DOCKET NO. 135 - An application of The United Illuminating Company for a Certificate of Environmental Compatibility and Public Need for the construction of one or two electric combustion turbines, one diesel engine-generator, and one associated 115 kV switchyard at its existing English Station and Grand Avenue Substation in New Haven, Connecticut.

Connecticut Siting Council

November 14, 1990

FINDINGS OF FACT

1. The United Illuminating Company, (UI) in accordance with the provisions of Sections 16-50g to 16-50z of the Connecticut General Statutes (CGS), applied to the Connecticut Siting Council (Council) on April 17, 1990, for a Certificate of Environmental Compatibility and Public Need (Certificate) for the construction, maintenance, and operation of one or two 80-to-105 megawatt (MW) combustion turbines, one 3.9 MW dual-fuel, diesel-type engine generator, and one associated 115 kilovolt (kV) switchyard within its English Station and Grand Avenue Substation in New Haven, Connecticut. The official name of the proposed project is the Contingency Combustion Turbine Project (project). (Record)

2. The application was accompanied by proof of service as required by CGS Section 16-50l. (Record)

3. Public notice of the application, as required by CGS Section 16-50l, was published in the New Haven Register on April 10 and 14, 1990. (Record)

4. Comments regarding the application were received from the Department of Environmental Protection, the Department of Health Services, and the Office of Policy and Management, Energy Division. (Record)

5. The Council and its staff made an inspection of the proposed site at the existing English Generation Station and its associated Grand Avenue Substation, on June 21, 1990. The inspection was publicly noticed in the New Haven Register on May 8, 1990. (Record)

6. Pursuant to CGS Section 16-50m, the Council, after giving due notice thereof, held a public hearing for the proposed project on June 21, 1990, beginning at 3:00 p.m. and reconvening at 7:00 p.m. in the Public Hearing Room, New Haven Hall of Records, 200 Orange Street, New Haven, Connecticut. (Record)

Overview

7. UI is an operating electric public service company, incorporated under the laws of the State of Connecticut, whose principal business is the production, purchase, transmission, distribution, and sale of electricity for residential, commercial, and industrial purposes in a franchise service area of about 335 square miles in the central and southwestern part of the State of Connecticut. (UI 1, Exhibit A, p. 1)

8. UI has submitted this application for a peaking generation project:

   1) As a result of recommendations promulgated from a New England Governors' Conference regarding identification and selection of future generation sites;
   2) To increase peaking capacity;
   3) To improve their capacity mix; and
   4) To provide black start capability to UI's other existing generators at English Station and New Haven Harbor Station during emergency outages.

   (UI 1, Exhibit A, pp. 2 to 4; UI 1, Exhibit B, pp. 4 and 5; UI 3, Q-9; Tr. pp. 18 to 29, 38 to 40)

9. UI proposes that the Council consider the project in two phases: the first would involve the Council's finding of public need and environmental compatibility for the project and a granting of a Certificate; the second would consist of a review of a Development and Management (D&M) Plan or an amendment to the Certificate which would address changes in technology, design, environmental modeling, and construction schedules prior to the commencement of construction of the project, if and when the project became necessary. Such a plan would allow for a sudden need to construct the project in a timely manner prior to year 2007. (UI 1, Exhibit E, p. 2-10)

10. Since no detailed design of the project has begun, a detailed construction plan and schedule has not been developed. This would be submitted with a D&M Plan at the appropriate time. (UI I, Exhibit E, p. 2-10)

Need

11. The final report of the New England Governors' Conference, Inc., "A Plan for Meeting New England's Electricity Needs," December 1986, (Final Report) presented several recommendations for meeting electricity needs for the New England Power Pool (NEPOOL), at least through the year 2000. One of the recommendations urged the electric utilities to identify sites for additional

peaking facilities and to develop licensing and siting procedures for pre-approval of sites with a view toward increasing the region's ability to respond to contingency or emergency situations. (Final Report, pp. 11, 46-47)

12. The availability of capacity in New England is expected to be adequate for the immediate future. However, without additional commitments by utilities to acquire new resources, the New England region as a whole has been forecasted to become capacity deficient by the early to mid-1990's. (UI 3, Q-8)

13. Prior to the commercial operation of Hydro-Quebec and Seabrook Unit 1, UI was deficient several times during brief periods of 1988 and 1989, in meeting its NEPOOL capability responsibility requirements and needed to obtain available peaking energy services from NEPOOL. UI has attributed these incidents in 1988 and 1989 primarily to higher than expected summer peak loads over extended periods. (UI 3, Q-16)

