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 12, 2004

TESTIMONY OF ALAN W. SCARFONE AND GARY JOHNSON CONCERNING RELATION OF PROJECTED LOAD FLOWS ON EXISTING TRANSMISSION LINES AT 15 GW AND 27.7 GW TO RECORDED HOURLY CURRENT FLOWS IN 2003

Q. Are you aware that questions have been raised at various times during the hearings about the validity and reasonableness of the Applicant's reliance upon the 15 GW and 27.7 GW New England load cases for calculating magnetic field levels?

A. Yes.

Q. Questions have been raised in part because these two load cases were developed by modeling the power flows in the future, even though measurements today of such future conditions are clearly impossible. Have new data become available that further support the use of the 15 GW and 27.7 GW load cases for your calculations of magnetic fields?

A. Yes. The Applicants had previously requested historical data from the system operator at CONVEX (Connecticut Valley Electric Exchange), which records and stores data from the SCADA (the electronic Supervisory Control and Data Acquisition) system. The Applicants had made this request in response to interest expressed by the Council, staff, parties and interveners about the historical loads on the existing transmission lines. The Applicants have only recently completed the time consuming process of obtaining, organizing, and analyzing records of the current flows for the year 2003 on the transmission lines that now operate on the proposed route. The CONVEX operator had problems in retrieving the data, and when the data set was analyzed, some data values were found to be suspect and were discarded to assure the validity of the remaining data set.

Review of the data identified entries where no line flows were recorded or where the flows remained unchanged from hour to hour. In a free flowing AC power system, it is virtually impossible to have the same flow on a transmission line for more than an hour or two, due to changes in load and generation. Therefore, these entries were excluded from the analysis. Most of the data that were removed from

consideration occurred in December 2003, as indicated on the figures. However, the data did encompass the summer peak, which is typically the period of highest current flow on transmission lines.

Q. How do these data support the validity and reasonableness of the 15 GW and 27.7 GW load cases?

A. First, these data show that the current flows modeled by the Companies in the 15 GW case, representing the average load flow on transmission lines operating in Cross Sections 1-8 of the proposed route, are quite close to the average loadings on these lines that were actually recorded in the year 2003.

Second, the current flows modeled by the Companies in the 27.7 GW case, representing the peak current flows (highest single hour New England load in 2007) on transmission lines operating in Cross Sections 1-8 of the proposed route, are shown to be very much greater than the *maximum hourly flows ever recorded* on 345-kV transmission lines in 2003. For the 115-kV lines in the 27.7 GW case, which are less stressed than the 345-kV lines in these conditions, we still find that almost all lines have current flows that are close to the *maximum* hourly current flow ever recorded in 2003.

Q. Please explain how you reached your conclusion regarding the 15 GW case.

A. Figure 1 shows the mean (average) recorded current flow in amperes on the existing transmission lines in 2003 as compared to the currents on these lines that were modeled for the 15 GW case. Bars marking ± 1 standard deviation show the variation around the mean current flow. Typically, about 68% of the recorded values fall within the range of current flows between –1 standard deviation and +1 standard deviation. For 18 of the 21 load conditions plotted, the 15 GW loads are at, or within, the range of values marked by ± 1 standard deviation. In the remaining three conditions the 15 GW current flows fall outside the range marked by ± 1 standard deviation (2 cases higher; 1 case lower).

Q. Please explain how you reached your conclusion regarding the 27.7 GW case.

A. The 27.7 GW case is meant to reflect the highest system loading during an hour within a year. Figure 2 compares the currents modeled in this case to the maximum hourly value recorded on each transmission line in 2003. Also shown are the median (50^{th} percentile) and minimum recorded current flows.

Note that the loadings on the 345-kV lines (387, 362) in Cross Sections 1, 3, 4 and 5 at a 27.7 GW system load are many hundreds of amperes greater than the highest hourly current flow recorded in 2003. The loadings on the 115-kV lines (whose line numbers start with 1) in the 27.7 GW case are generally much higher than the

median recorded currents in 2003 and are not far below the maximum recorded currents. There are only three line sections where the 27.7 GW modeled currents are at or below the median current flow in 2003.

Q. Should we expect that the currents on every line in every cross section of the route for the 15 GW case to equal or exceed the 2003 mean current loadings?

A No, but we would expect most of the loadings on lines at 15 GW to fall in the range of the 2003 average loadings. That is what we see in Figure 1.

Q. Should we expect the currents on every line in every cross section of the route for the 27.7 GW case to exceed the maximum-recorded hourly-value in 2003?

A. No. It would be improbable, if not impossible, for every line in the New England grid to simultaneously experience a maximum load. Increasing loads on some lines may cause the load served by other lines to be reduced. However, the 27.7 GW load case does heavily stress the 345-kV system and that is clearly reflected in the comparisons to the maximum loads recorded on 345-kV lines in 2003.

