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January 10, 2006

Mr. S. Derek Phelps
Executive Director
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

Re: Docket No. LIFE-CYCLE 2006 - LIFE-CYCLE 2006 - Connecticut Siting Council Investigation into the Life-Cycle Costs of Electric Transmission Lines

Dear Mr. Phelps:

This letter provides the response to requests for the information listed below.

With this filing, the Company has completed responding to all of the interrogatories requested during this proceeding.

<u>Response to CSC-01 Interrogatories dated 11/23/2005</u>
CSC - 001 RV-01

<u>Response to CSC-02 Interrogatories dated 12/23/2005</u>
CSC - 001 , 002 , 003 , 004 , 005 , 006 , 007 , 008 , 009 , 010 , 011 , 012 , 013 , 014

Very truly yours,
Robert Carberry / tms
Robert Carberry
Manager
Transmission Siting and Permitting
NUSCO
As Agent for CL&P

RC/tms
cc: Service List

SERVICE LIST
Docket: LIFE-CYCLE 2006

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Witness: CL&P Panel
Request from: Connecticut Siting Council

Question:
Provide all information documenting CL&P's costs for operation and maintenance of existing transmission lines. Where possible, please break these down by type of O&M expense, using cost categories that CL&P routinely uses. Please provide on a line-by-line basis, or by voltage category and type of line.

Response:
An incorrect version of the file attachment was provided with the response to Data Response CSC-01, Q-CSC-001. Please replace that file with the version attached here.

FERC Account	Description	YEAR 1999	2000	2001	2002	2003	2004
56300	Overhead Lines Expenses	$ 281,922	$ 244,124	$ 311,697	$ 388,112	$ 574,937	$ 764,232
57100	Maintenance of Overhead Lines	2,785,423	1,685,562	2,643,844	3,084,258	2,453,216	3,414,493
	Subtotal Overhead Lines	$ 3,067,345	$ 1,929,686	$ 2,955,541	$ 3,472,370	$ 3,028,153	$ 4,178,725
	Circuit miles of line - Overhead	1680.4	1680.4	1680.4	1680.4	1680.4	1680.4
	Cost per circuit mile - Overhead	$1,825	$1,148	$1,759	$2,066	$1,802	$2,487

The Connecticut Light and Power Company
Docket No. LIFE-CYCLE 2006

Data Request CSC-02
Dated: 12/23/2005
Q- CSC-001

Witness: CL&P Panel
Request from: Connecticut Siting Council

Question:
How does your company define the "life cycle cost" of a transmission line?

a. What are the major components of life cycle cost?
b. Are line termination costs included, such as protection? If so, please specify which equipment items are, and are not, included.
c. Is the cost of losses an element of life cycle cost? Why or why not?

Response:
We define life-cycle costs of a transmission line as the expected total cost of building, operating, and maintaining the line over the term of its expected useful life. Typically present-value factors are applied to each annual cost so that all costs can all be added to yield one present value. This value that can then be used for comparisons with the life-cycle costs of any potential alternative lines or facilities.

a. The major components of life-cycle cost for an electric transmission line are first cost of construction (including permitting and engineering costs), operating costs, maintenance costs, and costs of power losses. The life of the asset is also an important factor.

b. For purposes of making generalized life-cycle cost comparisons between most overhead and underground transmission lines of typical lengths, the differences in line terminal costs at substations or protective relaying and controls costs typically would be relatively insignificant and need not be specifically included. On the other hand, the installed costs of special equipment at a 115- or 345-kV line-terminal station that is needed for underground lines, such as series or shunt reactors, specially-equipped circuit breakers, and insulating fluid-pressurizing plants, should be included in determining the life-cycle costs for these lines. Furthermore, the Middletown-Norwalk project example demonstrated that underground 345-kV line applications can cause significant equipment replacement needs (e.g., surge arresters) at other substations, and the potential for such extra costs should be recognized in the Council's report. Therefore, for purposes of computing life-cycle costs, CL&P recommends including all relevant costs that enable a sound basis for comparison of alternatives.

c. Yes. It is possible for line alternatives to have different power losses. For example, underground transmission cable systems of equivalent voltage and capacity to an overhead transmission line will typically have larger conductors with lower losses. Therefore, to provide a sound basis for comparison of alternatives on a life-cycle cost basis, we recommend including power losses.

