DOCKET NO. 48

AN APPLICATION SUBMITTED BY THE UNITED ILLUMINATING COMPANY FOR A CERTIFICATE OF ENVIRONMENTAL COMPATIBILITY AND PUBLIC NEED FOR THE CONSTRUCTION, MAINTENANCE, AND OPERATION OF A 115 KV TRANSMISSION LINE AND ELECTRIC SUBSTATION IN THE CITY OF BRIDGEPORT.	:	CONNECTICUT SITING COUNCIL
	:	August 29, 1985

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

1. United Illuminating Company (UI), in accordance with provisions of sections 16-50k and 16-501 of the Connecticut General Statutes (CGS), applied to the Connecticut Siting Council (the Council) on April 11, 1985, for a certificate of environmental compatibility and public need for the construction, maintenance, and operation of a 115 kV transmission line and electrical substation in the City of Bridgeport, Connecticut. (Record)
2. The fee as prescribed by section 16-50v-1 of the Regulations of Connecticut State Agencies (RSA) accompanied the application. (Record)
3. The application was accompanied by proof of service as required by section 16-501(b) of the CGS. (Record)
4. Affidavits of newspaper notice as required by statute and section 16-501-1 of the RSA were filed with the application. (Record)
5. The Council and its staff made an inspection of the proposed substation site and proposed transmission line route on May 28, 1985.
6. Pursuant to section 16-50m of the CGS, the Council, after giving due notice thereof, held a public hearing on July 8, 1985, at 7:00 P.M. in the Bridgeport City Hall, 45 Lyon Terrace, Bridgeport, Connecticut. (Record)

7. The parties to this proceeding include the applicant and those persons and organizations whose names are listed in the Decision and Order which accompanies these Findings. (Record)
8. The Council took administrative notice of its record in Docket No. 49. (Record)
9. In Docket No. 49, the Connecticut Resources Recovery Authority (CRRA) applied to the Council to construct a refuse to energy facility in Bridgeport. This facility will have a net power output of 62 MW. The facility will generate 330 million kW hours of electricity per year. The Council issued a certificate of environmental compatibility and public need for that facility on August 16, 1985. (UI 1, Exhibit A, pp. 3, 5)
10. UI is proposing to construct a 115 kV transmission line between the CRRA facility in Bridgeport and UI's existing Ash Creek to Pequonnock 115 kV transmission line. UI also would install a substation adjacent to the CRRA facility. (UI 1, p. 1)
11. UI would be responsible for the design and construction of the interconnecting transmission line and substation. (UI 1, Exhibit F, p. 1)
12. Rust International Corporation (RUST), a RESCO subsidiary, would subcontract with UI to engineer, construct, own, and maintain the 115 kV substation. (UI 1, Exhibit A, pp. 2-3; Tr. p. 24)
13. The proposed substation would be located 70' northwest of the CRRA facility cooling towers. The final design of this substation would be subject to a cooling tower emissions study conducted by UI. The study recommended over-insulating to protect against corrosion, and indicated that cooling tower emissions would not be

likely to cause substation outages under normal operating conditions. (UI, Exhibit B, p. 5; Tr. pp. 42-43; UI 7, p. 1-1)

14. The size of the property needed for the proposed substation depends on whether an overhead transmission line is constructed or an underground system is constructed. If an overhead system is utilized, the property needed would measure 40'x60'. If an underground system is built, the property required would measure 40'x50'. (UI 1, Exhibit D, p. 4)

15. No screening would be needed for the proposed substation, because it would be located within the CRRA plant site. (UI 2, Q. 10)

16. UI is negotiating to purchase the net electricity produced by the CRRA facility. This is both a state and federal requirement under the Public Utility Regulatory Policies Act of 1978, PURPA. (UI 1, Exhibit A, p. 3)

17. The amount of power to be fed into the surrounding UI electric power system is expected to be on the order of 73 megavoltamperes. (UI 1, Exhibit A, p. 6)

18. UI evaluated five overhead and four underground transmission line systems. The preferred route would be the same for either option. (UI 1, Exhibit C, p. 1-1)

19. The underground system would have less potential for environmental impact. The underground option may provide a higher degree of reliability than the overhead system. A failure in an underground system would require several days to repair, while an overhead system could be repaired in hours. An underground line would have less visual impact than an overhead line. (UI 1, Exhibit C, p. 1-3, UI 1, Exhibit D, p. 7)

