

**STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
ENERGY FACILITY SITING BOARD**

In re The Narragansett Electric Company	:	
d/b/a National Grid	:	Docket No. SB-2008-02
(Rhode Island Reliability Project)	:	

Pre-Filed Testimony of

Joseph M. Drouin, P.E.

September 28, 2009

TESTIMONY OF JOSEPH M. DROUIN, P.E.

1 Q. Please state your full name and business address.

2 A. My name is Joseph M. Drouin, P.E. My address is 303 US Route 1, Suite 2A, Freeport,
3 ME.

4 Q. By whom are you employed and in what position?

5 A. I am employed by POWER Engineers, Inc (POWER) as a Project Engineer within
6 POWER's Transmission and Distribution division. POWER is an engineering consulting
7 firm which provides program management, project management, engineering design, and
8 construction support services in the fields of electrical energy generation, transmission,
9 and distribution design and construction, communications infrastructure, environmental
10 permitting and oversight, and industrial processing facilities.

11 Q. Please summarize your education, training, and experience.

12 A. I have worked in the field of overhead transmission line and distribution engineering
13 design since 2000. Seven years of that experience was with another consulting firm
14 focusing in high voltage and extra high voltage transmission and substation engineering
15 and construction services. The last three years have been in the role of Project Engineer
16 with POWER. My engineering and consulting design experience has included high
17 voltage and extra high voltage projects throughout the Northeastern United States, Texas,
18 and Florida. I have a Bachelors of Science degree from the University of New
19 Hampshire in Civil Engineering and am a registered Professional Engineer in the States
20 of Maine, Rhode Island, and Massachusetts.

21 Q. Are you familiar with National Grid's NEEWS Project (Project)?

1 A. Yes. In January of 2008, POWER was retained by National Grid to perform in the role
2 of Owner's Engineer and Program Manager in charge of engineering management and
3 design for the new and existing overhead transmission line and substation facility
4 upgrades and modifications for the Project. Since January of 2008, I have acted in the
5 role of Project Engineer responsible for the 115 kV and 345 kV overhead engineering
6 designs and coordination associated with the Project.

7 Q. What is the scope of your testimony in this proceeding?

8 A. In my testimony, I will explain the overhead electrical transmission line design clearance
9 requirements to the edge of National Grid's existing rights-of-way (ROW) as developed
10 and adhered to for the design of the Project through the Town of Johnston. I will also
11 discuss the Edward G. McGavran III, P.E. report (McGavran Report) submitted by the
12 Town of Johnston.

13 Q. Please explain the planned overhead transmission line modifications and clearance design
14 requirements for the Project through Johnston?

15 A. The Project will require the rebuild of the existing 115 kV overhead transmission lines
16 S171S and T172S through Johnston in order to accommodate the design and construction
17 of the new 345 kV circuit Line 359. On June 10th, 2009, POWER submitted to National
18 Grid a letter report outlining the design requirements applicable to the overhead
19 transmission line designs through Johnston, RI. This letter report is provided as
20 Attachment JMD-1.

21 Q. Have you reviewed the McGavran Report.?

22 A. Yes. I was provided with a copy of the McGavran Report and reviewed the document.

1 Q. The McGavran Report states on p. 3 that the Project's design requirements are only
2 consistent with the utilization of "the National Electrical Safety Code which is a
3 minimum standard for the citing [sic] of transmission lines." Is this correct?

4 A. This statement is not accurate. Although the National Electrical Safety Code was utilized
5 for the determination of minimum clearance design requirements, these clearance
6 requirements were increased with a design buffer for the Project. The applicable Project
7 design buffers are further clarified in POWER's letter report.

8 Q. Are you familiar with the RUS?

9 A. Yes, I am. The RUS is the Rural Utilities Service. RUS Bulletin 1724E-200, 2005 ed.
10 (RUS Bulletin) which is relied on in the McGavran Report is the U. S. Department of
11 Agriculture's design manual for high voltage transmission lines.

12 Q. Does the RUS Bulletin allow for the determination of alternative ROW widths less than
13 the 50' from centerline to edge of ROW as proposed in the McGavran Report?

14 A. Yes. The McGavran Report recommends (p. 3) that a minimum 50' distance from the
15 centerline of the proposed 115 kV structures to the edge of the right of way be utilized,
16 based on the RUS Bulletin. Section 5.3 of the RUS Bulletin states that the 50' ROW
17 width recommendation is a typical width which assumes predominantly H-Frame type
18 construction. This is not consistent with the Project's structures. As per the provisions of
19 Section 5.4 of the RUS Bulletin, the calculations for the required ROW width may be
20 determined utilizing a method which is "more directly related to the particular parameters
21 of the line design." The design approach as detailed in section 5.4.1 of the RUS Bulletin,
22 which considers structure framing, attachment hardware, and conductor movement in the

1 wind, is consistent with the approach used for the Project in determining required
2 clearances to the edge of the ROW.

3 Q. Are the design criteria for the Project consistent with these RUS Bulletin clearance
4 requirements?

5 A. Yes. Table 5-1 of the RUS Bulletin recommends a horizontal clearance for 115 kV
6 conductors to buildings, balconies, and areas accessible to pedestrians of 10.6' with the
7 conductors at rest and 7.6' with the conductors displaced by wind. These values are in
8 excess of the minimum recommendations of the National Electrical Safety Code. As per
9 POWER's letter report, the Projects design requirements for 115 kV conductors to the
10 edge of the ROW, assuming a building is constructed directly at the edge of the ROW in
11 Johnston are greater than those defined in Table 5-1 of the RUS Bulletin.

