STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL

Northeast Utilities Service Company Application to the Connecticut Siting Council for a Certificate of Environmental Compatibility and Public Need ("Certificate") For The Construction of a New 345-Kv Electric Transmission Line Facility and Associated Facilities Between Scovill Rock Switching Station in Middletown and Norwalk Substation In Norwalk, Including the Reconstruction of Portions of Existing 115-kV and 345-kV Electric Transmission Lines, the Construction of 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 No. 272

October 29, 2004

ISO NEW ENGLAND INC.

FIRST SET OF INTERROGATORIES TO KEMA, INC.

ISO New England Inc.("ISO"), an intervenor in the above-captioned proceeding, hereby requests that KEMA, Inc. ("KEMA") answer the following interrogatories. ISO requests that KEMA provide responses to the interrogatories on or before November 12, 2004.

If there are objections to any of the interrogatories, or if providing responses to particular interrogatories (or portions thereof) would be unduly burdensome, ISO requests that KEMA contact the undersigned as soon as possible.

In the event that any interrogatory requests specific data or information that has already been provided in this proceeding, KEMA need only specifically identify where the responsive data or information is located in the record.

I. DEFINITIONS

A. As used in these interrogatories, "any" shall include "all," and "all" shall include "any," as needed to make the request inclusive and not exclusive.

B. As used in these interrogatories, "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. As used in these interrogatories, "include" and "including" mean "including but not limited to."

D. As used in these interrogatories, "KEMA" means KEMA, Inc. and any of its present officers and employees and any former employees who may have worked on or contributed to KEMA's Harmonic Impedance Study for Southwest Connecticut Phase II Alternatives.

E. As used in these interrogatories, "KEMA's report," "KEMA's study," "report" or "study" shall mean KEMA's Harmonic Impedance Study for Southwest Connecticut Phase II Alternatives, unless the context shall otherwise require.

FIRST SET OF ISO NEW ENGLAND INTERROGATORIES TO KEMA

1. How large, physically, would the C-type filter installations be compared to the size of the basic shunt capacitor installation they would be replacing, and if the C-filters would be larger than the shunt capacitors, has KEMA investigated whether there is adequate existing space in the system or whether further property interests would have to be acquired for the C-type filters?

2. KEMA states that it investigated the maximum length of the proposed Phase II 345 kV line that could be installed underground, based solely on technical feasibility, rather than optimizing the system based on economics. Does this statement suggest that optimizing the system based on economics might result in a different 345 kV proposal for Phase II than a 345 kV proposal based solely on maximum technically feasible underground installation?

3. Can KEMA give an estimate as to how much each C-type filter installation would cost?

4. Please give KEMA's best estimate of how many filter installations of the type, size, and voltage class recommended by KEMA for installation in Southwestern Connecticut ("SWCT") there are in the United States and in the world? What is the next closest size filter installation that is currently in operation or under construction?

5. Please discuss the implications of a C-type filter or filter component failure and describe the potential modes of failure.

6. While KEMA's report makes reference to harmonic victims, it does not appear to indicate the extent of system disruption which may inflict damage on harmonic victims or the damage such victims and victim equipment may suffer. Please describe in detail the extent of system disruption which may occur as a result of harmonic-related distortion and the extent of damage which may be caused to harmonic victims and victim equipment.

7. What happens to harmonic resonant impedance as load level decreases and the capacitor/filter installations are switched off for voltage control? What are the implications for transient voltage performance?

8. Section 2.2.2 of the study indicates that the harmonics generated "are normally well damped and no high overvoltage transients will result". The studies undertaken by GE have not indicated harmonics to be well damped and have indicated temporary overvoltages to be high. How do you explain these differences between your studies and the GE studies?

9. Section 3.5 of the KEMA study models the Devon-Beseck circuits as 1750kcmil. Is it KEMA's opinion that these are adequate under steady state conditions? If so, is it based on actual testing and what were the results?

10. Section 5 of the study indicates that energizing the 345/115kV transformers will result in distortion events of 0.1-0.3 seconds. Please state your basis for this relatively short 0.1 to 0.3 second duration and state whether such short durations are necessarily the case in low system strength applications such as SWCT, where the transformer energization can be an order of magnitude higher, such as 5 seconds.

11. Section 5 of the study indicates that inrush phenomina can be mitigated through "operational procedures, protection and mitigation techniques". Please clarify: (a) how operational procedures and protection measures will help limit post fault recovery scenario given that these are not "planned" events; and (b) what the protection and mitigating techniques are.

