STATE OF CONNECTICUT
SITING COUNCIL

THE CONNECTICUT LIGHT AND POWER COMPANY APPLICATION FOR A CERTIFICATE OF ENVIRONMENTAL COMPATIBILITY AND PUBLIC NEED FOR THE CONSTRUCTION, MAINTENANCE, AND OPERATION OF A PROPOSED SUBSTATION LOCATED OFF COMMERCE PARK DRIVE, OXFORD, CONNECTICUT	:	DOCKET NO. 327
	:	May 10, 2007

DIRECT TESTIMONY OF KENNETH B. BOWES REGARDING PLANNING MATTERS CONCERNING THE PROPOSED OXFORD SUBSTATION

INTRODUCTION

Q. Please identify yourself and the other members of the panel who will respond to cross-examination regarding planning and environmental matters concerning the proposed Oxford Substation and related facilities (the "Project").

A. I am Kenneth B. Bowes, Director of Transmission Projects, employed by Northeast Utilities Service Company ("NUSCO"), agent for The Connecticut Light and Power Company (the "Company"). With me on this panel are NUSCO employees Jeffrey Martin, Project Manager, and Amanda Carroll, Siting and Permitting - Associate Scientist. The resumes of these panel members are attached.

Q. Does the Company expect to call on any other personnel to respond to planning or environmental issues?

A. NUSCO employees, including Robert E. Carberry, NUSCO Manager of Transmission Siting and Permitting, may be called upon to respond to questions relating to specific siting, engineering design or environmental topics. In addition, the Company may call on Substation Engineer Kris Aberg, Transmission Line Engineer Michael Carlson, CL&P Circuit Owner William Lepper, and Jamie Durand, Senior Wetland/Soil Scientist, ENSR International. In addition, Meghan Wagner, MPH, Senior Scientist for Exponent® will be available to answer questions concerning the health effects of electric and magnetic Fields.

Q. What responsibility have you had in connection with the Application to the Siting Council?

A. With Mr. Carberry and Mr. Martin, I have supervised the preparation and submission of the Application and interrogatory responses. The Application was compiled under our supervision by NUSCO staff, environmental consultants and others.

Q. What is the purpose of your testimony?

A. The purpose of my testimony is to provide an overview of the proposed Oxford Substation.

I will cover eight primary topics pertaining to planning matters:

1. Overview and general location of the Project;
2. Municipal consultations;
3. Need;
4. Review of siting criteria;
5. Line connections;
6. Safety and reliability;
7. Electric and magnetic fields;
8. Notices to nearby property owners; and
9. DOT's Comments on site location.

Further direct testimony on environmental matters concerning the Project will be provided by Amanda Carroll, Siting and Permitting - Associate Scientist.

1. OVERVIEW AND GENERAL LOCATION OF THE PROJECT

Q. Please describe the Project.

A. The Company is proposing a Project to build a new substation, to be known as the Oxford Substation, in Oxford, Connecticut. The Project will include the construction of a new electric power 115-kV to 13.8-kV substation, construction of the access drive from a new Town road known as Commerce Drive (the Town changed the name of the road from the time of the

Application by dropping the word "Park")associated with the Oxford Commerce Park, and construction of three new transmission line structures to connect the new substation to an existing 115-kV transmission line.

Q. Please describe generally the location of the proposed substation.

A. The proposed substation would be located on the Company's existing property (the "Property") located to the north of Jacks Hill Road, east of Christian Street, and west of North Larkey Road in Oxford, Connecticut. CL&P's purchase of the Property in 2005 was supported by the Town and approved by the Council in Docket No. 304.

The location is well-suited for the proposed use because it is immediately adjacent to an existing CL&P transmission line which traverses the site and centrally located with respect to a growing load area. In addition, it is located in an industrially zoned area lacking significant residential development or concentrated surrounding features.

Q. How does the Company intend to access the proposed substation?

A. Access will be from Commerce Drive, associated with the Oxford Commerce Park that is currently under development. The proposed access to the substation would be a gravel drive extending approximately 600 feet from Commerce Drive into the substation. The access drive would be approximately 15 feet wide to accommodate construction and maintenance vehicles, and beneath which underground duct banks will be installed for

13.8-kV power cables. It will be necessary to cross an inland wetland and an associated intermittent watercourse to provide access to the substation.

Q. Approximately how many vehicle trips to the site would occur per month?

A. Normally two to four.

Q. What will be the dimensions of the proposed substation within the fence line?

A. The substation would occupy an area of approximately 226 feet by 229 feet.

Q. What do you propose for the surface of the substation?

A. The surface area would be covered with trap rock.

Q. What equipment will be located within the proposed substation?

A. The substation within the fenced area would consist of:

- Two 47-Megavolt Ampere ("MVA"), 115- to 13.8-kV power transformers;
- Two metal-clad distribution switchgear enclosures;
- Five 115-kV circuit switchers, and one 115-kV circuit breaker;
- Nine 115-kV disconnect switches;
- A relay and control enclosure (approximately 48 feet by 14 feet);
- A battery enclosure (approximately 24 feet by 14 feet); and
- Within the switchgear and control enclosures, equipment for full Supervisory Control and Data Acquisition ("SCADA") system functions and digital metering for control and monitoring of the substation from a remote location.

Q. Will the substation have the capability for an additional temporary transformer?

A. Yes. The substation would also contain a circuit switcher and a disconnect switch to facilitate the installation of a mobile transformer in case one of the permanently installed transformers needs to be removed from service for a prolonged time.

Q. What is the estimated cost of the Project?

A. Approximately $10,070,643.

Q. What is the service life of the equipment?

A. The equipment has a nominal service life in excess of 40 years.

Q. Could the life of the substation be extended beyond 40 years?

A. Yes. There is room to expand the substation and CL&P's experience is that its substations often remain in service beyond 40 years.

Q. How long do you anticipate the construction phase of the Project to take?

A. Approximately one year.

Q. When do you expect to begin construction activities?

A. CL&P plans to begin construction of the substation in November 2007.

Q. What is the tentative in-service date?

A. December 2008.

Q. What will be the general operation of the proposed substation?

A. The proposed substation will operate on a 24-hour per day basis.

Q. Will staff be on site?

A. No, not normally. The equipment will be designed so it can be monitored remotely, and personnel will be dispatched for unusual or emergency situations and for routine/scheduled maintenance.

2. MUNICIPAL CONSULTATIONS

Q. Did you receive Council approval to acquire the subject property?

A. Yes, the Council granted approval to CL&P to acquire the proposed 15.77-acre property in the Council's Docket No. 304.

Q. Did the Town support such acquisition?

A. Yes, in fact the Council acknowledged the Town's support in its finding that "the First Selectman stated his support of this land acquisition, and that the acquisition is consistent with proper planning for the Town of Oxford."

Q. When was the subject property acquired?

A. October 31, 2005.

Q. Since that time, has the Town been involved with the Oxford Substation Project?

A. Yes, the Town has had many discussions with CL&P officials since October 31, 2005 and has closely monitored the progress of the Oxford Substation Project.

Q. How would you characterize the Town's position concerning the Oxford Substation Project?

A. The Town has been extremely supportive of the Oxford Substation Project and views it as a key component of the Town's overall economic development strategy.

Q. How has the Town communicated its support to CL&P?

A. In addition to frequent discussions with CL&P wherein the Town has expressed its enthusiasm for the Project, the Town has provided the following since 2005:

- April 19, 2005 letter from the First Selectman, August A. Palmer, III, to then CSC Chairman Katz;
- Testimony, Docket 304, by First Selectman Palmer;
- August 15, 2006 letter from First Selectman Palmer to CL&P;
- October 2006 Resolution of the Board of Selectmen;
- October 18, 2006 letter from Economic Development Director, Herman Schuler, to CL&P; and
- October 18, 2006 letter from Economic Development Commission to CL&P.

Copies of these correspondence have been provided to the Council in Appendix E, Volume II of II, of the Application.

Q. Did CL&P receive location approvals?

A. Yes. Both the Oxford Conservation Commission/Inland Wetlands Agency and the Planning & Zoning Commission unanimously approved the location of the Oxford Substation, such actions having been taken on August 14, 2006 and August 17, 2006, respectively.

3. NEED

Q. What is the purpose of the proposed Oxford Substation?

A. The purpose of the substation is to increase the capacity to transform electricity from 115 kV to 13.8 kV in order to improve electric distribution system adequacy and reliability in the Town of Oxford and its surrounding areas. Increasing the capacity to deliver electric power from the 115-kV transmission system to the local 13.8-kV distribution system is necessary to respond to increasing peak-load demands.

Q. What is the present situation in Oxford?

A. Currently, electric load in the Town of Oxford is served by distribution feeder circuits emanating from three primary 115- to 13.8-kV substations: Beacon Falls Substation in Beacon Falls, Bates Rock Substation in Southbury, and South Naugatuck Substation in Naugatuck.

Q. Has Oxford experienced demand growth recently?

A. From 2004 to 2006, Oxford's peak electric power demand grew by more than 5 MVA, reaching 24.3 MVA in the summer of 2006, an increase of nearly 26%. Peak demand is forecasted to increase at an even faster rate in the years to come as the Town experiences additional development. Based on planned development in Oxford, peak demand may reach nearly 60 MVA by the year 2012, representing more than a threefold increase in just 8 years.

