

Y-138 construction in existing easement alongside 32.5 kV line, 1991

Re Public Service Company of New Hampshire

DSF 91-130

Order No. 20,739

78 NH PUC 35

New Hampshire Public Utilities Commission

February 2, 1993

Application of Public Service Company of New Hampshire for a Certificate of Site and Facility to Construct, Operate, and Maintain a 115 kV Electric Transmission Line from White Lake Substation, Tamworth, N.H. to Saco Valley Substation, Conway, N.H. Along with the Necessary Substation Terminal Additions in the Towns of Tamworth and Conway, N.H.

APPEARANCES: Public Service Company of New Hampshire by Christopher J. Allwarden, Esquire; Attorney General's Office by Leslie J. Ludtke, Esquire, Senior Assistant Attorney General, Environmental Protection Division on behalf of the public; Site Evaluation Committee by Vincent J. Iacopino, Esquire.

BY THE COMMISSION:

REPORT

I. INTRODUCTION

This matter involves the application of the Public Service Company of New Hampshire (Applicant) for a Certificate of Site and Facility under RSA Chapter 162-F1(3), for authority to construct, operate and maintain a 115,000 volt (115 kV), alternating current (60 Hertz), electric transmission line in the Towns of Tamworth, Madison, and Conway, New Hampshire (N.H.) and the Village District of Eidelweiss, N.H., along with the necessary substation terminal additions in the Towns of Tamworth and Conway, N.H. The line is planned to be constructed in an existing right-of-way adjacent to the existing transmission line. The Applicant states the line is required to ensure continued reliability and continuity of service to the Applicant's customers.

The proposed transmission line will commence at the Applicant's White Lake substation, located west of N.H. Route 16 in Tamworth, and proceed in a northerly direction for approximately 13.9 miles to the Applicant's Saco Valley substation located near the intersection of N.H. Route 113 and US Route 302, east of Redstone, in North Conway. The first 10.5 miles of the line will be constructed adjacent to the existing 34.5 kV line followed by a section of approximately 0.9 miles in length that will be double-circuited with the existing 34.5 kV line (i.e., the existing structures will be replaced with a single line of poles which will support both the 34.5 kV and the proposed 115 kV circuits). The final 2.5 miles will be constructed adjacent to the existing 34.5 kV line. The entire line is to be constructed on rights-of-way of widths ranging from 75 feet to 152.5 feet, with the exception of a 300 foot long section that is 50 feet in width. These rights-of-way are already owned by the Applicant and were cleared in 1987 under previous permits. Some reclearing of the right-of-way will be required due to resprout growth over the last four years.

The proposed facilities were included in the Applicant's 1991 and 1992 filings of "Long Range Plans for Bulk Power Facilities" which are on file with the Public Utilities Commission (Commission) and the Site Evaluation Committee (SEC) as required pursuant to RSA 162-F:4 (Exhibits 14 & 15). The Commission previously granted licenses to the Applicant, pursuant to RSA 371:17, for water crossings across the Pequawket River and the Saco River (See N.H. PUC

DE 87-76; Order #18,703). Both licenses involved the construction of a 115 kV line adjacent to the existing 34.5 kV line and are part of this application. The Applicant also seeks a license to construct and maintain a transmission line across railroad crossings in Tamworth, Conway and two crossings in the Town of Madison, pursuant to RSA 371:24.

The Applicant maintains that the overall impact of the proposed line and associated substation additions are expected to be minimal, due in large part to utilization of the existing right-of-way corridor and substation locations. The line will maintain reliability of electric service to the North Conway area in accordance with its franchise thereby contributing positively to the future growth and development of the region. No unreasonable adverse effects on aesthetics, historic sites, air and water quality, the natural environment and the public health and safety are foreseen. Concerns about electromagnetic fields (EMF) which will be generated are addressed by the adoption of design objectives which will reduce field levels. Available alternatives to the construction of a new transmission line have been considered and were rejected by the Applicant as either uneconomical, having a greater potential environmental impact or inadequate as a long term solution to the increased electrical needs in the area. This proceeding was conducted as a joint proceeding with the SEC and the procedural history and the evidence presented is adequately set forth in the SEC findings and we incorporate them herein by reference.

There are two main findings which are the responsibility of the Commission under RSA 162-F:8 II. The Commission must find that the construction of the facility:

(a) Is required to meet the present and future need for electricity. A finding that the construction of the facility is required to meet the present and future need for electricity may be based upon a determination of need for capacity to generate electricity, need for a greater supply of energy, or need for more economic, reliable, or other wise improved sources of either capacity or energy. The commission shall consider economic factors when considering whether or not the facility will meet the present and future needs for electricity;

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(b) Will not adversely affect system stability and reliability factors.

RSA 162-F:8 II (a) and (b)

II. POSITION OF THE PARTIES

A. APPLICANT'S POSITION

1. NEED FOR POWER

Michael T. Smith, P.E., was the Applicant's main witness concerning the need for power, stability and reliability. In his testimony, Mr. Smith addressed the need for the line to meet the present and future electricity demands in the Central New Hampshire/Conway region. He also explained why the line is necessary to provide more reliable transmission capacity to serve electric customers in the area and the effects of the proposed line on system stability and reliability. In addition, he reviewed the economic and feasibility factors of various system alternatives which were considered by the Applicant as alternatives to the proposed line, consistent with the company's commitment to the integrated least cost resource planning concept.

Mr. Smith testified that in order to maintain a reliable system to supply their customers' electricity needs, the transmission network must be able to withstand various outage conditions while maintaining acceptable voltage levels to all customers without overloading other facilities. The Applicant has developed system design standards to achieve an acceptable design level of reliability for its transmission and distribution system. The Applicant's current design standards, entitled, "Guidelines for System Design" are attached to his testimony as MTS-1, (Exhibit 5, pg.

3).

In his testimony, he described the existing 115 kV transmission system in Carroll County (Exhibit 5, pg. 3) and how customers' electricity demands are served out of the Saco Valley and White Lake substations (Exhibit 5, pg 3). He further described existing system facilities that back-up the load normally fed from the Central Maine Power (CMP) system and the power supply arrangement with CMP (Exhibit 5, pg. 4). He identified the deficiency in the system's transmission capacity. The Applicant's system design guidelines specify, among other things, © Public Utilities Reports, Inc., 2008 56

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that the 115 kV transmission system be designed, at time of system peak, to withstand the simultaneous loss of an autotransformer and a generator without loss of load, after allowing for load transfer, (Attachment MTS-1). Because of the power supply arrangement with CMP, system analysis must consider contingencies on the CMP system, as well as the PSNH system, which could result in isolation of the Saco Valley load. The loss of the Boise Cascade independent power generator in northwestern Maine coupled with the loss of the Surowiec 345/115 kV autotransformer have been identified as contingencies on CMP's system which will result in low transmission voltage on the CMP system and at the Saco Valley substation. Under this condition, the non-firm transmission arrangement allows CMP to disconnect PSNH's K1214 line from the CMP system. This results in the Saco Valley load being picked up on the two 34.5 kV lines out of the White Lake substation. The Applicant's system deficiency consists of the inability of these two existing lines to serve the Saco Valley load during periods of heavy electricity demand.

Mr. Smith explained that the heaviest loads historically have been experienced in the White Lake-Saco Valley area during periods of cold winter weather. These heavy loads are caused primarily by electric heating demands and the operation of the local ski areas which are heavily dependent on electric power for their snow making and other facilities. This is also the time of the year when interruption of power to customers has the greatest adverse impact. Due to voltage constraints, during periods of heavy customer load, the two existing 34.5 kV circuits between White Lake and Saco Valley no longer have the transmission capacity to serve area load upon the loss of the tie to CMP. These voltage constraints are related to line losses incurred while delivering power over these lines to Saco Valley from White Lake, a substantial distance.

