



STATE OF NEW HAMPSHIRE

Inter-Department Communication

DATE: 30 September 2009

AT (OFFICE): NHPUC

TF

FROM: Tom Frantz, Director – Electric Division

SUBJECT: DE 09-124: PSNH petition for a license to upgrade lines across Bellamy River in Dover

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

On July 2, 2009, Public Service Company of New Hampshire (PSNH) filed a petition with the Commission under RSA 371:17 for a license to upgrade and maintain existing electric lines over the Bellamy River in Dover, New Hampshire. PSNH re-designed its facilities and filed a completely revised petition on September 8, 2009. PSNH states in its petition that the crossing is required to meet growth in demand, and to meet the reasonable requirements of service to the public in the seacoast area.

PSNH states that the crossing will be operated at a voltage of 115 kV, is currently licensed under Docket DE-3442, Order No. 6668, and that the structures of the 544 foot crossing will be located within the existing PSNH easement. PSNH also states that no wetlands permits. PSNH based its minimum clearance requirements on a 100-year flood elevation which exceeds the 10-year requirement of the National Electrical Safety Code and the clearance requirements of the Department of the Army Core of Engineers.

Staff employed The Liberty Consulting Group (Liberty) to review PSNH's petition. On September 14, 2009, Liberty filed an electronic memo of its review of PSNH's petition with Staff. Liberty reviewed the National Electrical Safety Code (NESC) conductor clearance requirements, the calculations of flood water surface elevations, and clearance requirements of the Department of the Army Core of Engineers for compliance. Liberty stated that "...PSNH has provided sufficient information and data to justify construction of new electric lines across public waters at this location" and that "...PSNH assures the Commission that the new overhead facilities will be properly constructed, operated, and maintained in accordance with the requirements of the NESC, ANSI C2-2007." Liberty also stated that "...if the proposed facilities are constructed, operated, and maintained as proposed in its filing, PSNH 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." Liberty further recommended to Staff that it recommend approval of PSNH's petition to the Commission.

Staff agrees with Liberty's assessment and recommends that the Commission approve the petition as filed in its revised petition. For your convenience and review, I have attached the Liberty report to this memo. Please contact me if you have any questions or would like to discuss this matter.

Docket Number DE 09-124

**Liberty Review of the Public Service Company of New Hampshire Petition to Cross
Public Waters of the Bellamy River in Dover, New Hampshire**

September 14, 2009

Review Summary

On July 2, 2009, Public Service Company of New Hampshire (PSNH) filed a petition with the Commission pursuant to RSA 371:17 for a license to upgrade and maintain existing electric lines across the Bellamy River in Dover, New Hampshire. Subsequent to its filing, PSNH re-designed the subject crossing and filed a completely revised petition on September 8, 2009. PSNH states that the upgraded crossing is required to meet the growth in demand in the seacoast area. The upgrade of the existing water crossing will allow PSNH to meet the reasonable requirements of service to the public and will remain designated as the M-183 115 kV line.

In support of its petition, PSNH supplied a locational geographic map and plan and profile drawing for the water crossing as Exhibits 1 and 2, construction details of the structure types used as Figures 1, 1A, and 2, various sea level calculations as Figure 3, flood profiles of the Bellamy River as Figure 4, locational flood geographic map as Figure 5, and a letter from the Department of the Army Core of Engineers (COE) stating revised clearance requirements for this location. PSNH also states that the crossing is currently licensed under Docket DE-3442, Order No.6668, and dated August 31, 1955.

PSNH states that the upgraded M-183 115 kV crossing will use the existing H frame structures on both sides of the crossing as PSNH has determined that the existing structures are capable of handling the increased weight and tensions of the new conductors based on the National Electrical Safety Code (NESC) Grade B loading conditions. By using the existing H frame structures, the crossing will retain its existing centerline in the center of the existing PSNH 135 foot easement. PSNH further states that no New Hampshire Department of Environmental Services (DES) wetlands permits are required as the existing structures are not in jurisdictional wetlands and that DES wetlands permits required for access will be obtained for construction of other line structures prior to construction.

As designed by PSNH, the upgraded crossing will consist of two pole wood H frame tangent structures on each side of the Bellamy River with a span of 544 feet between them. The existing tangent structure on the Westerly side of the river will consist of a Type A 50 foot tangent structure using Class 3 poles and is designated as structure #50. The phase conductors will be spaced horizontally 14.0 feet apart. The static conductors will be bracket mounted 0.5 feet above the top of the pole, 6.0 feet above the phase conductors, and centered between the phase conductors. The tangent structure on the Easterly side of the River will consist of a Type D 60 foot tangent structure using Class 3

poles with identical spacing dimensions and is designated as structure #51.¹

The three phase conductors will be 795 kcmil ACSR with a 26/7 stranding, will be tensioned to a maximum of 5,000 pounds, and sagged to 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 two static wires will be 7-#8 Alumoweld conductor, will be tensioned to a maximum of 3,600 pounds, and also sagged to NESC Heavy Load Conditions. PSNH states that the tensions were chosen to match the existing clearances as closely as possible.