Q. Is more substation capacity needed?

A. Yes. Substation capacity must be added to meet this demand, and it must be added in a way that provides an adequate and reliable source of power to the Town of Oxford for many years to come. The ISO-NE approved the plan for implementation of the Oxford Substation on January 26, 2006. Additionally, a substation for the Oxford area has been listed in the Council's Forecast of Loads and Resources since 2003.

Q. How much margin does CL&P presently have to address Oxford's growing demand?

A. Currently, very little margin exists to meet area growth as substations in neighboring towns near their rated capacity. Beacon Falls, Bates Rock and South Naugatuck have a combined rated capacity of 184 MVA. These three substations experienced a combined peak load of 180.9 MVA in 2006. The expected load growth in Oxford alone, not to mention load growth in the surrounding towns, is forecasted to consume this available margin by 2008.

Q. How will the Oxford Substation relieve the capacity deficiency?

A. The Oxford Substation would resolve capacity deficiencies by creating a new bulk power substation to provide a distribution power source for the Town of Oxford. The proposed new substation would be similar in size to the Beacon Falls and Bates Rock substations, providing between 70 and 75 MVA of substation capacity to the system. This additional capacity will not only provide enough supply to meet the needs of Oxford for years to come, but it will also improve the reliability of the Town's distribution system by eliminating reliance on circuits from neighboring substations.

Q. Did CL&P explore system alternatives to address this need?

A. CL&P's evaluation of system alternatives included construction of new distribution feeders (i.e., new distribution circuits from existing substation facilities to serve the Oxford area), adding transformer capacity at the115-kV bulk substations at Bates Rock, Beacon Falls, South Naugatuck, and Stevenson to supply these new distribution circuits, and alternatives such as distributed generation and demand response.

Q. What conclusion was reached?

A. Establishing a new substation in Oxford was found to be the best solution. Based on CL& P's alternatives analysis, construction of a new bulk substation in Oxford is the most reliable and cost-effective solution to serve the growing load in Oxford. The proposed Project would include new distribution feeders at reasonable lengths designed to serve the growing Oxford load, and it will enhance distribution system reliability in Oxford. Furthermore, most of the Oxford load that is currently consuming substation capacity in adjacent towns will be transferred to the new substation, freeing up capacity at those substations to serve load growth in their host towns.

Q. Has the Connecticut Energy Advisory Board ("CEAB") reviewed the Project?

A. Yes. The CEAB viewed this project favorably. In its April 2007 report to the Council, the CEAB concluded that CL&P made a compelling case that the proposed Oxford Substation conforms to the most relevant of the Preferential Criteria for this Project, which is enhanced reliability, and does not raise any material concerns relative to the other Preferential Criteria. The CEAB stated that CL&P has correctly assessed that the existing area substations are in need of relief; the existing 2006 loads on the three substations that supply this portion of the distribution system are very near their current capacity; the individual load will consume any available capacity by 2008; that achieving transformer capacity relief by transferring loads to neighboring substations is not a feasible solution; there does not appear to be sufficient potential for local generation or load reduction to effectively serve as alternatives to the proposed substation; and, the proposed substation is a reasonable approach to maintaining and improving local area reliability. Moreover, the CEAB noted that in the absence of any proposed alternatives, it appears to be the only realistic way forward.

4. REVIEW OF SITING CRITERIA

Q. Has the Council previously reviewed the site being proposed in this Application?

A. Yes. In Docket No. 304, the Council granted approval to CL&P to acquire the proposed 15.77-acre property between Jacks Hill Road and Christian Road in Oxford and a contiguous transmission line easement area on April 21, 2005. That Decision and Order was supported by CL&P's *Site Evaluation and Selection Report* documenting the evaluation of alternative sites and reasons for selecting the preferred site. The analysis of alternative locations focused on the search/study area, and the present site was authorized for acquisition in Docket 304 because it is where the need for additional power is the greatest. In addition, the Town's planned land use north of Jacks Hill Road is zoned for industrial/business purposes, whereas the Town's land use south of Jacks Hill Road will be more for residential, commercial, and Town purposes.

Q. Please review the siting criteria that were used to select the proposed substation site.

A. The major criteria used to evaluate site alternatives and select the best location for the proposed substation were:

- Sufficient space for needed facilities;
- Proximity to an existing 115-kV transmission circuit; and

- Central location with respect to a local distribution (customer) load area.

Other important site evaluation considerations include:

- Proximity to residential neighbors and other surrounding features;
- Natural resource (i.e. inland wetlands) and cultural resource constraints;
- Existing and future land use;
- Access from a public road;
- Earthwork requirements based on existing topography; and
- Real estate considerations such as whether the land is owned by CL&P.

Q. What other locations were considered?

A. In addition to the proposed site, CL&P examined three other sites: the south side of Jacks Hill Road; property off of Prokop Road, located east of the transmission line and south of Prokop Road, and an alternative off of Oxford Road, east of the transmission line and south of Oxford Road (Route 67).

Q. Why were these determined to be inferior to the preferred site?

A. The south side of Jacks Hill Road alternative is an inferior choice because:

- The zoning for the site was recently changed from Industrial to Residential as part of an approval from the Oxford Planning and Zoning Commission for development of senior housing that is already under construction.
- According to the Connecticut Department of Environmental Protection ("CTDEP") Natural Diversity Database ("NDDB"), this location is near a NDDB Area of Concern.

- Because of the seasonal high water table associated with this series, excavations are often inundated. Steep slopes of excavations are unstable when the soil is saturated and tend to slump. The erosion hazard for this soil series is also moderate.

The Prokop Road Alternative is an inferior choice because:

- The site is not directly traversed by the existing transmission line, and a new corridor would be needed to tie-in the transmission lines to the substation.
- A new easement would require additional tree clearing and upland disturbance.
- It contains steep grades and adjacent inland wetlands.
- Zoning for the site is industrial; however, uses west of the potential site consist of mixed use commercial/residential and residential development, and the area north of the potential site contains residential uses.

Likewise, the Oxford Road Alternative is an inferior choice because:

- A significant amount of earthwork and tree clearing would be required to obtain access and to make the site suitable for construction of the substation. These activities would result in wetland and floodplain impacts along a segment of the Little River.
- The transmission line tie-ins would also result in wetland impacts as the wetland area would need to be traversed in order to gain access to the existing transmission line which crosses the western portion of the site.
- The soils have been characterized as having a high water table. Excavations would often be inundated and the steep slopes of excavations would not be stable if the soil is saturated. In places, this soil is subject to ponding for several weeks during the winter.

- Zoning for the site is commercial; public utility stations are not a permitted use in this zone. Adjacent parcels to the northwest and to the north of Oxford Road contain residential uses.

Q. Why was the proposed location selected?

A. The Property is an ideal location for a substation given its central location relative to the growing load and its easy interconnection to a 115-kV transmission circuit that already traverses the Property along a CL&P right-of-way. In addition:

- There is sufficient developable land that belongs to CL&P;
- The substation itself would have no effect on any inland wetlands or 100-foot upland review areas;
- It allows CL&P to design a substation that meets the needs of the Town and is in an area already zoned for industrial use;
- It affords easy access from a new public road;
- Minimum effects will occur on the natural resources;
- The amount of earthwork required compares favorably to other sites; and
- The substation and its interconnections do not create a visual impact to residential neighbors.

5. LINE CONNECTIONS

Q. Please explain the design of the connection from the substation to the transmission lines.

A. The substation would be connected to the existing 115-kV 1575 transmission circuit, the nearest of three 115-kV circuits that traverse the Property on two lines of lattice steel towers. The 1575 transmission circuit would be "looped through" the substation, and a new 115-kV circuit breaker would be installed to split the existing transmission circuit into two circuits.

Q. How does a "loop through" design work?

A. A "loop through" design facilitates two transmission circuit connections to a substation, as opposed to one transmission circuit connection for a "tapped" design. Three new transmission line structures would be installed to make the connections between the existing 115-kV transmission circuit and the substation. Each of the 115-kV circuits would be capable of supplying the entire substation load.

Q. Please describe the proposed pole structures for the transmission circuit connection to the substation.

A. A single 74-foot laminated wood pole would be installed to the north of the substation, alongside an existing lattice steel tower within CL&P's existing transmission line corridor between the substation and this new pole; a 55-foot wooden H-Frame structure would be installed north of the substation within CL&P's easement; and a single 74-foot laminated wood pole would be installed south of the substation, alongside an existing lattice steel tower. These three new structures will support the new loop-line spans of conductors which terminate at the substation's line-terminal structures.

Q. Please describe the distribution getaways.

A. Distribution power-cable getaways would exit the substation underground in conduits. The getaways will pass under a culverted crossing designed for the entrance road, protecting them from any vehicle-related impacts. The underground distribution cable getaways would surface to the east and west of the intersection of the access drive with Commerce Drive and rise up wood poles to connect with overhead 13.8-kV line conductors. The distribution lines would then continue overhead to the east and west via new wood poles along Commerce Drive.

6. SAFETY AND RELIABILITY

Q. How would safety and reliability be maintained?

A. CL&P will maintain safety and reliability in the following ways:

- The Project would be constructed in full compliance with the standards of the National Electrical Safety Code and good utility practice. Should equipment experience a failure, protective relaying would immediately remove the equipment from service, thereby protecting the public and the equipment within the substation.

- The Substation will be equipped with measures to ensure continued service in the event of outages or faults on transmission or substation equipment.

