STATE OF CONNECTICUT

SITING COUNCIL

Re:	The Connecticut Light and Power Company and The United Illuminating Company Application for a Certificate of Environmental Compatibility and Public Need for the Construction of a New 345-kV Electric Transmission Line and Associated Facilities Between Scovill Rock Switching Station in Middletown and Norwalk Substation in Norwalk, Connecticut Including the Reconstruction of Portions of Existing 115-kV and 345-kV Electric Transmission Lines, the Construction of the Beseck Switching Station in Wallingford, East Devon Substation in Milford, and Singer Substation in Bridgeport, Modifications at Scovill Rock Switching Station and Norwalk Substation and the Reconfiguration of Certain Interconnections	)	Docket 272 October 29, 2004

FIRST SET OF INTERROGATORIES OF THE CONNECTICUT LIGHT AND POWER COMPANY AND THE UNITED ILLUMINATING COMPANY DIRECTED TO KEMA

The Connecticut Light and Power Company and The United Illuminating Company hereby request that KEMA respond to the following interrogatories on or before November 12, 2004.

DEFINITIONS:

A. "Any" shall include "all," and "all" shall include "any," as needed to make the request inclusive and not exclusive.

B. "And" shall include "or," and "or" shall include "and," as needed to make the request inclusive and not exclusive. For example, both "and" and "or" mean "and/or."

C. "Include" and "including" mean "including but not limited to."

D. "KEMA Report" refers to the report prepared by KEMA, Inc. entitled "Harmonic Impedance Study for Southwest Connecticut Phase II Alternatives," dated October 18, 2004.

INTERROGATORIES

1. Please confirm that KEMA did not study any line-out contingencies. If any study or analysis of line-out contingencies was performed, please provide all results, inputs and work papers.

2. Does KEMA agree that it is a widely accepted practice and normal planning criterion to consider contingency conditions in addition to line outages in planning a transmission system?

3. With respect to KEMA's modeling of system loads for the frequency-domain analysis:

(a) Please provide all assumptions made regarding the percentage of system load composed of motors, and state how the motor loads were represented;

(b) State whether the series inductances between the transmission voltage level and the utilization equipment, provided by substation transformers, distribution feeders, distribution transformers and service cables, are represented in the model, and if not, state whether the damping provided by KEMA's load representation would be greater in the model than would be expected in actual operation.

4. Please describe the impact of the application of several third-harmonic type-C filters in a system that is resonant near the second harmonic. How would the filters perform if line outages occur?

5. Assume that the harmonics concern in Southwest Connecticut relates to high-magnitude harmonics, injected by severely saturated power transformers following system faults and transformer energization, resulting in severe temporary overvoltages. Is KEMA aware of any applications of type-C filters specifically for the mitigation of high-magnitude low-order harmonics due to transformer saturation?

6. Please state whether KEMA has evaluated the equipment ratings to which type-C filters would need to be constructed, in order to be sufficiently robust to mitigate temporary overvoltages under high magnitude harmonic conditions. If so, please provide:

(a) the equipment ratings that would be necessary or desirable to mitigate temporary overvoltages such as those following a fault when many power transformers in the system will simultaneously experience magnetic inrush;

(b) any other equipment rating evaluations that KEMA has done for type-C filters for this Project.

7. Please confirm that KEMA did not evaluate the system condition where (a) no capacitors are needed for reactive power support of the system, (b) the minimum generation dispatch (as utilized in the GE studies), and (c) there is a critical line outage. If this evaluation was done, please provide all results, inputs and work papers.

8. Section 2.2.2 (p.14) of the KEMA Report states, "During core saturation, the magnetizing current with large 3rd harmonic levels will rise to a value easily exceeding twice its normal peak." Please clarify whether this is intended to mean that the 3rd harmonic level will exceed twice the normal magnetizing current magnitude, or will exceed twice the rated current magnitude.

9. In Section 5 (p. 31), KEMA states that transformer inrush is a short-duration event persisting for 0.1 to 0.3 seconds. Please provide any references, simulations or calculations substantiating that inrush phenomena in EHV systems does not persist longer than 0.3 seconds.

10. KEMA states in Section 2.2.2 (p.14) that harmonics produced by transformer magnetic inrush are "normally well damped and no high overvoltage transient will result." Please state the bases for this conclusion.

11. Section 2.2.1 of the KEMA Report (p. 13) states, "... phase controlled converters form the largest single source of distortion in power systems." Please provide citations to any references that substantiate this statement.

12. KEMA suggests that the preferable means to avoid excessive stimulation of harmonic resonances by transformer magnetic inrush is to retune the system prior to energization, such as by switching capacitor banks in or out. (See section 5 of KEMA Report, p. 31)

(a) Is it reasonable to assume that the system operator will be able to anticipate all system faults, and pre-emptively switch capacitors prior to the fault to avoid post-fault transformer inrush stimulation of harmonic resonant conditions?

