DOCKET NO. 9	:	
AN APPLICATION SUBMITTED BY NORTHEAST UTILITIES SERVICE COMPANY ON BEHALF OF THE CONNECTICUT LIGHT AND POWER COMPANY FOR A CERTIFICATE OF ENVIRONMENTAL COMPATIBILITY AND PUBLIC NEED WITH RESPECT TO A NEW 345 KV OVERHEAD ELECTRIC TRANSMISSION LINE BETWEEN OXBOW JUNCTION, IN HADDAM, AND BLACK POND JUNCTION, IN MERIDEN, AND THE RELATED RECONSTRUCTION OF AN EXISTING OVERHEAD 115 KV ELECTRIC TRANSMISSION LINE BETWEEN BESECK JUNCTION, IN WALLINGFORD, AND EAST MERIDEN SUBSTATION, IN MERIDEN	:	POWER FACILITY EVALUATION COUNCIL
	:	FEBRUARY 8 , 1977

F I N D I N G S O F F A C T S

I. GENERAL

1. The Connecticut Light and Power Company (CL&P), acting by its agent, the Northeast Utilities Service Company (NUSCO), in accordance with the provisions of 16-501 of the General Statutes of Connecticut, Revision of 1958, revised to 1977, as amended applied to the Power Facility Evaluation Council on April 13, 1976, for a certificate of environmental compatibility and public need for the construction of a new 345 kV overhead electric transmission line between Oxbow Junction, in Haddam, and Black Pond Junction, in Meriden and the related reconstruction of an existing overhead 115 kV electric transmission line between Beseck Junction in Wallingford and East Meriden Substation in Meriden. The fee prescribed in 16-50v-1(b) of the regulation of Connecticut State Agencies accompanied the application. (Tr. 8-30 p. 8)
2. The application, which included a one volume report, was accompaned by proof of service as required by section 16-501(b) of said General Statutes of Connecticut. (Record)
3. Affidavits of newspaper notice as required by statute and section 16-501-1 of the regulations of Connecticut State Agencies were also filed with the application. (Record)
4. Pursuant to section 16-50m of said General Statutes of Connecticut, the Power Facility Evaluation Council, after giving due notice thereof, held a public hearing at the Coginchaug Regional High School, Town of Durham on August 30 and 31, 1976 and the Korn School, Town of Durham on September 8, 13, 14, 21 and 27, 1976. (Record)

5. The parties to the proceeding, the Connecticut Light and Power Company, acting by its agency Northeast Utilities Service Company, hereinafter referred to as the applicant, and those other persons and organizations whose names are listed in the Decision and Order which accompanies these findings. (Record)

6. The Council retained Keyes Associates consulting engineers of Wethersfield, Connecticut as consultants to review this application. The consultants studied the consequences of the proposed line on the environment and provided the Council with technical data pertaining to the routing of the line and overhead versus underground construction, as well as other information the Council deemed necessary, pursuant to section 16-50n(c) of said General Statutes. (Tr. 9-21 p. 160, PFEC Ex. 1)

7. Several persons and agencies made a limited appearance pursuant to section 16-50j-15 of the Regulations of Connecticut State Agencies for the purpose of filing statements in writing which statements were made a part of the record. (Record)

8. On July 28 and August 2, 1976, January 3, 1977 and several days during the hearing, members of the Council made ground inspections of the proposed route and the alternate for the proposed line. (Record)

9. The applicant proposed the construction of a 345 kV H-frame line to be located in the northern part of an existing right-of-way between Oxbow Junction and Beseck Junction which would have a uniform width of three hundred feet. The proposed route includes two doglegs, one northward and one southward from the existing right-of-way, in the area between Routes 17 and 157. Only the 345 kV line was to be constructed in the doglegs at this time. In the area covering the Beseck/East Meriden substation a new 115 kV wood pole line is proposed to be built within the eastern part of the right-of-way. This new line will permit the existing double 345 kV steel pole line, to be used for two 345 kV circuits, instead of one 345 kV circuit and one 115 kV circuit as at present. The applicant also proposed in this section covering the East Meriden substation/Black Pond Junction part of the route, to add a second 345 kV circuit to the existing line of double circuit 345 kV steel poles. At two angle points, a new single circuit angle pole is proposed to be constructed along side the similar

crossing structure for the existing circuit. Such route is herein after described as the proposed route. (NUSCO Ex. p. 36 & 40)