- Reliability would be increased by incorporating "loop through" design configurations for the existing 115-kV overhead transmission lines, transformer protection, and redundant automatic protective relaying equipment.

- The distribution feeder system will be designed with automatic recloser-loop schemes to improve service reliability and restoration following faults on distribution feeders.

- In the event of a 115-kV line fault, the Substation's 115-kV circuit breaker would open to help isolate the faulted line.

- Protective relaying equipment is incorporated into the Project design to automatically detect abnormal system conditions and send a protective trip signal to the respective circuit breaker(s) at each end of a line to isolate the faulted section of the transmission system. The protective relaying schemes include fully redundant primary and backup equipment so that an outage of one scheme does not require the portion of the transmission system being monitored by the protective relaying equipment to be removed from service.

- Lighting would be provided within the substation yard to facilitate work at nighttime or during inclement weather, but the substation would not normally be lit at night.

- CL&P would install an oil sump to serve as a spill-containment chamber around the two proposed transformers.

- In accordance with 14 CFR Subpart 77 "Objects Affecting Navigable Airspace", a Notice of Proposed Construction will be filed with the Federal Aviation Administration ("FAA"), since the substation and associated transmission line structures are to be located within approximately 1,500 feet of the end of the runway at the Waterbury-Oxford Airport. The DOT Commissioner will also be notified of construction activities within 1/2 mile of the end of a public airport runway. Copies of these consultations and notifications will be provided to the Council when complete.

Q. Please discuss why CL&P believes there should be no safety concerns to the public.

A. The proposed substation would be designed and constructed in accordance with all applicable national, electric utility industry, state and to the extent practical, local codes. The access drive to the substation would be gated and locked. Additionally, the perimeter of the substation would be enclosed with a 7-foot high chain link fence topped with an additional foot of three strands of barbed wire to discourage unauthorized entry and vandalism.

Q. Will there be fire protection systems maintained at the proposed substation?

A. The relay and control enclosure would have fire extinguishers installed, along with smoke and heat detectors. Other equipment monitoring devices would allow the substation to be monitored from a remote location. Fire and smoke detection would activate an alarm at Connecticut Valley Electric Exchange, and the system operators would take appropriate action.

Q. Could you describe worker protection at the proposed substation?

A. Strict procedures and training for worker safety are always maintained by CL&P employees, and non-employees will always be accompanied by CL&P employees when within the substation. Contractors will be held to the same standards and monitored by CL&P.

Q. Will the environment be protected from the insulating oil used in the transformers?

A. Yes. The transformers will contain mineral insulating oil. The substation will be designed to contain 110% of the volume of the transformer oil in below-grade sumps should there be any inadvertent release of oil. In addition, the sump around the transformers serves not only as an environmental protection, but also functions to retard any fire in the very rare case of spilled and burning oil from a faulted transformer with a ruptured tank or bushing. .

7. ELECTRIC AND MAGNETIC FIELDS

Q. What are electric and magnetic fields?

A. Electric fields ("EF") are produced when a voltage is applied to a conductor. The level of an electric field at a given location depends on the magnitude of the voltage applied, the spacing between conductors and the distance between them.

Magnetic fields ("MF") are produced when electric current flows on a conductor. The level of a magnetic field at a given location depends on the magnitude of the current, the spacing of the conductors, and the distance from them. Levels of each field fall off quickly as the distance from the conductor source is increased. Objects such as trees or building walls easily block electric fields but magnetic fields, penetrate most materials.

EF and MF are collectively referred to as "EMF".

Q. Did the Company perform an analysis of the EMF and potential EMF if the proposed substation was in operation, and if so, what was the outcome?

A. Yes. The highest levels of electric and magnetic fields around the perimeter fence of a substation come from the transmission and distribution lines entering and leaving the substation. Fields produced by the substation equipment inside the fence will decrease in level rapidly with distance, reaching very low levels at short distances beyond substation fences. Typical background magnetic field levels in residences range up to 4 milligauss ("mG"), and the

magnetic fields off the property of a substation due to currents in the substation equipment will commonly be in this same range.

Q. Do magnetic fields currently exist at the property lines of the proposed substation?

A. Yes. At and beyond the boundaries of the subject Property, the predominant existing sources of power-frequency electric and magnetic fields ("EMF") are the transmission lines (circuits 1575, 1585 and 1990). Two existing lines of CL&P transmission towers supporting these three circuits (Note: 1990 is a bundled circuit on the easterly line of lattice steel towers, and the 1575 and 1585 circuits occupy the westerly line of towers) run side-by-side across the subject Property from north to south. There are no existing distribution lines on the Subject Property.

Q. Where will the highest EMF levels occur along the property lines?

A. The highest levels of EMF along the property lines will be found on the northerly and southerly property lines beneath where the three transmission circuits cross over these property lines. Field levels drop off rapidly with distance from a source, so the levels of EMF at all points east and west of these transmission circuits will be much lower than the levels found beneath the circuits. Many locations along the property line of the Property, particularly on its

west side, are at relatively long distances from the transmission circuits, more than a few hundred feet, where EMF levels from these circuits drop to negligible levels.

Q. Have you made any pre-project EMF calculations?

A. Calculations were made of pre-project electric and magnetic fields produced by the existing transmission circuits along profile paths which cross beneath the transmission circuits, in the vicinity of the northerly Property line and the southerly Property line at Commerce Park Drive.. The locations of these profile paths are shown on Figure M-1 of Volume 1 of the Application. The calculated fields at each of these locations are shown in Figures M-2 through M-9 in Volume I of II of the Application. Per standard practice, these calculations assumed balanced three-phase line currents in the transmission circuits, equal phase angles and predominant directions for the transmission circuit currents, level terrain, and bottom 115-kV line conductor heights above grade which are typical for the location where the conductors cross over these property lines. For electric fields, bare terrain is also assumed. Electric fields will be lower at ground level if the terrain holds vegetation or other objects which will partially shield electric fields from the line.

All calculations of electric and magnetic fields were made assuming that the transmission circuits are the only sources of such fields on the subject property.

Q. What line currents were used for the MF calculations?

A. Projected line currents on the peak-load day in the year 2013, determined by system power-flow model simulations, were used for these calculations. Assumptions used in the system power-flow model were ISO-NE's forecast system summer peak load in 2013, no transmission circuit outages, a generation and transmission system which includes all new and modified elements which have already received Council and ISO-NE approvals and which have projected in-service dates before 2013, and a reasonably expected generation dispatch and Connecticut import level for a peak-load day with some large generators unavailable for service. Magnetic fields were calculated using these peak line currents, and also using 70% of these peak line currents as an estimated average circuit current during the peak-load day in 2013. These choices were made for compliance with Section IV of the Council's September 28, 2006 draft "Electric and Magnetic Field Best Management Practices for the Construction of Electric Transmission Facilities in Connecticut".

Q. Where will the highest EMF be found after the Project is operational?

A. The highest levels of EMF will continue to be found on the northerly and southerly property lines directly beneath where the 115-kV transmission circuit conductors cross over these property lines. The results depicted in Figures M-2 through M-7 demonstrate that EMF levels beneath and close to the 115-kV circuits along the northerly property line will

increase under both of the load conditions, and EMF levels beneath and close to the 115-kV circuits along the southerly Property line will decrease under both of the load conditions.

The highest magnetic field level along the northerly Property line, post-project, will be 39.69 mG under the modeled peak-load condition, and 25.81mG under the modeled peak-day average load condition. The highest electric field level in this same location will be 0.97 kV/m.

The highest magnetic field level along the southerly Property line, post-project, will be 10.91 mG under the modeled peak-load condition, and 7.09mG under the modeled peak-day average load condition. The highest electric field level will be 1.08 kV/m.

EMF levels will drop off rapidly with distance from the transmission line sources, so the levels of EMF at all points along a property boundary to the east and west of the transmission circuits will be much lower than the levels found directly beneath the circuits. Beyond distances of not more than 200 feet east and west from the center of the outermost circuit, EMF levels will remain at very low background or negligible levels.

Q. How did the Company consider the Council's EMF Best Management Practices?

A. Consistent with the Council's EMF Best Management Practices for the

Construction of Electric Transmission Facilities in Connecticut, the design of the substation will incorporate field management practices as follows:

- the substation has been located very close to an existing transmission line so that the length of substation entry spans is very short;
- the substation equipment has been located at a sufficient distance from property lines so that this equipment makes no noticeable contribution to EMF levels along these property lines;
- new 13.8-kV distribution lines will exit the substation underground with close circuit spacing and conductor-phase spacing;
- vegetation will effectively screen electric fields.

Q. Has the Company complied with State and Federal EMF standards?

A. There are no State or Federal limits to electric or magnetic field levels at the property line of a substation; however, the Institute of Electrical and Electronic Engineers and the International Commission on Non-Ionizing Radiation Protection have issued guideline limits for long-term public exposures to magnetic fields. These guideline limits are 9,040 mG for the Institute of Electrical and Electronic Engineers and 833 mG for the International Commission on Non-Ionizing Radiation Protection.

Q. How will the MF from the proposed substation compare with those guidelines?

A. The existing and proposed levels of magnetic fields at and beyond the property lines of the substation are well below these limits and typical for all similar substations. Based on these aforementioned guidelines and science peer group reviews of epidemiological and laboratory studies, these magnetic field exposure levels will not pose an undue safety or health hazard to persons or property at or adjacent to the substation property.