14. UI's electric load demand shape has been characterized by sharp and brief peaks. During 1989, UI's existing peaking units were placed on line on 273 occasions. UI also exchanged 25 MW of base load capacity for 60 MW of peaking capacity from Northeast Utilities and acquired 80 MW of peaking capacity from Niagara Mohawk Power Corporation for use during times of peaking need. (UI 1, Exhibit E, p. 2-38; UI 3, Q-13)

15. With Seabrook Unit 1 now operating, UI has no current need for additional new capacity at this time and has no plans to proceed with the proposed project as long as it has sufficient supply capacity to meet its capability responsibility to NEPOOL and to its customers. (UI 3, Q-5, Q-9, Q-10; Tr. pp. 45-48; CSC F-90, UI Exhibit 3, Q-10, Q-20, Q-29; CSC F-90, Tr. pp. 10-20, 37-39)

16. UI's year of energy need under its planning series load growth scenario is forecasted to be 2007. Under low load growth, the year of need would come after 2009. Under high load growth, the year of need advances to 2000, which would require a commitment to construct during 1996 or 1997. These load growth scenarios include continuing capacity contributions from Seabrook Unit I and Hydro-Quebec Phase II beyond year 1991. Without capacity from Seabrook Unit I and Hydro-Quebec Phase II, UI's year of need under all three scenarios would be 1991. (UI 3, Q-11; Tr. I, p. 46)

17. UI's resource plan to meet future customer demand includes a combination of demand-side resources, non-utility generation resources, wholesale power purchase agreements, and/or a traditionally planned

combustion turbine. (UI 1, Exhibit A, p. 1-6; UI 1, Exhibit E, p. 1-10)

18. UI does not plan to disengage from Hydro-Quebec Phase II (H-Q II). Selling surplus capacity from Seabrook would not affect UI's year of need. (UI 3, Q-36; CSC F-90, Tr. II, p. 7)

19. In the event that load growth exceeds current forecasts, currently planned sources of generation are delayed, and/or demand-side resources fail to reduce expected peaks, UI would resort to the development of the project. (UI 1, Exhibit E, p. 1-1; UI 3, Q-10; Tr. I, pp. 19 and 20)

20. UI states that while there is no immediate need to commence construction, there is a need for UI as a public service company mandated by its franchise, to plan in order to be able to commence construction promptly if necessary to meet the Company's duty to serve its customers. (UI 3, Q-10)

21. At the time of a determination of need, UI would first attempt to secure capacity from non-utility generation, or through wholesale power purchase agreements. If competitively priced third-party small power production or cogeneration resources were available to meet load growth, UI would pursue those resources and defer the development of the proposed project until a need is established. Such alternative resources would need to be available in a timely manner, prudent, and of benefit to UI customers. UI did not assign probabilities to the availability of private power resources or to additional power purchases from wholesale power markets. (UI 1, Exhibit E, p. 1-10; UI 3, Q-8, Q-9; Tr. I, pp. 22-24)

22. UI has not exhausted its options to reduce demand through conservation and load management programs or to add capacity through the development of cogeneration or small power production facilities. (Tr. I, pp. 21, 61-62)

23. UI has not contracted with a private power producer for non-utility generation since December 1985. Any future UI power agreement with a private power producer would contract the maximum possible amount of dispatchable generation provided that the unit would produce electricity at a cost lower than the dispatch price from other available resources. (UI 3, Q-38)

24. UI estimates the time period to develop a private power producing plant from engineering details and financial arrangements to final permit approvals, could exceed three years. The time needed to construct this option to commercial operation could exceed five years. (UI 3, Q-35)

25. The lead time to construct the proposed project is estimated at three to 3 1/2 years. For the project to be operational in year 2007, a commitment to construct would be needed in year 2003 or 2004. (Tr. I, pp. 45, 47-52)

26. The period of time needed to complete detailed engineering, permitting, construction, and testing for the project is estimated at 28 months. (UI 1, Exhibit E, p. 2-11; UI 1, Exhibit F; UI 3, Q-34)

27. UI considered as part of its supply resource planning an increase in capacity through conversion of existing generators to intermediate-sized load units, but rejected this option because of the greater need for additional new peaking capacity which would be more reliable and could be constructed more quickly. (Tr. I, pp. 47-48)

28. The proposed project would be installed initially for meeting peak demand. However, over the passage of time and growing loads, the project could be repowered into combined-cycle, intermediate status by using existing steam turbines at English Station. (UI 1, Exhibit E, p. 2-41; Tr. I, pp. 29, 37)

29. The availability, term of contract, and electricity price of long-term supply purchase options would be considered in determining if construction of the proposed project should proceed. (UI 3, Q-9)

30. The Office of Policy and Management/Energy Division (OPM) questioned the timeliness of the proposed project since UI's forecasted year of need is 2007 and there was no evidence submitted by UI to indicate that UI's conservation and load management programs would fall short of expectations. (OPM letter received June 14, 1990, p. 2)