Approximately 41 megawatts of Saco Valley load can be supported on the 34.5 kV system from the White Lake substation. Loads in excess of this value cannot be supported and would have to be shed. For example, at projected peak winter loading conditions at Saco Valley in 1992/93, as much as 8 MW of load would have to be interrupted in order to alleviate voltage problems. Saco Valley substation peak winter load projections and estimates of load that would have to be disconnected are included in tables on pages 13 and 14 of the application and are revised in Exhibit 6. It is important to note that, due to the possible long duration of an autotransformer outage on the CMP system, interruption of Saco Valley load would likely continue for an extended period during peak winter load and ski activity times, well in excess of any reasonable acceptable customer outage. Future load growth in the Saco Valley-White Lake area will exacerbate the problem (Exhibit 5, pg. 6).

He further identified other contingencies which could result in conditions which would isolate the Saco Valley substation load. Loss of the Boise generator in Maine, by itself, could under some conditions result in marginal transmission voltage on the CMP system and at Saco Valley sufficient to cause the disconnection of the Saco Valley substation. Similarly, the failure of CMP's non-radial 115 kV line between its Raymond and Surowiec substations could under certain conditions result in marginal transmission voltage sufficient to trip Saco Valley off the CMP system. Under these conditions reliance must be placed on PSNH's 34.5 kV system out of

White Lake. Again, at winter peak loads in the White Lake-Saco Valley region, these lines do not have the transmission capacity to fully serve the Saco Valley load. Under certain contingencies the Applicant's guidelines specify that the 115 kV system may sustain some loss of load at time of system peak as long as the load lost does not exceed 30 MW and the duration of the outage does not exceed eight hours. These contingencies are of a type such that load can generally be restored within eight hours by line repairs or the use of a mobile 115/34.5 kV transformer. He specified that for the type of contingencies described earlier, the system needs to be designed to withstand these outages without loss of load because of the longer duration of the time needed to repair or replace the failed facilities involved. He testified that repair or replacement of a failed 345/115 kV autotransformer could take anywhere from 12 to 15 months (Exhibit 5, pg 6).

He also testified that the proposed 115 kV line between White Lake and Saco Valley substations would alleviate the existing deficiency in the system, since the deficiency is really one of inadequate transmission capacity to ensure reliability. The addition of a 115 kV transmission line connecting the White Lake substation to the Saco Valley substation will provide the needed reinforcement of the existing system. The new line provides a second 115 kV transmission feed into Saco Valley which will, in the near-term, serve as back-up to the K1214 115 kV feed from CMP in Maine. Under contingent conditions which result in the loss of the K1214 feed, the new 115 kV line will have sufficient capacity and would supply adequate voltage support to back-up the total load in the White Lake-Saco Valley region during periods of peak winter loading. Since the new line will allow the Applicant to serve all loads under these contingencies, which is not possible with the limitations of the existing system, the new line meets the need for reliable transmission capacity to serve the present and future electricity needs of PSNH's customers.

In addition, the proposed line will provide long term benefits for the Applicant's transmission system, as the Beebe River substation in Campton, N.H. is currently interconnected with the rest of the Applicant's electric system via two 115 kV lines. One of these lines (X178) runs north approximately 14 miles and then northwest for 20 miles to a point of intersection with two other 115 kV lines near Sugar Hill, N.H. The second line (E115/A111) runs south along the Merrimack River and terminates at PSNH's Webster substation in Franklin, N.H. With anticipated load growth in central New Hampshire, loss of either of these two lines could result in low transmission voltage at the Beebe River substation. The Applicant anticipates that new transmission facilities will need to be built within the next ten years to support future load growth in Carroll, Belknap

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and Grafton Counties. Installation of the proposed 115 kV line between White Lake and Saco Valley will complete a third transmission path into the Beebe River substation. This new east to west transmission interconnection will provide needed reinforcement for the Applicant's existing transmission lines that run from north to south (Exhibit 5, pg.7).

Mr. Smith further testified, that since the application was filed, the Applicant has prepared its 1992 load forecast. The purpose of the update is to clarify information previously submitted in pre- filed testimony and answers to data requests. His revised testimony (Exhibit 6) presents a revision of its Saco Valley substation load projects based on the 1992 forecast. A revised table

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showing the projections of Saco Valley substation peak winter load and load which would have to be disconnected at peak loading during constraint conditions for the years 1992/93 through 1995/96 was submitted as Attachment MTS-2. Supporting loadflow results which depict the

White Lake-Saco Valley area system conditions after the limiting contingency of the Bosie Cascade generator and the Surowiec 345/115 kV autotransformer were submitted as Attachments MTS-3a, 3b, 3c and 3d (Exhibit 6, pg 7).

In comparison to the projections contained in the tables in the application, the revised projections of the Saco Valley substation peak winter load are lower by one or two megawatts for the year 1992/93 through 1994/95. The revision also showed a reduction in the amount of Saco Valley substation load which would have to be isolated or disconnected at peak winter load conditions in each of the four years modeled. The revised projections show 8 megawatts of load would have to be shed to maintain acceptable system voltage conditions at peak winter loading. The previous information showed that approximately 13 megawatts of load would have to be shed to maintain acceptable system voltage conditions at peak winter loading (Exhibit 6, pg. 3). Mr. Smith explained that the difference between the projections relates to the amount of available capacitors which were modeled in each case. The 1992 load projections have taken into account newly available capacitor additions to the Applicant's system, and an improved load factor at the service delivery point to the New Hampshire Electric Cooperative (COOP) which is a result of recent capacitor additions within the COOP's service territory (Exhibit 6, pg. 3). He further explained that the revised projections, although lower, still demonstrate that the existing system is not capable of restoring all load to the Saco Valley substation during heavy winter loading periods under contingencies resulting in the loss of the K1214 feed from CMP. The results show that, under the winter peak scenario, a significant amount of the Saco Valley substation load would still have to be isolated for the system to operate with acceptable voltage conditions. (Exhibit 6, pg. 3).

2. SYSTEM STABILITY AND RELIABILITY

Mr. Smith testified that the new line will not have any adverse effects on either system stability or reliability. The proposed transmission line will maintain the existing stability in the area. Reliability is of course improved since the addition of a 115 kV line between the White Lake and Saco Valley substations will significantly improve the Applicant's ability to restore electric power to their customers in a minimal amount of time under the contingencies set forth. He defined stability generally as that attribute of the system which enables it to develop restoring forces between the elements thereof, equal to or greater, than the disturbing forces, so as to restore a state of equilibrium between elements. An electric power system needs to be designed to be stable, so that the arbitrary disturbance or loss of a system element does not create an imbalance or loss of equilibrium in the system leading to the loss of other elements. A system should be designed so that a fault on a transmission line does not cause a generator to be inadvertently tripped off the system and result in a widespread outage of customers. He further defined reliability, to be the ability of an electric power system to deliver necessary electric power to meet customer needs upon demand under both normal conditions and contingent conditions.

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III. INTERVENOR'S POSITION

The Public Counsel and the limited intervenors questioned the attempts and efforts of the Applicant to develop a feasible alternative route. They also questioned whether the proposed transmission line was necessary at this time and the urgency for serving present electrical needs. They further questioned the reasonableness of the guidelines and whether the contingencies set forth could actually happen simultaneously. No expert witnesses were presented by Public Counsel or the intervenors.

A. PUBLIC COUNSEL

Public Counsel did not object to the construction and maintenance of the proposed facility. Counsel raised the concern about potential adverse health effects stemming from the use of the line to transmit large power flows from Maine to Beebe River, not about the limited operation of the line as a back-up to ensure system reliability (PC Brief pg. 5). Public Counsel also contended that the Applicant offered no evidence in its application, its public presentations, its responses to data requests, the adversarial hearings or its post-hearing brief, that the levels of current flow projected to occur in the transmission line pertain to any articulated need for the transmission line (PC Brief pg. 7).