Q. Do these data provide the Council additional assurance that the 15 GW and 27.7 GW load cases can be relied upon for the purposes of modeling magnetic fields in the future?

A. Yes. In summary, the data confirm that the current flows modeled by the Companies for the 15 GW case reflect average or typical loading conditions on the transmission lines now operating on the proposed route. The data also show that the 27.7 GW case reflects loadings on existing lines that exceed (345-kV lines) or are close to the maximum (115-kV) loads ever recorded on these lines in 2003 as one would expect for a future peak system load and a deficiency of generation in Southwestern Connecticut. (Direct Testimony of John Prete Concerning Magnetic Field Modeling, September 24, 2004, Applicants' Ex. 156).

Q. Does this conclude this testimony?

A. Ye

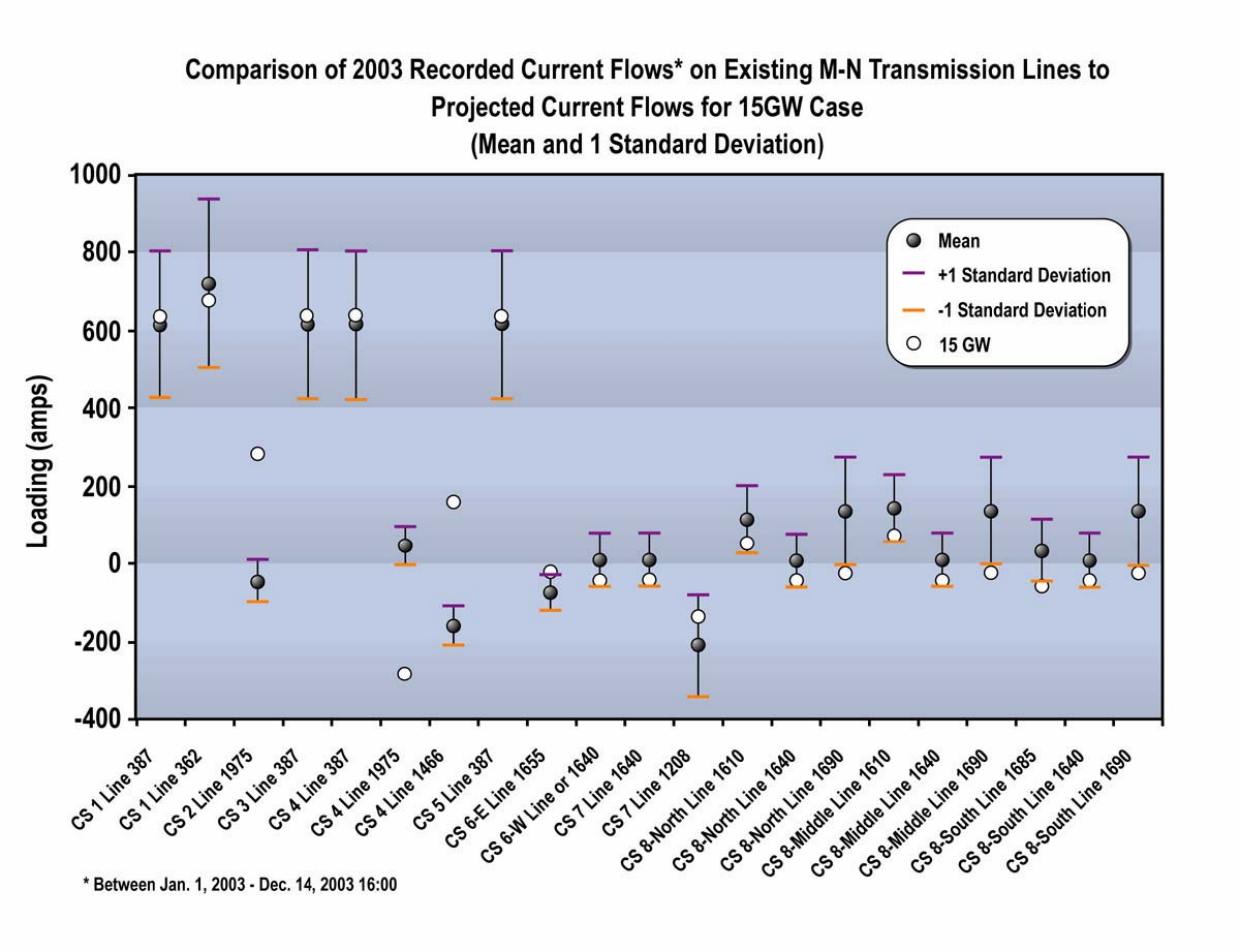

Figure 1. 2003 hourly current flows (mean ± standard deviation) recorded on existing transmission lines for Cross Sections 1-8 of the proposed Middletown-Norwalk route and modeled average current flows at 15 GW. Positive load flows indicate that the flow on the line is in the direction of the view of the cross section identified in Volume 10 of the Application. Negative load flows indicate that the flow on the line is in the opposite direction of the cross section view.