31. OPM opines that pre-licensing the proposed project could offer UI a timing advantage over non-utility developed generation even though most cogeneration projects are considered base load generation. (OPM letter received June 14, 1990, p.2)

32. OPM recommends that UI pursue a detailed study comparing photovoltaic units and incremental conservation and load management with the proposed gas turbine project. (OPM letter received June 14, 1990, p.1)

Project Description

33. Since its initial construction and operation, English Station has contained eight turbine-generators with twelve boilers used for generation, of which, two generators and four boilers are still operational. The remaining generators and boilers are unused or partially disassembled. Operational generators No. 7 and 8

presently are powered from boilers using No. 6 fuel oil. Other operational boilers use No. 2 oil, No. 6 oil, and propane. The sulfur content of the fuel oil burned in these units does not exceed one percent, in accordance with State emission standards. (UI 1, Exhibit E, pp. 2-1 and 2-2)

34. Within English Station the main structures are turbines, associated boilers, and auxiliary equipment. The highest parts of the station are the exhaust stacks; three are 239.89 feet above ground level (AGL), two at 238.75 feet AGL, and the precipitator at 159.5 AGL. (UI 1, Exhibit E, p. 2-2)

35. UI proposes to install the one or two, 80 to 105 MW-sized combustion turbines within English Station on existing support pedestals from retired steam turbines. Each new turbine would be a heavy duty, single shaft industrial unit connected to a self-cleaning, air-inlet filtration system, silencer, and duct work. (UI I, Exhibit E, pp. 2-3 and 2-4)

36. UI chose combustion turbine technology for the project because of low capital cost, quick start capability, minimal land requirements, low environmental impacts, relatively short construction time, flexibility to expand to combined-cycle operation in the future, and proven technology. (UI I, Exhibit E, p. 1-11; UI 3, Q-31)

37. UI's submission of the project without a specifically-sized generator would allow flexibility to select a particular manufacturer and type of equipment when the specific time to construct was determined. This procedure could lower the cost of the selected equipment, allow the selection of the best available technology suitable to the project at that time, allow quick acquisition of equipment, and prevent unnecessary expense in the event that sudden need did not arise within the next several years. (UI 3, Q-7)

38. The air intake and filter system for the proposed turbines would be located on the existing roof and would be contained in a steel box approximately 30 feet by 50 feet by 20 feet tall. Each turbine would be connected to a lubricating oil system, control system, and gas cooling (either air or hydrogen) system through a heat exchanger, which would cool the gas by water. The generator excitation system would be connected to neutral grounding equipment, power circuit breakers, and protective relaying and metering equipment. (UI 1, Exhibit E, pp. 2-3 and 2-4)

39. The turbine exhaust gases would be directed through the existing turbine room roof, via exhaust silencers, to two new individual stacks. The two new steel stacks would

replace one existing stack and one previously demolished masonry stack, each about 240 feet AGL. Each new stack would be approximately 23 feet in diameter and 240 feet AGL, subject to DEP approval. Another new steel stack 240 feet AGL would be required for the new 3.9 MW emergency generator. (UI 1, Exhibit E, pp. 2-4, 2-5, and 2-8)

40. The existing, 240-foot high AGL masonry exhaust stack would be replaced by a larger diameter stack needed for the volume and velocity of exhaust gases produced by the proposed generators. The bases of the demolished stacks would be adequate to support two of the proposed new stacks. (Tr.I, p. 7, 8)

41. UI modeled the operation of the turbines using various fuel characteristics, costs, and data from other available New England generators. The turbines would have capacity factors ranging from five percent to 20 percent, equivalent from 440 to 1750 full load peaking hours per year, plus an additional 225 hours for periods of severe weather. This represents about 250 to 350 startups per year. The turbines would have an estimated service life of 25 years. (UI, Exhibit E, p. 2-44; Tr. I, pp. 29-30)

42. Construction of the second combustion turbine could proceed later than construction of the first unit as need arose. (UI 3, Q-24)

43. UI has no plans to prepare English Station for the installation of the proposed project prior to the commitment to begin construction. UI also has no plans to prepare Grand Avenue/Mill River Substation for the proposed project prior to 1993. (UI 3, Q-23)

44. A new 3.9 MW dual-fuel (natural gas and No. 2 fuel oil) diesel-engine generator would be constructed to black start either turbine and to provide electrical system peaking capacity in emergency situations. New fuel oil pumps, piping, and a new steel exhaust stack 240 feet AGL, would be installed. This unit would be connected to the plant's 4.16 kV switchgear bus. (UI 1, Exhibit E, p. 2-8)