(b) How would the system operator prevent thermal overloads and/or voltage collapse if other system events were to occur while this equipment was switched out of service?

(c) Was any analysis done to demonstrate that the system will be secure with capacitors and cables removed from service in preparation for manually energizing a transformer?

13. Does KEMA agree that transient simulations of fault performance of the Southwest Connecticut transmission system must be performed with the proposed type-C filters in order to determine whether the proposed type-C filters provide a satisfactory mitigation of the harmonic resonance problem shown to result in severe temporary overvoltages following faults?

14. What are the additional physical space requirements for converting existing shunt capacitor banks to type-C filters, as suggested by KEMA in section 5.2 (p.34) of its report?

15. Section 7.3.2.2 of the KEMA Report (pp. 47-48) indicates that "light" generation dispatch (more generation units on line than in the minimum dispatch situation), without a line outage, results in a first resonance near the fourth harmonic. Could a significant line outage contingency, combined with a minimum generation dispatch condition, reduce the resonance below the third harmonic?

16. A type-C filter, such as suggested by KEMA, has a series-connected inductor and capacitor (L, C2) in parallel with the damping resistor (R1). The combination of L and C2 are tuned to the fundamental frequency (60 Hz) to minimize losses and thermal duty applied to the damping resistor R1.

(a) If the system frequency deviates, such as during a major system disturbance, would the damping resistor be exposed to severe and rapid overheating?

(b) Would the protective tripping of the filter be the normal action in the event of a filter component overload?

(c) Would the tripping of all the type-C filters in Connecticut during a major system disturbance be necessary to protect the filters from excessive duty caused by frequency variation? If your response is "no", state the basis for this conclusion.

(d) If your response to (c) is "yes", please describe the impact of the tripping of all the type-C filters in Connecticut on system security.

17. If the East Devon - Beseck line is out for maintenance and there is a fault on the Plumtree – Long Mountain line, are the filters at Southington and Frost Bridge effective in mitigating temporary overvoltages on the 345-kV cables? If so, please provide your supporting analysis.

18. Does KEMA believe that a frequency scan alone is sufficient to judge whether a particular configuration is technically feasible?

19. The KEMA Report (p. 11) states, "The STATCOMs are also sized to replace the shunt reactors required for voltage regulation on the capacitor terminations, as applicable from a loadflow point of view." What shunt reactors are referenced in this statement?

20. When the 345-kV variable shunt reactors were included in KEMA's analysis, what setting was assumed, i.e. how many MVARs was each shunt reactor absorbing?

21. The KEMA Report (p. 14) states, "These second order (2nd) and third (3rd) order harmonic currents results in some harmonic voltages associated with the system impedance at these harmonic numbers, but they are normally well damped and no high overvoltage transient will result."

(a) Is this statement supported by any electromagnetic transients analysis?

(b) If not, what is the basis for this statement?

22. The KEMA Report (p. 25) states that the Plumtree to Norwalk – Phase 1 line has 20.5 miles of overhead lines. Please provide the source for the 20.5 mile number.

23. The parameters described on p. 25 of the KEMA Report include, for the section between Devon and Beseck, "three parallel sections of 1750 kcmil XLPE cables of varying lengths up to 40 miles."

(a) Does KEMA consider 1750 kcmil to be acceptable? If so, what is the basis for the acceptability of 1750 kcmil?

(b) Are these cables assumed to be in a common duct bank?

(c) What were the assumed ratings of three 1750 kcmil cables in a common duct bank?

24. The KEMA Report (pp. 58, 60) states, "Also with the filters in and out of service, no large changes in the resonance frequency should be expected." What is the basis for the expectation that with filters out of service, there is no large change in the resonance frequency compared to when the filters are in service? Please quantify "large changes."

25. KEMA has stated that the proposed filters are tuned to the 3rd harmonic. Please state whether the graphs on page 65 of the Report support this proposition.

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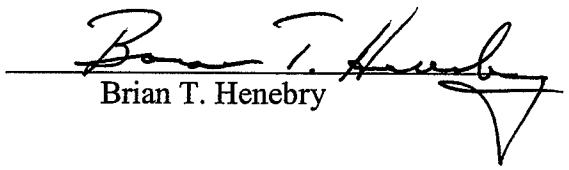
CERTIFICATION

This is to certify that on this 29th day of October, 2004, an original and twenty (20) copies of the foregoing were delivered by hand to the Connecticut Siting Council, 10 Franklin Square, New Britain, CT 06051, and a copy of the foregoing was mailed, postage prepaid, to all parties and intervenors. Electronic copies of the foregoing were also sent to the Connecticut Siting Council and all parties and intervenors.



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