



## STATE OF NEW HAMPSHIRE

Inter-Department Communication

DATE: 13 October 2010

AT (OFFICE): NHPUC

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**FROM:** Tom Frantz – Director, Electric Division

**SUBJECT:** DE 10-223: Petition by New England Power Company d/b/a National Grid for a License to Construct and/or Maintain Electric Lines over and across Public Waters in the Town of Walpole, New Hampshire

**TO:** Chairman Getz, Commissioners Below and Ignatius  
Executive Director Howland

On August 26, 2010, New England Power Company d/b/a as National Grid filed a petition with the Commission under RSA 371:17 for a license to construct and maintain electric lines over and across the public waters of the Connecticut River in Town of Walpole, New Hampshire. National Grid supplemented its filing on September 29, 2010. On October 1, National Grid filed Exhibits 2-1 and 3-1 to supplement the September 29 filing.

National Grid currently operates and maintains a 115 kV transmission line, designated J-136N, that runs between Flagg Pond Substation in Fitchburg, Massachusetts and Bellows Falls Substation No. 14 located in Rockingham, Vermont. The J-136N line was constructed in 1927. No license for crossing the Connecticut River has ever been issued by the Commission for the J-136N line. National Grid proposes to reconductor one mile of the J-136N line for increased reliability. The degradation of the line is based on the observations National Grid made as it reconducted the I-135N line, a line of similar age, location and conductor type as the J-136N.

Staff employed the Accion Group Inc. (Accion) to review National Grid's petition. Accion filed an electronic memo of its review of National Grid's petition with Staff on September 30. Accion stated that "...Grid has provided sufficient information and data to justify construction of new electric lines across public waters at this location" and that "...Grid assures the Commission that the new overhead facilities will be properly constructed in accordance with the requirements of the NESC, ANSI C2-2007 and will be maintained in accordance with NESC." Accion also stated that "...if the proposed facilities are constructed, operated, and maintained as proposed in its filing, Grid will provide safe and reliable service to the public based on sound engineering standards and that construction will be in accordance with the 2007 edition of the National Electrical Safety Code." Accion further recommended to Staff that it recommend approval of Grid's petition, but add a couple of conditions that specified in the Accion report.

Based on the recommendation of Accion and Staff's review of the filing, Staff recommends that the Commission grant Grid's revised petition. Accion's report is attached for your consideration.

Please contact me if you have any questions or would like to discuss this matter.

**ACCION REVIEW OF THE NEW ENGLAND POWER COMPANY D/B/A NATIONAL  
GRID  
PETITION TO CROSS PUBLIC WATERS OF THE CONNECTICUT RIVER  
IN THE TOWN OF WALPOLE, NEW HAMPSHIRE**

**September 30, 2010**

**REVIEW SUMMARY**

On August 26, 2010, New England Power Company d/b/a National Grid (Grid) filed a petition with the Commission pursuant to RSA 371:17 for a license to construct and maintain electric lines across the Connecticut River in Walpole, New Hampshire. Grid filed supplemental information on September 29, 2010. The location of the proposed crossing is 1,500 feet south of the Bridge Street Bridge between Rockingham, Vermont and Walpole, New Hampshire. Grid states that the rebuild of the existing J-136N 115kV line<sup>1</sup> crossing is required to assure the reliability of its transmission system and to assure against conductor failure. The rebuild of the companion I-135N circuit in 2009 found that the similar conductor was degraded. Grid believes that similar degradation exists in the composite conductor of the J-136N 115kV line and has given this project high priority and that the reasonable requirement of service to the public in the area cannot be met without the facilities replaced. Grid states that due to access issues at the southerly structure, it will reconductor a total of one mile of the J-136N 115kV line between the Bellows Falls Substation and structure 6. The J-136-N line was not previously licensed for a public water crossing. Grid seeks to take advantage of an Independent System Operator-New England (ISO-NE) outage opportunity commencing on November 1, 2010 causing the project to have a very tight construction schedule.

In support of its petition, Grid submitted related exhibits as follows: a location plan depicting the geographic location of the proposed crossing and a plan and profile drawing depicting the location and projected elevations of the proposed crossing (Appendix A, Exhibit 1-1); a construction detail drawing (New England Power Company drawing of Type N-48 Dead-End Tower) depicting the construction specifications of the existing structure on the southerly side of the crossing (Appendix A, Exhibit 2-1); and an elevation drawing of the Bellows Falls substation take off structure.

Grid states that the new J-136N 115kV crossing will have the same alignment as the existing unlicensed crossing and utilize the two existing structures. Grid also states that it owns permanent easements for its lines and facilities on both sides of the Connecticut River at the crossing location and that all work will be conducted within the scope of those easements.

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<sup>1</sup> The J-136N 115kV line connects the Flagg Pond Substation in Fitchburg, Massachusetts and the Bellows Falls No. 14 Substation in Rockingham, Vermont.

Additionally, Grid states that only the licence petitioned for in this proceeding is required for the construction of this crossing.

As designed by Grid, the proposed crossing will consist of a single circuit existing 54 foot Type N-48 lattice steel dead-end structure (Structure 1B) on the southerly side of the river in horizontal configuration with 21.75 feet spacing between the phase conductors. The shield wire is centered between two of the phase wires and is 10.0 feet above them. On the northerly side of the river, the 69 foot existing double circuit lattice steel high terminal bridge structure at the Bellows Falls Number 14 Substation will be used. At Bellows Falls, the terminal bridge structure is also in horizontal configuration with 14.6 feet spacing between the phase conductors. The shield wire is centered between two of the phase wires and is 8.6 feet above them. The span of the crossing is 2093 feet. Structures 2 through 6 of the J-136N 115kV line are double circuit lattice steel tangent structures. Grid attests that all steel structures have been analyzed for structural adequacy.

