January 7, 2004

Ms. Pamela B. Katz
Chairman
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

Re: Docket No. 272 - Middletown-Norwalk 345kV Transmission Line

Dear Ms. Katz:

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

This filing completes all the requested information for the D-W-01 set of interrogatories.

Response to D-W-01 Interrogatories dated 10/24/2003
D-W - 004 , 014 *, 018 , 020 , 027 , 028 , 029 , 030 , 031 *, 032 , 035

Very truly yours,

Anne Bartosewicz
Project Director - Transmission Business

ABB/tms
cc: Service List

* Due to the bulk nature of this material, the Companies request bulk filing status.

Witness: **Anne Bartosewicz**
Request from: **Towns of Durham and Wallingford**

Question:
The following question was submitted to CL&P on May 22, 2003 as Town of Durham Question No. 7, in response to the Municipal Consultation Filing. However, no response has been provided to date. Therefore, the question is being resubmitted at this time: Provide copies of the Documents that formed the basis for CL&P's decision to dismiss the alternative under street route between Oxbow Junction and Beseck Switching Station.

Response:
The Companies dismissed an under street route between Oxbow Junction and Beseck Switching Station because underground construction of this 345-kV line into the Beseck Substation could restrict the output of Millstone Generating Station, compromise the reliability of off-site power to the nuclear generating station and could adversely impact grid reliability. Faults on underground cable systems are virtually always permanent, and energizing a permanently faulted cable can result in significant additional damage. This is a very important consideration at Beseck Substation where the design includes the termination of the 345-kV transmission line from the Millstone Generating Station. Installing a small underground section, without additional switching stations, in the existing 345-kV line from Millstone would require the Companies to remove automatic reclosing operations and require manual on site inspections of the entire 345-kV line prior to re-energizing the line.

This judgement was based on engineering knowledge and the configuration of the transmission system as shown in the one line diagram included in the Municipal Consultation Filing dated May, 2003, Volume 6, Supplemental Report by Other Agencies, "Southwest Connecticut Electric Reliability Study", specifically, page 25, Diagram 5 "SWCT Electric Reliability Project".

Witness: **Roger C. Zaklukiewicz**
Request from: **Towns of Durham and Wallingford**

Question:
Reference pages G-13 and G-14 and Section G.4.3 of the Application. Provide copies of the Documents for the evaluation and determination of the transmission technology that would be used for the Middletown to Norwalk Project.

Response:
A copy of the study the Companies commissioned to investigate potential technology alternatives for the 345-kV Middletown – Norwalk Transmission Line Project is attached. This study investigated the feasibility of constructing an overhead or underground high voltage direct current (HVDC) transmission line, between East Devon substation in Milford and Beseck switching station in Wallingford, a distance of about 34 miles.

The Companies concluded that a HVDC transmission line is not a technically and economically practical alternative for the following reasons:

For reliability reasons, the 345-kV system is constructed in a series of "loops", so that if one line serving an area is lost, power flows on the alternate transmission line serving the area. This occurs without operator intervention and the system instantaneously adjusts to meet customer demands. The proposed 345-kV Middletown – Norwalk project would complete a 345-kV loop in southwest Connecticut and integrates Southwest Connecticut into New England and Connecticut 345-kV transmission grid. A HVDC transmission line does not provide instantaneous backup upon the loss of an alternate transmission line serving the area.

The transmission of electric power using HVDC technology is not economical for short distances. HVDC transmission systems require expensive converter stations at each end of the transmission line to convert power from AC to DC and vice versa. Economic considerations call for a certain minimum transmission distance (break-even distance) before a HVDC line can be considered cost competitive. The estimated break-even distance for overhead HVDC and overhead AC transmission is approximately 300 miles. There is no break-even distance between an overhead AC and an underground HVDC transmission line. The direct cost of the proposed AC transmission line from Beseck to East Devon is approximately $100 million. If an overhead HVDC line were to be installed, its direct cost, including the converter stations, would be approximately 4 times as much as the equivalent AC facilities. The direct cost of an HVDC underground transmission line would be approximately 5 and 1/2 times that of the equivalent AC facilities. The primary reason for the higher costs is the need for converter stations at the terminals to convert AC into DC and vice versa.

For a long (approximately 24+ miles long) submarine cable installation, where it is not possible to construct mid point reactive compensation stations, an AC transmission line is not a viable option. Underground HVDC provides a viable means to build such a transmission line since reactive compensation is not needed.

AC/DC converters require a large amount of reactive power to operate correctly, both in rectification, as well as in inversion. For example, a 1200 MW HVDC transmission link requires, capacitive reactance in the order of 480 to 660 MVAR (approximately 50% of the active HVDC link). Synchronous or static capacitance must be installed at each terminal for this purpose. The need for this additional capacitance increases the size requirements of the AC substation to which the converter station is connected.