10. During the hearing on the application, the applicant proposed approximately fourteen modifications to the proposed route principally pertaining to right-of-way width, structures, and location of doglegs. These modifications are more particularly set forth in Exhibits 20A, 20B, 20C, and 20D, provided by NUSCO. (NUSCO Ex. 20A, 20B, 20C, 20D)

11. The applicant proposed as an alternate route the use of an existing 345 kV line between Oxbow Junction and Chestnut Junction, and the construction of a new 345 kV line along an existing right-of-way between Chestnut Junction and Black Pond Junction via Hans Brook Junction. The existing right-of-way between Hans Brook Junction and Black Pond Junction will have to be widened to the north by 85 feet. No other widening is necessary. Such route is hereinafter referred to as the alternate. (NUSCO Ex. 1 p. 34-36)

12. Four structural options exist along the alternate route between Chestnut Junction and Hans Brook Junction. All four options involve a wood H-frame 345 kV line on an 85 foot widened right-of-way between Hans Brook Junction and Black Pond Junction, and 345 kV and 115 kV circuits between Beseck Junction, East Meriden substation, and Black Pond Junction as in the proposed plan to be in service by 1985. Option A: replace the existing 115 kV line with a single pole 115 kV and a wood H-frame 345 kV line. Option B: replace the 115 kV line with a composite 345/115 kV steel pole line. Option C: build a new double circuit steel pole 345 kV line with one circuit installed. Option D: build a new single circuit vertical configuration steel pole 345 kV line. (NUSCO Ex. 1 p. 12, 29-30; Tr. 9-21 p. 107

13. The proposed and the alternate line will conform to PUCA guidelines and requirements. (NUSCO Ex. 1 p. 6)

14. Human exposure to high voltage overhead power lines has no known biological effects. (Tr. 9-27 p. 128)

II. NEED

15. Bulk power from eastern Connecticut is currently transferred to southwestern Connecticut via two 345 kV lines. (NUSCO Ex. 1 p. 8)

16. As of July 1, 1976, the Millstone to Southington east-west 345 kV line had carried a maximum load in 1976 of 1325 amps which was 64% of its carrying cpapcity. (NUSCO Ex. 11 p. 1)

17. As of July 1, 1976, the Haddam Neck to Black Pond east-west 345 kV line had carried a maximum load in 1976 of 1146 amps which was 48% of its carrying capacity. (NUSCO Ex. 11 p. 1)

18. The primary purpose of the proposed construction is to create a new 345 kV east-west circuit to strengthen the 345 kV grid in order to assure the reliable delivery of bulk power from generating stations in eastern Connecticut to loads in central, western and southwestern areas of the state. (NUSCO Ex. 1 p. 7)

19. The 115 kV transmission lines in central Connecticut provide local distribution. They provide almost no transfer capability of bulk power from east to west. (Tr. 8-30 p. 98)

20. Northeast Utilities summer peak load in the central, western and southwestern areas has been very close to 36% of Northeast Utilities total peak load for each of the past five years. (Tr. 8-31 p. 87; NUSCO Ex. 11 p. 4; NUSCO Ex. 1 p. 14)

21. Northeast Utilities summer peak load in the central, western and southwestern areas is forecasted to grow at a compound annual rate of 5.0% which is the same as the growth rate forecasted for the Northeast Utilities system. (NUSCO Ex. 1 p. 14)

22. The actual 1976 summer peak load for the NUSCO system was 3463 MW. This was 0.6% higher than the actual 1975 summer peak load of 3442 MW. The 1975 summer peak load was 4.4% higher than the actual 1974 summer peak load of 3296 MW. (Tr. 8-31 p. 85; NUSCO Ex. 18 p. 73)

23. For January through July, 1976, the actual total output of generation into the NUSCO system was 11,856.7 GWH compared to 11,329 GWH for the same seven month period in 1975. This represents as an increase of 4.7%. When the actual output is normalized for weather conditions, the increase is still 4.7%. (Tr. 8-30 p. 87)