The Connecticut Light and Power Company
Docket No. LIFE-CYCLE 2006

Witness: **CL&P Panel**
Request from: **Connecticut Siting Council**

Question:
Do you estimate your company's transmission line capital and construction costs to be higher, lower, or about the same as those for other Northeastern utilities? If your costs are higher or lower, specify why you believe this is so.

Response:
It is not clear whether this question is asking about annual capital spending by CL&P or costs per mile of line, so we have answered both questions.

CL&P's annual capital spending has recently become the highest in New England, driven primarily by ISO-NE's assessment of the region's needs. The ISO planning process considers many factors, including local load growth, available generating capacity, the relative bid prices of the generators, the resulting power flows on the system, etc. CL&P's significant annual spending is predominantly to address the severe reliability needs in southwest Connecticut.

If this question is about the cost per mile of line, it is very difficult to compare costs between utilities in the Northeast, as such costs can vary widely from project to project depending upon the line route. For example, National Grid may have very different costs in and around Providence, Rhode Island versus a more rural route in New Hampshire or New York State. Northeast Utilities experiences very different costs of construction in Connecticut, New Hampshire and Western Massachusetts, with most of this difference based on the costs of construction and new rights-of-way. Engineering, Project Management and Material costs (apart from associated sales taxes) are fairly consistent among these three states, while the costs of construction of overhead lines in Connecticut tends to be higher for several key reasons:

1. Connecticut is a predominantly urban/suburban state, and therefore it is unusual for a line to run straight for miles, to not cross over highways and railroads, and to not have jogs in the route around developed areas.
2. In many states, it is possible to build underground lines alongside the road within the public right-of-way ("ROW"). This avoids the need to dig up the road, avoids some of the conflicts with other underground utilities, and allows longer work hours than Connecticut's Department of Transportation is permitting for work in state roads. In Connecticut, there is little extra ROW alongside state or local roads, and often there are other underground utilities within these roads. As a result, CL&P may be forced to place underground transmission cables under one lane of a road, or to place some of its underground facilities on private property adjacent to the public ROW, either of which significantly increases the costs of construction.
3. As a result of existing laws pertaining to the construction of transmission facilities, it is more difficult to site an overhead line in Connecticut. In many instances, routes cannot be optimized due to applicable law, existing land uses, and other local concerns.
4. The cost of living and, therefore, labor costs are higher in Connecticut than in many other areas of New England.

In general, we believe that CL&P's transmission line capital and construction costs are higher than those of most other Northeastern utilities with transmission facilities in mainly rural areas, but similar to the costs experienced by those utilities which have similar constraints associated with building in a more urban/suburban environment.

In the future, however, CL&P's per mile cost for 345-kV transmission lines is likely to be materially higher than that of other utilities in the Northeast (excluding ConEd) because of the provisions of P.A. 04-286, which will require underground line construction in conditions where utilities outside Connecticut would build overhead.

Provided that underground line construction is "technologically feasible," P.A. 04-286 precludes the construction of 345-kV overhead lines in many places, including "residential areas," of which much of the state consists. As demonstrated in Docket No. 272, the practical effect of this statute is to require that underground construction be maximized to its technological limit on 345-kV line projects that are not in rural or agricultural areas. This requirement dramatically increases the capital cost of construction because:

- The first costs of installing 345-kV underground cable, on a per mile basis, are a multiple of the costs for the same length of overhead line.
- Expensive termination stations are required for each segment of 345-kV underground construction.
- Where a segment of underground line must be installed to avoid adjacency of an overhead line to a residential area or to other so-called "statutory facilities", the overhead right-of-way terrain is often not suitable for installation of underground cables. In such a case, an underground segment that leaves and then returns to the right-of-way along highway rights-of-way must be constructed. Such a segment will increase the overall length, and therefore the cost, of the line.
- The VAR-management and system-resonance frequency issues that can be associated with maximizing the underground construction of transmission line additions to the 345-kV system can require use of the more costly of the two 345-kV underground cable technologies, i.e., XLPE cables.
- Finally, the VAR-management and system-resonance frequency issues that can be associated with maximizing the underground construction of transmission line additions to the 345-kV system can require more costly substation equipment and expensive modifications to other portions of the existing transmission system. For example, in Docket No. 272, the uprating of hundreds of surge arresters was found to be necessary for these reasons. Other situations could require more drastic and costly system modifications.

