

STATE OF NEW HAMPSHIRE

Inter-Department Communication

DATE: 15 October 2010

AT (OFFICE): NHPUC



FROM: Tom Frantz – Director, Electric Division

SUBJECT: DE 10-224: Petition by PSNH for a License to Construct and Maintain Electric Lines and Fiber Optic Cable over and across the Cocheco River in the City of Dover, New Hampshire

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

On August 27, 2010, Public Service Company of New Hampshire (PSNH) filed a petition with the Commission under RSA 371:17 for a license to construct and maintain electric lines over and a fiber optic cable across the Cocheco River in Dover, New Hampshire. PSNH supplemented its filing on September 23, 2010. PSNH states in its petition that the crossing is required to accommodate area load growth and that these facilities are an integral part of PSNH's distribution system.

PSNH currently operates and maintains a 115 kV transmission line, designated the M-183 line, that runs between PSNH's Madbury Substation located in Madbury and its Cocheco Substation in Dover. The line crosses the public waters of the Cocheco River at one location in Dover. That crossing has been licensed by the Commission (see Order No. 12,219 in Docket 76-22). PSNH also received a license from the Commission for the fiber optic cable it installed and maintains at the same crossing location (see Order No. 22,454 in Docket DE 96-370). PSNH states that it needs to uprate the M-183 line conductors to increase the power transfer capability of the line in order to meet the increased load growth in the seacoast area of New Hampshire.

Staff employed the Accion Group Inc.(Accion) to review PSNH's petition. Accion filed an electronic memo of its review of PSNH's petition with Staff on September 13. Accion 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." Accion 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." Accion further recommended to Staff that it recommend approval of PSNH's petition, but add a couple of conditions that it specified in the Accion report.

Based on the recommendation of Accion and Staff's review of the filing, Staff recommends that the Commission grant PSNH a license to construct and maintain electric lines and fiber optic cable over across the Cocheco River as recommended by Accion in its report. I have attached Accion's report to this memo.

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

**ACCION REVIEW OF THE PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE
PETITION TO CROSS PUBLIC WATERS OF THE COCHECO RIVER
IN THE CITY OF DOVER, NEW HAMPSHIRE**

September 24, 2010

REVIEW SUMMARY

On August 27, 2010, Public Service Company of New Hampshire (PSNH) filed a petition with the New Hampshire Public Utilities Commission (Commission) pursuant to RSA 371:17 for a license to reconstruct and maintain electric lines and a fiber optic cable across the Cocheco River in Dover, New Hampshire. PSNH supplemented its petition on September 23, 2010. PSNH states that the reconstruction of the M-183 115kV line between its Madbury substation in Madbury, New Hampshire and its Cocheco Street substation in Dover, New Hampshire is required to meet the reasonable requirements of service to the public due to load growth in the seacoast area of New Hampshire. PSNH proposes to increase the power transfer capacity of the existing line by increasing tower heights to allow for higher temperature operation of the line. PSNH also states that the M-183 115kV line is an integral part of its transmission system and the New England transmission grid. The subject crossing was previously licensed as a public water crossing in Docket 76-22, Order No. 12,219, and dated April 21, 1976. In Docket DE 96-370, PSNH was granted a license under Order No. 22,454, dated December 11, 1996 to add an all-dielectric self-supporting fiber optic cable (ADSS) below the phase conductors on the then existing structures. The location of the crossing is just south of Cocheco Street and 0.4 miles east of the intersection with Gulf Road. PSNH states that the in-service date for this project is November 12, 2010, and that PSNH plans to take advantage of a scheduled Independent System Operator – New England outage of the M-183 115kV line that commences on October 30, 2010 to perform the construction.

In support of its petition, PSNH submitted related exhibits as follows: a location plan depicting the geographic location of the proposed crossing (Exhibit 1); a plan and profile drawing depicting the location and projected elevations of the proposed crossing (Exhibit 2); a construction detail drawing (PSNH 115kV Transmission Standard Dead End Structure Type E) (Figure 1); and a construction detail drawing (PSNH 115kV Transmission Standard Dead End Structure Type DA) (Figure 2). Both Figure 1 and Figure 2 depict the construction specifications of the structures to be used in the crossing.

PSNH states that the new M-183 115kV line crossing will have the same alignment as the existing licensed crossing and remain within the PSNH right-of-way corridor. Structure #88 on the northerly side of the crossing is a two wooden pole Type E dead end structure and will remain in service. Structure #87 on the southerly side of the crossing is a two pole wooden

Type C angle structure and will be replaced with a three pole wooden Type DA dead end structure within the PSNH right-of-way. PSNH further states that it owns permanent easements, not less than one hundred 135 feet wide for its lines and facilities on the southerly side of the crossing, owns the property on the northerly side of the crossing in fee, and that all construction will take place within its property and easements. Additionally, PSNH states that no New Hampshire Department of Environmental Services (NHDES) or New Hampshire Department of Transportation (NHDOT) permits are necessary for the construction of this crossing.

The replacement of structure #87 will occur within the protected shore land of the Cocheco River as defined by RSA 483-B. While RSA 483-B:5-b(1)(a) requires a shore land permit for construction, excavation, or filling activities within the protected shore land, Administrative Rule Env-Wq 1406.04(d)(7) provides an exemption from these permitting requirements for the replacement of utility poles and guy wires using mechanized equipment, provided that appropriate siltation and erosion controls are used and all temporary impacts are restored. No NHDES approvals are required for this waiver to the rules. PSNH states that it will comply with this Administrative Rule with the installation of the replacement #87 structure. PSNH also states that this section of the Cocheco River is considered a federal channel and that it has consulted with the U.S. Army Corps of Engineers. The U.S. Army Corps of Engineers advised PSNH that since the wire and cable clearances at the location of the crossing will be increased over those presently in place, no Army Corps permit modifications are required.