24. If both of the two existing 345 kV east-west lines are in operation, they will be capable of carrying the projected flows which are expected to occur in 1979. (Tr. 8-30 p. 16)

25. The 1979 electric system can be expected to successfully survive all single contingencies which might occur prior to the installation of the Millstone III unit. (NUSCO Ex. 1 p. 17)

26. With the forecasted load growth, overloads are possible in 1979 if one of the east-west 345 kV lines is forced out of service during heavy power transfers to New York and the New Haven Harbor unit or the Bridgeport Harbor No. 3 is out of service. (NUSCO Ex. 1 p. 17)

27. The above condition could be ameliorated by running uneconomic generation in southwestern Connecticut while heavy transfers to New York State were taking place. (Tr. 8-30 p. 19)

28. The most severe double contingency on the system in 1979 would be loss of the two existing central Connecticut east-west 345 kV lines at a time when the system is at or near the summer peak load. (NUSCO Ex. 1 p. 15)

29. A double contingency outage in 1979 could result in the following overloads at the time of the summer peak:

    a. both Manchester autotransformers - 160% of nameplate rating

    b. North Bloomfield to Canton 115 kV line - 185% of emergency rating

    c. Canton to Weingart Junction 115 kV line - 144% of emergency rating

    d. North Bloomfield to Farmington 115 kV line - 115% (or more) of emergency rating

    e. Manchester to Hopewell 115 kV line - 107% (or more) of emergency rating

    (NUSCO Ex. 1 p. 15)

30. In 1979 it will be very difficult to relieve the above overloads through operating procedures in emergencies. (NUSCO Ex. 2 p. 7; Tr. 8-30 p. 16)

31. The above 115 kV lines could burndown from overloading. (NUSCO Ex. 1 p. 15)

32. The autotransformers at Manchester could suffer insulation deterioration from overloading. (NUSCO Ex. 1 p. 16)

33. To reduce the excessive line loadings in Connecticut it would be necessary to rapidly reduce generation in eastern Connecticut. (NUSCO Ex. 1 p. 16)

34. The ability to transfer short term (five to ten minutes) emergency power between New York and New England of from 1000 MW to 1200 MW has been maintained during recent years. (NUSCO Ex. 1 p. 17)

35. There is no agreement with New York to provide emergency power for more than five minutes to ten minutes. (Tr. 9-8 p. 65)

36. Under many conditions the New York companies would be able to maintain an unscheduled flow of replacement power until off-line generation could be started in southern and western Connecticut or until at least one of the 345 kV lines could be put back in service. (NUSCO Ex. 1 p. 16)

37. If New York companies are not able to provide the replacement power, it could become necessary to disconnect loads in Connecticut to prevent permanent damage to the system. (NUSCO Ex. 1 p. 16)

38. A third 345 kV east-west transmission line will be needed by 1979 to supply power to southwestern Connecticut in the event of a double line outage occurring along the existing east-west 345 kV lines to prevent overloads when the system is near peak load and generating stations (in southwestern Connecticut) are out of service or overtaxed. (Tr. 9-21 p. 167; NUSCO Ex. 1 p. 16)

39. A third east-west 345 kV line along either the proposed route or the alternate route would provide reliability in case of a double contingency outage. (Tr. 9-14 p. 60; NUSCO Ex. 1 p. 12 & 16; Tr. 9-27 p. 118)

40. Physical separation of circuits may provide the benefit of improved reliability. However, no evidence was presented to indicate that the improvement would be significant. (Tr. 8-30 p. 28; Tr. 9-14 p. 60; Record)

41. The distance between the alternate and the proposed routes varies from slightly less than one mile at the narrowest point to slightly less than three miles at the widest point. (PFEC Ex. 1 p. 35-36, plate #2)

42. There are currently three 345 kV lines on the right-of-way which runs north from the Millstone generating units approximately ten miles to Hunts Brook Junction. (NUSCO Ex. 18 p. 109 & 130 & Map #1; Tr. 9-27 p. 77)

43. A fourth 345 kV line on this Millstone to Hunts Brook Junction right-of-way is identified in the ten-twenty year forecast submitted January 1, 1976. The proposed in-service date is 1981. (NUSCO Ex. 18 p. 122 & 130)