12. Section 5.2, Table 6 of the study indicates parameters for the C-type filter. Please: (a) clarify the practicalities of retrofitting the filters to the existing capacitor banks recognizing the size of the additional capacitors and inductances required; and (b) quantify the costs associated with filter losses.

13. Section 5.1 of the study indicates that STATCOMs can be designed to "provide some damping at key low order harmonics". Please clarify what level of damping the STATCOM(s) can provide, given their ratings, for the post fault recovery scenario during which inrush to multiple transformers occurs.

14. Section 5.1 also indicates that STATCOMs will improve "dynamic voltage support and transient performance...". Even if this is true in theory, is it true in practice, given the status of the technology? Please comment.

15. Section 7.3.3 notes that the C-type filter design provides the lowest impedance except for the 2nd. How effective or ineffective are C-type filters for 2nd harmonic mitigation?

16. Section 7.3.3, Figure 11 indicates that the C-Type filter has effectively moved the first resonant frequency above the 3rd harmonic. This marginal move from a first resonance point of ~2.8 to ~3.2 has been achieved effectively by adding 400MVAr of filter capacitance. Please confirm or deny that further filtering will be required if further reinforcements are introduced to the SWCT system beyond Phase II.

17. Figure 12 indicates that the filters appear to mitigate a 5.5 harmonic; however, they appear to produce an even lower 3.7 harmonic. Please indicate whether or not this suggests that there could be other situations where even lower order harmonics could be generated and explain why or why not.

18. Figure 15 indicates a second lowest resonance approximately between the 8th and 11th harmonic. Given that converter equipment generates harmonics at the 11th, will this now not create a problem around the 11th harmonic? Further, does this not suggest the need for more complex filter design than the KEMA report proposes, again, at additional cost and requring further space?

19. How will the C-type filters be affected by changes in system conditions including: (a) capacitor switching, (b) load level changes, (c) line maintenance outages, and (d) generator status changes.

20. Testing was performed at 70% to 100% load level. How effective are the C-type filters at lower load levels with lower loads, capacitors and generation?

21. If C-type filters are tuned to the 3rd harmonic, is it possible that they can shift harmonic resonances at the 3rd harmonic to levels below the 3rd harmonic?

22. The study results suggest that up to 20 miles of additional undergrounding could be enabled due to installation of C-type filters, based on 70% to 100% load level testing. If lower loads were tested, wouldn't the studies potentially indicate lower order harmonic resonance at less than 20 additional miles?

23. KEMA has observed that ISO New England is concerned about the complexity of multiple STATCOMs in SWCT from an operational perspective, and KEMA has stated that C-type filters are not as complex as STATCOMs and will not negatively affect system operations.

a. Does KEMA have any operational experience with respect to C-type filters, and if so, what additional operating considerations does KEMA believe they impose on system operators, and has KEMA encountered any operational difficulties?

b. If KEMA does not have any direct operational experience, does KEMA nevertheless know what additional operating considerations C-type filters impose on system operators, and what operational difficulties have been encountered in connection with C-type filters?

c. Does KEMA believe that the use of multiple STATCOMs in close proximity, as originally proposed for SWCT in Case 5, would present undesirable operational complexity?

24. KEMA recommends C-Type filters, either alone or in the combination with one or two STATCOMs. Would the C-type filters be less effective as a mitigation tool if operated without one or two STATCOMs? If not, please describe how much less effective they would be.

25. When KEMA recommends one or two STATCOMs, would the Glenbrook STATCOM be included in, or in addition to, the recommended STATCOMS?

26. What purpose does KEMA have in mind in recommending the possibility of STATCOMs in combination with C-filters, and if no STATCOMs are employed, would that purpose be effectively served by some other means or would there be added reliability risk or operational complexity in the system?

27. KEMA has concluded that when C-Type filters and/or STATCOM mitigation schemes are employed, Phase II with a 20-mile underground extension is a workable solution from a system resonance point of view, and KEMA has recommended that transient analyses should be performed with a detailed system model of the selected options with the mitigation solutions in place and that an IEEE 519 analysis be performed. If the these analyses yield results that are not satisfactory, would KEMA conclude that a 20-mile underground extension is not workable?

28. If not already in the record in this proceeding, please provide a copy of the curriculum vitae or professional biography of each of the authors of the KEMA report and of any other principal contributor to the KEMA report.

ISO NEW ENGLAND INC.

By___s/*Anthony M. Macleod*_____
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Certification

I hereby certify that a copy of the foregoing has been mailed, e-mailed and/or hand-delivered to all known parties and intervenors of record this 29th day of October, 2004.

____s/ *Anthony M. Macleod*_____
Anthony M. Macleod