As designed by PSNH, the proposed crossing will consist of the existing two (2) sixty-foot pole Type E dead end structure (#88) on the northerly side of the crossing and a new three (3) seventy-five-foot wooden pole Type DA dead end structure (#87) on the southerly side of the crossing with a span of 501 feet between them. Both structures configure the phase wires in a horizontal configuration with two static wires above the phase conductors and the ADSS cable below the phase conductors. Structure #88 spaces the phase conductors 14 feet apart and centers the two static wires on the phase conductors; attaching them near the top of the poles and 4 feet 10 inches above the phase conductors. The ADSS cable is pole mounted nine (9) feet below the phase conductors on the most easterly pole. The new structure #87 spaces the phase conductors 14 feet apart and centers the two static wires on the phase conductors and attaches them to a cross arm 7.5 feet above the phase conductors. The ADSS cable is pole mounted 13.5 feet below the phase conductors on the most easterly pole.

The three phase conductors are 795 kcmil (thousands of circular mils) Aluminium Clad Steel Reinforced (ACSR) conductors with 36/1 stranding, tensioned to a maximum of five thousand (5,000) 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 static wires are 7 strand #8 Alumoweld

conductors tensioned to a maximum of three thousand six hundred (3,600) pounds, and sagged to NESC Heavy Load Conditions. The ADSS cable is a 64 strand fiber optic cable, tensioned to a maximum of two thousand seven hundred (2,700) pounds, and also sagged to NESC Heavy Load Conditions.

PSNH determined that the 100-year flood level at this location of the Cocheco River is 10.3 feet using the elevations contained in the Strafford County Flood Insurance Study, 33017CV000A, Map Number 330171C033D, Panel 330 of 405, with an effective date of May 17, 2005 issued by the Federal Emergency Management Agency and are based on the National Geodetic Vertical Datum of 1988. 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 level required by the NESC because the 10-year flood information was unavailable and use of the 100-year flood data would be conservative.

PSNH calculated the surface area of the crossing according to Note 19 to Table 232-1 of the NESC and found that the surface area was 74+/- acres. Because the Cocheco River leads to a much larger body, PSNH used the clearance requirements for water bodies greater than 2,000 acres as required by Note 19 to Table 232-1 for its clearance requirements. For crossing of waters suitable for sailing of over 2,000 acres, NESC Table 232-1.7.d requires a water surface clearance of 42.1 feet for phase conductors corrected for 115kV operation, 37.5 feet for static wires that meet Rule 230.E.1, and 37.5 feet for ADSS fiber optic cables that meet Rule 230.F.1.b. NESC Table 232-1.2 also requires that the clearance to the land surface or traveled way be 20.1 feet for phase conductors corrected for 115kV operation, 15.5 feet for static wires that meet Rule 230.E.1, and 15.5 feet for ADSS fiber optic cables that meet Rule 230.F.1.b.

PSNH 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 for the phase conductors, static wires and ADSS cable, 120 degrees F ambient temperature for the static wires and ADSS cable, and 285 degrees F at 50 degrees F ambient for the phase conductors.¹ PSNH used these design conditions and combinations thereof to determine the minimum clearance of all conductors to the water and land surfaces, between the phase conductors and static wires, and between the phase conductors and the ADSS cable.

As designed by PSNH, the maximum sag of the phase conductors would occur when the phase conductors are at 285 degrees F at a 50 degree F ambient. At this condition, PSNH calculates that at minimum clearance, the phase conductors would remain 43 feet above the 100-year flood level of 10.3 feet, and 46.7 feet above the land on the southerly side of the river.

¹ PSNH calculates ampere limits for its lines at these conditions. PSNH holds the line temperature constant for temperatures above or below 50 degrees F assuring NESC clearances will be met under all operating conditions.

PSNH calculates that the maximum sag of the static wires, attached well above the phase conductors, always provides greater clearance than the phase conductors and can never be the limiting factor. As designed by PSNH, the maximum sag for the ADSS cable occurs when the ADSS cable is at 120 degrees F. At this condition, PSNH calculates that the ADSS cable would remain 38.2 feet above the 100-year flood level of 10.3 feet and 36.7 feet above the land on the southerly side of the river. In addition, the minimum distance requirement between the phase conductors and the static wires or ADSS cable according to NESC Table 235-6-2a and adjusted as required by Rule 235.C.2.a.1, is 57.4 inches or 4.8 feet. PSNH calculates that the minimum distance between the phase conductors and the static wires are when the phase conductors are at 30 degrees F and have no ice, while the static wires are at 30 degrees F and have one inch of radial ice. Under these conditions, PSNH calculates that the minimum clearance between the phase conductors and the static wires will be 7.0 feet vertically and 6.0 feet horizontally or 9.2 feet. PSNH also calculates that the minimum distance between the phase conductors and the ADSS cable occurs when the phase conductors are at 285 degrees F while the ADSS cable is at minus 20 degrees F. Under these conditions, PSNH calculates that the minimum clearance between the phase conductors and the ADSS cable will be 4.3 feet vertically and 4.5 feet horizontally, or 6.2 feet. As designed, all clearances exceed NESC requirements.

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

CONCLUSIONS AND RECOMMENDATIONS

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

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

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

Accion 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.

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

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

- Require 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 PSNH maintains and operates this crossing in conformance with the National Electrical Safety Code.
- Require that PSNH abide by the requirements for exemption under Administrative Rule Env-Wq 1406.04(d)(7) regarding shoreline protection.
- Require that in addition to the normal service list, a copy of the order is sent to the New Hampshire Department of Environmental Services and the U.S. Army Corps of Engineers.