The three phase conductors will be 795 ACSR conductors with 26/7 stranding, tensioned to a maximum of 8,800 pounds, and sagged to National Electrical Safety Code (NESC), American National Standards Institute (ANSI) C2-2007 Heavy Load Conditions (0 degrees F, 4 pounds per square foot wind loading, and ½ inch radial ice). The 3/8 inch shield wire will be an Extra High Strength galvanized steel conductor, tensioned to a maximum of 4,900 pounds, and sagged to NESC Heavy Load Conditions.

Grid determined that the 10-year flood level at this location of the Connecticut River is 252.3 feet using the elevations contained in the Flood Insurance Rate Map for Cheshire County, Panel 14 of 610, Map Number 33005C0014E with an effective date of May 23, 2006 issued by the Federal Emergency Management Agency and are based on the National Geodetic Vertical Datum of 1929.

Grid stated that the Connecticut River at the line crossing location is not suitable for sailing.<sup>2</sup> For crossing of waters not suitable for sailing, NESC Table 232-1.6 requires a water surface clearance of 18.6 feet for phase conductors adjusted for 115kV operation and 14.0 feet for neutral conductors that meet Rule 230E1. NESC Table 232-1.2 also requires that the clearance to the land surface be 20.1 feet for phase conductors adjusted for 115kV operation and 15.5 feet for neutral conductors that meet Rule 230E1.

Grid investigated a multitude of weather and loading conditions for its design. The conditions investigated include ANSI C2-2007 Heavy Load Conditions, minus 20 degrees F ambient temperature, 105 degrees F ambient temperature for the phase and shield wire

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<sup>2</sup> Staff determined that this area of the Connecticut River was not suitable for sail boating when the companion circuit I-135N was reconstructed. Staff makes reference to its Staff Memo to the Commission in Docket DE 08-003 and dated April 7, 2009.

conductors, and 284 degrees F for the phase conductors. Grid used these design conditions to determine the minimum clearance of the conductors to the water and land surfaces. For the determination of minimum separation calculations between the phase conductors and shield wire, Grid used a 30 degree F ambient for the bare phase conductors and a 30 degree F ambient with 3/4 inch radial ice with 4 pounds of wind per square foot for the shield wire, a 30 degree F ambient for the bare phase conductors and 1/2 inch of radial ice without wind for the shield wire, and NESC Heavy Load Conditions for both.

As designed by Grid, the maximum sag of the phase conductors would occur when the phase conductors are at 284 degrees F. At this condition, Grid calculates that at minimum clearance, the phase conductors would remain 23.4 feet above the 10-year flood level of 252.3 feet and 24.5 feet above the land at the tower on the south side of the river. Grid calculates that the maximum sag of the shield wire conductor over the water occurs when it is at NESC Heavy Load Conditions. At these conditions, Grid calculates that at minimum clearance, the shield wire conductor would remain 50.4 feet above the 10-year flood level of 252.3 feet. Grid also calculates that the maximum sag of the shield wire conductor occurs over land when it is at 105 degrees F. At that condition, Grid calculates that at minimum clearance, the shield wire would remain 37.3 feet above the land on the south side of the river. In addition, the minimum distance requirement between the phase conductors and the Shield wire conductor according to NESC Table 235-6-2 is 4.8 feet corrected for 115kV operation. Grid calculates that the minimum distance between the phase and shield wire conductors is 8.8 feet when the shield wire conductors are at 30 degrees F, 4 pounds per square foot wind loading, and with ¾ inch radial ice and the phase conductors are at 30 degrees F without ice. As designed, all clearances exceed NESC requirements.

The proposed crossing in this petition is in an area that is considered a special wind region as depicted in Figure 250-2(e) of the NESC. Such designation requires that the proposed facility location be analyzed for unusual local wind conditions. Grid states that no local special conditions were found.

Grid states that the use and enjoyment by the public of these waters will not be diminished in any material respect as a result of the proposed electric line crossing. Grid further attests that the construction of the crossing will be in accordance with the requirements of the NESC, ANSI C2-2007 and that the crossing will be maintained and operated in accordance with the NESC.

## **CONCLUSIONS AND RECOMMENDATIONS**

Accion reviewed the petition and associated technical information filed by Grid in support of its petition.

Accion found that Grid has provided sufficient information and data to justify construction of new electric lines across public waters at this location.

Accion found that Grid assures the Commission that the new overhead facilities will be properly constructed in accordance with the requirements of the NESC, ANSI C2-2007 and will be maintained in accordance with the NESC.

Accion concluded that if the proposed facilities are constructed, operated, and maintained as proposed in its filing, Grid will provide safe and reliable service to the public based on sound engineering standards and that construction will be in accordance with the 2007 edition of the National Electrical Safety Code.

Accion recommends that Staff recommend approval of Grid's petition to the Commission.

Accion further recommends that Staff recommend that the Commission include the following additional conditions in its order.

- Require that all future reconstruction to this approved crossing shall conform to the requirements of the National Electrical Safety Code and all other applicable safety standards in existence at that time.
- Require that Grid maintains and operates this crossing in conformance with the National Electrical Safety Code.