January 18, 2005

VIA HAND DELIVERY AND ELECTRONIC MAIL

Pamela B. Katz
Chairman
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06505

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 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.

Dear Chairman Katz:

During the hearing held on January 5, 2005, Peter Boucher, counsel for Durham and Wallingford, asked the Companies to file copies of any provisions of the National Electrical Safety Code ("NESC") related to electric or magnetic fields. In response to this request, the Companies hereby file an original and twenty (20) copies of the attached memorandum regarding provisions of the NESC concerning induction, induced voltages, and electrostatics. All references are to the 2002 edition of the NESC.

Very truly yours,

Brian T. Henebry

cc: Service List

National Electrical Safety Code References for Induction, Induced Voltages, and Electrostatics (2002 Edition)

Section 9. Grounding Methods for Electric Supply and Communications Facilities

Rule 092E: **Point of Connection of Grounding Conductor**

> Fences [at electric supply facilities][1] that are required to be grounded by other parts of this code shall be designed to limit touch, step and transferred voltages in accordance with industry practices

Part 2. Safety Rules for the Installation and Maintenance of Overhead Electric Supply and Communication Lines

Section 21. General Requirements

Rule 212: **Induced Voltage**

> ....Cooperative procedures are recommended in the control of voltages induced from proximate facilities. Therefore, reasonable advance notice should be given to owners or operators of other proximate facilities that may be adversely affected by new construction or changes in existing facilities.

Rule 215C3: **Grounding of Circuits, Supporting Structures, and Equipment**

> Multiple Messengers on the Same Structure
> Communication cable messengers exposed to power contacts, power induction, or lightning, shall be bonded together at intervals specified in Rule 92C.

Section 22. Relations Between Various Classes of Lines and Equipment

Rule 223A4: **Communications Protective Requirements**

> Where communication apparatus is handled by other than qualified persons, it shall be protected by one or more of the means listed in Rule 223B if such apparatus is permanently connected to lines subject to the following:
>
> 1. Lightning
> 2. Contact with supply conductors whose voltage to ground exceeds 300V
> 3. Transient rise in ground potential exceeding 300V
> 4. Steady-state induced voltage of a hazardous level

Section 23. Clearances

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[1] Brackets within quotes contain text not included in the NESC that has been added for clarification purposes

Rule 232: **Vertical Clearances of Wires, Conductors, Cables, and Equipment Above Ground, Roadway, Rail, or Water Surfaces**

C1c: *Additional Clearances for Wires, Conductors, Cables and Underground Rigid Live Parts of Equipment.*

For voltages exceeding 98-kV ac to ground, either the clearances shall be increased or the electric field, or the effects thereof, shall be reduced by other means as required to limit the steady-state current due to electrostatic effects to 5 mA [milliAmperes] rms [root-mean-square] if the largest anticipated truck, vehicle, or equipment under the line were short-circuited to ground. The size of the anticipated truck, vehicle, or equipment used to determine these clearances may be less than but need not be greater than that limited by federal, state, or local regulations governing the area under the line. For this condition, the conductors shall be at final unloaded sag at 50°C (120°F).

D3c: *Alternate Clearances for Voltages Exceeding 98-kV AC to Ground or 139-kV DC to Ground*

For voltages exceeding 98-kV ac to ground, either the clearances shall be increased or the electric field, or the effects thereof, shall be reduced by other means as required to limit the steady-state current due to electrostatic effects to 5 mA [milliAmperes] rms [root-mean-square] if the largest anticipated truck, vehicle, or equipment under the line were short-circuited to ground. The size of the anticipated truck, vehicle, or equipment used to determine these clearances may be less than but need not be greater than that limited by federal, state, or local regulations governing the area under the line. For this condition, the conductors shall be at final unloaded sag at 50°C (120°F).

Rule 234: **Clearance of Wires, Conductors, Cables, and Equipment From Buildings, Bridges, Rail Cars, Swimming Pools, and Other Installations**

G3: *Additional Clearances for Voltages Exceeding 22-kV for Wires, Conductors, Cables, and Unguarded Rigid Live Parts of Equipment*

For voltages exceeding 98-kV ac to ground, either the clearances shall be increased or the electric field, or the effects thereof, shall be reduced by other means as required to limit the steady-state current due to electrostatic effects to 5 mA [milliAmperes] rms [root-mean-square] if the largest anticipated truck, vehicle, or equipment under the line were short-circuited to ground. The size of the anticipated truck, vehicle, or equipment used to determine these clearances may be less than but need not be greater than that limited by federal, state, or local regulations governing the area under the line. For this condition, the conductors shall be at final unloaded sag at 50°C (120°F).

Part 3. Safety Rules for the Installation and Maintenance of Underground Electric Supply and Communication Lines

Section 31. General Requirements Applying to Underground Lines

Rule 315A: **Communications Protective Requirements**

Where communication apparatus is handled by other than qualified persons, it shall be protected by one or more of the means listed in Rule 315B if such apparatus is permanently connected to lines subject to the following:

1. Lightning
2. Contact with supply conductors whose voltage to ground exceeds 300V
3. Transient rise in ground potential exceeding 300V
4. Steady-state induced voltage of a hazardous level

Rule 316: **Induced Voltage**

....Cooperative procedures are recommended in the control of voltages induced from proximate facilities. Therefore, reasonable advance notice should be given to owners or operators of other proximate facilities that may be adversely affected by new construction or changes in existing facilities.

Section 39. Installation in Tunnels

Rule 391A3: **Environment**

Installation in Tunnels

3. Design to avoid unsafe conditions due to induced voltages

Part 4. Rules for the Operation of Electric Supply and Communications Lines and Equipment

Section 42. General Rules for Employees

Rule 420C6: **Personal General Precautions**

Employees should exercise care when extending metal ropes, tapes, or wires parallel to and in the proximity of energized lines because of induced voltages. When it is necessary to measure clearances from energized objects, only devices approved for the purpose shall be used.

Rule 422C5: **Overhead Line Operating Procedures**

Employees working on or in the vicinity of equipment or lines exposed to voltages higher than those guarded against by the safety appliances provided shall take steps to be assured that the equipment or lines on which the employees are working are free from dangerous leakage or induction or have been effectively grounded.

Section 43. Additional Rules for Communications Employees

Rule 434: **Sheath Continuity**

Metallic or semiconductive sheath continuity shall be maintained by bonding across the opening, or by equivalent means, when working on buried cable or in manholes. [To avoid dangerous induced voltages.]

Section 44. Additional Rules for Supply Employees

Rule 443: **Work on Energized Lines and Equipment**

A3: *General Requirements*

All employees working on or in the vicinity of lines or equipment exposed to voltages higher than those guarded against by the safety protective equipment provided shall assure themselves that the equipment or lines on which they are working are free from dangerous leakage or induction or have been effectively grounded.

A5: *General Requirements*

Metal measuring tapes, and tapes or ropes containing metal threads or strands, shall not be used closer to exposed energized parts than the distance specified in Rule 441A. Care should be taken when extending metallic ropes or tapes parallel to and in the proximity of high-voltage lines because of the effect of induced voltages.

Rule 445A1: **Protective Grounds**

Current-Carrying Capacity of Grounds

The grounding device shall be of such size as to carry the induced current and anticipated fault current that could flow at the point of grounding for the time necessary to clear the line.

Rule 446D3: **Live Work**

Adequate electrostatic shielding in the form of protective clothing that has been evaluated for electrical performance shall be provided and used where necessary.