The Connecticut Light and Power Company
Docket No. LIFE-CYCLE 2006

Data Request CSC-02
Dated: 12/23/2005
Q- CSC-003

Witness: **CL&P Panel**
Request from: **Connecticut Siting Council**

Question:
Do you estimate your company's transmission line operating and maintenance costs to be higher, lower, or about the same as those for other Northeastern utilities? If your costs are higher or lower, specify why you believe this is so.

Response:
CL&P estimates that its transmission line operating and maintenance costs are within the range experienced by other Northeastern utilities. Cost differences among companies may typically be attributed to differences in type and condition of right-of-way vegetation, line construction type, age of plant, and rural versus urban conditions.

Witness: **CL&P Panel**
Request from: **Connecticut Siting Council**

Question:
List the most important factors affecting overhead transmission line capital costs and briefly discuss their relevance to your system.

Response:
The most important factors affecting overhead transmission line capital costs are:

- Structure type and heights
- Size and type of structure foundations
- Numbers of deadend and angle structures required
- Cost of acquiring new right-of-ways
- Unique designs, such as split phasing
- Length of a line

Tall steel structures, and especially deadend and angle structures, require much larger poles and foundations, resulting in significantly higher material and construction costs. In areas where wider right-of-ways ("ROW") are available, shorter wood-pole H-Frame structures can be constructed, but in Connecticut we are frequently confined to narrower ROW's that can only accommodate vertically-configured lines on taller steel poles. These steel poles also require much more costly concrete foundations in comparison with direct embedded wood poles.

With the degree of urban and suburban land development that we encounter, especially in Southwest Connecticut, existing transmission line routes take many turns to avoid densely developed areas. Each of these turns requires more deadend and angle structures, which in turn causes the cost of the line to increase.
On the Middletown-Norwalk project, costly requirements to reduce magnetic field levels have been imposed for the first time. Field-management measures such as taller structures and split-phase line construction result in significant cost increases.

The other main factor which causes large increases in the costs of foundations is the type of terrain where the construction is taking place. We have seen 100%-200% increases in foundation costs in areas that have large rock formations, as compared to the costs of foundations in more agricultural types of land.

Finally, if a new right-of-way or expansion of an existing right-of-way is required for overhead construction through a densely settled area, the cost thereof can be the single largest component of overall capital costs. New right-of-way costs through rural areas are less significant.

Witness: **CL&P Panel**
Request from: **Connecticut Siting Council**

Question:
List the most important factors affecting underground transmission line capital costs and briefly discuss their relevance to your system.

Response:
Large factors affecting underground transmission line capital costs are listed below in three categories: (1) the costs for the cables and accessories, (2) the labor and material costs of trenching and installing large splice vaults, and (3) the labor and material costs for pulling and splicing of the cables. Costs in each of these categories also increase with the length of an underground cable system.

The costs for underground cables and accessories for 345-kV lines are substantially higher today for XLPE cable systems in comparison to HPFF cables systems. Length of the cables, supply and demand issues, raw material prices, numbers of providers and manufacturing capacities, fuel costs, warranties, and foreign currency exchange rates are the most important factors in the cable and accessories cost category. Moreover, expectations created by Public Act 04-286 for maximizing the technologically feasible lengths of new underground 345-kV lines in areas of certain land uses will drive a need to choose the higher cost and less-well-proven XLPE cables, as was the case in the Council's Docket No. 272 for the Middletown-Norwalk project. This is because XLPE cables have a lower capacitance in comparison with HPFF cables. As was the case in Docket No. 272, this expectation will add inordinate complexity and costly time to the planning and siting process for new 345-kV lines.

For the latter two cost categories outlined above, trench lengths, labor costs, labor shortages, conduit costs, trench dimensions and backfill materials, equipment and fuel costs are important factors. For the underground transmission lines which CL&P is currently building in Southwest Connecticut, CL&P has encountered additional factors which are significantly increasing construction costs by 10 to 20%. These include the following:

1. Percentage of Rock

In some areas of the Bethel to Norwalk project, over 25% of the trench excavation has been in rock. Rock excavation can be almost four times more expensive than soil excavation.

2. Contaminated Soil

A large percentage of the soil under the local and state roads in Southwest Connecticut (perhaps also in other areas of Connecticut as well) is contaminated. All excavated soil must be trucked off site, and soil found to be contaminated must be disposed of in an environmentally acceptable manner.