20. UI prefers a 3-phase, 60-Hertz, 115 kV single circuit overhead line. (UI 1, Exhibit D, p. 13; UI 1, Exhibit B, p. 3)

21. An overhead line for this project would have a 10' vertical separation between conductors. The 10' vertical distance between conductors cannot be reduced. (UI 1, Exhibit C, p. 4-3; UI 2, Q. 29)

22. Six overhead line routes were evaluated by UI, all of which followed paved streets in the proposed project area. These routes were Howard Avenue; Howard - Pine or Cherry Street - Wordin Avenues; Wordin Avenue; Hancock Avenue - Pine-Cherry-Howard Avenues; Osborne Street - Boswick Avenue; and Osborne Street - Boswick-Cherry-Fairfield Avenue. (UI 1, Exhibit C, p. 4-11)

23. The proposed Howard Avenue route is the shortest, 2350' long, with the least environmental impact of the six routes evaluated. It would require seven single pole structures 250'-400' apart. All such poles would be under 100' in height. (UI 1, Exhibit C, p. 4-11; UI 1, Exhibit C, p. 3-5)

24. The proposed Howard Avenue route would exit the northeast corner of the CRRA facility, follow the west side of Howard Avenue south of Route I-95, and would parallel an existing line of wooden utility poles on the east side of Howard Avenue. The proposed route then crosses Route I-95, and leads to an existing railroad catenary, Structure B-745, and at that point taps into UI's existing Ash Creek-Pequonnock transmission line. (UI 1, Exhibit C, p. 1-1; UI 1, Exhibit G, Exhibit 2)

25. At the railroad terminus of the proposed transmission line, modifications to catenary structure B-745 would result in a structure 5' taller than at present. This is the preferred tap for either the overhead or underground option. (UI 1, Exhibit B, p. 4; UI 1, Exhibit C, p. 2-2)

26. Five overhead conductors were evaluated. These were Linnet, 336.4 Kcmil; Hawk, 477 Kcmil; Parakeet, 556.5 Kcmil; Tern, 795 Kcmil; and Rail, 954 Kcmil. (UI 1, Exhibit C, p. 2-2)

27. The proposed phase conductor selected by UI is Tern, 795 Kcmil and the proposed shield wire is 7 No. 6 Alumoweld. (UI 1, Exhibit B, p. 4)

28. UI had recommended that Rust consider two 115 kV lines for increased reliability. Rust decided on the one-line option, due to the cost. (UI 1, Exhibit D, p. 4)

29. The proposed pole structures would be light grey, single-shaft, tubular steel poles. Each would support 3-phase conductors and a shield wire. (UI 1, Exhibit B, pp. 3-4)

30. The foundations of the poles would be of drilled concrete piers or caissons. If soils are suitable, the poles would be installed by the vibratory method, thus keeping surface disturbance to a minimum. (UI 1, Exhibit C, p. 4-8; UI 1, Exhibit G, p. 16)

31. Structures Rt-1 and Rt-2 would be placed on the CRRA property site, and an easement would be required for them; structures Rt-3 through Rt-7 would be on the public right-of-way on Howard Avenue. (UI 2, Q. 33)

32. From the proposed substation north to railroad structure B 745, the pole structures would be of the following heights: Rt-1, 70'; Rt-2, 80'; Rt-3, 75'; Rt-4, 94'; Rt-5, 98'; Rt-6, 98'; and Rt-7, 89'. (UI-4)

33. The proposed poles would be higher than the surrounding buildings. (UI 2, Q. 26, Q. 28)

34. UI would be willing to negotiate sharing pole space with other entities having the legal right to occupy public streets as long as no safety, operation, or maintenance standards are violated and all costs are shared equitably. (UI 2, Q. 32)

35. In an underground system, electrical failures are uncommon, but repair can be time-consuming. An underground system is more expensive to build than an overhead line. (UI 1, Exhibit C, p. 3-25; UI 1, Exhibit D, pp. 6-7)

36. Construction of an underground system would necessitate the purchase of a 50'x30' parcel at the southeast corner of Howard and Railroad Avenues. (UI 1, Exhibit C, p. 1-1)

37. Four potential underground system routes were evaluated by UI. These were Howard Avenue; Hancock Avenue; Hancock Avenue-Pine Street - Howard Avenue; and Wordin Avenue. The Howard Avenue route, with a length of 2350', would be the most direct route. (UI 1, Exhibit C, p. 3-5)

38. Utilizing the Howard Avenue route, any underground cable system would have to be installed in duct because Howard Avenue is heavily travelled. A high tide in the area would bring water to within 2½-3' of the street surface, and therefore any cables could not be buried very deeply. (UI 1, Exhibit C, p. 3-6)