8. NOTICES TO NEARBY PROPERTY OWNERS

Q. What measures were undertaken to inform the public and the property owners in the vicinity of the Project?

A. As more fully described in Section Q of the Application, Volume I of II, the legal notice for the Project was published on several occasions in the Connecticut Post and the Oxford Villager, a local weekly newspaper. In addition, notices were sent by certified mail to all abutters and nearby owners. See Exhibit 1 of the Application in Volume I of II.

Q. What was the outcome of the certified mailing to all abutters and nearby owners?

A. Certified mail receipts were received from all abutters and nearby owners listed in Exhibit 1.

9. DOT'S COMMENTS ON SITE LOCATION

Q. Did the Company consult with the Council before acquiring the subject property on October 31, 2005?

A. Yes; as discussed earlier, although CL&P was not required to seek approval of the Council prior to purchasing the subject property [based on the ruling by the Council in Petition No. 237 that Connecticut General Statutes §16-50z does not apply to electrical substations], the Company filed a statement of intent to acquire the subject property as the site for a possible future CL&P 115-kV substation located within an industrial park between Jacks Hill Road and Christian Street, and a transmission line easement adjacent to the existing right-of-way for possible future transmission line use located near the Waterbury Oxford Airport, Oxford, Connecticut, which proceedings were designated Docket No. 304.

Q. Why was the subject property selected?

A. There were several reasons that bear repeating why the subject property was selected:

- the Company was concerned about the growing demand in Oxford due to aggressive economic development efforts and planned residential complexes;
- the Company was also concerned about the availability of only one circuit feeding the entire town coming out of Beacon Falls over a mile and a quarter of mountainous terrain;

- the subject property is adjacent to 3 existing 115kV transmission lines and right of way;

- the significant commercial and residential development planned for the area surrounding the subject property necessitated a purchase before acquisition and development by a third party; and

- the acquisition of the subject property was supported by Town officials and the property owner.

Q. Did the DOT provide comments in Docket No. 304?

A. Yes, as set forth in the Application, Volume II of II, Appendix C, and the Council found:

> The DOT Bureau of Aviation and Ports has had discussions with CL&P regarding a possible substation and its close proximity to Oxford Airport. CL&P was made aware of those DOT and Federal Aviation Administration criteria which may have to be met for the installation of a future substation. The DOT does not object to the intent to acquire the proposed property. (DOT letter of 4/27/05) [See FOF #18].

Q. When were the existing transmission lines energized?

A. Two transmission tower lines carrying 115-kV circuits cross the property. The circuits on the easterly tower line were energized in 1923, and the circuits on the westerly tower line were energized in 1961.

Q. What is the tallest height of the existing transmission structures?

A. About 100 feet above ground.

Q. Will any of the new equipment proposed to be included in the substation facilities be taller than the tallest transmission line structure?

A. No.

Q. Was the Company aware that the Airport might install enhanced runway approach lighting in the future?

A. Yes.

Q. Was the substation designed in a manner consistent with this future lighting improvement by the Airport?

A. Yes, in fact, the Company, in addition to modifying its terminal structures, also moved the substation location to clear locations for 2 MALSR [Medium intensity approach light system with runway alignment indicator lights] masts with lighting masts.

Q. If the Airport were to install enhanced lighting, would it do so on the Company's structures?

A. No, neither the Company's substation structures nor the existing transmission line towers can accommodate the lighting pedestal. Therefore, the Airport would have to erect suitable structures or work with the Company to reconstruct transmission structures in a manner that provides proper clearance to the MALSR structures.

Q. So, is it fair to say that notwithstanding the Company's structures in proximity to Runway 36, the Airport would need tall structures within the runway protection zone to support its enhanced lighting?

A. Yes, according to DOT plans, these could range up to about 75 feet in height.

Q. Have you had discussions with Airport officials over the years concerning the transmission line or siting of a substation on the subject property?

A. Yes.

Q. What was the nature of those discussions?

A. Long before the substation was planned, and after, the Company had discussions and meetings with Airport officials concerning potential future modifications to the Airport such as a runway expansion and lighting enhancements.

Q. What was the tone of those discussions?

A. There was a spirit of cooperation.

Q. What actions were required to be taken by the Company subsequent to such discussions and meetings?

A. None; we understood that the Airport did not receive the necessary funding so it did not pursue any improvements.

Q. At any time during those discussions and meetings, did the Airport inform the Company that it had any objections to the siting of a substation on the subject property?

A. No.

Q. At any time during those discussions and meetings, did the Airport inform the Company that it had any reservations as to the siting of a substation on the subject property?

A. No.

Q. When did you first learn of the objections of the Airport as reflected in the comments of the DOT dated April 25, 2007?

A. The Company learned of such objections from the documents posted on the Council's website on May 1, 2007.

Q. Was the Airport served with a copy of the Application to the Council?

A. Yes. On December 15, 2006, copies of the Application were sent to the following:

Department of Transportation
Ralph J. Carpenter, Commissioner
Department of Transportation
2800 Berlin Turnpike
Newington, CT 06131-7546

Bureau of Aviation & Ports
Department of Transportation
2800 Berlin Turnpike
Newington, CT 06131-7546

Matthew J. Kelly
Waterbury-Oxford Airport
300 Christian Street
Oxford, CT 06478

Federal Aviation Administration
Reid F. LaVerne
Manager, Airports Division
Federal Aviation Administration
New England Region
ANE-600
12 New England Executive Park
Burlington, MA 01803

Q. After the Company filed the application, did it receive any written communications or telephone inquiries from the Airport, the DOT or the FAA?

A. No written or verbal communications were received by the Company.

Q. If the Airport were to enhance its runway approach lighting in the future, can the Company's facilities be modified to accommodate such lighting?

A. Yes.

Q. Can the existing transmission line structures be lowered?

A. Yes. In fact, at the time the subject property was acquired, the Company also acquired additional right-of-way adjacent to its existing right-of-way north from the proposed Substation property to facilitate a lowering of the transmission structures, in anticipation of a future need associated with the Airport.

Q. Why was the lowering of the existing transmission structures not incorporated into this substation project?

A. The lowering of such structures is not necessary for the Company to construct and operate a safe and reliable substation. Furthermore, the Company must justify the costs of a project and such costs must be approved by ISO-New England as a benefit to the regional system.

Q. Approximately what would the cost of lowering such structures be?

A. The cost to lower all the structures on the substation property would be several million dollars more than the cost of the substation interconnection proposed in the CSC application.

Q. Does the approval from ISO-NE include lowering the existing transmission line structures?

A. No.

Q. In its comments of April 23, 2007, the DOT has raised a concern about electronic noise. What is the Company's response?

A. Since we became aware of the DOT correspondence, Mr. Carberry has had numerous conversations with expert consultants and has reviewed relevant manuals in an effort to learn more about the DOT's expressed concerns. This information gathering process is

ongoing as of the time this testimony is submitted. We will be prepared to provide the Council with our assessment of the information we have gathered at the hearing.

Q. In the past, has the Airport ever raised any concerns to the Company about "electronic noise"?

A. No.

Q. Do you have any reason to believe that any of the substation's equipment will adversely affect the Airport's equipment?

A. No.

Q. Does this conclude your testimony?

A. Yes.

EXHIBIT A

RESUMES

Kenneth B. Bowes
Director, Transmission Projects
Northeast Utilities Service Company
Berlin, Connecticut

RESUME

Director, Transmission Projects, 2004 - Present

- Responsible for the project management of transmission projects in the three-state service area for Northeast Utilities. Development of the scope definition, budget and schedule for >$100 million in annual project spending. Responsible for the administration of Transmission contracts and project cost & scheduling departments.

Director, Transmission Construction, Test & Maintenance, 2002 - 2004

- Responsible for the field construction, test and maintenance of the transmission system for Northeast Utilities. Development and staffing of the new 150 employee organization to assume transmission O&M functions including safety and environmental programs and compliance for the Transmission Business.

Director, Transmission & Distribution Maintenance, 1999 - 2002

- Responsible for the operation and maintenance of the transmission system, substation facilities, and the underground network system for CL&P. Process Owner of Maintenance for Northeast Utilities System. Direct management of 375 employees including: union line workers, electricians, general utility workers, underground cable splicers, test personnel, central maintenance workforce, and the Technical Services department. Provide expert testimony in lawsuits and regulatory proceedings.

Manager, Technical Services, 1997 - 1999

- For the Retail Business Group, manage a technical support department with staff of 55 employees and annual budget of $4 million. Responsible for: environmental operations, telecommunication network systems, process computers, mobile radio, paging, radio control, SCADA, telemetry systems, distribution automation, chemistry laboratory, corrosion control, and support services for the Northeast Utilities System.

Team Leader, Market Management Industrial Accounts, 1995 - 1997

- For the Retail Marketing Group, establish the strategic direction of the Industrial Market Segment, including the preparation of marketing plans, development of value-added services, strategic partnerships, sales and marketing materials, and direct sales support.

Senior Engineer and Section Lead - Laboratory Services, 1993 - 1995

- For the Technical Services Department, establish and define the section workload, assign, schedule and track activities and expenditures. Represent the electric utility industry on national technical committees and panels. Perform complex power engineering assignments requiring a high standard of professional technical competence including: new energy conservation technologies, power conditional equipment, electric vehicles, railway electrification, and transmission and distribution grounding studies.