3. Work Hours

While constructing underground lines in state roads, the contractors are subject to work hours dictated by the Connecticut Department of Transportation ("CDOT"). In many instances, the contractors are only allowed to work at night, and there may only be a 6- to 8-hour work window when construction can take place. This has significant impacts on the cost of construction because considerable set up and clean up time is required for each shift. With a shorter work window, more time may be spent during any given shift setting up and cleaning up than is spent constructing the line.

4. Stream and Railroad Crossings

Where open-cut trenching across small streams and railroads is not permitted, and where CDOT will not permit cables to hang from highway bridges over streams and railroads, special construction methods such as horizontal directional drilling or "jack and bore" are the alternatives. These are higher cost construction methods which often place cables at greater depths below the surface and which can require significant environmental-impact controls.

5. Depth of the Trench

The depth of the trench is impacted by other underground utilities or other physical obstacles within the right-of-way. The deeper the trench the more expensive it is to build. Larger cable sizes or wider trenches with more thermal backfill material can also be required where the extra cable depth would significantly reduce cable ampacity.

6. Vault Locations

Vaults built in the roads require long road-lane closures, especially with 345-kV lines where the cable splices in these vaults may take weeks to complete. Consequently, CDOT has required CL&P to build as many vaults off the road as possible. Building these vaults off the road can have large cost impacts. There is the obvious cost of obtaining easements over private property adjacent to the road, but there is also the increased cost of additional cable and trench. This additional cost is incurred because turning the cable ducts off of and then back onto the road at each vault results in the crossing of more buried utilities, adds trench and cable length, and introduces bends which may reduce cable pulling lengths, therefore requiring additional vaults.

Witness: CL&P Panel
Request from: Connecticut Siting Council

Question:
Describe your company's overall philosophy related to siting and constructing new transmission facilities.

Response:
Because the focus of the Council's life-cycle cost investigation is on electric transmission "lines", CL&P's response to this question focuses on lines and not other types of transmission system facilities.

CL&P's overall philosophy for making new investments in transmission lines is to ensure the continuance of a reliable and economic electric power system to support electric service requests, public safety and the expansion of the Connecticut economy.

Proposed transmission line additions or upgrades generally serve at least one of the following purposes:

1. To reliably serve customers' peak-load demands.
2. To maintain system reliability under varying generator dispatch scenarios.
3. To provide transmission capability to transfer power on a regional basis.
4. To provide transmission capability to efficiently deliver output, locally or regionally, from new generators which interconnect to the transmission system.
5. To resolve system reliability and safety concerns of high short-circuit currents.

The Independent System Operator - New England ("ISO-NE"), through its Regional System Plan process, identifies and proposes transmission line projects that address regional system reliability and economic efficiency issues which are not resolved by market responses. CL&P planners are closely involved in this process, and if the identified solution requires construction in CL&P's service area, CL&P will likely propose to construct it. Projects required to serve these ends on a local basis may also be independently identified by CL&P's own planners, and proposed to be built by CL&P.

Any such projects must, of course, be designed to comply with all safety standards and all national and regional reliability standards, including those newly mandated by the Federal Energy Act of 2005.

CL&P's philosophy with respect to the siting of a transmission line project for which a need has been identified as described above is to fully meet the requirements of all applicable federal, regional, state and local laws and regulations, while at all times being sensitive to and, when possible, responsive to, the needs of stakeholders in the region and the local community.

In its project design and route selection CL&P is guided by the stated purposes of the Public Utility Environmental Standards Act, ("PUESA"), which is administered by the Connecticut Siting Council ("CSC"): "the balancing of the need for adequate and reliable public utility service at the lowest reasonable cost to consumers with the need to protect the environment and ecology of the state and to minimize damage to scenic, historic and recreational values; to provide environmental quality standards and criteria for the location, design, construction and operation of facilities for the furnishing of public utility services at least as stringent as the federal environmental quality standards and criteria, and technically sufficient to assure the welfare and protection of the people of the state."

With respect to the state siting process, CL&P encourages the CSC to exercise its "exclusive" statutory authority with respect to determinations of the need for, the location of, and alternatives to electric transmission facilities, to the exclusion of other state agencies, and to limit the role of such other agencies with respect to these matters to a commenting function, as envisioned by the Public Utilities Environmental Standards Act, thus eliminating multiple, overlapping, and sometimes conflicting permitting requirements.