39. The per foot cost of a buried cable system is high. Underground obstructions, such as gas and sewer pipes and distribution cables, are also of concern. (UI 1, Exhibit C, p. 3-5)

40. Four types of underground cables were evaluated by UI. They are High Pressure Gas Filled, 350 Kcmil; Low Pressure Oil Filled, single conductor, 350 Kcmil; Low Pressure Oil Filled 3 conductor, 350 Kcmil; and Extruded Dielectric 750 Kcmil. The High Pressure Gas Filled Cable system (HPGF) was selected by UI as the best underground option. (UI 1, Exhibit C, p. 2-3; UI 1, Exhibit C, p. 3-2)

41. The HPGF system is filled with nitrogen to a pressure of 200 p.s.i. This system is preferred because of its ruggedness, lack of susceptibility to dig-in, and its high reliability. Most of UI's 115 kV underground cable system is HPGF. (UI 1, Exhibit C, p. 3-11; p. 3-39)

42. The following steps would be taken in the construction of an underground system: surveying, trenching, pipe installation, cable pulling, pothead construction, evacuation, nitrogen filling of the line, testing, energizing, and clean-up. (UI 2, Q. 8)

43. The following steps would be taken in the construction of an overhead line: construction surveying, foundation construction, structure erection, stringing of conductor and shield wires, and clean-up. (UI 2, Q. 8)

44. The total duration of foundation construction activities for an overhead line would be about one month. For an underground line, the construction duration would be three months. (UI 2, Q. 22)

45. The installation of pole foundations would generate less dust than the excavation of trenches for an underground system installation. Neither method of pole installation, driven piles or caissons, would involve removing much soil. Therefore, dust would be a minor problem. (UI 2, Q. 22)

46. The underground system installation would affect the area longer due to trench digging, cable placement, and backfilling. The overhead system's temporary impact would include the use of parking lanes on Howard Avenue for construction equipment. Once the poles are in place, the transmission wires would be pulled with minimal traffic interruption. No disruption in electrical service would be expected in the area during construction. (UI 1, Exhibit G, p. 4; p. 11; p. 12)

47. There would be some impact to traffic on Route I-95 when overhead transmission lines are pulled across the highway. Traffic would have to be halted for five minutes. This work would be scheduled for off-peak hours. (UI 1, Exhibit G, p. 11; UI 2, Q. 18)

48. Impacts to the local traffic on Howard Avenue would be minor during construction of either an overhead or underground system. (UI 1, Exhibit G, p. v)

49. The area surrounding Howard Avenue is used primarily for industrial and commercial purposes. Businesses located along the proposed route include a moving van truck storage area, a fuel tank storage area, a rendering facility, and a truck rental facility. (UI 1, Exhibit G, p. iv; UI 1, Exhibit G, p. 3)

facility. (UI 1, Exhibit G, p. iv; UI 1, Exhibit G, p. 3)

50. No persons live immediately adjacent to the proposed Howard Avenue route. About 1000 people live within 1000' of the proposed route. (UI 1, Exhibit G, p. 8)

51. Six sites on the National Register of Historic Places are within 1 mile of the proposed Howard Avenue route. One historic district has been proposed for a nearby area. The overhead line would be visible from the proposed Railroad Avenue Historic District. (UI 1, Exhibit F, p. 5)

52. If the underground system were used, the State Historic Preservation Officer would ask for an archeological survey before any final evaluation of the proposed project's effects on historic sites. (UI 2, Q. 14)

53. The proposed overhead transmission line would have no effect on Bridgeport's National Register of Historic Places resources, and such a system would be compatible with the industrial character of the area. (UI 3)

54. There would be no increased hazard due to the location of conductors near the fuel storage tanks on Howard and Wordin Avenues. (UI 2, Q. 20)

55. Since none of the proposed construction would take place in tidal wetlands or coastal or navigable waterways, no DEP wetlands permits would be required. (UI 1, Exhibit J)

56. There are no native plant communities within 1000' of the proposed Howard Avenue route. (UI 1, Exhibit F, p. 4)

57. There would be no television or radio interference or electric field effects resulting from a new 115 kV transmission line on the proposed route. (UI 2, Q. 22)

58. After considering potential effects on nearby Sikorsky Heliport, the Department of Transportation's Bureau of Aeronautics has approved the construction of the proposed transmission line. (UI 1, Exhibit I)

59. In order to complete construction of the proposed project, UI would also have to obtain permits from the Department of Public Utility Control, the Federal Aviation Administration, the Department of Transportation, and the City of Bridgeport. (UI 1, Exhibit D, pp. 5-6)