44. Statistical data on transmission outages, based on past performance, can provide an indication of future average expected performance. The values that will be experienced year-by-year will of course vary. (NUSCO Ex. 9 p. 1 & 2)

45. For all of New England for the six year period, 1969-1974, there were 27 double outages on 345 kV lines. Of these thirteen were instantaneous (closed within a minute), four lasted one to five minutes, four lasted six to ten minutes, and seven lasted longer than ten minutes. The average duration of these twenty-seven double outages was slightly less than fifteen minutes. (Tr. 9-27 p. 100)

46. Statistical data for the central Connecticut area for the seven year period, 1969-1975, indicates there were twenty-four system disturbances involving the 345 kV transmission system in the area. Of these twenty-four disturbances, four (i.e. 17%) resulted in two 345 kV circuits within the defined area being forced out at the same time. (NUSCO Ex. 12 p. 1)

47. The four double outages in the central Connecticut area occurred in the months of January, February, January and December. Two of the outages lasted less than five minutes, one lasted eighteen minutes and one lasted twenty-one minutes. (Tr. 9-13 p. 103; Tr. 8-31 p. 25)

48. In addition to the four double outages within the central Connecticut area, another four (of the 24) disturbances resulted in the outage of a 345 kV circuit close to the area in addition to a circuit within the area. These four outages occurred in August, June, July and July. (Tr. 8-31 P. 23-25; NUSCO Ex. 12 p. 1)

49. The 33% figure (i.e. the 4 within the area plus the 4 close to the area, divided by the total of 24) is an indication of what the overlapping probabilities are but it is not a statistically rigorous figure. (Tr. 9-8 p. 59)

50. Seventeen percent is a more reliable figure for an indication of what the overlapping probabilities are for these lines. (Tr. 9-13 p. 63 and 103)

51. There have been as many as 20 high load days in the summer when the double contingency situation would be a serious consideration. (Tr. 9-13 p. 9)

52. The probability of the two adjoining 345 kV lines failing at once is relatively small although it must be realized that the lines are on common right-of-way for 17 miles. (PFEC Ex. 1 p. 12; NUSCO Ex. 1 p. 15)

53. Possible causes of double line outages include: tornados, plane crashes, guying failures, vandalism, sabotage, hurricanes, malfunctioning control and relaying equipment and human errors. (NUSCO Ex. 1 p. 15; Tr. 9-27 p. 78)

54. No evidence was presented to indicate that double line outages have actually been caused by plane crashes, sabotage or vandalism. (Record)

55. As of August 31, 1976, the two 345 kV east-west lines had been in service for approximately two years and had not been out of service simultaneously. (Tr. 8-31 p. 111-112)

56. Statistical data for the entire NUSCO 345 kV system for the eight year period 1967-1974, indicates that each of the existing 345 kV east-west lines can be expected to be forced out of service individually on average of about two hours per year. This includes both line-originated and terminal-originated outages. This is what can be anticipated in a typical year. (Tr. 9-8 p. 50-56; NUSCO Ex. 9 p. 1-7)

57. No rigorous estimate of the economic cost of disconnecting loads has been made by NUSCO. Rough estimates indicate a cost for industrial and commercial customers of from $1 to $6 per kilowatt hour of interruption. For an interruption of service in the southwestern area, the cost could be millions of dollars. (Tr. 9-8 p. 60)

58. The Northeast Power Coordinating Council and the New England Power Pool criteria for system design specify that an interconnected bulk power system be able to suffer the overlapping loss of any two transmission lines, allowing for a five minute delay between outages in which to adjust generation levels, without overloading facilities which remain in service and without incurring system instability. (NUSCO Ex. 1 p. 14-15)

59. Without the addition of a new east-west 345 kV line, the effects of several of the conditions which were studied by NUSCO, and described in its application, do not meet the above NPCC or NEPOOL criteria. (NUSCO Ex. 1 p. 14)

60. If a new 345 kV line is not built in 1979, the situation worsens in each year thereafter as the loads grow in southwestern Connecticut. (Tr. 8-31 p. 101)