With respect to the construction of approved transmission line facilities, CL&P's philosophy is to effect the construction efficiently and in compliance with a comprehensive set of Development and Management ("D&M") Plans developed in collaboration with the CSC staff and approved by the CSC. CL&P believes that the D&M Plan development process should be a collaborative administrative process, rather than an occasion for further public hearings that allow opportunities for disappointed stakeholders to re-visit issues settled by a decision in a contested case, or to allow stakeholders and others to seek changes and delays in the project, or to extract concessions as the price of closure of the proceedings.

Witness: **CL&P Panel**
Request from: **Connecticut Siting Council**

Question:
How are transmission and distribution system planning activities coordinated or integrated to optimize the costs of new construction and maintenance?

Response:
REGIONAL TRANSMISSION PLANNING

ISO-NE is responsible for developing and maintaining a process that creates a coordinated regional plan for New England's transmission system plan. Annually this takes the form of a Regional System Plan ("RSP"). The framework for developing the RSP involves the Planning Advisory Committee ("PAC") which has representatives from New England transmission owners, distribution companies and other interested stakeholders including generator owners, marketers, load serving entities, government representatives, and state agencies.

Transmission owners coordinate with ISO-NE on the interconnection of new distribution facilities with the transmission system. After a plan is developed, the transmission owner must still apply to ISO-NE for approval to interconnect new facilities under Section I.3.9 of the ISO-NE Transmission, Markets and Services Tariff. Section I.3.9 is an adverse impact test that is performed under peer review by ISO-NE and NEPOOL participants. The FERC-approved ISO-NE Transmission, Markets and Services Tariff also includes regional coordination processes which must be used to develop transmission plans in support of distribution needs. This process is also followed to coordinate new construction planning activities between transmission and distribution owners. The need to reliably serve changing customer demands is continuously examined and thoroughly reviewed to ensure optimized, consistent and cost-effective transmission facilities are constructed in support of distribution company requirements.

CL&P DISTRIBUTION SYSTEM PLANNING

In CL&P, a Distribution Asset Management organization monitors, assesses and plans upgrades and additions to the distribution system. One primary focus of CL&P's distribution system planning has been to eliminate islands of load that would be dropped for extended time periods for the single failure of a piece of substation equipment or a supply line to a substation. Another CL&P planning focus has been to convert older distribution systems which operate at voltages of 4.8 kV, 8.32 kV and 27.6 kV, and to eliminate associated small distribution substations, in order to standardize its distribution system on two nominal voltages, 13.8 kV and 23 kV. By reducing the number of substations and different types of equipment used on the system, CL&P is able to achieve cost benefits. At the same time, higher-voltage tie-line capabilities between neighboring bulk-power substations contribute to improved reliability of customer supply by eliminating islands of load.

COORDINATION OF TRANSMISSION AND DISTRIBUTION PLANNING

Because bulk-supply substation projects (i.e., substations which interconnect 115-kV lines with 13.8- or 23-kV distribution systems) require both transmission line and substation equipment additions at a shared-use facility, and Connecticut Siting Council approval, a great deal of planning and engineering coordination occurs between transmission and distribution system planners and engineers. Some examples of this coordination within CL&P are:

- annual multi-year projections of load growth and forecast indications of load-relief needs
- comprehensive and mutual review of customer loads on distribution feeders and substations, and load-transfer plans
- sharing of customer-specific information for additions to the electric system
- technical challenge sessions to assess alternatives and identify solutions
- single point of contact for project siting and site studies
- single point of control for project execution, including the engineering/design, material procurement and construction of the project
- project schedule and budgeting coordination
- use of standard substation designs to minimize construction and maintenance costs while maximizing reliability and operating flexibility
- alignment of protective relaying systems and their operation
- listing of new distribution substation plans in the transmission company's annual forecasts of loads and resources
- joint planning of feeder switching for load-shedding events

The Connecticut Light and Power Company
Docket No. LIFE-CYCLE 2006

Data Request CSC-02
Dated: 12/23/2005
Q- CSC-008

Witness: **CL&P Panel**
Request from: **Connecticut Siting Council**

Question:
How and where is the cost of right-of-way acquisition included in the capital cost information your company provided in response to the Life Cycle Cost Interrogatories issued earlier under this docket?

Response:
On page 3 of the response to Data Request CSC-01, Q-CSC-002, in which CL&P provided estimated capital costs for overhead transmission lines, CL&P responded:

> We have not attempted to estimate land rights costs because they are site and project specific and highly variable. Where existing CL&P right-of-way is available, they can be zero.