12 Q. Finally, do Rhode Island agencies rely on either the RUS Bulletin or the NESC?

13 A. Yes. In the "Rules Prescribing Standards for Electric Utilities" (September 21, 2004)
14 (the "Rules"), the Division of Public Utilities and Carriers has defined "Standard
15 Practice" as being guided by the National Electrical Safety Code and the National
16 Electric Code (Rules, § VIII-A.) Section VIII-B of the Rules requires public utilities to
17 construct, install, operate and maintain their facilities in accordance with standard
18 practice as defined in the Rules.

19 A. Does this conclude your testimony?

20 A. Yes.

The Narragansett Electric Company d/b/a National Grid
Rhode Island Reliability Project
EFSB Docket No. SB-2008-02
Witness: Joseph M. Drouin, P.E.

Attachments

JMD-1 Letter Report from Joseph M. Drouin, P.E. of POWER Engineers, Inc. to David J. Beron, P.E. (June 10, 2009) (attachments omitted.)



June 10, 2009

David Beron
National Grid
25 Research Drive
Westborough, MA 01582

Subject: National Grid Lines T172/2227 - Transmission Right of Way Clearance Report
Town of Johnston, RI

Dear Mr. Beron:

POWER Engineers, Inc. (POWER) has been retained by National Grid (NG) to act as their Owner's Engineer for the New England East West Solutions (NEEWS) transmission reliability upgrade project in the greater Rhode Island and Massachusetts area. In this role, POWER is responsible for the detailed engineering, design, and drafting of the new and existing high voltage and extra high voltage overhead transmission line upgrades associated with NEEWS, along with upgrades required at multiple substation facilities.

The scope of POWER's overhead engineering design includes, amongst several other upgrades, a rebuild of NG's existing 115 kV Line T172(N/S), which extends from Woonsocket S/S in North Smithfield, RI to Drumrock S/S in Warwick, RI, a distance of approximately twenty-one (21) miles. As part of the rebuild of Line T172(N/S), the relocation of multiple existing distribution facilities will be required. In several of these areas, the distribution will be double circuited on self supporting single steel pole structures with Line T172(N/S).

As per the request of the Town of Johnston, RI, POWER developed this preliminary engineering analysis report which highlights the minimum electrical high voltage (115 kV) and distribution voltage (23 kV or less) line clearances provided to the edge of the existing NG rights-of-way (ROW) through the Town of Johnston for both the rebuilt Line T172(N/S) and the double circuited distribution line(s). These clearances were measured against the requirements of the National Electric Safety Code (NESC) 2007 and NG standards.

Included within the appendices of this document, POWER has provided a set of report calculations exported from our engineering software models. These design models were developed utilizing Power Line Systems proprietary transmission line design software package, PLS-CADD.

ANALYSIS PROCEDURES AND ASSUMPTIONS

The proposed 115 kV Line T172(N/S) structure relocations and associated distribution facility relocations located in the Town of Johnston, RI were modeled in PLS-CADD. PLS-CADD performed a detailed, automated analysis of the conductor movement envelopes for

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each circuit throughout a defined range of applicable weather conditions. The software then verified that the conductor movement envelopes remained within the bounds of the required input clearances. Preliminary design assumptions used in the analyses are provided below:

Conductor Movement Envelope Weather Conditions

As per the requirements of the NESC 2007 and NG standards, conductor movement envelopes were reviewed for the following weather conditions:

Weather Case	Ambient Air Temperature (°F)	Wind Pressure (PSF)
Everyday	60	0
Blowout	60	6

Design Clearances

Required horizontal design clearances to the edge of NG's existing transmission ROW were based upon the NESC 2007 Code (Rule 234) and NG required horizontal clearances to buildings, plus an applicable buffer (regardless of the existence of a building at the edge of ROW at the time of analysis). The horizontal design clearances are stated below based upon voltage:

Weather Case	Voltage (kV)	Required Clearance to ROW(ft)
Everyday/Blowout	115	11.1 *
Everyday/Blowout	23 or less	8.5**

* Required design clearance includes NESC clearance plus a five (5) ft buffer.

** Required design clearance includes NESC clearance plus a four (4) ft buffer.

Electrical Conductors

All analyses were completed utilizing the following proposed electrical conductors:

Line T172(N/S) (115 kV)

1590 kcmil ACSR (Aluminum Conductor Steel Reinforced) "Falcon"

1590 kcmil ACSS (Aluminum Conductor Steel Reinforced) "Falcon"

Distribution – (23 kV or less)

795 kcmil ACSR (Aluminum Conductor Steel Reinforced) "Drake"

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ANALYSIS OUTPUT

Provided in APPENDIX B is the detailed PLS-CADD software analysis output reports resulting from the edge of ROW clearance calculations for the proposed T172(N/S) rebuild and applicable distribution lines. The portion of Line T172(N/S) which falls within the Town of Johnston, RI includes the approximate station limits of 456+30 through 752+65 on the attached reports. The analysis output results provided which do not fall within these limits are outside of the boundaries of the Town of Johnston, RI.

CONCLUSIONS

Under the Everyday and Blowout weather conditions analyzed as defined within this letter, the conductor movement envelopes for all energized cables of the rebuilt Line T172(N/S) and associated double circuited distribution line(s) fall within the requirements of the NESC 2007 design code and NG's standard design procedures.

The design calculations and conclusions as presented in this report are preliminary and contingent upon final design structure layouts. Regardless of any line design modifications which may be required, conductor movement envelopes will be maintained as per the requirements of NESC 2007 and NG standards.

If you have any questions regarding these assumptions, analyses, or results, please feel free to contact me at 207-869-1223.

Sincerely,
POWER ENGINEERS, INC



Joseph M. Drouin, P.E. (Rhode Island #9008)

JD/es
Sent Via: Email
c: Peter Lacouture (R&C)
Scott Ryder (EIG)
Fray Thompson (POWER)
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