61. Following the installation of the third Millstone nuclear unit in 1982, the east to west power flows will increase substantially. This would result in extremely serious conditions in the event of a double contingency outage and may result in overloads in the event of a single contingency outage. (NUSCO Ex. 1 p. 18-19)

62. An incidental benefit for a new east-west 345 kV line is that it will permit the transfer of substantial amounts of power to New York without requiring abnormal dispatch of generation, even when the New Haven Harbor unit or equivalent generation in southwestern Connecticut is out of service. (NUSCO Ex. 2 p. 10)

63. If a new 345 kV line is not built in 1979 there could be many times when power flowing into New York City would require running uneconomic generation in southwestern Connecticut to protect the system. (Tr. 8-31 p. 102)

64. The need for a new 345 kV line is not based on getting power to New York. (Tr. 9-8 p. 12)

65. The estimated construction cost of the proposed plan in 1979 is $4,500,000 which can be broken down as follows:

$2,150,000	345 kV Oxbow to Beseck
1,500,000	r-o-w Oxbow to Black Pond
665,000	345 kV Beseck to Black Pond
185,000	115 kV Beseck to E. Meriden
$4,500,000	

(NUSCO Ex. 1 p. 10)

66. The estimated construction cost for the alternate route Option A, involves 1979 costs of $2,450,000 which can be broken down as follows:

$1,830,000	345 kV wood H-frame line and replacement 115 kV line from Chestnut Junction to Hans Brook Junction
520,000	345 kV wood H-frame line Hans Brook Junction to Black Pond Junction
100,000	r-o-w widening Hans Brook Junction to Black Pond Jnct.
$2,450,000	

(NUSCO Ex. 1 p. 29; NUSCO Ex. 15 p. 1)

67. Option C differs from Option A in that it would involve a new double circuit steel pole 345 kV line, with one circuit installed, between Chestnut Junction and Hans Brook Junction. Such construction would be $2,470,000 more expensive in 1979 than Option A. (NUSCO Ex. 1 p. 29-30)

68. In addition to the 1979 costs, the alternate route Option A involves 1985 costs of $2,800,000 which can be broken down as follows:

$1,300,000	- second 345 kV line between Black Pond Junction and Beseck Junction
1,500,000	- additional breaker at Beseck Junction
$2,800,000	

(NUSCO Ex. 1 p. 29; NUSCO Ex. 15 p. 1)

69. In addition to the 1979 and 1985 costs, the alternate route Option A involves 1992 net costs of $2,300,000 which can be broken down as follows:

	$4,700,000	- third 345 kV line between Black Pond Junction and Beseck Junction
less	2,400,000	- credit to equalize the number of breakers; (i.e. by 1992 the additional breaker at Beseck Junction would be required for the proposed route

(NUSCO Ex. 15 p. 1; Tr. 9-8 p. 87; Tr. 9-14 p. 168)

70. For purposes of comparing the cost of the proposed plan to that of the alternate plan Option A, the 1985 and 1992 costs must be expressed in present value terms. The present value of carrying charges for the proposed plan is $6,240,000 while for the alternate plan Option A the present value of carrying charges is $5,526,000. Thus, the alternate plan Option A is approximately $714,000 less expensive than the proposed plan. (NUSCO Ex. 15 p. 1-5)

71. The cost estimates of the proposed and the alternate route are based on NUSCO's latest review of the price of materials and the price of labor. They reflect the actual number and types of angles required. (Tr. 9-14 p. 33-34)

72. Keyes Associates reviewed the NUSCO cost estimates for the proposed and the alternate route and found them to be appropriate and reasonable. (PFEC Ex. 1 p. 37 & 38)

73. The cost of underground construction in 1979 along the proposed route is estimated by NUSCO to be $19,000,000 which can be broken down as follows:

$12,000,000	- 345 kV Oxbow Junction to Beseck Junction
5,000,000	- 345 kV Beseck Junction to Black Pond Junction
2,000,000	- 115 kV Beseck Junction to E. Meriden substation
$19,000,000	

(Tr. 8-30 p. 42)

74. No specific estimate of the cost of underground construction along the alternate route was presented. There was evidence, however, that underground construction of 345 k V transmission lines is generally more expensive than overhead construction and may even range up to ten times as much. (NUSCO Ex. 1 p. 52-55; Record; PFEC Ex. 1 p. 28-32)

