Q4. Do Petitioners agree that a single-pole, double-circuit line design is warranted in
15 these neighborhoods?

16 A4. No. First, a change from the proposed side-by-side davit-arm design in these
17 neighborhoods to a single-pole, double-circuit design, will not alter in any way
18 the clearing that VELCO will undertake in these areas. As Mr. Disorda noted in
19 his prefiled testimony, the full corridor will be cleared in 2008 per VELCO’s
20 practice of a four-year cycle and based on adherence to current industry
21 vegetation management practices, regardless of whether the Project is

1 constructed. Based on these facts, Ms. Hinds' premise that the single-pole design
2 will reduce clearing impacts is simply incorrect and unsubstantiated.

3
4 Second, as described in the prefiled rebuttal testimonies of Michael Buscher and
5 Brad Fossum, Ms. Hinds' assertion that the overall mass of the utility structure
6 will be reduced is incorrect. In fact, when the structure heights and concrete bases
7 are taken into account, the steel poles necessary to accommodate a double-circuit
8 design will extend an average of 15 feet higher and be 19 inches in diameter
9 larger than the structures Petitioners propose.

10
11 Finally, and most importantly, this new line is proposed to introduce a second,
12 redundant feed into the East Avenue Substation supplying the Cities of
13 Burlington, South Burlington and Winooski, and the Towns of Colchester and
14 Williston, to address a serious existing reliability exposure created by the current
15 radial configuration serving Burlington and the reliability needs of GMP's local
16 network. The reliability benefits of the second circuit into the East Avenue
17 Substation would be significantly compromised by the single-pole, double-circuit
18 design that Ms. Hinds proposes. The single-pole, double-circuit design does not
19 conform to good utility practice given the role this corridor plays today in serving
20 the city of Burlington, and the role it will play serving additional communities
21 following completion of 115 kV to 34.5 kV transformation at East Avenue and
22 any later 115 to 34.5 kV transformations (Gorge VELCO Substation).

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For a further discussion on the unacceptability of the single-pole, double-circuit design, please refer to the prefiled rebuttal testimonies of Munir Kasti and Terry Cecchini on behalf of Petitioners.

Q5. How does South Burlington’s proposed single-pole, double-circuit design compromise reliability?

A5. The single-pole, double-circuit design compromises reliability because both circuits would be exposed to common mode failures which would take out both lines for a single event. Based on applicable NERC, NPCC, ISO-NE reliability criteria, common mode failures of double-circuit lines are treated as single-outage events requiring the same treatment as any other single outage event. All planning criteria consider loss of common elements as a single event, so the loss of a single-pole, whether steel or wood, with or without foundations, is considered a single event. The criteria specifically note that the loss of multiple lines, if connected to a single-pole, should be considered a single outage.

A single-outage event following the use of this design would result in the loss of both 115 kV circuits serving the East Avenue Substation. This would in turn result in the loss of roughly half of BED’s customers (including UVM and Fletcher Allen Hospital), as well as one of the main transformers serving BED’s and Green Mountain Power’s local 34.5 kV network at East Avenue, which in

1 turn serves the surrounding communities of Winooski, Colchester and Williston,
2 as well as the cities of Burlington and South Burlington. Loss of both 115 kV
3 circuits, and consequent loss of the 115 to 34.5 kV transformer at East Avenue,
4 would leave BED only the option of placing most to all of the customers lost from
5 the East Avenue Substation onto BED's Queen City Substation and not its
6 McNeil Substation due to system limitations posed by loss of the East Avenue
7 115 to 34.5 kV transformer. However, due to system limitations at Queen City,
8 even this could not be accomplished at BED load levels above approximately 59
9 MW. Finally, at summer peak demand load levels, without the McNeil generator
10 on-line, this outage could overload portions of GMP's local 34.5 kV system,
11 which may in turn result in GMP or BED having to shed additional customers in
12 order to remove the overload, restore public safety and return the electrical
13 network to a reliable state.

14
15 These exposures arise with the suggested use of single-pole, double-circuit
16 construction in the proposed Project. Following completion of the next potential
17 phase of the Project (the Gorge VELCO Substation), two 115 to 34.5 kV
18 transformers would be lost following outages of this double-circuit line, which
19 would significantly increase the adverse consequences of the outage.

20

- 1 Q6. Ms. Hinds asserts that a steel pole design coupled with “appropriate vegetation
2 management” should mitigate the potential for structure failure or common mode
3 failure. Do you agree?
- 4 A6. No. Examples of common mode failures that could adversely affect both circuits
5 include (but are not limited to) the following:
- 6 1. Tree contact slapping conductors together or contacting both circuits;
 - 7 2. Lightning strike causing both circuits to trip or damaging equipment;
 - 8 3. Foreign objects, e.g., a vehicle, or a metallic balloon, making contact with
9 both circuits or the single-pole; and/or
 - 10 4. Collateral failure or damage due to
 - 11 a. Extreme weather events, e.g. icing, tornado, micro-bursts, high winds; and
 - 12 i. Galloping and insulator swings due to high winds; or
 - 13 ii. Unbalanced ice unloading;
 - 14 b. Brush fire causing flashover of both circuits; and/or
 - 15 c. Insulator/hardware failure causing damage to other circuit.
- 16
- 17 Steel poles on concrete foundations should mitigate the potential for structure
18 failures that could be caused by a lighter vehicle hitting a pole or high winds
19 damaging a pole. However, steel poles on concrete foundations would not
20 successfully mitigate other failure modes that impact the conductors. An April
21 5th, 2007 outage on the VELCO Irasburg to Moshers Tap double-circuit line
22 section (installed in 2005) provides one example of this kind of mode failure. The