45. Use of the diesel generator as the source of AC power would allow existing station auxiliary units to be used to start the new turbines without requiring off-site power from another source (black start capability). Such capability would allow the station to function during blackout periods before electricity is made available to customers. Black start capability currently exists at Bridgeport Harbor Station, but not in New Haven Harbor Station. The addition of the new diesel generator would provide black start capability to English Station and New

Haven Harbor Station. UI has not experienced emergency conditions at either English Station or New Haven Harbor Station which would have required black start capability for at least five years. (UI 1, Exhibit E, pp. 2-33, 2-39, and 2-40; UI 3, Q-15)

46. Electrical power to start the proposed turbine-generators under normal conditions would come from the planned Mill River 13.8 KV distribution substation via a 13.8 kV/4.16 kV startup station transformer connected to the new project's 4.16 kV switchyard bus inside English Station. The diesel generator would also be connected to English Station's 4.16 kV switchgear bus. Each turbine generator's electrical output would be delivered to a new 13.8 kV/115 kV generator step-up transformer within the existing confines of the Grand Avenue Substation across the west branch of the Mill River. Connections would be made from new 115 kV underground cables installed within a new cable bridge linking English Station to Grand Avenue Substation. New 115 kV additions to the switchyard would include two separate protective relaying systems, an open air rigid bus, six new tower structures 75 feet to 120 feet high for the relocation of existing lines, and a new approximately 35-foot by 65-foot concrete block, control and protective relay equipment building. (UI 1, Exhibit E, pp. 2-9 and 2-10, Figure 2.1-7 and Figure 3.1-8)

47. Large portions of the English Station yard and Grand Avenue Substation yard would be cleared and graded. Existing concrete cable vaults and coal-crane rails would be demolished. This area would be used for a new water storage area and natural gas compressor building. This space could also be used for the reconstruction of an oil storage tank now sited at Grand Avenue Substation. If found serviceable, the fuel tank would be dismantled and relocated to this area and used for fuel storage for existing Units 7 and 8. If not serviceable, the tank would be removed. New trailer-mounted, water demineralizer units and a new 1.2 million gallon water tank would also be sited in this area. (UI 1, Exhibit E, pp. 2-5 and 2-6; Tr. I, pp. 28-29)

48. The plant auxiliary equipment would be powered through a new 4.16-kV switchgear bus from an uninterruptable power supply consisting of one 125-volt direct current station battery unit. (UI I, Exhibit E, p. 2-7)

49. Installation of the project would accelerate the need to reinforce certain elements of UI's transmission system which would normally require servicing over the next 14 years. However, no elements would require service before 1996 due to construction of the proposed project. (UI I, Exhibit E, p. 2-10)

Fuel

50. UI would construct the proposed project with the capability of burning both natural gas and fuel oil. However, UI would initially license the proposed project exclusively to burn natural gas. If needed, UI could seek to obtain permits for dual-fuel capability at a later time. (UI 3, Q-28)

51. While burning natural gas, the project would reduce UI's dependency on oil-fired generation, at the time of annual peak, in year 2007 by approximately 14.7 percent and change UI's capacity mix as follows:

	Existing Capacity Mix (1989)	Forecasted Mix With Project Using Natural Gas (2007)
Nuclear	7.4 %	13.9 %
Oil	57.8 %	43.1 %
Gas	0.4 %	12.0 %
Coal	29.8 %	21.9 %
Hydro	0.0 %	5.7 %
Refuse	4.6 %	3.4 %
Total	100.0 %	100.0 %

(U.I. Forecast Report to the Connecticut Siting Council, March 1, 1990, derived from Exhibit 1 and Exhibit 2)

52. In the future, the project could be capable of burning alternative fuels such as propane, synthetic natural gas, and medium BTU coal-derived gas, when available or economic. (UI I, Exhibit E, p. 2-5)

53. UI does not expect that current natural gas supplies in New England would be adequate for the proposed project without new pipeline capacity. (UI 3, Q-26)

54. If available, natural gas would be brought into English Station from an existing tap in the North Haven area from the Southern Connecticut Gas Company System which presently runs to New Haven Harbor Station. An existing line runs along Grand Avenue that could be used if upgraded to meet English Station's gas needs. (Tr. I, pp. 64-65)

55. Natural gas would need to be delivered to the turbines at 300 pounds per square inch (PSIG) pressure. (UI 1, Exhibit E, pp. 2-26, 6-24)

56. If the need arose, and adequate gas supplies were not available, UI would pursue the same proposed project based on the use of fuel oil for the turbines. (Tr. I, pp. 40-41)

57. A liquified natural gas terminal located at New Haven Harbor Station could be an economic source of fuel for the proposed project. (Tr. I, pp. 66-67)

58. If the project is constructed, a decision to convert the proposed project to intermediate or base load generation at some later time could change if the price of gas imported from Canada were to increase as a result of future action taken by the Canadian National Energy Board. (Tr. I, pp. 63-64, 66)

