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October 13, 2004

TO: Parties and Intervenors

FROM: S. Derek Phelps, Executive Director

RE: **DOCKET NO. 272** - 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 the Scovill Rock Switching Station in Middletown and the Norwalk Substation in Norwalk, Connecticut.

Parties and Intervenors are advised that I will be providing a brief presentation at an event scheduled and coordinated by the Federal Energy Regulatory Commission (FERC) today (Docket No. PL04-14-000). This event is described as a technical session to discuss infrastructure issues for the State of Connecticut and the surrounding region.

Included in my presentation will be reference to the executive summary of the KEMA report that will be sent to the service list of the above-referenced proceeding next week. I have enclosed a copy of that executive summary herewith for your review.

EXECUTIVE SUMMARY

Harmonic Impedance Study of Southwest Connecticut Transmission Alternatives

By

KEMA, Inc.
T & D Consulting

KEMA performed an independent technical review of the Application to the Connecticut Siting Council (Council) for a Certificate for the construction of Phase II facilities and associated technical studies provided in supplemental filings. As directed by the Council, KEMA 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. In addition, KEMA investigated several mitigation schemes to assess whether these schemes could extend the portion of the Phase II line that can be feasibly constructed underground.

A new system model was developed, based on data provided by the Applicant. This model was used to evaluate the different system alternatives from a harmonic resonance point of view. In evaluating the study results obtained, the desirability of having a first resonance point in excess of the 3rd harmonic was used as one measure of acceptability.

Base Case Results

KEMA studied the new Base Case system (Applicant/ISO-NE Study Case 5) with 24 miles of undergrounding using XLPE cables and compared its harmonic resonance performance with that of the approved Phase I system. KEMA also investigated extending the undergrounding with XLPE cable along the East Devon to Beseck corridor. The results for the Phase II Base Case are comparable and consistent with harmonic scan results performed by the Applicant and their consultants.

Mitigation

KEMA examined two methods of mitigating the harmonic resonance performance of the base case system. These include: 1) STATCOMS (also examined by the Applicant), and 2) passive filtering using "C-type" filters. Harmonic resonance results for the STATCOM application were similar to the results of the Applicant's studies. STATCOMs may be an effective mitigation method, but ISO New England is concerned about their complexity from an operational perspective.

KEMA's study results for passive filtering are encouraging. These results indicate that C-type filters, tuned to the 3rd harmonic, increase the frequency of the first major resonance point and significantly dampen higher frequency resonances. Such filters appear to provide a more effective mitigation approach than STATCOMs from a harmonic resonance perspective alone. Also, they are not as complex and will not negatively affect system operations.

Additional Undergrounding

With regard to increased undergrounding between E. Devon and Beseck, KEMA's results confirm that harmonic resonance performance deteriorates as the amount of additional undergrounding increases. However, the results also indicate that passive filtering would be effective in mitigating these negative effects, especially for additional undergrounding in the range of ten to 20 miles. Based on these results alone, if effective mitigation is employed, additional undergrounding of up to 20 miles along the proposed corridor from East Devon north to Beseck would be technologically feasible.

Undergrounding of the entire East Devon to Beseck corridor appears to be a risky choice from a reliability perspective, because system resonance points below the third harmonic may occur.

Recommendations

Based on these study results, KEMA recommends:

1. An optimal application of C-Type filters, either alone or in the combination with one or two STATCOMs, should be developed. In so doing, the tuned C-Type filters should be optimized for specific substations and for the entire system.

2. Transient analysis studies should be conducted, based on a detailed system model of the selected configuration.