B. LIMITED INTERVENORS

Theresa L. Kennett was formally granted limited intervenor status, and was permitted to make a statement to the Committee. At the adversarial hearings, the Chairman also allowed other members of the public who accompanied Mrs. Kennett to make statements for the record. Public statements were offered by Diane Biolota, Bayard W. Kennett, Maurice Geiger and Rep. Howard C. Dickinson. At the close of the adversarial hearings, Mrs. Kennett filed a post-hearing brief wherein she addressed a number of issues. The issues she raised which are relevant to this portion of the proceeding include whether the transmission line is required to meet the present need for electricity in the Mt. Washington Valley, whether the design guidelines are reasonable, (she argues the evidence suggests a lack of urgency), and whether the driving force is the power needs of the Mt. Washington area.

IV. COMMISSION ANALYSIS

RSA 162-F:8 II(a), requires the Commission to find that the proposed facilities are required to "meet the present and future demand for electric power". This has been characterized as the need for power issue.

The term "electric power" as used in the statute includes both energy (the ability to perform work over a period of time), and capacity (the capacity of providing energy at any given instant in time). In *Re: New England Electric Transmission Corporation*, 67 NH PUC 409, at page 415, the Commission addressed the words, "demand" and "power", where it stated:

"The two words in the statute which bear careful examination are "demand" and

"power".

To utility and electrical engineers the two terms have meaning in that engineers must plan and operate electric systems to provide energy over periods of time to perform work and provide the capability to supply energy at any instant in time when the system is called upon to deliver. To economists the term "demand" means the amount of a commodity that buyers will buy at each specified price in a given market over a given period of time. *Dictionary of Economics and Business*, Nemmers, p. 120 (1976). "Electric power" is the commodity which may have value to buyers either in the form of energy to perform work or the capability to deliver energy at a given instant in time. The statute in question does not specifically stipulate which view of the two terms is appropriate and we can surmise, as with most legislation which regulates in technical areas and which creates administrative agencies to perform the regulatory function, that we are to interpret the statute in practical terms in light of the requirements and needs of the industry to be regulated and its consumers. See *2A Sutherland, Statutes and Statutory Construction Sec. 49.05, City of Manchester v Boston & Maine Railroad* (1953) 98 NH 52, 99 PUR NS 181, 94 A2d 552."

In this docket the Commission will view the terms "demand" and "power" in the engineering sense, as the comprehensive scheme envisioned by RSA 162-F is best served by such an interpretation. Accordingly, we construe the term "electric power" to include both energy and capacity.

A. NEED FOR POWER

The testimony and the evidence presented in the record of these proceedings clearly shows that the Applicant was aware that the transmission system in the Mt. Washington area needed future additions to stay in conformance with PSNH design guidelines. The Applicant indicated concern in the 1970's about adequately serving the increasing electrical loads in the Tamworth, Conway and Ossipee areas by proposing a 115 kV line in an application dated June 12, 1974 to the Siting Committee. The proposed 19.1 mile line would go from Tamworth to Conway, N.H. in a right-of-way occupied by a 34.5 kV transmission line. Moreover, as referenced in Michael T. Smith's testimony, almost 40 megavars of 34.5 kV capacitors have been installed in the Carroll County area to support load restoration at the Saco Valley substation. (Based upon the evidence, it appears that the Applicant has taken reasonable measures to avoid or delay the construction of the 115 kV line.)

The evidence establishes that the Saco Valley substation is a major facility supplying the Carroll County region. The Saco Valley substation is normally supplied with electric power from a 115 kV line of the Applicant interconnected to the CMP system. Transmission service from CMP is non-firm. Moreover, the contract provides that non-firm service is conditioned upon the availability of adequate CMP transmission capacity and further provides that the Saco Valley load may be switched to the Applicant's system for critical CMP contingencies or if otherwise required by CMP system conditions. In the event of the loss of the 115 kV feed from CMP, the Saco Valley load must be fed from the Applicant's existing system over the two existing 34.5 kV lines out of the White Lake substation. The two 34.5 kV lines do not have the capacity to fully serve the forecasted Saco Valley load during periods of heavy electricity demand in the region.

The Applicant's revised load projections show that the deficiency in the back-up capacity of the existing system could result in up to 8 megawatts of load isolation at Saco Valley in the winter of 1992/93, (Exhibit 6). Isolation of load results in the interruption of electric service to customers.

The Applicant's system design guidelines are deterministic in nature, requiring that the system be studied and designed on the assumption that the specified contingencies have occurred at peak loading conditions. A responsible public utility cannot and does not plan the reliability of its system to respond to past actual outages, but designs its plans to avoid future representative outages. In this manner predictability of system response and survivability is known. If the Applicant were forced to be in a position of interrupting load on a long term basis, good and prudent utility practice would be violated. The proposed transmission line will provide reliability under the contingencies foreseen by the system engineers, and provide reliable electric service.

The proposed 115 kV transmission line will allow the system to withstand certain contingencies without loss of load after allowing for load transfer. These contingencies include the loss of a 345/115 kV autotransformer and a generator at the same time, or the loss of a non-radial line. The addition of the proposed 115 kV line will enable the Applicant to fully serve

the forecasted peak winter loads at Saco Valley and meet its reliability standards in the late 1990's. Upon careful review of all the evidence in the record the Committee finds by a preponderance of the evidence that the need for power exists.

1. POWER ISSUE

Public Counsel attempts to limit the Applicant's use of the line to the open mode, based on the analysis that no need was demonstrated by the Applicant to require additional power needs in the area. The argument is made that, if the Committee were to find that the Applicant did not demonstrate a need for one of the methods of operation proposed, a certificate should not be issued authorizing that mode of operation.

The Commission has not in prior orders required that a utility demonstrate that every possible use or operation of a facility must be examined or approved before approval is given for a particular mode of operation. Good utility practice requires the utilization of equipment for purposes other than contingencies referenced in the system design guidelines. The Commission is required by the statute to consider a finding that the proposed facility is required to meet present and future demand for electric power and will not adversely effect system stability and reliability. The fact that a facility meets not only this criteria, but other uses as well, will cause further support for the approval of an application. The Commission accepts the Company's position that the 1992 load projections support the need for power for present and future electrical demands in the area, and that the closed mode of operation may have to be utilized to provide the necessary reliability and stability the system requires to avoid interruption of load or in the performance of day to day operations.

2. ALTERNATIVE SYSTEMS

The Commission has reviewed the 1992 forecast and finds that it supports the same conclusion as the projections, i.e., that the deficiency in the capacity of the existing system could result in up to 8 megawatts of load isolation at Saco Valley in the winter of 1992/1993, and even greater load isolation in later years. A number of other system alternatives to building a new 115 kV transmission line between White Lake and Saco Valley, were reviewed, considered, and are rejected:

a) Additional generation

Building additional generation capacity is not feasible, as the Applicant presently has excess generating capacity and the cost associated with building a generator in the area sufficient to meet the projected needs would have an installed capacity cost of approximately five to ten times the estimated cost of the proposed line (Exhibit 1, pg 24; Exhibit 5, pg. 10).

b) Construction of alternative lines

Two alternative 115 kV transmission lines that would have to cover longer distances and require acquisition and clearing of new right- of ways, are found not to be cost or environmentally effective when compared to the proposed transmission line that is located within an existing right-of-way (Exhibit 1, pg. 25; Exhibit 5, pg.9).

c) Load management & conservation

Load management and conservation programs have been reviewed. The evidence submitted does not support a conclusion that those programs realistically could achieve results that would forgo the need for the proposed transmission line. (Exhibit 5, pgs. 8-9; Exhibit 4, pg. 69; Exhibit 11, Ans. 22,23 & 36).

d) Alternative back-up

The issue was raised that the need for the proposed transmission line could be eliminated by providing back-up generation for the loss of the Bosie Cascade generator and the use of a spare autotransformer to back-up loss of the Surowiec 345/115 kV autotransformer. The Commission recognizes that such additions would have to be made to the Central Maine Power System over which the Commission has no authority. It is not common utility practice for a utility to provide improvements to the system of another utility unless the addition is required as a result of some reliability criteria being violated that the local utility created.