PSNH determined that the 100-year flood level at this location of the Bellamy River was based on information contained in the Flood Insurance Rate Maps (FIRM) and Flood Insurance Study #33017CV000A provided by the Federal Emergency Management Authority at the Sawyer Mill Dam in Dover, New Hampshire. PSNH corrected this information to the crossing location and determined that the 100-year flood level was 10.9 feet above the mean high water level at the crossing location. This data is based on the National Geodetic Vertical Datum of 1929. PSNH stated that it used the 100-year flood for water elevations in its design instead of the normal flood level or 10-year flood levels required by the NESC for the purpose of conservatism. PSNH also determined the mean high water level at the crossing location to be 4.75 feet at Fort Point, New Hampshire, a location very near the crossing. Adding the mean high water level to the flood elevation yielded a 100-year design water elevation of 15.65 feet. Due to the uncertainties that of the available flood data, PSNH increased the design flood elevation to 20.0 feet.

The Department of the Army Core of Engineers modified its clearance requirements for this crossing (Department of the Army Permit No. 195400204) from 56 feet above mean high water to 32 feet above mean high water based on clearances required by the US Coast Guard. The US Coast Guard requires a 20.0 foot clearance above the clearance required for a fixed bridge across the waterway. The Scammel Bridge (NH Route 4) was reconstructed as a fixed bridge with a clearance of 11.8 feet above mean high water.

PSNH calculated the surface area of the crossing according to Note 19 to Table 232-1 of the NESC and the FIRM and found that the surface area was 99.6 acres. For crossing of waters suitable for sailing of between 20 and 200 acres, NESC Table 232-1.7.b requires a water surface clearance during a 10 year flood of 28.5 feet for phase conductors and 25.5 feet for neutral conductors that meet Rule 230C1. NESC Rule 232.C.1a states that an additional clearance of 1.6 feet is needed for the 115 kV phase conductors which brings the phase conductor minimum clearance to 30.1 feet. NESC Table 232-1.2 also requires that the clearance to the land surface be 18.5 feet for phase conductors plus the 1.6 foot correction factor for 115 kV (20.1 feet total) and 15.5 feet for neutral conductors that meet Rule 230C1. The NESC clearance requirements of the lowest conductors therefore exceed those required by the Core of Engineers.

¹ The type of tangent structure and the pole class were confirmed by verbal communication.

PSNH investigated a multitude of weather and loading conditions for its design. The conditions investigated include ANSI C2-2007 Heavy Load Conditions for the phase conductors and static wires, 30 degrees F ambient temperature for the phase conductors, 30 degrees F ambient with 1 inch of radial ice for the static wires, and 285 degrees F for the phase conductors. PSNH used these design conditions and combinations thereof to determine the minimum clearance of the conductors to the water, land surfaces, and between the phase and static conductors.

As designed by PSNH, the maximum sag of the phase conductors would occur at ANSI Heavy Load Conditions. At these conditions, PSNH calculates that at minimum clearance, the phase conductors would remain 33.5 feet above its 100-year flood level design basis elevation of 20.0 feet and 30.3 feet above the land on the westerly side of the river. Due to the fact that the static wires are located above the phase conductors, the clearance to the water surface of the static wires will always exceed NESC phase conductor clearance requirements. In addition, the minimum distance requirement between the phase conductors and the static wires according to NESC Table 235-6-2.a is 57.4 inches (4.8 feet). PSNH calculates that the minimum distance between the phase and neutral conductors is 7.0 feet horizontally and 7.4 feet vertically when the phase conductors are at 30 degrees F without ice and the static wires are at 30 degrees F with 1 inch of radial ice.

PSNH 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. PSNH further attests that the construction of the crossing will be constructed, maintained, and operated in accordance with the requirements of the NESC, ANSI C2-2007.

Conclusions and Recommendations

Liberty reviewed the petition and associated technical information filed by PSNH in support of its petition.

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

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

Liberty concluded that if the proposed facilities are constructed, operated, and maintained as proposed in its filing, PSNH 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.

Liberty recommends that Staff recommend approval of PSNH's petition to the Commission.