75. For each million dollar investment in transmission facilities, the carrying charges, and thus the burden on rate payers, are estimated to average approximately $180,000 per year over the life of the facility. This includes the cost of money, taxes, operation, maintenance, and depreciation. (Tr. 9-27 p. 29-32)

76. A fourth east-west 345 kV line has been identified in NUSCO's ten year forecasts of loads and resources. (NUSCO Ex. 18 p. 122)

77. This fourth line has a proposed in-service date of 1982. (NUSCO Ex. 18 p. 122)

78. NUSCO anticipates that this fourth line will be needed from Portland Junction to Berlin (ten miles) and from Berlin to Southington (8.1 miles). (NUSCO Ex. 18 p. 122; Tr. 8-30 p. 23)

79. There is no reasonable chance that construction of a line from Portland to Southington could be completed by 1979. (Tr. 8-30 p. 28)

80. The Portland to Southington line would provide an east-west tie which would take care of the entire southwest area, just as much as would the proposed third line. In addition, the line from Portland to Berlin to Southington would have an autotransformer in Berlin tapped off that line in 1983, and would feed into a 115 kV system which would support the greater Hartford area. (Tr. 8-30 p. 105)

81. The estimated construction cost of the Portland to Southington line, with double circuit structures, is approximately $12,500,000. (Tr. 8-30 p. 28; Tr. 9-14 p. 34-35)

82. NUSCO anticipates that a fifth east-west 345 kV line will be needed along the Portland to Berlin to Southington route. (Tr. 8-30 p. 30)

83. The proposed in-service date of the such fifth line is between 1988 and 1990, and it is related to the proposed generating units at Montague, Massachusetts, and to the installation of nuclear units by the New England Electric System in Rhode Island. (Tr. 9-21 p. 119-120)

84. A sixth east-west 345 kV line, which NUSCO anticipated would be constructed in the 1990's along the Oxbow-Beseck route, depends on additional generation being built in eastern Connecticut or near the Connecticut River. (Tr. 8-31 p. 28-30; Tr. 9-8 p. 13)

85. A 345 kV line is anticipated for 1988 from Frost Bridge north into Massachusetts to connect with the second Montague unit. (Tr. 9-14 p. 19)

86. Studies in New England now point to the early 1990's as being the earliest date in which 765 kV transmission may be introduced in New England. (Tr. 8-31 p. 34)

87. A third east-west 345 kV transmission line through central Connecticut conforms to a long range plan for expansion of the electric power grid of the electric system serving the State and interconnected utility systems and will service the interest of the electric system's economy and reliability. (NUSCO Ex. 1 p. 10-11; Record)

88. The Public Utilities Control Authority believes a third east-west 345 kV circuit is necessary to assure reliable delivery of power from eastern Connecticut generating stations to loads in central, western, and southwestern areas of the state. (Record)

89. The Department of Planning and Energy Policy reviewed projections of regional electric power demand and grid system planning needs and did not dispute the need for a third east-west 345 kV circuit. (Record)

90. The Department of Commerce concurs that there is a public need to strengthen the east-west grid system to assure an adequate supply fo electricity to meet prospective peak-load periods. (Record)

91. No post hearing comments were submitted by the above mentioned agencies. (Record)

III. ENVIRONMENTAL

Land-Use

92. The alternative route, Oxbow Junction-Chestnut Junction-Hans Brook Junction-Black Pond Junction conforms to FPC guideline #1, "... existing rights-of-way should be given priority as the locations for additions to existing transmission facilities ...". The alternate route requires much less right-of-way acquisition than the proposed route. (NUSCO Ex. 1 p. 11, 12; Tr. 9-27 p. 65)

93. The alternate route will require only about 24 additional acres, whereas the proposed route will require as much as 185 additional acres. (PFEC Ex. 1 p. 33)

94. Along the alternate route, no widening is necessary between Chestnut Junction and Hans Brook Junction if changes in structures are made. Between Hans Brook Junction and Black Pond Junction, the 250 foot wide right-of-way will have to be widened by 85 feet or an existing line will have to be replaced by a double circuit steel pole line. (NUSCO Ex. 1 p. 35)