Such facts do not exist in this case. The major companies of the New England Power Pool itself failed to justify the need of a spare autotransformer for the entire region (Post-hearing response to MDC, ATTACHMENT 1- TRANSMISSION STUDY ON THE NEED FOR A SPARE 345/115KV MOBILE TRANSFORMER IN NEW ENGLAND). There is no evidence in the record that such actions are feasible.

3. REASONABLENESS OF THE DESIGN GUIDELINES

The Commission has reviewed the Applicant's guidelines for system design and has found that guidelines fall well within good and prudent utility engineering standards. We see no evidence in this proceeding to alter that finding. We note that, the Applicant's reliability

Upon Consideration of the foregoing report, the findings of the Bulk Power Supply Facility Site Evaluation Committee, the Wetlands Board Permit and the Department of Transportation Permit attached hereto as Attachment A, B and C, respectively, all of which are made part of this order, it is

ORDERED, that the Public Service Company of New Hampshire is authorized to construct, operate and maintain a 115,000 volt (115 kV) alternating current (60 Hertz), electric transmission line in the Towns of Tamworth, Madison and Conway and the Village District of Eidelweiss, N.H. along with the necessary substation terminal additions in the Towns of Tamworth and Conway, adjacent to the existing 35.4 kV right-of-way, being approximately 13.9 miles, and it is

FURTHER ORDERED, that the proposed 115 kV transmission line facility is of sufficient character and environmental impact to require a Certificate of Site and Facility; and it is FURTHER ORDERED, that the requisite good cause exists to permit issuance of this Certificate of Site and Facility to permit construction of the proposed 115 kV (AC) transmission line; and it is

FURTHER ORDERED, that a Certificate of Site and Facility be, and hereby is, granted pursuant to RSA Chapter 162-F to Public Service Company of New Hampshire for the construction, operation and maintenance of a 115 kV transmission line and the necessary substation terminal facilities along an existing transmission right-of-way approximately 13.9 miles in length already owned by the Applicant between Tamworth and Conway, N.H.; and it is FURTHER ORDERED, that all licenses and/or permits referred to in the foregoing report and attached findings of the Bulk Power Supply Facility Site Evaluation Committee, including the permits issued by the Wetlands Board under RSA Chapter 482-A, the of the Department of Transportation under RSA Chapter 231, and the Commission under RSA Chapter 371, are granted, as specified, thus constituting compliance under RSA Chapter 162-F:8 II that all state standards and requirements shall be met by the Public Service Company of New Hampshire as a condition of granting this Certificate of Site and Facility.

By order of the Public Utilities Commission of New Hampshire this second day of February, 1993.

FOOTNOTES

1The application was filed on September 3, 1991 and thereby, is governed by the provision of RSA Chapter 162-F, in accordance with RSA Chapter 162-H:5.

ATTACHMENT A

APPLICATION OF PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE FOR A CERTIFICATE OF SITE AND FACILITY TO CONSTRUCT, OPERATE, AND MAINTAIN A 115 kV ELECTRIC TRANSMISSION LINE FROM WHITE LAKE SUBSTATION, TAMWORTH, NH TO SACO VALLEY SUBSTATION, CONWAY, NH.

Appearances: Public Service Company of New Hampshire by Christopher J. Allwarden Esquire;
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Attorney General's Office by Leslie J. Ludtke, Esquire, Senior Assistant Attorney General, Environmental Protection Division as Public Counsel on behalf of the public. Site Evaluation Committee Counsel, by Vincent J. Iacopino, Esquire.

REPORT

INTRODUCTION

This matter involves the application of the Public Service Company of New Hampshire (PSNH or the Applicant) for a Certificate of Site and Facility under RSA Chapter 162-F, for authority to construct, operate and maintain a 115,000 volt (115 kV), alternating current (60 Hertz), electric transmission line in the Towns of Tamworth, Madison, and Conway and the Village District of Eidelweiss, New Hampshire along with the necessary substation terminal additions in the Towns of Tamworth and Conway, New Hampshire. The line is planned to be constructed in an existing right-of-way adjacent to the existing transmission line. The Applicant states that the line is required to ensure continued reliability and continuity of service to the Applicant's customers.

Procedural History

The application was filed on September 3, 1991. By letter dated January 14, 1992, the Applicant PSNH was notified that additional information was required before the Committee could acknowledge receipt of the application. On February 26, 1992, PSNH filed supplemental information with the Committee. The Committee reviewed the material and again notified PSNH that the application was incomplete primarily due to insufficient wetlands delineation along the proposed right-of-way. By letter dated March 26, 1992, PSNH filed the additional information required. The Committee accepted the completed application at its meeting of April 27, 1992. As required by the provisions of RSA 162-F:7, the Committee, pursuant to an Order of Notice published in local papers, held a public informational hearing in Carroll County on May 28, 1992, at the Elementary School in Madison, New Hampshire. Members of the public were supplied with a Meeting Agenda and Information Handout prepared by the Committee. The Applicant distributed a printed written Public Information Sheet along with a pamphlet entitled, "Understanding Electric & Magnetic Fields".

At the informational hearing the Applicant presented five witnesses: Douglas A. Lord, PSNH, Chocorua District Manager; David J. Hickey, PSNH, Transmission Line engineer; David L. Plante, PSNH, Project Manager; Robert M. Heaton, PSNH, Transmission Substation Engineer; and Dr. Linda S. Erdreich, Bailey Research Associates.

Other participants in the proceeding included the Public Counsel, who represented the public interests throughout the proceeding as provided pursuant to RSA 162-F:9. No formal parties intervened as of that time, but members of the public participated by submitting questions in writing to the of the Committee who sought answers from the Applicant's witnesses.

Pursuant to a Procedural Order the Applicant filed its prefiled testimony on July 15, 1992.

Thereafter, the Public Counsel, Staff of the Public Utilities Commission and Committee Counsel presented written data requests. The Applicant filed its written responses on August 6, 1992 with

additional responses on August 31, 1992. Supplemental written testimony was filed by the Applicant on September 8, 1992.

On August 14, 1992, limited appearance status was granted to Theresa L. Kennett.

On September 14 and September 15, 1992 public adversary hearings were conducted jointly by the Site Committee and the Public Utilities Commission as required by RSA 162-F:7.

Because this application was filed under then existing provisions of RSA 162-F, the makeup of the Committee was as defined therein. Since this application, however, the Committee has been restructured to include the Director, of the Governors' Office of Energy and Community Services, the Director of Water Supply and Pollution Control Division, Department of Environmental Services, and all three Public Utilities as voting members. For purposes of transition, Jonathan S. Osgood of the Governors' Office of Energy and Community Services, Dr. Edward J. Schmidt, Director, Water Supply and Pollution Control Division, and Public Utilities, Bruce B. Ellsworth and Linda G. Stevens, were present at the hearings but did not vote on the application.

PSNH's APPLICATION

The original application and the supplemental application request a Certificate of Site and Facility to construct, operate and maintain a proposed transmission line that will commence at the Applicant's White Lake Substation, located west of N.H. Route 16 in Tamworth, New Hampshire and proceed in a northerly direction for approximately 13.9 miles to the Applicant's Saco Valley Substation located near the intersection of NH Route 113 and US Route 302, east of Redstone, in North Conway, New Hampshire. The first 10.5 miles of the line will be constructed adjacent to the existing 34.5 kV line followed by a section of approximately 0.9 mile in length that will be double circuited with the existing 34.5 kV line (i.e. the existing structures will be replaced with a single line of poles which will support both the existing 34.5 kV and the proposed 115 kV circuits). The final 2.5 miles will again be constructed adjacent to the existing 34.5 kV line. The entire line is to be constructed on rights-of-way of widths ranging from 75 feet to 152.5 feet, with the exception of a 300 foot long section that is 50 feet in width. These rights-of-way are already owned by the Applicant and were previously cleared. Some re-clearing of the right-of-way will be required due to re-sprout growth over the last four years.