Engineer - Laboratory Test, Standards Laboratory, 1984 - 1985, 1986 - 1992

- For the System Test Department, primarily responsible for power quality investigations to determine the causes of power system disturbances and their cost effective mitigation. Other duties include the metrology of the electrical standards used for the corporation. Inter-laboratory comparisons with the National Institute of Science and Technology, manufacturers, and other utilities.

Assistant Engineer - Area Operations, 1985-1986

- Performed engineering assignments in the support of the design, analysis, construction, operation, and maintenance of the electric distribution system. Customer relations skills were developed through the coordination and scheduling of customers, contractors, and other utilities for the installation and maintenance of electric service.

EDUCATION

M.S.E.E. 1990, Concentration in Telecommunications and Information Processing

- Rensselaer Polytechnic Institute, Hartford, Connecticut

B.S.E.E. 1984, Electronic Systems Option

- University of New Hampshire, Durham, New Hampshire
  Grant State Honor Scholarship

PUBLICATIONS

- IEEE Working Group on Nonsinusoidal Situations, "Practical Definitions for Powers in Systems with Nonsinusoidal Waveforms and Unbalanced Loads: A Discussion", 95 WM 040-6 PWRD, 1995
- IEEE Working Group on Nonsinusoidal Situations, "A Survey of North American Electric Utility Concerns Regarding Nonsinusoidal Waveforms", 95 WM 036-4 PWRD, 1995
- Bowes, K. B., "The Effects of Temporary Overvoltage (TOV) on Consumer Products", POWER QUALITY '91 USA, Official Proceedings of the Third International Power Quality Conference, Universal City, CA, September 22-27, 1991
- Bowes, K. B., Lorusso, A., "Harmonic and Power Characteristics of Electronic Ballasts for Fluorescent Lighting Applications", POWER QUALITY '90 USA, Official Proceedings of the Second International Power Quality ASD Conference, Philadelphia, PA, October 21, 29, 1990
- Anderson, L.M., Bowes, K.B., "The Effects of Power-line Disturbances on Consumer Electronic Equipment", IEEE Transactions on Power Delivery, Volume 5, Number 2, pp. 1062-65, April 1990
- Bowes, K. B., "The Effects of Power-line Disturbances on Electronic Products", POWER QUALITY '89 USA, Official Proceedings of the First International Power Quality Conference, Long Beach, CA, October 15-20-1989 (Also edited and reprinted in Power Quality Magazine - Premier V Issue)

PROFESSIONAL AFFILIATIONS

- Edison Electric Institute, Transmission Committee – 1st Vice Chairman, 2006
- IEEE Working Group on Nonsinusoidal Situations, 1993 - 1998 (Winner of 1998 IEEE Working Group Award)
- National Fire Protection Association (NFPA), National Electrical Code, Subcommittee on Nonlinear Loads, 1993

Robert E. Carberry April, 2007

Manager – Transmission Siting and Permitting
Northeast Utilities Service Company
Hartford, Connecticut

Education:

Bachelor of Science in Electric Power Engineering, June, 1972, Rensselaer Polytechnic Institute, Troy, NY

Master of Engineering in Electric Power Engineering, June 1973, Rensselaer Polytechnic Institute, NY

Management Development Program, Hartford Graduate Center, 1989

Experience:

June 1973 to March 1974 - Bechtel Associates Professional Corp., electrical design of Midland nuclear plant including load flow and voltage studies.

March 1974 to March 1975 - NUSCO, Protection Engineering Section. Performed relay settings and assisted Transmission Line Engineering.

March 1975 to March 1984 - NUSCO, Transmission Line Engineering. Standards, investigations and studies for permanent and temporary grounding, radio and audible noise, electrical/biological effects of AC fields, special insulation, thermal rating studies and research projects, high phase order, HVDC, compact line design, insulated shield wires, and lightning performance.

March 1984 to April 1985 - NUSCO, Substation Project Engineering. Project conceptual development and management plus associated studies and standards activities.

April 1985 to March 1988 - NUSCO, Substation Project Engineering Manager.

March 1988 to November 1992 - NUSCO, Manager of Substation Engineering and Design.

December 1992 to June 1997 - NUSCO, Manager of Transmission Line and Civil Engineering.

June 1997 to October 2000 - NUSCO, Manager of T&D Asset Strategy.

October 2000 to September 2001 - NUSCo, Manager of Transmission Engineering.

September 2001 to March 2003 - NUSCO, Project Manager – Bethel to Norwalk Transmission Project.

March 2003 to October 2004 - NUSCO, Project Director – Bethel to Norwalk Transmission Project.

October 2004 to Present – NUSCO, Manager – Transmission Siting and Permitting.

NU's EMF expert 1975- present and leader of the NU EMF Task Force established in 1990.

Other Experiences:

Adjunct Faculty Member, University of Hartford, College of Engineering, January to May, 1987. Conducted portions of course in Power Systems Analysis.

T&D Emergency plan assignment as First Deputy to the Director, Electric, a liaison position with the CT Office of Emergency Management, 1985 to 2002.

Member of Advisory Committee serving the Connecticut Interagency EMF Task Force, 1991 to present.

Professional Engineering Registration: Connecticut and Massachusetts

Industry and Professional Society Activities/Senior Member, IEEE (1983)

IEEE Power Engineering Society, Transmission and Distribution Committee memberships.

1) Corona and Field Effects (C&FE) Subcommittee, Member 1976 to present, Vice Chairman 1983 to 1985.

2) C&FE Working Groups on AC Fields and Audible Noise, 1976 to present.

3) Chairman of C&FE Working Group on Design and Environmental Considerations, 1977 to 1985.

4) Secretary and Vice Chairman of Administrative Subcommittee's Coordinating Group on Environment, Safety and Public Affairs, 1981 to 1984.

IEEE Power Engineering Society, Substations Committee memberships

1) Substations Committee, member 1987 to 1995

2) Environmental Subcommittee and Associated Working Groups, member 1985 to 1995.

3) Various Working Groups of the Distribution Substations Subcommittee and the Gas Insulated Substations Subcommittee, member 1985 to 1995.

Edison Electric Institute - Chairman of the Electric Light and Power group delegation to the American National Standards Committee C63 on Electromagnetic Compatibility, 1980 to 1985.

Electric Power Research Institute - Industry advisor on project RP1591, Assessment of AC Transmission Line Field Effects, 1982 to 1984. NU representative on Transmission Line Business Unit Council, October, 1995 to December, 1996, and on EMF/RF Area Council, 2005-present.

International Electrotechnical Commission, CISPR C - Member of an advisory group assisting the Technical Advisor to the U.S. National Committee of the IEC on matters pertaining to interferences from overhead power lines, 1980 to 1988.

Edison Electric Institute - EMF Task Force, 1990 to present: EMF Steering Committee 1995 to 2003.

Professional Recognitions:

IEEE PES Working Group Recognition and/or Prize Paper Awards

- AC Fields Working Group (1992)
- Working Group on Design and Location of Substations for Community Acceptance (1992)
- Substation Security Working Group
- "A Survey of Methods for Calculating Transmission Line Conductor Surface Voltage Gradients," 1980
- "Corona and Field Effects of AC Overhead Transmission Lines: Information for Decision Makers," 1986

Jeffrey R. Martin

Professional History

- Northeast Utilities (Jun 2004 – Present)
- ENSR International (Sep 2001 – Jun 2004)
- Environmental Science Services, Inc. (Mar 1998 – Sep 2001)
- Massachusetts Department of Environmental Protection (Dec 1987 – Mar 1998)

Education

- BS (Mechanical Engineering) University of New Hampshire – Dec 1987

Technical Specialties

Mr. Martin has over 19 years of experience managing energy and land development projects. Areas of expertise include:

- Energy, Land and Coastal Development Project Planning
- Local, State, Regional and Federal Environmental and Regulatory Permitting
- Development and Execution of Environmental Impact Studies
- Preparation of Environmental Impact Reports/Statements
- Development of Regulatory Permitting Strategies
- Development of Agency, Public and Stakeholder Outreach Programs
- Navigational Impact Assessments

Background

Mr. Martin is a Project Manager in the Transmission Group at Northeast Utilities (NU) in Berlin, Connecticut. He manages all facets of project development, from siting and permitting to the construction of electric transmission projects. Prior to joining NU, Mr. Martin served as a Project Manger for two environmental consulting firms, ESS Group in Wellesley, MA and ENSR International in Westford, MA. In these positions, Mr. Martin managed development projects for a wide array of clients, providing environmental services such as feasibilities studies, siting and permitting, environmental assessments, and development of mitigation strategies. Mr. Martin is also a former Program Chief for the Massachusetts Department of Environmental Protection (DEP) Chapter 91 Waterways Program, where he spent 11 years gaining extensive experience in planning and permitting a wide range of coastal projects, including submarine cables and pipelines. Mr. Martin offers a current and thorough understanding of many local, regional, state and federal regulatory processes, and has established and maintained valuable working relationships with key decision-making personnel at many of these Agencies. Mr. Martin's areas of regulatory expertise include: Section 10/404 permitting by the U.S. Army Corps of Engineers; Coastal Zone Management Consistency

Certification; coastal permitting programs in CT and MA; and 401 Water Quality Certification.