Land Use

59. The City of New Haven is located on Long Island Sound at the southern end of Connecticut's Central Valley. English Station is located on an island near the mouth of the Mill River near where the river empties into Long Island Sound. The elevation of the site is approximately 10 feet above sea level. (UI 1, Exhibit E, pp. 3-1 and 3-2)

60. Within a one mile area surrounding English Station, the land is zoned as residential (44 percent), heavy industry (20 percent), business (17 percent), light industry (eight percent), recreational (four percent), and other uses (seven percent). (UI 1, Exhibit E, pp. 3-5 to 3-7, 3-16 to 3-25)

61. The project is located entirely inside English Station and Grand Avenue Substation, within an area zoned for heavy industry. Surrounding land uses within one mile include light industrial, commercial, residential, and recreational areas, New Haven Harbor, and the Quinnipiac and Mill Rivers. (UI I, Exhibit E, pp. 3-2, 3-16 to 3-25, 4-1)

Environmental Effects

62. Prevention of Significant Deterioration (PSD) regulations of the Connecticut Air Regulations apply to the construction of major stationary sources of air pollution located in areas designated as attainment or unclassified for at least one of the six criteria pollutants. These regulations have established maximum allowable increases or increments of ambient pollutant concentrations. The New Haven area is currently designated as nonattainment for carbon monoxide (CO) and ozone (O_3). It is designated as attainment for sulfur dioxide (SO_2) and total suspended particulate matter (TSP) and as either attainment or unclassifiable for nitrogen dioxide (NO_2) and lead. (UI 1, Exhibit E, pp. 3-51 and 3-52)

63. English Station is a major stationary source of air pollutants. The installation of the proposed generators would comprise a major modification and therefore would

require a PSD operations permit from the DEP. (UI 1, Exhibit E, pp. 5-33 and 5-34.

64. Although the Clean Air Act is currently in the process of change by the United States House of Representatives and Senate, UI believes the proposed project could be constructed to comply with any existing or proposed emission standards in force by 1995. (UI 1, Exhibit E, pp. 3-51 to 3-57; Tr. I, pp. 68-69)

65. UI modeled the effects of operating the two proposed combustion turbines with energy generation at maximum output for emissions. Total effects on ambient air quality from operating the proposed units at maximum output and emissions from the existing English Station Units 7 and 8 were also modeled on a worst case basis. The modeling of emissions was based upon the use of best available control technology (BACT) for each pollutant. Annual emissions were derived from an estimated 2000 operating hours per year at 100 percent load for the proposed turbines and 1000 operating hours at 100 percent load for the emergency generator. (UI 1, Exhibit E, pp. 5-26 to 5-28; Tr. I, pp. 68-69)

66. Based upon UI's air emission modeling, potential emissions from the proposed generators would produce the following:

Pollutant	Total Potential Emissions (Tons/Year)	Combined Turbine Emissions (Tons/Year)	Diesel Generator (Tons/Year)
Sulfur Dioxide (SO_2)	5.97	5.40	0.57
Particulates (TSP)	10.12	10.00	0.12
Nitrogen Oxides (NO_X)	285.80	260.00	25.80
Carbon Monoxide (CO)	99.96	65.00	34.96
Unburned Hydro-carbons	41.57	32.40	9.17
Lead	0.00	0.00	0.00

(UI 1, Exhibit E, p. 5-44)

67. Based upon projected emissions of 6.0 tons of SO_2 per year (TPY) and particulate matter at 10.1 TPY, the project would be subject to minimum stack height requirements mandated by the DEP's Stationary Source Stack Height Guidelines. In order to prevent plume downwash, a stack height calculated at 239.3 feet AGL would be required. The proposed stacks at 240 feet AGL would exceed the minimum height requirement. This height would also meet the minimum requirements for acceptable ground-level emission concentrations. (UI I, Exhibit E, pp. 5-36 and 5-35)

68. CO emissions would be controlled by the use of catalytic converters or by combustion controls. Because natural gas combustion is clean-burning and naturally low in sulfur, emissions of particulate matter and sulfur oxides (SOx) would be low and difficult to measure. No additional emission controls are expected to be required at this time by the DEP to reduce these emissions. A continuous emission monitoring system would be installed if required by the DEP. (UI I, Exhibit E, pp. 2-27, 2-28, 2-30, and 5-30)

69. A staged combustion or demineralized water injection system, depending on the type of turbine selected would control thermally produced emissions in the turbine. Either system would be capable of limiting NOx to 25 parts per million by volume (ppmv) dry at 15 percent oxygen during full generation output. (UI I, Exhibit E, pp. 2-6)