The proposed facilities were included in the Applicant's 1991 and 1992 "Long Range Plans for Bulk Power Facilities" which are on file with the Public Utilities Commission and the Site Evaluation Committee as required pursuant to RSA 162-F:4. (Exhibits 14 & 15). The Applicant previously was granted licenses, pursuant to RSA 371:17 for water crossings over the Pequawket Pond and the Saco River (See Re: PSNH 72 NH PUC 215; Order #18,703). Both Licenses involved the construction of a 115 kV line adjacent to the existing 34.5 kV line and are part of this application.

The Applicant maintains that the overall impact of the proposed line and associated substation additions are expected to be minimal, due in large part to utilization of the existing right-of-way corridor and substation locations. The line will increase reliability of electric service to the north country area thereby contributing positively to the future growth and development of the region. No unreasonable adverse effects on esthetics, historic sites, air and water quality, the natural environment and the public health and safety are foreseen. Concerns about electric and magnetic fields (EMF) which will be generated are addressed by the adoption of design objectives which will reduce magnetic field levels. Available alternatives to the construction of a new transmission line have been considered by the Applicant and rejected as either uneconomical, having a greater potential environmental impact or inadequate as a long term solution to the increased load growth in the area.

In its Application, PSNH included information to meet the requirements of State agencies and departments having jurisdiction over the construction of the transmission line. The Application included:

1. The proposed transmission line will cross the Saco River and Pequawket Pond in the Town of Conway, both of which are considered public waters for the purposes of licensing by the Public Utilities Commission. The Commission has previously licensed the crossings pursuant to RSA 371:17 for the proposed 115 kV line at these locations in Docket DE 87-76.

The Public Utilities Commission has jurisdiction under RSA 371:24 to grant or permit transmission lines to cross over railroad properties. There are four railroad crossings, one in Tamworth, one in Conway and two in Madison. Appendix K to the application identifies the four railroad crossings.

2. The Department of Transportation has jurisdiction under RSA 231:161 to grant a license or permit to erect, install and maintain a transmission line across a State highway. Appendix K to the application identifies six State highways which will be crossed by the proposed line.

- a. NH Route 16, Tamworth
- b. NH Route 113, Madison
- c. NH Route 113, Madison
- d. NH Route 153, Conway
- e. NH Route 113, Conway
- f. US Route 302, Conway

3. The New Hampshire Wetlands Board, has jurisdiction under RSA 482-A to grant a dredge and fill permit with respect to wetland areas affected by the construction of the transmission line. Appendix H to the Application identifies the location of the various surface water and wetland areas which will be crossed by the proposed line. Appendix E of the Supplemental Information supplied on February 26, 1992 sets forth a detailed narrative describing the location of wetlands and surface waters along the 13.9 mile corridor.

APPLICANT'S POSITION

The Applicant presented its case through five witnesses whose testimonies are summarized as follows:

Michael T. Smith, P.E., Engineering Manager, presented testimony addressing four areas: First, a brief overview of the transmission line project proposed by PSNH in this proceeding. Second, the need for the line to meet the present and future electricity demands in the Central Conway region with an explanation of the reasons why the line is necessary to provide more reliable transmission capacity to serve customers in the area. Third, the effects of the proposed line on system stability and reliability. Fourth, the economic and feasibility factors of various system alternatives which were considered by PSNH as alternatives to the proposed line, consistent with PSNH's commitment to the integrated least cost resource planning concept. (Exhibits 5, 6 & MTS-1 attachment).

David J. Hickey, P.E., Transmission Line Engineer, then testified: First, he addressed the proposed route for the new transmission line and the effect that the line and its proposed route will have on the orderly development of the region and aesthetic values. Second, he reviewed the alternative routes investigated by PSNH, and the feasibility of underground construction as an alternative to overhead construction. Third, he described the proposed line design and configuration, construction methods and maintenance requirements. (Exhibit 7 & DJH-1 attachment).

Robert M Heaton, P.E., Transmission Substation Engineer, testified: First, he reviewed the design, construction and maintenance aspects of the substation additions that will be necessary to accommodate the proposed transmission line at both the White Lake and Saco Valley

substations. Second, he addressed the technical aspects of electric and magnetic fields as they relate to power systems facilities. Third, he explained the field management design techniques which PSNH proposes to utilize to reduce magnetic field levels associated with the proposed line. (Exhibit 10 & RMH 1,2 attachment).

Beatrice S. Hebert, Environmental Analyst, testified: First, she described the effects of the proposed transmission line project on historic sites, air and water quality and the natural environment, and second, impacts related to public health and safety, with the exception of public health concerns regarding electromagnetic fields. (Exhibit 8).

Linda S. Erdreich, PH.D., Epidemiologist, testified: First, she addressed the potential human health effects from exposure to electric and magnetic fields from power lines, including results of epidemiologic studies, controlled laboratory studies of humans, laboratory studies in whole animals and in isolated cells and tissues. Second, she presented a review of the recent research by groups of expert scientists and by scientific organizations and regulatory agencies. (Exhibit 9 pgs. 3-4).

During Dr. Erdreich's examination the following studies were reviewed and discussed : Health Effects of Exposure to Powerline- Frequency Electric and Magnetic Fields, Public Utility Commission of Texas, March 1992, (Exhibit 16); Electromagnetic Fields and the Risk of Cancer, National Radiological Protection Board. (Exhibit 17); Committee on Interagency Radiation Research and Policy Coordination letter dated 8/5/91. (Exhibit 18); SAB Report: Potential Carcinogenicity of Electric and Magnetic Fields, January 1992. (Exhibit 19); EPA, Evaluation of the Potential Carcinogenicity of Electromagnetic Fields, Review Draft. (Exhibit 20); Interim Guidelines on Limits of Exposure to 50/60 Hz Electric and Magnetic Fields, International Non-ionizing Radiation Committee of the International Radiation Protection Association. (Exhibit 21); London et al., Exposure to Residential Electric and Magnetic Fields and Risks of Childhood Leukemia, American Journal of Epidemiology, 11/1/91. (Exhibit 22); and the Connecticut Academy of Science and Engineering Responses to Inquiry, Electromagnetic Field Health Effects, for the Department of Health Services, State of Connecticut, 4/1/92. (Exhibit 23). Public Counsel cross-examined the witnesses concerning the need for the transmission line; the purpose of the line; reliability and stability factors and criteria; as well as the certainty or uncertainty of health effects from exposure to electromagnetic fields; potential health risks associated with exposure to electromagnetic fields; available alternatives; and, alternative available routes.

The witnesses also responded to questions propounded by Committee members and Counsel for the Committee.

INTERVENOR'S POSITION

At the evening meeting of September 15, 1992, Theresa L. Kennett, limited intervenor testified (Tr pg. 100-109). The committee allowed public statements from the following individuals: Diane Biolota, Bayard W. Kennett, Maurice Geiger and Rep. Howard C. Dickinson, Jr. (Tr pgs., 83-100 & pgs. 109-111) all expressed concern about exposure to EMF.

Ms. Kennett, limited intervenor, questioned the Applicant's attempts and efforts to develop a feasible alternative route. She expressed concerns about EMF and the health effects of the proposed power line. In her written brief she questioned whether the proposed transmission line was necessary at this time as well as the urgency for serving present electrical needs. She further questioned the reasonableness of the company's guidelines and whether the three contingencies set forth would actually happen simultaneously.(Tr pgs. 103-104) All the intervenors strenuously stated that from their information the proposed transmission line may have an adverse effect on public health.