AC/DC converters generate many harmonics. Unless addressed, the harmonic currents can have many negative effects on the power system, including but not limited to the malfunction of protection systems, overheating of customer equipment (such as induction motors), and can cause the malfunction of sophisticated process controllers. Harmonics can also interfere with neighboring communication equipment. At each converter station, filters must be installed on the AC side to mitigate the harmonics transferred to the AC system. On the DC side, smoothing reactors must be installed. These components require a lot of space. The reactors are typically noisy, requiring sophisticated sound suppression facilities or large buffer zones around the converter station.

Unlike the AC transmission system, HVDC converter stations have very little overload capacity. To provide the same emergency ratings as an equivalent AC transmission line, the converter stations would have to be significantly oversized further increasing their cost and decreasing their competitiveness relative to AC.

Approximately 15 acres of land are required for the converter station. This is in addition to the land required for the AC equipment and buses at each terminal of the HVDC transmission line.

For these reliability reasons and the cost impact to customers, the Companies determined a HVDC transmission line is not a technically and economically practical option for this project and eliminated this alternative from further consideration.

* Due to the bulk nature of this material, the Companies request bulk filing status.

HVDC System Study (Final).pdf

DC Study Cover Final.doc

Witness: **Anne Bartosewicz; John J. Prete**
Request from: **Towns of Durham and Wallingford**

Question:
Reference page H-2 and Section H.4 of the Application.

a Provide copies of the Documents for the evaluation of each of the other potential routes that were evaluated for the proposed Middletown to Norwalk Project.
b. Provide copies of the Documents that formed the basis for the determination that each of these potential route options should not be selected as the proposed route for the Middletown to Norwalk Project.

Response:
Please see the response to DW-01, Q-D-W-027, which identifies the documents and information requested in questions a and b.

Witness: **Roger C. Zaklukiewicz**
Request from: **Towns of Durham and Wallingford**

Question:
Reference pages H-10 and H-11 and Section H.2 of the Application.

a Provide copies of the notes, minutes, summaries, reports and other Documents of the meetings, and the other discussions of the team that performed the alternatives identification and evaluation process.
b. Provide copies of the Documents distributed or circulated at the meetings, and at the other discussions of the team that performed the alternatives identification and evaluation process.
c. Provide copies of the materials and other Documents used in presentations made at the meetings, and at the other discussions of the team that performed the alternatives identification and evaluation process.
d. Provide copies of the correspondence between Burns & McDonnell Engineering, Inc. and CL&P or UI regarding the routing analyses performed by Burns & McDonnell Engineering, Inc.
e. Provide copies of the correspondence between Power Delivery Consultants, Inc. and CL&P or UI regarding the evaluation of underground cable types and the identification and evaluation of underground routes that could be suitable for potential cable systems.
f. Provide copies of the correspondence between ESS Group, Inc. and CL&P or UI regarding the review of a marine route performed by ESS.

Response:
This interrogatory is overly broad and goes beyond reasonable discovery and long-standing practice in Siting Council proceedings. Under the Uniform Administrative Procedure Act, a party has the opportunity to "inspect and copy relevant and material records, papers and documents not in the possession of the party or such agency, except as otherwise provided by federal law or any other provision of the general statutes..." Conn. Gen. Stat. § 4-177c(1) (emphasis added). CL&P and UI object to this interrogatory to the extent that the interrogatory does not seek relevant and material information.

Witness: **Cyril J. Welter**
Request from: **Towns of Durham and Wallingford**

Question:
Reference Table H-1 of the Application.

a Provide copies of the Documents that form the basis for the conclusions for each location presented in the column in Table H-1 titled "Overhead Alternative Routes."
b. Provide copies of the Documents that form the basis for the conclusions for each location presented in the column in Table H-1 titled "Underground Alternative Routes – Along Existing Transmission Corridors."
c. Provide copies of the Documents that form the basis for the conclusions for each location presented in the column in Table H-1 titled "Underground Alternative Routes – Along Existing Roads."
d. Provide copies of the Documents that form the basis for the conclusions for each location presented in the column in Table H-1 titled "Overhead/Underground Combined Alternative Route."

Response:
The information summarized in Table H-1 was derived from public and private sources and incorporated into a digital Geographic Information System (GIS) database using ArcGIS software. The public sources include USGS 1:2,400 topographic maps; and GIS information available at a website sponsored by the University of Connecticut - http://magic.lib.uconn.edu. The primary private sources were the Companies' own real estate records and proprietary aerial photography licensed from The Southern New England Telephone Company. This information has been integrated into a GIS database that is readable with ArcGIS software. The terms of the license agreement preclude the dissemination of the aerial photography. However, the remainder of the information can be provided on CD to the Council or to interested parties or intervenors. ArcGIS software will be required to run the database.