60. Visual impacts of the proposed overhead transmission line would be limited to Howard Avenue, Route I-95, the railroad line, and immediately adjacent areas. (UI 1, Exhibit F, p. 6)

61. A motorist travelling in an easterly direction on Route I-95 would see a partially blocked view of the overhead transmission line structures at a distance of 1900'. A full view would be obtained 900' away. Travelling in a westerly direction, the structures would be seen from 2600' away. At no time would the entire structures be visible because the highway is elevated and the lower portion of the structures would be concealed. (UI 2, Q. 16)

62. The overhead transmission lines themselves would be more difficult to see than the support structures. The approximate viewing distance of the lines from either direction on Route I-95 is about 1000'. (UI 2, Q. 16)

63. Overhead transmission line planning did not take into consideration that Route I-95 may be widened in the future, as outlined in the City of Bridgeport's Master Plan for 1970-1990. (Tr. pp. 35-36)

64. The present in-service date of the proposed project is March, 1988. (UI 2, Q. 54; Tr. p. 43)

65. The proposed overhead transmission line would not affect scenic resources or land uses in the project area sufficiently to justify the construction of an underground system. (DEP comments of May 22, 1985; UI 1, Exhibit G, pp. 5, 21)

66. No significant long-term impacts on land uses or population would be expected as a result of the proposed overhead transmission line. There are no recreational areas in or adjacent to the proposed route. (UI 1, Exhibit G, p. v; UI 1, Exhibit G, p. 21)

67. Signal Resco included the costs of the transmission line, substation, and electrical interconnections in the base cost of the project as part of the agreement between Signal Resco and UI. Costs for these facilities exceeding 2.5 million dollars would be passed to the towns through higher disposal fees. (Tr. p. 25)

68. The additional costs for an underground line would result in increased tipping fees, which could discourage the participation of municipalities. (Tr. pp. 26-27)

69. UI's costs to interconnect the generating facility with its transmission system would be paid by CRRA/Resco per FERC Order 69. No costs for this interconnection would be borne by UI's rate payers. (UI 2, Q. 47)

70. Calculations for determining the estimated 40-year present worth data assume an annual inflation rate of 9.5% and an interest rate of 13.6%. (UI 2, Q. 45, p. 2)

71. UI defines the electricity purchased from the generating facility as capacity under existing NEPOOL rules. The energy could be resold to UI customers or to members of NEPOOL. (Tr. pp. 47-48)

72. A study conducted by C.T. Main indicates that the least expensive underground system is more than twice the expense of the lowest cost overhead system. (UI 1, Exhibit C, p. 1-2; Tr. p. 26)

73. Adding a circuit to the suggested underground route would double the cost for each of the four alternatives. (CRRA Exhibit 2, Q. 2; Tr. 49)

74. Erecting the transmission line in the middle of the existing distribution line would be more costly than erecting a parallel circuit the entire distance with distribution circuit attached. (Tr. pp. 51-52)

75. UI would derive no economic benefits from using the transmission line to support distribution circuits. Access to the transmission structures would be more difficult with a distribution system added to the support structure. (Tr. pp. 51-52)

76. If Interstate-95 is to be widened in the vicinity of the electrical crossing, additional costs might be generated by the relocation of two supporting structures away from the I-95 area. These structures would have to be higher to accommodate the lengthened span across the highway. (Tr. p. 36)

77. The cost of replacing and relocating these two structures, if necessary, is estimated to cost in the low hundreds of thousand dollars. This cost would be borne either by the State or Federal Government since I-95 is an interstate highway. Doubling the tension on the line is estimated to cost $100,000. (Tr. pp. 36-37, Tr. p. 38-39)

78. UI choose the 954 Kcmil conductor as the most economic conductor to use in the project on a total life cycle cost basis. This cable would allow additional generation capacity if necessary. (UI 1, Exhibit C, pp. 2-5, 2-6)

79. Based on cost and technical considerations, UI choose the 350 Kcmil HPGF cable for the underground option. (UI 1, Exhibit C, p. 3-2)

80. The estimated total costs to construct the transmission line are as follows: (1988$)

	Overhead	Underground
Substation	$742,000	$805,600
Transmission Line	1,272,000	2,322,000
Total (1988$)	$2,014,000	$3,127,600

(UI 1, Exhibit B, p. 2; Tr. p. 26)