A number of petitions were received signed by concerned citizens in the Conway, Madison,

Eaton and Albany areas noting their concern that EMF effects, while uncertain, may be potentially carcinogenic.

FINDINGS

On December 15, 1992 the Committee met in a public meeting in Concord, NH and undersigned members of the committee who were present, voted to make the findings required by RSA-162-F:8 and to transmit those findings to the Public Utilities Commission.

As stated in Re: New England Electric Transmission Corporation, 67 NH PUC 409 on page 413:

"The Commission must note that this is an administrative proceeding. While it bears some resemblance to civil judicial proceedings there are important differences. First, strict rules of evidence are not applied, especially hearsay rules. Second, most testimony and documentary will be expert testimony or exhibits based on the expertise of the witness sponsoring the exhibits. Third, the problems associated with drawing inferences from eyewitness accounts of past behavior or events are virtually nonexistent in these type of proceedings.

The SEC and the Commission are almost always confronted with expert testimony from qualified witnesses. Uncertainty associated with such evidence arises because the witnesses and exhibits attempt to predict with reasonable certainty events which may or may not occur in the future or the effects of environmental phenomena over long periods of time where data are uncertain, conflicting or non-existent.***."

Recognizing these characteristics, the SEC and the PUC have tested PSNH's application for the proposed transmission facility to determine whether the facility should or should not be issued a Certificate of Site and Facility.

The following is a discussion of the Committee's findings:

The first issue is whether the requisite good cause under RSA 162-F: 6, II has been shown to permit the Committee to consider the Application. Pursuant to RSA 162-F:2 I(c), the Committee finds that the proposed 13.9 mile 115 kV transmission line should require a Certificate of Site and Facility because the Application warrants an investigation to determine if the placement of the proposed transmission line adjacent to an existing transmission line will produce any unreasonable adverse environmental impact. The aforementioned statute defines a Bulk Power Supply Facility, among other definitions, as a line in excess of 100 kilovolts (kV) which the Site Committee or Commission determines require a Certificate because of a substantial environmental impact. The Committee finds the proposed transmission line is one which requires a Certificate, in that it poses a substantial environmental impact due to its location.

There are two main findings which are the responsibility of the Site Evaluation Committee under RSA 162-F:8 I. The SEC must find that the proposed facility:

A. Will not unduly interfere with the orderly development of the region with due consideration having been given to the views of municipal and regional planning commissions and municipal legislative bodies, and

B. Will not have an unreasonable adverse effect on esthetics, historic sites, air and water quality, the natural environment and the public health and safety.

The SEC hereby finds that the proposed transmission line will not unduly interfere with the orderly development of the region and will not have an unreasonable adverse effect on esthetics, historic sites, air and water quality and the natural environment.

The SEC makes these findings after having considered the available alternatives and the

environmental impact of the facilities presented by the Applicant, Public Service Company of New Hampshire (PSNH).

Several possible alternatives to the transmission line's location and the specific use of the existing right-of-way were discussed and studied. In addition to the proposed facility, the following alternatives were presented: (Exhibit 7 pq. 5).

Alternative A1: Relocated a portion of the line south of Route 113 near Eidelweiss, New Hampshire. The total length of this route is approximately 7,900 feet and is approximately 2,900 feet (0.53 miles) longer than the existing route. Approximately 27.2 acres of land would have to be cleared and three or four additional stream and wetland crossings would be required. The total incremental cost to use this route was estimated at \$660,700.

Alternative A2: This alternative route departs from the proposed route approximately 600 feet south of Route 113 near Eidelweiss, New Hampshire, proceeds northwesterly for 1600 feet on the north side of Banfield Brook to a point near the southerly boundary of the gravel pit owned by Tilton Sand and Gravel. From that point the route turns and proceeds in a generally northeasterly direction for 1,900 feet to rejoin the existing corridor in the north end of Eidelweiss, New Hampshire. The total length of the route is approximately 5,700 feet and is approximately 1,600 feet (0.30 miles) longer than the existing route. Approximately 8.6 acres of land would have to be cleared. The line would be highly visible from Route 113 in this location. The total incremental cost to use this route was estimated at \$458,600.

Alternative B1: This alternative route departs from the existing corridor approximately 3,200 feet southwest of the Madison/Conway Town line and rejoins the corridor near the sewerage treatment plant off Route 113 in Conway, New Hampshire. The route follows a southwesterly arc crossing the north slope of Tasker Hill, then crossing Tasker Hill Road, passes to the north of Snake Pond and crosses Route 153. The route also involves at least three additional stream crossings and impacts a wetland area on the east side of Route 153. The total length of this route is approximately 15,200 feet (2.88 miles) longer than the existing route. Approximately 52.3 acres of land would have to be cleared. The total incremental cost to use this route was estimated at \$1,029,600.

Alternative B2: This alternative route departs from the existing corridor approximately 700 feet southwest of the Madison/Conway Town line and intersects the B1 route on the southwest side of Tasker Hill. The route then follows the same route as B1 rejoining the existing corridor near the sewerage treatment plant off Route 113 in Conway, New Hampshire. This route has similar environmental impacts to those of B1 with two additional possible stream crossings. The total length of this route is approximately 15,200 feet (2.88 miles) and is approximately 5,200 feet (0.98 miles) longer than the existing route. Approximately 52.3 acres of land would have to be cleared. The total incremental cost to use this route was estimated at \$1,119,400.

Alternative B3: The first part of this route follows either B1 or B2 to a point on the north side of Snake Pond Road where it continues in an arc easterly towards Conway Lake then northerly crossing Route 113 and the Saco River rejoining the existing corridor on the west side of Route 302 near the Saco Valley substation. The latter portion of this route attempts to follow a corridor that has been identified in New Hampshire Department of Transportation studies as a possible corridor for an eastern Highway Bypass around Conway. The final route for the highway has not been selected and its future is unknown. This route follows a long sweeping arc which results in expensive transmission line construction, since a majority of the structures required would be angle type structures as opposed to lower cost tangent type structures. This route also involves several additional stream

Valley Substation. This alternative would require the acquisition and clearing of approximately 35 miles of new right-of-way. The second transmission alternative was to construct a 115 kV line from Deerfield, New Hampshire north to the Saco Valley Substation, a distance of 60 miles. (Exhibit 5 pg. 9). Both alternatives were rejected because the potential environmental impacts of each alternative were significantly greater than those of the proposed route.

Public Counsel argued and in her brief maintains that the Applicant proposes to construct the 115 kV transmission line to provide back-up for its non-firm contract with Central Maine Power. She suggests that, if PSNH negotiated a firm contract with Central Maine Power, PSNH would have no need for a new transmission line or any other back-up facility as the reliability criteria pertaining to Central Maine Power's system would not permit it to disconnect the Public Service load. The record does not confirm Counsel's allegation that the Applicant proposes to construct the proposed transmission line to provide back-up for its non-firm contract with Central Maine Power. The SEC finds that the Applicant's objective is to ensure system reliability and stability. A distribution system alternative was considered. This required the installation of a third 34.5 kV line between the White Lake and Saco Valley substations. The SEC finds that this alternative would only pick up approximately 5 megawatts of the Saco Valley load, and would not be an adequate technical solution to the existing problem of providing additional reliability to the area. (Exhibit 5 pg. 9).

The SEC finds that additional generating capacity in the area could delay the need for the proposed line if installed in sufficient quantity to assure reliability. However, there are no plans for additional generation coming on line because the Applicant has excess generation at this time, and the addition of generating facilities for the sole purpose of solving transmission problems is not a feasible alternative due to higher costs in the range of \$15-30 million dollars. (Exhibit 5 pg. 10).

The SEC finds, compared to the currently owned and cleared existing right-of-way from

White Lake to Saco Valley substations, the alternatives considered are significantly more costly and likely to have much greater adverse environmental impacts.