1 tree in question was a 94-ft white pine in good health, and was located outside of
2 the cleared right-of-way. Fourteen inches of heavy, wet snow had fallen in the
3 region, causing the tree to bend over from snow loading and rest on the 46 kV
4 line. The trees' leaves touched the 115 kV circuit, and ultimately caused an
5 outage. That outage would not have been prevented by steel poles on concrete
6 foundations.

7
8 Steel poles would not protect against common mode failures to the circuits caused
9 by lightening, vegetation, foreign objects, equipment failure (insulator or
10 hardware damage causing damage to the other circuit).

11
12 In addition, Ms. Hinds does not have the engineering background, the knowledge
13 of planning or design practices on the power system or the understanding of
14 vegetation management practices to base her conclusions upon qualified
15 credentials. It takes a number of individuals -- transmission design engineers,
16 transmission planning engineers, foresters, operations engineers and aesthetic
17 experts -- to evaluate what can be done with a corridor to balance the public need
18 for a reliable power delivery network (i.e. the transmission system) with other
19 factors. VELCO believes its proposed design, which remains within the existing
20 150-foot corridor in the Country Club Estates and Valley Ridge neighborhoods,
21 strikes that balance.

22

1 Q7. Will construction of the Project with single-pole, double-circuit design in the
2 areas mentioned by South Burlington result in a greater cost?

3 A7. Yes. Temporary structures would need to be erected in order to build the new
4 structures. The installation of the temporary structures may need to be located on
5 properties adjacent to the VELCO utility corridor, and additional vegetation and
6 ground disturbances may be required for those structures. The temporary line
7 would require additional time and cost for completion of the Project. The
8 temporary line would also result in two additional outages – one to move the
9 existing line to the temporary structures, and a second outage when moving the
10 existing line back to the new, permanent structures. These costs and impacts are
11 not present in the Project as proposed.

12

13 **4. Approval of Phases I and II by ISO-NE**

14 Q8. Should there be a concern that ISO-NE has approved both the Project and Phase
15 II, the Gorge VELCO Substation? Is this joint regional approval cause for
16 concern?

17 A8. This is not cause for concern. ISO-NE has often given approval to multi-stage
18 projects. Since VELCO is a Local Control Center (or LCC), we have the
19 obligation to reliably operate the Vermont portion of the high voltage
20 transmission grid in New England in coordination with ISO-NE. We cannot put
21 in-service any portion of a project without adequate internal review and analysis
22 and without the same review of the ISO-NE operations staff. The Project has

1 been reviewed by VELCO's technical staff; they have concluded that the Project
2 will have no adverse impact on system stability and reliability if constructed and
3 built as proposed. With that review no other approvals are needed from ISO-NE
4 since the original approved Proposed Plan Application (PPA) included the East
5 Avenue Substation.

6
7
8 Q9. Has VELCO sought PSB approval, constructed and put into service a portion of a
9 project approved by ISO-NE in the past?

10 A9. Yes. VELCO put into service the Sand Bar phase-shifting transformer and
11 substation upgrades that were approved as part of the Northwestern Vermont
12 Reliability Project ("NRP") by ISO-NE. VELCO filed a 248 for the Sand Bar
13 elements of the NRP before submitting the remainder of the NRP to the PSB. The
14 Sand Bar project was completed and put into service in June of 2004, long before
15 any other element of the NRP. Similarly, East Avenue Phase I is merely the first
16 element of a larger potential project.

17
18 Another example worth examining is that of the VELCO 370 line (the new 345
19 kV line between our West Rutland and New Haven substations). This line was
20 approved by ISO-NE as part of the NRP in 2002. The line was placed into
21 service in January of 2007. The NRP will not be complete, as approved by ISO-
22 NE, until elements such as the 115 kV line are completed and energized. This last

1 element, based on current schedules reflecting regulatory and condemnation
2 delays, will not be energized until 2008 at the earliest. That means a transitional
3 form of the NRP without the 115 kV line between New Haven to Queen City will
4 be in-service for over a year. No ISO-NE approval letters were provided to
5 operate in this state; instead, coordinated examinations by the operations staffs of
6 VELCO and ISO-NE determined how the system would operate in this mode
7 before the equipment was placed into service, allowing the system security and
8 reliability to be maintained once the equipment was energized. This course of
9 action is the normal course of business with ISO-NE, local control centers, and
10 multi-stage projects.

11
12 Should circumstances change and the Gorge VELCO Substation not be required
13 in the timeframe anticipated, VELCO would merely file a revised PPA with ISO-
14 NE and obtain approval of the constructed East Avenue Substation, which by its
15 existence and use will have demonstrated no significant adverse impact to system
16 reliability and stability. This is the main test for any proposed facilities that are to
17 be added to the regional transmission network.

18

1 **5. Conclusion**

2 Q10. Does this conclude your testimony at this time?

3 A10. Yes, it does.

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