70. No hazardous or toxic chemicals would be used in normal operation of the turbines, and no hazardous waste would be created. The water treatment capacity of the demineralization unit would be approximately 700,000 gallons. When this capacity is reached, the unit would be hauled off-site for regeneration. (UI I, Exhibit E, p. 2-31 and 2-32)

71. Tap water for the water injection system would require up to 500 gallons of water per minute (gpm), of which 400 gpm would be demineralized for use in the system. The demineralizer units are not expected to operate at full load for an extended period of time. Wastewater at a maximum instantaneous flow equaling 100 gpm would be directed to city sewers and would have no effect on groundwater. Construction of the proposed project would not increase wastewater flow above levels now using floor and equipment drains. There would be no groundwater consumption or deterioration resulting from the project. (UI I, Exhibit E, p. 2-29 to 2-32, 5-54 to 5-56; Tr. II, pp. 5-6)

72. Expected annual use of potable water would be approximately 12 million gallons, or less if a dry-low NOx burner system were selected. (UI 1, Exhibit E, p. 5-54)

73. Salt water for cooling the turbines would be drawn from the Mill River through water intake structures now used for existing units No. 7 and No. 8. Up to 5,400 gpm would be used for each proposed unit. Total use would be about 15,500,000 gallons per day. The intake water would be fed into a closed loop water cooling system and discharged back into the Mill River. The cooling water discharge would represent about 9.4 percent of the currently permitted discharge for existing Units 7 and 8, and 8.2 percent of the permitted discharge for retired Units 1 through 6, within the permitted limits of the English Station. (UI I, Exhibit E, pp. 2-6, 2-7, 2-30, 5-54, and 5-55; DEP Letter, June 15, 1990, p. 2)

74. The cooling water would be discharged into the Mill River at a 14 degree F rise in temperature similar to the currently permitted discharge from Units 7 and 8, and previously permitted use by Units 1 through 6. (UI 1, Exhibit E, pp. 5-55)

75. The DEP regulates the discharge of pollutants into surface waters and issues National Pollution Discharge Elimination System (NPDES) permits as mandated by the Federal Water Pollution Control Act and the Clean Water Act. The discharges from the proposed project would comprise a modification to UI's English Station permit and would require DEP review and permitting. (UI I, Exhibit E, pp. 3-58 and 3-59)

76. Construction effects would include workforce traffic into and out of the site, material deliveries, fugitive dust, and construction noise. Such effects would be intermittent and temporary. (UI 1, Exhibit E, pp. 6-22 to 6-24)

77. Construction activities would create fugitive dust as an air pollutant emission from demolition and transportation of materials to and from the site. Such dust would be controlled by water sprays, covering the loaded trucks, and periodically cleaning the paved roads of English Station. (UI 1, Exhibit E, pp. 4-13 to 4-15)

78. UI's noise level controls for the proposed project would keep noise in compliance with the Connecticut Noise Control Regulations of daytime levels at 61 dBA and nighttime levels at 51 dBA at the residential property lines and 66 dBA at commercial property lines. The closest residence to English Station is about 700 feet from the site's nearest boundary. (UI 1, Exhibit E, pp. 6-19 to 6-21)

79. UI's noise analysis does not indicate that any of the four possible combustion turbine units suitable for the proposed project would emit a prominent discrete tone or be heard beyond the boundaries of the station. (Tr. I, p. 30)

80. Animal species observed or expected to occur on the project site are typical for urban areas. The site is characterized by poor habitat and low species diversity. No federal or state recognized endangered, threatened, or animal and plant species of special concern have been observed within the project area. (UI 1, Exhibit E, p. 3-46)

81. An inventory of existing cultural, historic, and archaeological resources was obtained with the assistance of the State Historic Preservation office. A number of historic sites listed in the National Register of Historic

Places, the State Register of Historic Places, and the Historic American Engineering Record were identified within one mile of the project area. The project is not expected to affect these sites. (UI 1, Exhibit E, pp. 3-8 to 3-15)

Alternatives

82. UI has assessed its four existing generation stations for location suitability for peaking combustion turbines. This analysis led UI to decide to locate the proposed project inside the existing English Station complex because it would not require the construction of a new structure, would use replacement stacks instead of additional stacks, provide more space for equipment and future expansion in the yard, and use the existing plant components for a future repowering of Units No. 7 and 8 with a combustion turbine/heat recovery steam generator. The proposed project would comprise the maximum sized units that could be accommodated within English Station. (UI 1, Exhibit E, pp. 6-1 to 6-7, 6-13 to 6-36; UI 3, Q-22)

83. An intermediate-load unit constructed at English Station would operate 30 to 50 percent of the time and would not be as efficient as other existing units in UI's system. (Tr. I, pp. 29-30)