On page 2 of the response to Data Request CSC-01, Q-CSC-004, in which CL&P provided estimated capital costs for underground transmission lines, CL&P responded:

> Land costs are site and project specific. Most often underground lines will be built within road right-of-ways, but some parts of a line (e.g., vaults) may be forced onto private property by Connecticut DOT or local community requirements. Future significant costs may be incurred by CL&P if the state requires existing underground cable systems to be relocated within or outside Connecticut DOT right-of-ways.

CL&P recognizes that land costs can be a crucial driver of the differential between overhead and underground transmission line construction, and addressed this subject in its pre-filed testimony filed with the Council on January 6, 2006. However, such cost considerations are so condition-specific that they cannot be estimated for a generic cost comparison.

The Connecticut Light and Power Company
Docket No. LIFE-CYCLE 2006

Data Request CSC-02
Dated: 12/23/2005
Q- CSC-009

Witness: **CL&P Panel**
Request from: **Connecticut Siting Council**

Question:
What vegetation management practices are used on the transmission rights-of- way on your system?

Response:
The vegetation management practices employed by NU on the transmission system include side trimming and brush control. Manual cutting, mechanical mowing and the use of federal- and state-registered herbicides are the methods used to control targeted brush vegetation on rights-of-way. All methods are combined to employ an integrated approach for the management of problem vegetation.

Witness: CL&P Panel
Request from: Connecticut Siting Council

Question:
If herbicides or growth retardants are used, what is the cost impact of their use compared to traditional trimming and mowing?

Response:
The most effective brush-control technique depends upon many factors, including the local climate, the type of vegetation in the area, and the starting condition of the right-of-way. For Connecticut, the cost for performing brush control using herbicides is typically less than the cost of other methods on a per-acre basis. Herbicides reduce the amount of vegetation to be controlled, and less time (labor and material) is required to maintain these areas. Cutting without stump treatment, and mowing results in more dense stands of targeted vegetation which not only cost more to cut initially but also increase vegetation-control costs in future years due to the increased amount of work required. Each of these methods of brush control is traditionally used in Connecticut. No use is made of growth retardants at this time.

Cost data for the various control methods is provided in the response to Data Request CSC-02, Q-CSC-012.

Witness: **CL&P Panel**
Request from: **Connecticut Siting Council**

Question:
Are there additional environmental or safety costs associated with the use of herbicides or growth retardants? What are they?

Response:
Please see the response to Data Request CSC-02, Q-CSC-012 for total costs of chemical control methods. There are no significant additional costs which are attributable to safety or environmental concerns associated with the use of herbicides or growth retardants. To ensure public safety, contractors who perform herbicide applications are certified and receive on-going training in the use of these materials. All licensing and training costs are included in the cost per acre reflected in the response to Data Request CSC-02, Q-CSC-012.

Witness: CL&P Panel
Request from: Connecticut Siting Council

Question:
What is the approximate cost per mile for vegetation management for various typical rights-of-way?

Response:
There are two separate vegetation management activities performed on transmission line right-of-ways. Side trimming is the trimming and removal of trees along the edges of the right-of-ways. CL&P performs side trimming on a 10-year cycle, so approximately 1/10th of the system is trimmed annually. Brush control is the removal or cutting of vegetation within the boundaries of the right-of-way. CL&P performs brush control on a 4-year cycle, so approximately 1/4th of the transmission system is maintained annually. Each activity is conducted independently of the other, using different contractors, and the costs are tracked using different unit measures.

Side trimming: Side trimming is tracked on a cost per mile basis. In 2004-2005, the cost to trim one side of a right-of-way ranged from just under $1,000 per mile to over $10,000 per mile, with an average of $2,639 per mile. These are costs for trimming one side of a right-of-way for a distance of one mile every ten years. Actual costs will vary depending on the amount and type of vegetation (trees) along the edge of a right-of-way.

Brush Control: Brush control is tracked on a cost per acre basis and not by linear mile. Brush control is performed using a variety of methods with each one having a different average cost per acre.

Manual brush cutting: Normally, manual cutting is the most costly method of vegetation control. Current estimates for manually cutting one acre of brush will range from approximately $500 per acre to over $1,000 per acre, depending on the densities of the targeted vegetation. NU performs manual cutting on only small sections of right-of-ways, and a reasonable estimate of the average cost per acre is $750.