The following is the basis for the above findings:

A. The proposed transmission line will not unduly interfere with the orderly development of the region, is a finding that must be made by the SEC.

On the issue of orderly development of the region, the Committee finds the single most important factor is the selection of an existing, already occupied utility corridor for the new line. The region has already developed and will continue to develop this corridor. Use of the existing right-of-way for the proposed line will be consistent with the established land use patterns in the area. The 115 kV transmission line itself will likely contribute to the future development of the region by providing more reliable electric service to the area and helping to meet the future load growth in the Carroll County and the Central New Hampshire region.

In considering the issue of orderly development of the region, the Committee is required to give "due consideration to the views of the Municipal and Regional Planning Commission and Municipal Legislative Bodies". The Tamworth Conservation Commission, the Conway Conservation Commission, the Madison Conservation Commission and the Board of Selectmen of the Towns of Madison, Conway and Tamworth were placed on the service list in this proceeding. Although these proceedings were duly noticed and publicized and the Commissions and Municipalities were on the service list in this docket, the SEC was not presented with any

facts to indicate that the project would interfere with the orderly development of the region. In their letter of September 29, 1992 the Selectmen of the Town of Conway recognized "the need for a reliably consistent supply of electricity but urged that the committee "take whatever time and actions necessary to protect the residents from those electric and magnetic fields". By letter dated September 10, 1992, the Town Manager of Conway wrote to voice his concern with the proceedings moving quickly and concluded that the project should be tabled.

On the basis of the evidence submitted the SEC concludes and finds that the proposed line is consistent with the existing land use patterns and will not unduly interfere with the orderly development of the region.

B. The proposed transmission line will not have an unreasonable adverse environmental effect on esthetics, historic sites, air and water quality, the natural environment and the public health and safety, is another finding that must be made by the SEC.

Within the broader category of environmental impacts there are five specific categories of impacts which the SEC must address. These five categories are (1) impacts on esthetics, (2) impacts on historic sites, (3) impacts on air and water quality, (4) impacts on the natural environment and (5) impacts on public health and safety.

Before examining the five specific impacts it should be stated that the proposed facility will be located on or near existing transmission lines and electric substations. Secondly, every human activity has some effect on the environment and construction and operation of the proposed facility is no exception to the rule. However, the relevant inquiry under the statute is whether the proposed facility will have an unreasonable environmental impact. Whether the impacts are unreasonable depends on the assessment of the environment in which the facility will be located, an assessment of statutory or regulatory constraints, or prohibitions against certain impacts on the environment and a determination as to whether the proposed facility exceeds those constraints or violates those prohibitions. Re New England Electric Transmission Corporation, 67 NH PUC 910, pg 923.

(a) Esthetics Impacts

The SEC finds that the new line and terminal additions will be located within the existing rights-of-way and substation facilities. The majority of the line will be constructed adjacent to the existing 34.5 kV line and will present a minimum visual impact, with the overall appearance being reasonably compatible with the existing landscape and visual environment. The SEC finds there will be no unreasonable adverse effect of esthetic values.

(b) Impacts on Historic Sites

The SEC finds that the Applicant has investigated possible historic resources which might be impacted by this project. Working closely with the N.H. Division of Historical Resources it was determined that there are no known historical or archaeological sites within or adjacent to the proposed right-of-way. The SEC accepts these proofs and so finds.

(c) Impacts on Air and Water Quality

The Committee finds the applicant will accomplish all wetland construction in accordance with PSNH's Standards for Transmission Line Construction and comply with all requirements of the N.H. Wetlands Board and the Department of Environmental Services. Air quality impacts from the proposed line will essentially be limited to construction related dust and equipment and vehicle exhaust emissions, which will be localized and short term. The SEC finds there will be

no unreasonable adverse effect on air and water quality.

(d) Impacts on the Natural Environment

The SEC finds that there will be no unreasonable adverse effect on the natural environment as the use of the existing right-of-way avoids any serious adverse effects which normally would be brought about by the destruction of habitat which is associated with the clearing of new right-of-way.

The SEC finds the proposed transmission line will not have any unreasonable adverse effect on esthetics, historic sites, air and water quality and the natural environment. The existing right-of-way location of the proposed line mitigated many of the issues which normally would be raised in this type of proceeding.

(e) Impacts on Public Health and Safety

The issue concerning the effects of the transmission line and the exposure to electromagnetic fields (EMF) on public health and safety initiated most of the public comments in this proceeding. Public Counsel and members of the public expressed a real and genuine concern as to the potential risks on human health and public safety, mainly associated with EMF.

Dr. Erdreich testified, that the scientific evidence does not show that exposure to EMF from power lines or every day electrical devices results in the development of cancer or other adverse health effects. When asked specifically, Will EMF occur with the proposed power line? she replied, "electric and magnetic fields occur in the vicinity of any power line. I have reviewed the Electric and Magnetic Field Study included in Appendix J of the Application. Electric and magnetic fields presently exist in the vicinity of the line, and the proposed 115 kV line will contribute to these fields. Although there will be an increase in these fields, the increase in magnetic fields from the 115 kV line has been minimized because the engineers configured the line in a way that reduces magnetic field levels." (Exhibit 9 pg. 9).

The specific design considerations (Exhibit 10 pg 8) incorporated in the line design to minimize the EMF levels include the following:

1. The line will be built using single poles with conductors configured in a triangular pattern. This single pole type construction is illustrated in Appendix E of the Application as Type WT-1. The triangular configuration is the effect of partial cancellation of the fields generated from each of the individual conductors. As the distance separating each conductor is decreased, the cancellation increases, thereby reducing the overall field levels. The proposed design minimizes this distance as much as possible and still maintains work clearances required by the National Electric Safety Code. Traditional H frame design would result in magnetic field levels 85% higher on the west edge of the right-of-way, although they would be 7% lower on the east edge.

2. The triangular design has a lower resultant field on the side with one conductor. The line is conducted so that the single conductor is always located to the side that is closest to the edge of the right-of-way. This reduces the magnetic field levels at the edge of the right-of-way by 10-13% compared to a configuration with the two conductors closest to the edge of the right-of-way.

3. The conductor heights of all conductors will be five feet higher than the minimum required by the national Electric Safety Code. This has the effect of increasing the distance between the edge of right-of-way and the source of the fields, thereby reducing the magnetic field level at the edges of right-of-way. This will reduce the magnetic field levels by 10% on the west side of the right-of-way and up to 14% in certain line sections

on the east side of the right-of-way, compared to levels at a conductor height of 20 feet (NESC minimum).

4. In the section of line which passes through the Town of Conway where the 115 kV line and the 34.5 kV line are double circuited on the same pole (line section 8-9), the 115 kV phases are placed on three of the top crossarms because at peak load conditions the current in those conductors will be higher than the currents in the 34.5 kV conductors. This configuration will minimize the field levels at the edge of right-of-way because the conductors generating the higher fields will be farther away. This will reduce the magnetic field on the east side of the right-of-way along this section of line by 36% compared to conventional design placement of the 115 kV circuit conductors entirely of one side of the pole.

5. The arrangement of the new 115 kV conductors is designed to maximize the cancellation effects with the adjacent 34.5 kV line. This involved investigating the geometry and phase relationship of each line as well as studying the projected coincidental load levels of the lines over time. The proposed phase arrangements for each section of the right-of-way corridor are illustrated in Appendix B of the Application. The proposed arrangements will reduce magnetic field levels by as much as 3.8 milligauss as compared to standard designs.

Based on Dr. Erdreich's review, she concluded from reviewing the scientific data, that the electric and magnetic field levels expected to occur will not have an unreasonable adverse effect on public health. (Exhibit 9 pg. 9).

Dr. Erdreich was extensively cross-examined by Public Counsel and members of the Committee regarding the extent of the scientific community's view of the effect of EMF. (Tr pg. 185-187).