84. Two units currently deactivated at Steel Point Station rated at 28.7 MW and 35.0 MW and now on deactivated reserve status may have potential for reactivation. The 35.0 MW unit could be repowered as an intermediate load unit by using a combustion turbine/heat recovery steam generator resulting in a combined cycle generator capable of 118 MW. In 1988, the cost to construct this type project was estimated at $95 million (1990 $). The status of Steel Point Station as a generation site remains uncertain at this time. (UI 3, Q-18, Q-20)

85. Although UI has not formally analyzed combined cycle conversions of its existing active generators at English Station, these two operating units and four other steam turbines located in UI's system have the potential for combined cycle conversions. (UI 3, Q-14)

86. UI considered using the space in English Station for other generational uses but concluded the proposed project would be the best utilization of the site. (Tr. I, pp. 43-44)

87. New Haven Harbor Station could possibly accommodate an additional 900-1000 MW of intermediate capacity or 600 MW of peaking capacity. Approximately 200 MW of peaking capacity could be accommodated at Bridgeport Harbor Station or 300 MW of combined cycle intermediate capacity. (UI 3, Q-20, Q-21, Q-22)

88. UI has no further plans at this time to attempt any other identification and site selection efforts for future generation sites. (Tr. I, p. 38)

Alternate Technology

89. UI considered and rejected pumped storage hydro-electric units, renewable energy technologies, oil/gas dual-fueled steam powered units, pulverized coal, and fluidized bed plants based on cost estimates provided from a consultant's proprietary data base for these options. (UI 1, Exhibit E, pp. 6-1 to 6-12; UI 3, Q-31)

90. UI's consideration of renewable energy options included hydro units, refuse-burning plants, photovoltaic technology, and other non-utility owned, small power production. UI views such projects as supply resources which could be pursued in the future if found prudent, economic, and competitive with planned utility generation. However, UI concluded that renewable energy options at the present time are limited and that refuse burning generation is the most reasonable renewable fuel alternative to develop new capacity. (Tr. I, pp. 20-25)

91. UI and OPM/Energy jointly investigated the Photovoltaics for Utility Scale Applications (PVUSA) Program in 1989. The comparative cost benefit study favored a gas powered turbine option over a photovoltaic unit at that time. UI considered and rejected photovoltaic technology for the proposed project because, at present, units in the 100 MW to 200 MW size would not meet UI's need to implement such capacity quickly. UI does not consider such units to be currently a proven technology nor cost effective when compared to the proposed combustion turbine technology. (UI 1, Exhibit E, p. 6-8; UI 3, Q-30; Tr. I, pp. 24-28; CSC F-90, UI Exhibit 3, Q-7)

Costs

92. General Electric (GE), Westinghouse (WEST), Asea-Brown-Boveri (ABB), and Kraft Werks Union (KU), supplied UI the total cost estimates of a two combustion turbine project as follows (1990$):

Manufacturer	Output Each Unit	Total Cost (Millions)	Dollars Per MW (000's)
GE	87 MW	$ 140	$ 800
WEST	115 MW	$ 170	$ 720
ABB	89 MW	$ 140	$ 800
KU	101 MW	$ 180	$ 900

These estimates assume a commercial startup date of January 1, 1994, an annual inflation rate of 5.5 percent, an Allowance for Funds Used During Construction (AFUDC) of

8 percent, and a levelized annual carrying cost for fixed expenses of approximately 18 percent of capitol cost excluding fuel costs. (UI 1, Exhibit E, p. 2-43; UI 3, Q-39)

93. The estimated costs for the proposed project are as follows:

A.	English Station Total Cost	$113 million
	1. Generators	(96 million)
	2. Emergency generator	(3 million)
	3. Electrical equipment	(8 million)
	4. Site Preparation	(3 million)
	5. Stacks and related equipment	(3 million)
B.	Grand Avenue Substation	10 million
C.	Project Engineering and Development	12 million
D.	Miscellaneous	6 million
	Subtotal excluding AFUDC and escalation (1990$)	141 million
	AFUDC and escalation	40 million
	TOTAL	$181 million

(UI I, Exhibit E, p. 2-43; derived from UI 3, Q-40)

94. Costs to process and develop detailed project plant engineering to date are as follows:

- o Actual processing costs from January 1988 to May 31, 1990: $700,000.
- o Estimated detailed engineering and evaluation: $3 million to $5 million.