Mechanical Mowing: NU performs right-of-way mowing sporadically in Connecticut, but employs mowing as the primary control method for the transmission line right-of-ways in New Hampshire. In Connecticut, mowing costs currently range from $500 per acre to over $750 per acre - again depending on the densities of the targeted vegetation. An average cost for mowing large parcels is about $530 per acre in Connecticut.

Chemical Control: NU employs herbicide applications as the primary method for vegetation control on transmission line right-of-ways in Connecticut. In sensitive areas, this method includes vegetation cutting and stump treatments. Over the past several years costs for chemical control have ranged from as low as $90 per acre to just over $260 per acre. Average per-acre costs for the past two years are $189 and $229 respectively, and costs will vary with the densities of targeted vegetation.

Although there is no "typical right-of-way" we have used the above cost data and made some example assumptions for single lines to answer this question. An example right-of-way width to be maintained for a single 115-kV H-Frame line, or a single-pole double-circuit 115-kV line, is 100 feet. This width equates to about 12.12 maintenance acres per mile of right-of-way. Assuming that we control brush on the right-of-way using herbicides, the brush-control cost per mile of this example right-of-way would be $2,727, using an average cost per acre of $225. Similarly, an example right-of-way width to be maintained for a single 345-kV H-frame line, or two parallel 115-kV H-Frame lines, is 150 feet. This width equates to 18.18 maintenance acres per mile of right-of-way. Again assuming that we control brush on the right-of-way using herbicides at the same average cost per acre of $225, the brush-control cost per mile of this example right-of-way would be $4,091. Each edge of these example right-of-ways would also require side trimming every 10 years at an average cost of $2,639 per mile.

In summary, an average mile of right-of-way costs approximately $5,278 once every ten years for side trimming (both sides), and the costs for brush control on right-of-ways that are 100 to 150 feet wide will range from $2,727 to $4,091 per mile once every four years. For wider right-of-ways with multiple transmission lines, the side trimming costs would be the same, but the average cost for brush control every four years would range higher.

The Connecticut Light and Power Company
Docket No. LIFE-CYCLE 2006

Data Request CSC-02
Dated: 12/23/2005
Q- CSC-013

Witness: **CL&P Panel**
Request from: **Connecticut Siting Council**

Question:
Provide information on the differences in capital costs and construction costs for standard conductors (e.g. ACSR) and composite conductors (e.g. ACCR, ACCC).

Response:
The major cost difference between ACSR and composite conductors is the purchase price of the material. The construction cost to install composite conductors would be slightly higher, because specialized equipment is required. However, this cost difference is ignored for the purposes of the estimates below. The material and construction cost comprise the major portion of the total capital cost; smaller cost elements include permitting, engineering, project overheads and the cost of money.

ACSR conductors presently cost about $2 per pound. We understand that ACCR conductors cost in the range of about $18 to $25 per pound. (We do not have similar cost data for ACCC conductors, but would anticipate a similar range.) Based on these conductor costs, the total cost to purchase and install a 115-kV circuit mile of 1590-kcmil ACSR conductors on existing structures is about $100,000, and the total cost to purchase and install a 115-kV circuit mile of 1272-kcmil ACCR conductors is $450,000 to $600,000 per mile. Assumptions made for these circuit-mile estimates are that the structure types, number, and sizes are all the same, and that the smaller ACCR conductor can provide ampacity to match the larger ACSR conductor. One could reasonably expect that the ratio to purchase and install similar bundled composite and standard conductors for 345-kV transmission lines would remain approximately the same at (4.5 - 6.0) to 1.0.

The Connecticut Light and Power Company
Docket No. LIFE-CYCLE 2006

Witness: **CL&P Panel**
Request from: **Connecticut Siting Council**

Question:
Comment on the annual variations in transmission line O&M expenses, as previously reported to FERC on the Form 1 for 1999 to 2004, i.e., what O&M cost factors impact total costs to create annual variations of up to 50 percent?

Response:
There was an error where 1999 credits were accounted for in 2000. The shift in the 1999/2000 charges is $600,000. With this correction the 1999 O&M costs total $2,467,345 and the 2000 O&M costs are $2,529,686.

In the first half of 2003, the Transmission Construction and Maintenance department was shifted from maintenance work to a large capital project. Lower priority maintenance was shifted from 2003 to 2004 when little capital work was done. This shift was about $300,000. With this adjustment the 2003 costs are $3,328,153 and the 2004 costs are $3,878,725.