Representative Energy Project Experience

Long Island Replacement Cable (LIRC) – Replacement of and Existing Submarine Cable System between Norwalk, CT and Northport, Long Island. Serving as Project Manager for the proposed replacement of a seven-cable electric transmission system between Connecticut and Long Island, New York. The new transmission system will be a three-cable system capable of operating at the same capacity as the existing system (300 MVA), while providing distinct environmental benefits as compared to the existing system. Responsibilities include management and oversight of all project activities including: budget management and oversight; obtaining state and federal regulatory approvals (including siting and environmental permits); public, stakeholder, and regulatory agency outreach and coordination; and construction oversight.

Miscellaneous Replacement and Maintenance Projects, Connecticut and Massachusetts. Served as Project Manager for numerous electric transmission system replacement and maintenance projects. Examples include replacement of existing shield wire systems in both MA and CT, and CCVT and lightening arrestor replacements at substation facilities throughout the Northeast Utilities service territory. Responsibilities include project budget management and reporting; obtaining local and state permits; coordination with stakeholder agencies (e.g., road, highway, and railway authorities); and construction oversight.

Oxford Substation Project, Oxford, Massachusetts. Serving as Project Manager for development of a new electric transmission and distribution substation in Oxford, CT. This substation numerous electric transmission system replacement and maintenance projects. Examples include replacement of existing shield wire systems in both MA and CT, and CCVT and lightening arrestor replacements at substation facilities throughout the Northeast Utilities service territory. Responsibilities include project budget management and reporting; obtaining local and state permits; coordination with stakeholder agencies (e.g., road, highway, and railway authorities); management of engineering and design efforts; and construction oversight.

Confidential Projects, Massachusetts and Connecticut.. Currently serving as Project Manager for numerous reliability-driven transmission projects in MA and CT. These projects include development of new transmission lines, reconductoring and rebuilding existing transmission lines, and modifications at numerous substation facilities. Responsibilities include coordination of system planning efforts with internal and external team members; development of siting and permitting strategies, project schedule development, and management of engineering and design efforts.

Cape Wind Associates, LLC – Offshore Renewable Energy Generation and Submarine Cable Project, Massachusetts. Served as Project Manager for a proposed renewable energy generation project involving up to 195 offshore wind turbines with a potential to generate 420 MW of electricity. The proposed wind farm is

sited on Horseshoe Shoal in Nantucket Sound and will interconnect with the regional power grid through an AC submarine cable to the southern shore of Cape Cod. Responsibilities included management and oversight of all project activities; preliminary siting and alternative analyses; development of public and regulatory agency outreach programs; environmental impact analyses; and local, regional, state and federal permit acquisition.

Generation Ventures Associates - Electric Generation Facility, Brockton, MA. Served as Project Manager for the development and permitting of a gas-fired electrical generating facility in Brockton, Massachusetts. Responsibilities include the acquisition of applicable environmental permits, including a Wetlands Order of Conditions from the Brockton Conservation Commission and the preparation and filing of an Environmental Notification Form (ENF) with the Massachusetts Environmental Protection Act (MEPA). Oversight of the development and execution of technical and environmental studies associated with the preparation of an Environmental Impact Report (EIR) and representation of the Client during the MEPA review process.

PG&E Generating – 1,100 MW Gas-Fired, Combined Cycle Independent Power Plant, Athens, NY. Provided environmental consulting services for the siting and preparation of regulatory filings for a new 1,100 MW natural gas-fired power plant near the Hudson River. Mr. Martin conducted a navigational impact assessment associated with the construction of intake and discharge pipes within the Hudson River for cooling tower makeup. Mr. Martin was also involved in critically reviewing the intake/discharge facility design, including dredging components and regulatory feasibility. This plant is planned to be operational in 2001.

National Grid USA (Massachusetts Electric Company) – Electric Transmission Cable, Harwich, MA. Served as Project Manager for the preparation and filing of a Notice of Intent pursuant to the Massachusetts Wetlands Protection Act for the installation of an electric transmission cable and conduits in Harwich, Massachusetts. Represented the Client before the Harwich Conservation Commission and negotiated special permit conditions to ensure that manhole de-watering activities would have no adverse impact on adjacent wetland resource areas.

National Grid USA (Nantucket Electric Company) - Beach Nourishment Project, Harwich, MA. Served as Project Manager for the performance of technical studies examining the causes of extensive coastal erosion at NEC shorefront property in Harwich, Massachusetts. Proposed and assisted in the design of a 3,000 cubic yard beach nourishment program. Applied for and obtained local, state and federal permits for the project, and represented the Client before the Harwich Conservation Commission. Negotiated special permit conditions with the Conservation Commission and supervised the development and implementation of a coastal bank and beach grass planting plan.

NSTAR Services – Acushnet River Submarine Cable Crossing, Acushnet and New Bedford, MA. Served as Project Manger for installation of one (1) new a 115 kV submarine electric transmission line, and the relocations of fourteen (14) existing submarine cables across the Acushnet River. Responsibilities also included preparation and submission of regulatory permit applications, and representation of the Client before

the regulatory agencies at public hearings and meetings. Also played advisory role on committee convened by the U.S. Army Corps of Engineers and USEPA to address potential project impacts associated with the New Bedford Superfund Project.

NSTAR Services – Electric Transmission Cable/Conduit Installation, Roadway Installations, New Bedford, MA. Served as Project Manger for installation of one (1) new a 115 kV electric transmission line and several cable conduits within existing roadway alignments in New Bedford. Responsibilities also included preparation and submission of regulatory permit applications, and representation of the Client before the regulatory agencies at public hearings and meetings.

NSTAR Services – Pine Hills Gas Pipeline Project, Plymouth, MA. Served as Project Manger for installation of a new 12–inch diameter natural gas pipeline to supply the Pine Hills residential development project in Plymouth, Massachusetts. Responsibilities also included preparation and submission of regulatory permit applications (MEPA-ENF and Notice of Intent), and representation of the Client before the regulatory agencies at public hearings and meetings.

AMERSCO, Inc. – Landfill Gas to Energy Project, Proposed Gas Pipeline Feasibility and Siting Evaluation, Chicopee and Springfield, MA. Conducted a regulatory applicability and constraints analysis, and alternative routing evaluation for a proposed 8-inch diameter gas pipeline project. The proposed pipeline will originate at an existing landfill site in Chicopee, Massachusetts, and will be routed across the Massachusetts Turnpike and Chicopee River, to a potential electric generation facility in Springfield, Massachusetts.

Keyspan Energy/Northeast Utilities – Multiple Submarine Cable Replacement Project, Long Island Sound, Connecticut and Long Island, NY. Served as Task Manger for regulatory permitting of the proposed removal and replacement of several submarine electric transmission cables from Connecticut to Long Island, New York. Responsibilities include preparation of relevant portions of the Connecticut Siting Council Application, State Office of Long Island Sound Programs, U.S. Army Corps of Engineer Sections 10 and 404 permitting, and municipal agency filings.

TransEnergie, Cross Sound Cable Project – Proposed Submarine Cable Crossing of Long Island Sound, Connecticut to Long Island, NY. Prepared alternative submarine cable routing analysis in response to mandates received by the Connecticut Siting Council. Alternative routing analysis was based on the results of comprehensive geological investigations, compatibility of potential substation landfalls in Connecticut, and economic feasibility studies conducted by others.

Commonwealth Electric Company - Martha's Vineyard Cable Project, Falmouth to Tisbury, MA. While at MADEP, Mr. Martin served as the Program lead for regulatory review and permitting of the submarine power cable from mainland Cape Cod to the island of Martha's Vineyard. Responsibilities included detailed Chapter 91 regulatory review and compliance assessment, environmental impact review, navigational impact assessment and extensive inter-agency and municipal coordination.

Nantucket Cable Electric Company, Inc., Nantucket Cable Project, Harwich to Nantucket, MA. While at MADEP, Mr. Martin served as the Program lead for regulatory review and permitting of the submarine power cable from mainland Cape Cod to the island of Nantucket. Responsibilities included detailed Chapter 91 regulatory review and compliance assessment, environmental impact review, navigational impact assessment and extensive inter-agency and municipal coordination.

Miscellaneous Electric Transmission and Pipeline Projects. Over 11-year tenure with MADEP, played either a Program lead or regulatory staff review role on multiple transmission and pipeline projects throughout Massachusetts. Nature of role on such projects included Chapter 91 regulatory review and compliance assessment, environmental impact review, navigational impact assessment and inter-agency and municipal coordination. A list of representative project proponents is provided below.

- **NEES/Massachusetts Electric**
- **Commonwealth Electric Company**
- **Commonwealth Gas Company**
- **Boston Gas Company**
- **Boston Edison Company**
- **Algonquin Gas Company**
- **Tennessee Gas and Transmission Company**

Michael D. Carlson

18 Lancaster Road
Cromwell. CT 06416
(860) 665-6766 (W) (860) 635-0077 (H)

Summary of qualifications

Northeast Utilities Service Company
Berlin, CT

2003-Present Principal Engineer
1985-2003 Senior Engineer
1975-1985 Engineer
1973-1975 Associate Engineer
1971-1973 Assistant Engineer

All positions were within the Transmission Line & Civil Engineering Section.

Position Summary:

To supervise and train direct reports in the design and construction of new or modifications to transmission line facilities for the NU system.

To act as project leader\manager in support of the design and construction of new or modifications to transmission line facilities for the NU system.

Primary Duty:

1. Engineer\design, schedule, material acquisition, obtain\review permits required from regulatory agencies and assist construction to completion of new\modifications to NU transmission system.
2. Assist in Storm Restoration of T&D facilities.