(UI 3, Q-34)

95. The estimated average cost for energy based on estimated adjusted fuel costs as provided by the four possible engineering options would range from 5.8¢/kwH to 8.1¢/kwH if the project were built by 1994. As measured at the busbar under 115 kV load, generation costs would range from 6.2 ¢/kwH to 8.8 ¢/kwH, depending on fuel cost and excluding carrying costs. (UI 1, Exhibit E, pp. 2-44 and 2-45; UI 3, Q-39; Tr. I, pp. 31, 35 and 36)

96. The estimated installed cost of electricity in year 2007 would exceed $700 per kilowatt, depending upon the size of the generating unit selected and based upon a forecasted price of No. 2 oil for year 2007. The price of electricity could be 16¢/kwH for a unit using No. 2 oil whether the electricity were produced by UI or purchased elsewhere, providing that peaking capacity were available at that time. (Tr. I, pp. 31 to 36)

97. UI estimated natural gas prices, based on existing tariffs, would range between $4.80 to $6.70 (1990$) per million British thermal units (MBTU) with a 1010 BTU pèr cubic foot or higher heating value. (UI 1, Exhibit E, p. 2-42)

98. UI did not develop an estimated cost comparison between gas and oil-fired units for the proposed project operating in year 2007. (Tr. I, pp. 32 to 37)

Permits

99. If constructed, the project would comply with all local, State, and federal laws, regulations, codes, and other related requirements concerning noise, effluents, and emissions applicable to the facility. Such permits would be required from the Siting Council, the Department of Environmental Protection, the Department of Public Utility Control, U.S. Army Corps of Engineers, and City of New Haven. (UI 1, Exhibit E, pp. 2-49 and 2-50)

100. UI has submitted an application to the DEP Bureau of Air Management for a Permit to Construct a fuel burning source in advance of a commitment to construct. When a construction date had been determined, UI would apply for all other permits. Such permits would include:

a. DEP air Permit to Operate the combustion turbine;
b. DEP air Permit to Operate the diesel generator;
c. DEP modification to NPDES water discharge permit for English Station to include additional discharges or to reactivate previously discontinued discharges;
d. DEP permit for additional discharges to city sewers under the State Pollution Discharge Elimination System (SPDES) Program;
e. DEP permit for the modification of an existing water Diversion Registration to include additional Mill River water intake for cooling;
f. DEP permit for dredging or erection of structure;
g. DPUC review of method and manner of construction of the transmission line reconfigurations;
h. U.S. Army Corp. of Engineers permit for structure or work in or affecting navigable waters for the additional transmission line crossing the Mill River; and
i. Various City of New Haven permits including local Coastal Site Plan Review development permit for construction within a flood hazard area, administration of the State Building Code, Air Pollution Control Code approval, permit to relocate or rebuild the oil storage tank, and review of project plans for fire safety code adherence. (UI 1, Exhibit E, Section, 2-4)

101. UI's air permit application to the DEP for construction of the proposed project includes a request for a renewable construction permit which would allow for a non-elapsing permit subject to future review and possible revision. The request, if granted, could condition the permit holder to require

a review of the best available control technology (BACT) if construction has not commenced within a specific period of time from the issuance of the air permit. Construction would not be allowed until that review was completed. (Tr. I, pp. 72-74)

102. The DEP has ruled that UI's air compliance construction permit application is complete and an evaluation of the Best Available Control Technology (BACT) would need to be approved. (DEP letter, June 19, 1990, p. 1)

103. DEP has the statutory authority to issue an air compliance Permit to Construct subject to annual review if construction is not begun within one year of permit issuance, if construction is suspended for one year, or if any standard for granting construction permits is not met. If BACT changes, construction has not started, and one year or more has lapsed since permit issuance, DEP has the right to revise the conditions of the permit. (DEP letter, June 19, 1990, p. 2)

104. DEP states that UI may not be able to amend the historic Water Diversion Registrations (Registrations) currently issued for English Station's Units No. 1 to 6 if these generators were not operating or capable of being operated at the time of filing. Amendments to the existing Registrations for Units No. 7 and 8 may be possible if excess volumes exist in the Registrations to accommodate the water use of the proposed project. (DEP letter, June 19, 1990, p. 2)

105. UI's existing National Pollution Discharge Elimination System (NPDES) State Discharge Permits for English Station expires on May 15, 1992, and would require renewal and modification which could result from temperature increases to water discharges into the Mill River created by the proposed project. (DEP letter, June 19, 1990, pp. 2 and 3)

106. DEP states that there are no sensitive coastal resources on the project site. However, a Structures and Dredging Permit for any project construction beyond English Station's existing seawall would be required from DEP's Coastal Resources Management Division. (DEP letter, June 19, 1990, p. 3)

107. UI's survey of ambient noise levels on site and projected project-related noise impact study was comprehensive. DEP questions whether turbines selected for the project would emit prominent discrete tones which would violate noise standards. (DEP letter, June 19, 1990, p. 3)

108. UI expects any DEP decision granting major permits could be conditioned on UI's compliance with all applicable future standards and requirements prior to construction. Copies of future permit applications would be submitted to the Council at the time of filing. UI estimates all necessary permit submittals and approvals could take an estimated seven to nine months to acquire from a date of final engineering completion. (UI 3, Q-32, Q-33)

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