The Applicant agreed to supply two new epidemiology studies made in Sweden when they became available. After hearings closed the studies were presented as post hearing information. In the summary section of the study, "Magnetic Fields and Cancer in People Residing Near Swedish High Voltage Power Lines", it states, that the results of the study provide more support for an association between magnetic fields and cancer development than against it. The Electrical Power Research Institute comment (also presented as post hearing information) concerning the study is: "This vigorously conducted study of childhood and adult cancer provides important new information. It used a design involving only a population of people who lived relatively close to transmission lines, a first for EMF epidemiologic studies."

The results of this study do provide further evidence that there may be a true association between exposure to the magnetic fields around AC power lines and risk of childhood cancer. However, in the absence of more firm evidence that magnetic fields are indeed a cancer causing agent, and in the absence of a more convincing causal link between the magnetic fields and the tumors in question, the SEC believes that a moratorium on power lines is premature and

unwarranted at this time.

The Committee does, however, have the responsibility of weighing this potential but unproven risk of cancer in the context of each individual application. In a similar case, New England Electric Transmission Corp., 67 NH PUC 910 pg. 922, this Committee Stated: "Accordingly, we must undertake an assessment of the risks of unreasonable adverse health effects and make a judgment based on the record and the present imperfect state of human knowledge."

Specifically the Committee must consider whether or not reasonable and appropriate consideration has been given to this potential but unproven risk.

Thus the Committee has examined the scientific evidence presented to it regarding the health effects of magnetic fields, the measures taken by the Applicant to minimize magnetic field levels at the edge of the right-of-way, and construction alternatives presented in the record, the aim of which is to minimize human exposure to magnetic fields. Based on the evidence the Committee finds the proposed power line does not pose an unreasonable adverse effect on public health and safety.

The SEC finds that the evidence does not support a finding that unreasonable adverse effects will be produced by the proposed transmission line. Accordingly the SEC finds that the electromagnetic effects of the proposed line will not have an unreasonable adverse effect on the public health and safety.

CONCLUSION

The Site Evaluation Committee finds and determines that:

1. The proposed facility is for the construction, operation and maintenance of a 115 kV electric transmission line to be constructed adjacent to an existing 34.5 kV transmission line in an existing right-of-way. The reality of the situation is that the existing right-of-way will now be burdened by two transmissions lines. In light of all the circumstances, this facility has an environmental impact that required an investigation for a Certificate of Site and Facility.

2. The proposed facility consisting of a 13.9 mile 115 kV AC power line to be constructed, operated and maintained in the existing 34.5 kV corridor extending from the White Lake Substation to the Saco Valley Substation, and the associated substation facilities:

a) will not unduly interfere with the orderly development of the region.

b) will not have an unreasonable adverse effect on esthetics, historic sites, air and water quality, the natural environment and the public health and safety.

The undersigned members of the Bulk Power Supply Facility Site Evaluation Committee, hereby adopts these findings and transmits them to the New Hampshire Public Utilities Commission pursuant to RSA 162-F:8,I.

The Application and Petitions are referred to the Wetland Board, the Water Supply and Pollution Control Division, Department of Environmental Services, the of Transportation, and the Public Utilities Commission for the issuance of such permits and licenses as required by law to be included in the Certificate of Site and Facility that may be issued by the Public Utilities Commission.

Robert W. Varney, Dept. of Environmental Services

Stephen K. Rice, Comm. Dept. of Resources & Economic Development

Wilbur F. LaPage, Dir. Div. of Parks, Dept. of Resources and Economic Development

Dr. Patrick J. Meehan, Dir. Division of Public Health Dept. of Health & Human Services

Douglas L. Patch, Public Utilities Commission

Dr. Donald A. Normandeau, Dir. Fish & Game Dept.

Charles P. O'Leary, Comm. Dept. of Transportation

Delbert F. Downing, Dir. Water Resources Division Dept. of Environmental Services
Dennis R. Lunderville, Dir. Air Resources Division, Dept. of Environmental Services
John E. Sargent, Dir. Division of Forests & Lands Dept. of Resources & Economic
Development
Jeffrey H. Taylor, Dir. Office of State Planning
Michael D. Cannata, Jr. Chief Eng., Public Utilities Comm.

Attachment B

May 26, 1992

Robert W. Varney, Energy Facility Evaluation Committee Department of Environmental
Services Office of the 6 Hazen Drive Concord, New Hampshire 03301-0095
RE: PSNH 115 kv Electric Transmission Line, Tamworth to Conway

Dear Varney:

At the May 5, 1992, meeting the Wetlands Board reviewed Public Service of New
Hampshire's file, #92-410, to construct a new 115 kv electric transmission line from White Lake,
Tamworth to Saco Valley, Conway utilizing an existing transmission line corridor.
The Board voted the following conditions be imposed for the dredge and fill of 32 sq.ft. for
two poles and thirteen anchors, place 32 sq.ft. of concrete blocks for two temporary bridges and
impact 7,176 sq.ft. of wetlands for temporary timber mats per plans received 2/27/92 and
3/27/92:

1. Dredge spoils to be placed out of jurisdiction.
2. Area to be regraded to original contours following completion of work.
3. No further alteration of wetlands or surface waters.
4. All temporary structures shall be removed prior to or upon completion of the
installation work.
5. If a permit is issued, the expiration date shall be two years from issuance.
6. Duration of the permit and requested time extensions shall be in accordance with
rules Wt 502.01 and Wt 502.02.

Respectfully yours,
Delbert F. Downing
DFD/KNK/np

Attachment C

DSF 91-130 APPLICATION OF PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE
Administration Room 102 Tel: (603)271-3734

January 20, 1993

Mr. Wynn Arnold Secretary and Executive Director NH Public Utilities Commission 8 Old
Suncook Road, Bldg. #1 Concord, New Hampshire 03301

Dear Mr. Arnold:

The New Hampshire Department of Transportation has considered the Petition for a Permit
under RSA Chapter 231 to cross State highways with overhead conductors with respect to the
above referenced matter. The Petition is considered with respect to six State highway crossings
which are identified in Appendix G of the Application as:

1. NH Route 16, Tamworth, NH
2. NH Route 113, Madison, NH
3. NH Route 113, Madison, NH
4. NH Route 153, Conway, NH

5. NH Route 113, Conway, NH

6. US Route 302, Conway, NH

In recognition of the Applicant's Petition for these highway crossings, a permit is granted with the following conditions:

A. All wires and cables located within the public ways will conform to clearances required by the National Electric Safety Code and any additional clearances required by the Department of Transportation, as deemed appropriate to allow for improvements to existing highways.

B. All poles or structures will be located outside the highway right-of-way and where practicable at least 50-feet from highway right-of-way to allow for future improvements to the highway facilities.

C. All other facilities installed within the limits of the public right-of-way including temporary structures, appurtenances and equipment used in the construction phase of these transmission lines shall conform to the Utility Accommodation Manual by the State of New Hampshire, Department of Transportation. Construction schedules and procedures including traffic control and restoration measures shall be approved in advance of construction by the appropriate Highway District Engineer.

D. This proposed transmission line project is within the limits of the Conway Bypass study. To the extent practical, this line will be constructed so as to be compatible with the proposed highway improvements. This shall be coordinated with Utilities Engineer Greg E. Placy [Tel: (603)271-2297].

I understand that this permit with the accompanying conditions will be incorporated into a Certificate of Site and Facility with respect to the Application, as and when issued by the Public Utilities Commission pursuant to RSA Chapter 162-F crossings of State maintained highways will be granted in the normal manner after the crossings are installed, provided the petition for licenses are submitted and the installations are made in compliance with the foregoing provisions.

Sincerely,

Charles P. O'Leary, Jr.

CPO/mkr

cc: Ken Kyle, NHDOT, District 3

Greg E. Placy, Utilities Engineer

David Plante, PSNH