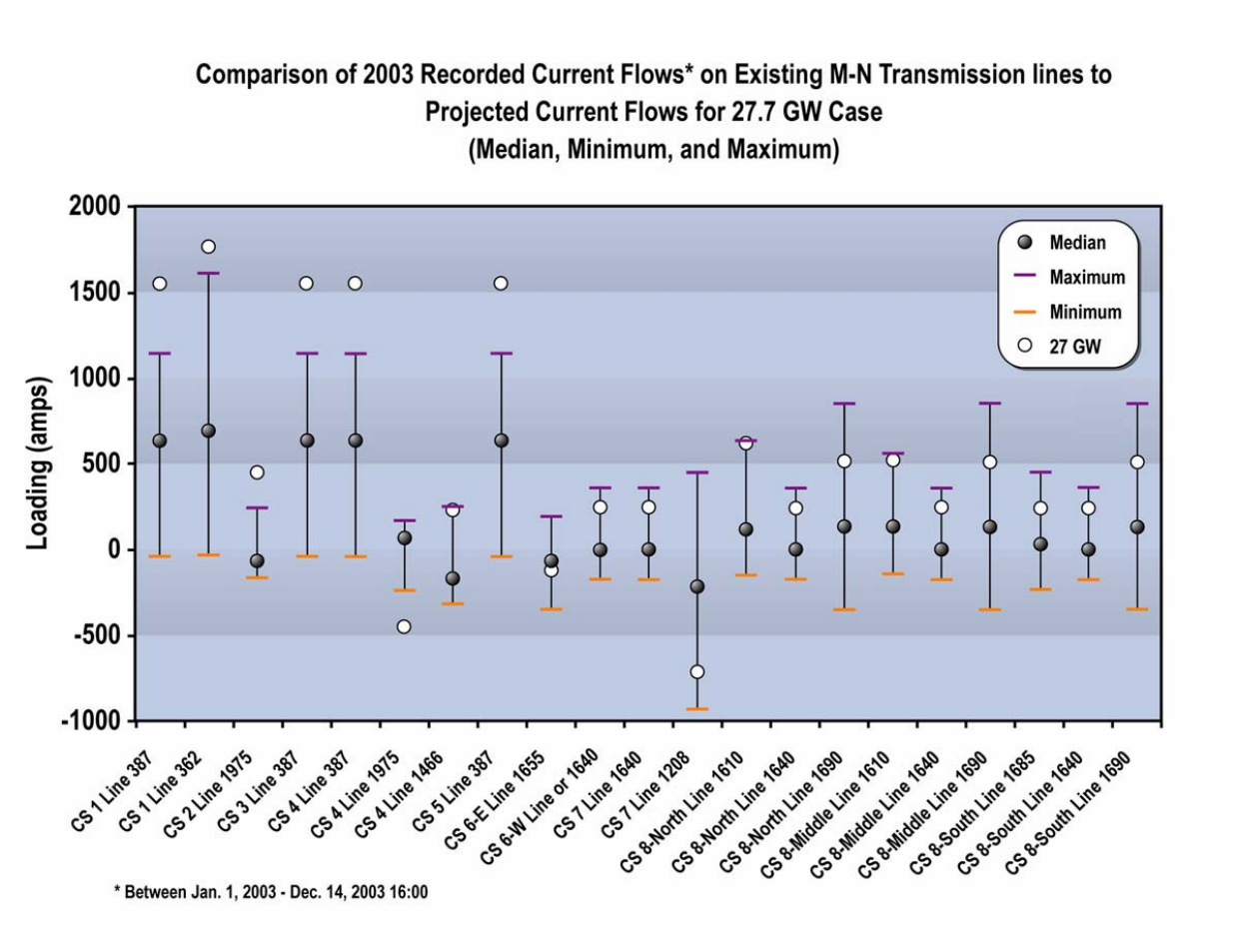

Figure 2. 2003 hourly current flows (maximum, median, minimum) recorded on existing transmission lines for Cross Sections 1-8 of the proposed Middletown-Norwalk route and modeled hourly peak current flows at 27.7 GW. Positive load flows indicate that the flow on the line is in the direction of the view of the cross section identified in Volume 10 of the Application. Negative load flows indicate that the flow on the line is in the opposite direction of the cross section view.

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