Sole Department Duties:

1. Responsible for material standards for the NU transmission system which includes reviewing and qualifying prospective vendors.
2. Responsible for conceptual designing and providing material and construction cost estimates, for decision making purposes, for future system proposals sand alternatives.
3. Transmission Line Section interface with Connecticut Department of Transportation and Massachusetts Department of Public Works for highway projects which may affect the NU transmission system.

The Hartford Electric Light Company

Cumberland Avenue

Wethersfield, CT

Summer 1970 Construction Representative

Worked for the Construction Department following ongoing projects.

Education

1967 - 1971

University of Connecticut; Hartford and Storrs, CT

Received Bachelor of Science Degree in Civil Engineering

Professional experience

Major Projects Completed:

1. Independent Power Plants

   Project Engineer responsible for the interconnection of several independent power plants in Connecticut and Massachusetts to the NU transmission system

2. Summer 1997 Capacity Projects:

   Project Engineer for the Agawam - Chicopee 115-kV Reconductor project. Also ordered and follow purchase orders on companion project Agawam - North Bloomfield 115-kV Reconductor project. These projects required an all out effort as the lead time was less than half of what normally would be scheduled.

2. Millstone - Manchester 345-kV Line:

   Engineered and field monitored the construction of 47 miles of transmission line in support of Millstone Unit #3

3. Chestnut Junction - Black Pond Junction 115/345- kV Lines:

   Engineered and field monitored the construction of a new 345-kV line, relocation of an adjacent 115-kV line and reconstruction of junction points to accommodate new construction.

Awards

Received two SPOT Recognition Awards:

1. For innovative design at Stony Hill Substation to modify transmission supply (1996).
2. For letter of commendation from the Commissioner of the Connecticut Department of Transportation on highway relocation project in Stamford (1996).

Professional Licenses

Professional Engineer Licenses in Connecticut and Massachusetts

Seminars \ Training

Have attended the following seminars:

1. Engineering and Construction Law Seminar
2. ECNE Annual Transmission and Distribution Seminar (1994)
3. Transmission Underground Seminars sponsored by the University of Connecticut.
4. Northeast Transmission Line Group Meeting
5. Hubble Power Systems Seminar
6. PDC Underground Cable Systems: Principles and Practices

Kris Aberg

SUMMARY Over 16 years of experience in the field of substation power engineering, project management and regulatory approvals. Presently employed as a Senior Engineer and Team Leader in Northeast Utilities Service Company's Substation Engineering and Design group. Serving as Circuit Breaker Specialist for the Northeast Utilities transmission and distribution systems since 1992. Responsible for specifying, ordering and approving substation power circuit breakers, circuit switchers and reclosers applied at operating voltages ranging from 4.8 kV to 345 kV.

EXPERIENCE **PROJECT ENGINEER/CIRCUIT BREAKER SPECIALIST**
9/86 to present Northeast Utilities, Hartford, Connecticut, USA

2003 Promoted to **Project Engineering Manager** with continued managerial responsibility for the Senior Designers as well as complete project responsibility for major substation projects.

2002 Named **Team Leader** with direct managerial responsibilities, incl. Annual Performance Reviews, for four Senior Electrical Designers.

1998 Promoted to **Senior Engineer** in July 1998.

1992 Named **Circuit Breaker Specialist** in January 1992 with responsibilities which include preparation of technical specifications, bid evaluation, review of approval drawings, approval of circuit breaker suppliers and maintaining contact with manufacturers of outdoor power circuit breakers, circuit switchers and reclosers applied at operating voltages ranging from 4.8 kV to 345 kV for the NU transmission and distribution systems.

1990 Promoted to **Engineer** in November 1990

1989 Named **Back Up Circuit Breaker Specialist**

1988-1998 **Associate Engineer** Promotion included the following added the responsibilities:

- Maintenance and publication of thermal ratings for the Northeast Utilities Transmission system. Chaired a 1998 comprehensive task force review of the thermal ratings applied throughout the NU System.

- Substation Transformer Noise Specialist responsible for performing sound studies, arranging sound measurements, evaluating compliance with local and state noise regulations, and recommending mitigation if necessary.

Project Engineer for major substation projects with cash flows exceeding $5,000,000. Project Engineering responsibilities includes the responsibility for obtaining all required regulatory approvals which involves coordinating contributions from the Legal Department, the Environmental Planning Department as well as participating at public hearing and testifying in front of local and State Agencies.

1986-1988 **Assistant Engineer** , Substation Engineering Group. Responsibilities included:

- Preparation of technical specifications, project scope and cost estimates for substation projects.

- Budget development, scheduling and management of substation projects.

1985 - 1986 **PROJECT ENGINEER/PROJECT MANAGER**
Brown Boveri Corporation (now ABB) Bergen, Norway.

Employment with this multinational Swiss corporation began as a **Project Engineer** responsible for the engineering of control systems for power generation plants and substations.

EDUCATION **Master of Business Administration** (1990) University of Hartford, West Hartford, Connecticut.

Bachelor of Science in Electrical Engineering (1984) South Dakota School of Mines and Technology, Rapid City, South Dakota.

AFFILIATIONS Member Toastmasters International since 1990, CTM. Member IEEE.

Affiliations/Activities

Member, New England Utilities' Environmental Roundtable: Permitting Committee
Wallingford Conservation Commission, Chairman (1997 to present)
Friends of the Sleeping Giant State Park, Land Acquisition Committee
Wallingford Land Trust (Founder, former chair, and life member)
Edison Electric Institute: Served on the following groups:

- Siting and Environmental Planning Task Force
- Wetlands Task Force
- Utility Forest Carbon Management Policy Committee

Speaker on land management topics: Middlesex Community College, Yale University, Antioch (New England) University, Farmington River Watershed Assoc.

James C. Durand

Years Experience: 15

Professional History

- ENSR International – Senior Wetland/Soil Scientist, Project Manager (2002-Present)
- BSC Group – Group Manager of Ecological Sciences (2000-2002), Senior Wetland-Soil Scientist (1991-2000)
- Town of Walpole, Massachusetts – Conservation Agent (1990-1991)
- Gulf of Maine Research Center, Inc. – Wetland Scientist (1989-1990)

Education

- B.S. (Natural Resource Science, Concentration in Wildlife Biology & Management) University of Rhode Island
- (Graduate Level Course work in Soil Science) University of Massachusetts, Amherst
- (Graduate Level Course work in Soil Science) University of New Hampshire

Training

- US Army Corps of Engineers Wetlands Delineator Certification Program Training
- 40-Hour General On-Site Staff Certification Program, Hazardous Waste Operator and Emergency Response

Professional Registrations and Affiliations

- Professional Wetland Scientist
- New England Regional Soil Science Certificate
- Associate Certified Wildlife Biologist
- New Hampshire Certified Wetland Scientist
- Registered Professional Soil Scientist - Society of Soil Scientists of Southern New England

Representative Project Experience

Middletown-Norwalk 345-kV Project, Northeast Utilities System. Conducted field investigations of the proposed Norwalk River crossing in the City of Norwalk, Connecticut. Evaluated the proposed crossing location to collect existing condition information of the purposes of designing a site-specific crossing plan to minimize short-term and long-term disturbances on he river and river oxbow physical and biological characteristics.

Manchester-Hopewell 115kV Transmission Line Upgrade Project, Northeast Utilities System. Conducted Federal and state wetland delineation and GPS survey along 6.5 miles of overhead electric transmission right-of-way in Manchester and Glastonbury, Connecticut. Performed reconnaissance surveys to inventory ecological communities and habitat types encountered along the right-of-way. Responsible for obtaining clearances from the Connecticut State Historic Preservation Office, Connecticut Natural Diversity Data Base, and U.S. Fish and Wildlife Service for N.U.'s proposed maintenance and rehabilitation of the 1767 transmission line.

Operation and Maintenance Plan, National Grid. Prepared a System-Wide Operation and Maintenance Plan for National Grid's overhead electric transmission, distribution and substation facilities for maintaining existing National Grid facilities under the Massachusetts Endangered Species Act. The Operation and Maintenance Plan was prepared under the routine operation and maintenance provisions of the Massachusetts Division of Fisheries and Wildlife, Massachusetts Endangered Species Act regulations.

New England Power Company, Circuit S-19 Transmission Line Refurbishment. Serving as Project Manager/Senior Wetland Scientist for refurbishment of 12 miles of 69kV overhead electric transmission line in Central, Massachusetts. Phase I activities included completion of: wetland delineation and identification of stream crossings and vernal pools habitats; regulatory review to identify special designations or sensitive habitats; field location of primary and secondary construction access routes and recommendations for the use of swamp mats; environmental permitting assessment to determine regulatory implications, permitting needs, and available maintenance exemption provisions; and updating of New England Power T-Sheets to depict boundaries of wetlands, waterways, buffer zone, and construction access routes. Phase II activities include preparation of: federal and state consultation letters; agency liaison with local conservation commissions; preparation of permit application filings; preparation of wildlife/rare species mitigation plans; and construction environmental monitoring during construction.