95. Along the alternate route immediately east of Dooley Pond the right-of-way is constricted to a width of 260 feet. The addition of another 345 kV line most likely would require the acquisition of a house or an additional lattice steel tower similar to the existing tower east of Dooley Pond. (Tr. 8-30 p. 66)

96. On the alternate route the additional right-of-way required between Hans Brook Junction and Black Pond Junction will require the acquisition of one house at the Route 147 crossing. (Tr. 8-30 p. 66)

97. Along the alternate route between Chestnut Junction and Hans Brook Junction there is no need to acquire a new right-of-way. (Tr. 8-30 p. 66)

98. On the alternate route between Hans Brook Junction and Black Pond Junction the utilities own two-thirds to three-quarters of the land in fee. (Tr. 9-21 p. 108)

99. There is no planned water supply site on the alternate route. (Tr. 9-21 p. 20, 25)

100. Almost half of the alternate route is agricultural land. Transmission rights-of-way are compatible with agricultural land-uses. (Tr. 9-14 p. 14; Tr. 9-21 p. 144; PFEC Ex. 1 p. 35)

101. Land-use impacts of the proposed route include the following: (a) widening the existing right-of-way by 175 feet, (b) acquiring two houses at Foothills Road and one at Arbutus Street, (c) spanning one lot in the proposed industrial park in Middlefield, (d) conflicting with residential uses, a town road, and a town industrial park between Routes 17 and 157, (e) acquiring a totally new 300 foot wide right-of-way for a distance of 2.8 miles, and (f) infringing on conservation areas and recreational areas. (Tr. 8-30 p. 38, 45, 46; NUSCO Ex. 1 p. 42 seg. 1-5; PFEC Ex. 1 p. 35)

102. The proposed route would cross about one and one-quarter acres of the proposed industrial park in Middlefield. (Tr. 9-14 p. 36)

103. The proposed route would affect the proposed industrial park west of Route 17 by limiting building and/or parking space and possibly conflicting with access to the industrial park from Route 17. (Tr. 8-31 p. 64-70)

104. The proposed line traverses both state and local areas designated as open space: (a) state owned Durham Meadows, a designated natural area, and (b) a large designated open space area owned by the Town of Durham. (Tr. 8-30 p. 74; NUSCO Ex. 1 seg. 3)

105. Transmission lines are not compatible with recreational areas. (PFEC Ex. 1 p. 35)

106. Along the proposed route, part of Saw Mill Brook in Durham is marked as a potential water supply reservoir in the State Plan of Conservation and Development. (Tr. 9-14 p. 74-76)

Ecological

107. Widening an existing right-of-way does less ecological damage than cutting a new right-of-way. (Tr. 9-27 p. 18-19)

108. Construction of underground transmission lines in this area would have greater natural systems impact than overhead lines. (NUSCO Ex. 1 p. 46)

109. No significant natural system effects are anticipated along the alternate route because the line would be constructed along an existing right-of-way and in general no new access roads would be needed. (Tr. 8-30 p. 67-68)

110. The proposed route deviates from the existing right-of-way to cross approximately 4750 feet of previously undisturbed wetland. (PFEC Ex. 1 Plate I; Tr. 9-27 p. 21; Tr. 9-21 p. 15)

111. The alternate route does not deviate from the existing right-of-way. It crosses only about 500 feet of previously undisturbed wetland. (PFEC Ex. 1 Plate I; Tr. 9-27 p. 21; Tr. 9-21 p. 15

112. Most wetlands traversed along the alternate can be spanned. Those that cannot be spanned do not provide significant wildlife habitat. (PFEC Ex. 1 p. 33)

113. No construction would be necessary along the alternate route between Oxbow Junction and Chestnut Junction, and no additional environmental effects would be created. (Tr. 8-30 p. 65)

114. From an ecological point of view a preference was expressed for the alternate route. (Tr. 9-27 p. 21; PFEC Ex. 1 p. 33)

115. The ecological impacts on the proposed route are somewhat greater than c the alternate route. (Tr. 9-21 p. 78; Tr. 9-27 p. 21; PFEC Ex. 1 p. 33)