81. Energy costs over time are measured by ohmic and dielectric losses throughout the life-cycle of the cable. This measurement considers the present value of the series of costs to supply those losses, which are evaluated over a period of 40 years. Energy charges in 1984 were $0.0441/kwhr and escalated at 9.5% annually. Present value was calculated using a factor of 13.6%. (UI 1, Exhibit C, p. 3-23 and 3-24)

82. Total life cycle costs over a 40 year period for five overhead cable options along Howard Avenue including all labor, material, structures, foundations, construction, conductors, shield wires, and modifications at a 55 MW loading were estimated as follows (1984$):

	Labor and Material	Losses	Total
1) 336.4 Kcmil	$384,660	$177,700	$562,360
2) 477 Kcmil	$400,030	$125,360	$525,390
3) 556.5 Kcmil	$407,030	$108,350	$515,380
4) 795 Kcmil	$426,560	$ 77,120	$503,680
5) 954 Kcmil	$438,840	$ 64,720	$503,560

(UI 2, Q. 34, p. 5)

83. Total life-cycle costs over a 40 year period for four installed underground cable options along the Howard Avenue line including; materials, labor, construction, foundations, transition station, and modifications to structure B-745, were estimated as follows (1984$):

Cable	Labor and Material	Transition Station Modification to B-745	Total
1) 350 Kcmil HPGF	$ 905,430	$242,200	$1,147,630
2) 350 Kcmil 1/c LPOF	$1,047,410	$242,200	$1,289,610
3) 350 Kcmil 3/c LPOF	$ 911,330	$242,200	$1,153,530
4) 750 Kcmil Ext. Diel.	$ 837,540	$242,200	$1,079,740

(UI 2, Q. 40, p. 2; Q. 45, p. 3)

84. Included in the costs for the underground cable options are estimated costs for annual present worth of maintenance and losses as follows (1984$):

Cable Type	Maintenance	Losses	Total
1) 350 Kcmil HPGF	$11,000	$ 83,210	$ 94,210
2) 350 Kcmil 1/c LPOF	$11,000	$119,050	$130,050
3) 350 Kcmil 3/c LPOF	$11,000	$ 91,950	$102,950
4) 750 Kcmil Ext. Diel.	$11,000	$ 57,490	$ 68,490

(UI 2, Q. 45, pp. 5-10)

85. The cost of underground cable per 10 foot section for the Howard Avenue lines is estimated as follows:

1) 350 kcmil/HPFG $ 7.90/10 ft;
2) 350 kcmil 1/c LPOC $15.80/10 ft;
3) 350 kcmil 3/c LPOF $49.60/10 ft; and
4) 750 kcmil Ext. Die. $15.00/ 10 ft.

(UI 2, Q. 46, pp. 6-9; UI 1, Exhibit C, pp. 3-33 to 3-37)

86. Total life cycle costs for three other underground options along Hancock Avenue (I), Hancock Avenue/Pine Street (II), and Wordin Avenue (III) would be as follows:

	I	II	III
1) 350 Kcmil/HPGF	$1,046,730	$1,020,310	$1,073,150
2) 350 Kcmil 1/SCOF	$1,252,150	$1,228,100	$1,280,560
3) 350 Kcmil 3/SCOF	$1,092,870	$1,058,130	$1,116,630
4) 750 Kcmil Ext. Die.	$1,005,410	$ 980,420	$1,031,650

(UI 2, Q. 40, p. 2)

87. The seven support structures of the proposed Howard Avenue line vary in height; costs would range from $18,000 to $52,700. (UI 2, Q. 26)

88. Costs to modify the support towers after installation for the purpose of accommodating an additional line would range from $1,000 to $20,000 per structure. (UI 2, Q. 3)

89. Three options for the combination of existing distribution lines along Howard Street would cost $150,000, $300,000, or $410,000. These estimates include conversions from one voltage to another and would be charged to CRRA. (Tr. p. 40)

90. The estimated cost to replace the proposed overhead conductors and shield wire would be $82,100. Replacing the underground circuit would cost $201,400. (UI 2, Q. 35)

91. Each month's delay in commencing construction operations would add $2,100 in overhead costs or $5,300 in undergrounding costs. (UI 2, Q. 53)

92. The estimated cost to purchase the parcel of land at the intersection of Howard and Railroad Avenues is approximately $70,000. (UI 2, Q. 37)

93. Savings from installing the underground option in conjunction with a repaving of the street are estimated at $44,000. (UI 2, Q. 44)

94. Annual visual inspection of overhead cable structures would cost approximately $500. Repainting would occur every 10 years at an approximate cost of $7,500. An underground survey would be performed every two years at an estimated cost of $3,500. (UI 2, Q. 35)