National Grid, USA, 115/13.2 kV Substation. Served as Project Manager/Senior Wetland Scientist for siting, permitting and construction of the Westford 57 115kV Electric Transmission Substation for Massachusetts Electric Company. Performed ecological and wetland surveys for siting of the proposed substation, including

alternative site analysis. Mr. Durand conducted rare species (blue-spotted salamander) surveys, vernal pool evaluation and sampling, evaluation of terrestrial habitat via drift fences and pitfall traps, and design of mitigation measures. Additional services included assistance with the preparation of legal submittals to the EFSB and attendance at EFSB public hearings with the Massachusetts Energy Facilities Siting Board (EFSB). Mr. Durand also prepared several permit applications, on behalf of Massachusetts Electric Company, for associated pole replacement projects and duct line installation for new and expanded electric distribution facilities. Mr. Durand has also worked on several New England Power Service Company electric transmission line upgrades involving feasibility studies, wetland delineation and resource area determinations, and preparation of notification packages for submittal to local municipal officials.

J-1 System 2005 Integrity Project, Algonquin Gas Transmission, LLC. Served as Project Manager in preparing Environmental Report accompanying Prior Notice Request for Authorization of Blanket Activity (45-day Prior Notice Filing) to the Federal Energy Regulatory Commission for the replacement of three existing sections of various diameter pipelines in the Cities of Medford and Everett, Massachusetts. Provided environmental construction oversight for the implementation of the project-specific Utility-Related Abatement Measure ("URAM") Plan to address impacted groundwater and soil that would be encountered during construction.

Tennessee Gas Pipeline Company, Rhode Island Lateral. Served as Wetland Scientist and Environmental Inspector for the siting, permitting, licensing, and construction of 25-miles of 24-inch natural gas pipeline from Burrillville to Cranston, Rhode Island. Interfaced with RIDEM staff during the issuance of final permit approvals and throughout the construction phase of the project. A significant length of the siting and routing of the pipeline was collocated with existing National Grid rights-of-way.

Western Leg Pipeline Project, Confidential Client. Co-Project Manager for the preparation of an environmental feasibility study for the siting and construction of 250-miles of 24-inch natural gas pipeline through Pennsylvania, New York, New Jersey, and Connecticut. The primary objective of the feasibility study was to identify feasible route alternatives and comprehensive due diligence of preferred corridors. The methodology employed in our feasibility study utilized a fatal flaw approach, seeking to determine what, if any, environmental, land-use/planning or physiographic issues represented impediments to pipeline construction within the study area. Subsequent to the feasibility study, a River Task Force was assembled to more fully evaluate conceptual crossing plans and construction methodologies for two major river crossings. The River Task Force investigated the feasibility from environmental, engineering, and regulatory perspectives of crossing two significant river corridor.

Commonwealth Electric Company, New Bedford 115kv Power Supply Study. While at previous employment – Served as Senior Wetland Scientist Commonwealth Electric Company, New Bedford 115kv Power Supply Study. Environmental studies to support electric transmission line siting. Delineation of freshwater and coastal wetlands utilizing aerial photographs and field verification. Interpreted aerial photographs to identify wetland systems bordering the Acushnet River, including review of high and low salt marsh habitats, tidal flats and presence of eelgrass beds. Preparation of preliminary construction specifications for work in salt march habitat. Preparation of conceptual salt marsh restoration plan.

Blue Atlantic Transmission System, El Paso Corporation. Serving as Senior Scientist for El Paso Corporation's Blue Atlantic Transmission System. Feasibility and routing studies, public outreach, and environmental permitting for 750-miles of 36-inch diameter offshore natural gas pipeline from Sable Island, Nova Scotia to Long Island, New York. Preparation of components of Environmental Assessment, participation in agency consultation meeting. Coordinating public outreach program involving preparation of presentation to the lobster industry, fishery organizations, local, state and federal regulatory agencies. Preparation of responses to data requests from agency and non-government organizations.

El Paso Energy, "DOMAC Project" Malden-Melrose-Revere Lateral. While at previous employment – Served as Project Manager for El Paso Energy's, "DOMAC Project" Malden-Melrose-Revere Lateral. Ecological Assessment/State and Federal Permitting, including FERC, Federal, state (including MEPA – ENF filing and waiver request) and local environmental permitting for seven mile linear utility project. Wetland delineation of freshwater and coastal wetlands along 7.5 miles of natural gas pipeline right-of-way. Conducted functional wetland assessment and wildlife evaluations. Verified the presence and location of isolated wetland communities, intermittent and perennial tributaries and areas of hydric soils and wet signatures utilizing aerial photo-interpretation. Secured permits and clearances for pipeline construction through an Area of Critical Environmental Concern (ACEC). Prepared environmental construction plan and provided on-call services for environmental inspection. Coordinated archaeological/historical surveys, and pest/rodent control management during construction. Worked cooperatively with the USEPA and Massachusetts Department of Environmental Management to prepare a wetland and stream restoration plan for work along the Rumney Marshes Area of Critical Environmental Concern.

U.S. Environmental Protection Agency, New England Region 1. Project Manager – U.S. Environmental Protection Agency, New England Region. Responsible for researching and obtaining available historical aerial photography and collateral data, performing wetland aerial photo-interpretation and reverse trend analysis on sites of suspected wetland violations, preparation of interpretive mapping and plan drawings, report preparation, in the

field ground-truthing to document historical wetland impacts (including soils evaluations of previously disturbed sites), and representing EPA as expert witness for preliminary settlement hearings. Evaluation areas have included sites in Southeast Massachusetts, Western Massachusetts, Southern Maine and Northern Vermont. Provide recommendations for the installation of groundwater monitoring wells, and conceptual schemes for wetland restoration and mitigation efforts.

Meghan E. Wagner, M.P.H.
Senior Scientist

Professional Profile

Meghan Wagner is an Epidemiologist in Exponent's Health Sciences practice. Ms. Wagner has experience in the design, management, and statistical analysis of prospective and retrospective epidemiologic studies. Ms. Wagner also has extensive experience in writing structured literature reviews and critical reviews of scientific literature. Since joining Exponent, she has provided epidemiologic evaluations and support in numerous research areas, including electric and magnetic fields, benzene, butadiene, ethylene oxide and asbestos. She also gained significant experience communicating health risk to the public and testifying in hearings.

Prior to joining Exponent, Ms. Wagner worked as a consultant in the field of health outcomes and pharmacoepidemiology. She has experience in design of large-scale database analysis projects, SAS programming, the statistical interpretation of study results, and the preparation of budget impact models. Ms. Wagner also served as a project manager for a cohort study examining the dynamics of infectious disease transmission. As part of this work, Ms. Wagner assisted in the development of an HIV surveillance system in Brooklyn, NY.

Credentials and Professional Honors

M.P.H., Epidemiology Mailman School of Public Health, Columbia University, 2004
B.S., Animal Science, Cornell University, 2001

Prior Experience

Analyst, Analytica International, NY, NY, 2004–2005
Project Director, Bedford Stuyvesant West Community Studies, Columbia University, NY, 2004
Graduate Research Assistant, Bedford Stuyvesant West Community Studies, Columbia University, 2002–2003

Publications and Presentations

Miller M, Wagner M and Serner M. Exploring Black men's sexual diversity. Journal of Urban Health. 2005 March; 82(Supplement 1): i26-34.

Hardick J, Gaydos CA, Wagner M, Hardick A, Wood BJ, Miller M. High prevalence of *Trichomonas vaginalis* among women who use drugs in New York City. National STD Prevention Conference, Philadelphia, PA, March 8–11, 2004.

Kaetzel R, Wagner M, Sweeney L, Duggan A, Gargas M, and Teta MJ.

An evaluation of early-life susceptibility and exposures to ethylene oxide. Society of Toxicology Conference, Charlotte, North Carolina, March 25-29, 2007.

Teta MJ, Lau E, Sceurman BK, Wagner ME. Therapeutic radiation for lymphoma: risk of malignant mesothelioma. Cancer. 2007 Apr 1;109(7):1432-8.

Wagner ME. Contributor to the Encyclopedia of Epidemiology, "Allergen." SAGE Publications. 2007.

Resume of William J. Lepper

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(860) 621-2284

Present Position: Circuit Owner, Distribution Asset Management

Oct 1999 to present Circuit Owner - Western (Waterbury) Region

Major Function

Provide Electrical Distribution Design and Management of Distribution Assets (Substations & Distribution Circuits) for the following towns: Naugatuck, Bethany, Seymour, Oxford, Southford, Beacon Falls, with some additional distribution circuits in Prospect, Middlebury, Southbury and Waterbury.

This work includes the design or modification of new or existing distribution circuits to improve their reliability or meet the electrical demand due to new business growth. It involves development of project packages from conception (justification) to completion of the work in the field.

Performing reliability studies consist of monitoring: outages, recovery time of outages, circuit loading, and making necessary field changes to improve the reliability of the circuits.

Minor Functions

Perform EMF surveys for customers in the Western Region.

Preparation of the TD 250 program for the Western Region

Mar 1984 to Oct 1999 Senior Electrical Engineer, Special Projects, NU's Nuclear Energy Division

Provided Electrical Engineering Design Services to the following Nuclear Plants owned by Northeast Utilities, Connecticut Yankee, Millstone 1, 2, 3, and the Seabrook Nuclear Power Station.

Specific projects: Completion of the Electrical Design of Millstone 3, Design of new switchgear room at Connecticut Yankee, Design of electrical plant modifications to meet the shutdown requirements of units after the 3 Mile Island Nuclear Station Accident and other nuclear plant accident scenarios.

Provide engineering services for the Reliability Center Maintenance (RCM) programs for all the Nuclear Units. This involved participation in EPRI (Electrical Power Research Institute) programs and conferences on Substation Maintenance.