116. The Durham Meadows, along the proposed route, is a unique natural area because: (a) it is a groundwater reservoir; (b) it contains a mixture of adjacent habitats valuable to wildlife; (c) there are numerous wetland types within the meadows; (d) it is a relatively undeveloped area. (Tr. 9-27 p. 21-22)

117. Within the entire study area, no other wetland could compare with Durham Meadows. (Tr. 9-27 p. 22-23)

118. Durham Meadows is a state owned wetland managed for waterfowl habitat improvement purposes. (Tr. 9-27 p. 25)

119. If the proposed route were followed access roads to build structures in Durham Meadows could cause blockage of some surface water. (Tr. 9-21 p. 79, 80)

120. Providing access in wetland areas may invite unnecessary, unwanted or harmful types of intrusion. (Tr. 9-27 p. 24)

121. On the proposed route the 175 foot widening and 300 foot wide right-of-way proposed will temporarily disrupt wildlife with small home ranges and will have little effect on animals with extensive home ranges. (PFEC Ex. 1 p. 73)

122. The Department of Environmental Protection foresees no adverse impact on natural systems along the proposed route providing a development and management plan is developed and properly instituted. (Record)

122a. The Department of Environmental Protection did not evaluate the environmental impact of the alternate route. (Record)

Visual - Structures

123. The addition of a 345 kV line along the alternate route would result in a total of three 345 kV lines and one 115 kV line from Chestnut Junction to Hans Brook Junction, and three 345 kV lines from Hans Brook Junction to Black Pond Junction. (NUSCO Ex. 1 p. 35)

124. Option A of the alternate route will result in additions to the numerous poles on the existing right-of-way. However, the additional wood pole H-frames are visually consistent with the existing structures and will maintain a low profile. The cost of this option is approximately $2,450,000 in 1979, (NUSCO Ex. 1 p. 28, 35; NUSCO Ex. 15 p. 1)

125. Option B of the alternate route would not increase the number of poles on the right-of-way, but the height of the proposed poles would make them inconsistent with the existing structures. The cost of this option is approximately $4,970,000 in 1979. (NUSCO Ex. 1 p. 29-30, 35)

126. Option C of the alternate route would add a row of single pole steel structures within the existing right-of-way which would appear inconsistent with the existing structures. The cost of this option is approximately $4,920,000 in 1979. (NUSCO Ex. 1 p. 29, 30, 35)

127. Option D of the alternate route would add one row of steel poles within the existing right-of-way. Because of their height, these poles would appear inconsistent with the existing structures. The cost of this option is approximately $4,190,000 in 1979. (NUSCO Ex. 1 p. 29, 30, 36)

128. Another option along the alternate route would be to rebuild on the existing right-of-way of a double circuit 345 kV steel pole line and a composite 345/115 kV steel pole line between Chestnut Junction and Hans Brook Junction, and a double circuit 345 kV steel pole line with a single circuit 345 kV steel pole line between Hans Brook Junction and Black Pond Junction. This option would cost approximately $10,000,000 in 1979. (Tr. 9-27 p. 128-129)

129. Between Hans Brook Junction and Black Pond Junction on the alternate route, there is a significant cost difference between placing an H-frame on a widened right-of-way and using steel poles with no widening. The use of wood pole H-frame structures costs substantially less than the use of steel poles. The applicant already owns much of the right-of-way in fee required for the H-frame structures. (Tr. 9-21 p. 110)

130. Along the alternate between Hans Brook Junction and Black Pond Junction, wood pole H-frame structures are preferred over steel poles because wood poles are more compatible with existing structures. (Tr. 9-21 p. 107, 108, 110)

131. Double circuit 345 kV steel poles are typically 130 feet high. The average height of H-frame structures are about 80 feet. (Tr. 8-30 p. 66; NUSCO Ex. 1 p. 37)

132. On the proposed route a 345 kV H-frame structure will be placed adjacent to the existing lattice tower on top of Beseck Mountain and will be similarly visible. (NUSCO Ex. 1 p. 43)

133. Permitting vegetation to grow along the alternate route could reduce the visual impact somewhat. (Tr. 9-21 p. 146-147)