Much of this information was summarized in the attached spreadsheet (page 2, 3, and 4 of 4), which was used in the early stages of route selection. In addition, much of the assembled data was confirmed through field reconnaissance.

Route data_v10.xls

Link	Total Length (miles)	Angles >= 45 Degrees (no.)	Wetlands Waterbodies Watercourses (no.)	Rock Locations (no.)	Maximum Grade	Structure in Expanded R/W	Land Use				Public Facilites Within 200 ft		ROW	Link
							Residential (ft.)	Commercial / Industrial (ft.)	Undeveloped (ft.)	Central Business Districts (ft.)		Length Within Road	Length Within T-Line ROW	
1	2.55													1
2a	0.87													2a
2b	6.14													2b
2u	8.29													2u
3a	0.21													3a
3b	2.60													3b
3u	3.35													3u
3v	0.48													3v
4	5.89	2	19	6	Beseck Mtn		3300	0	27800	0	0	0	31100	4
5	3.13	0	14	0	3 mi. - 6-18%		1300	4400	10800	0	4	0	16500	5
5u	3.45													5u
6	3.94	1	0	5	6%		16100	8000	0	0	0	24100	0	6
6z	3.94	2	0	5	6%		16100	8000	0	0	0	24100	0	6z
7a	2.45													7a
7b	3.30													7b
7u	1.82													7u
8	2.33	1	10	6	26%		2950	3450	5900	0	0	0	12300	8
8z	2.33	2	10	6	26%		2950	3450	0	0	0	0	12300	8z
9	2.67	1	5	2	14%		2250	950	10900	0	0	0	14100	9
10	13.65	7	24	Throughout	12 mi.- 6-26%		11500	3500	57100	0	0	0	72100	10
11	9.74	3	1	2	7%		36000	13600	400	0	5	50000	0	11
12	14.32	4	63	9	19%		19400	0	56200	0	1	0	75600	12
12z	14.32	5	63	9	19%		19400	0	0	0	1	0	75600	12z
13	3.27	3	0	0	4%		7200	10100	0	0	0	17300	0	13
14	2.85	3	0	0	4%		4000	12500	0	0	2	16500	0	14
15	4.55	4	1	0	8%		17000	6000	0	1000	4	23300	0	15
15z	4.55	5	1	0	8%		17000	6000	0	1000	4	23300	0	15z
16	7.43	2	0	0	8%		23600	14000	1600	0	0	39200	0	16
17	4.89	2	19	2	7%		22400	0	3400		1	0	25800	17
17z	4.90	3	19	2	7%		22400	0	0		1	0	25800	17z
18	5.92	3	2	6	8%		27300	0	4000	0	2	31300	0	18
18z	5.92	4	2	6	8%		27300	0	0	0	2	31300	0	18z
19	1.66	1	1	3	6%		8000	0	800	0	2	8800	0	19
20	2.53	3	0	3	8%		7000	7900	0	0	0	14900	0	20
20z	2.53	4	0	3	8%		7000	7900	0	0	0	14900	0	20z
21a	3.27	1	15	5	7%		5450	3200	10950	0	0	0	19600	21
21az	3.27	2	15	5	7%		5450	3200	10950	0	0	0	19600	21z
21b	0.63													
21c	0.45													
22a	0.38													22a
22b	1.15													22b
22c	0.57													22c
22u	1.50													22u
22v	3.11													22v
22vz	3.11	3	1	2	6%		8000	17700	0	0	0	16500	5600	22vz
23	3.49	2	12	9	11%	11	7720	3600	7080	0	0	0	18400	23
24	3.79	5	23	6	8%	1	3550	5250	11200	0	0	0	20000	24
24z	3.79	6	23	6	8%	1	3550	5250	11200	0	0	0	20000	24z
25a	3.88													25a
25b	0.51													25b
26	3.06	0	9	6	7%	16	8750	5700	1750	0	0	0	16200	26
27a	1.19	3												27a
27b	1.12													27b
27sc	1.35													
28	1.30	3	1	0	4%		0	6600	0	0	0	5200	0	28
29	1.00	1	0	3	6%		0	5300	0	0	0	5300	0	29

Link	Total Length (miles)	Angles >= 45 Degrees (no.)	Wetlands Waterbodies Watercourses (no.)	Rock Locations (no.)	Maximum Grade	Structure in Expanded R/W	Land Use				Public Facilites Within 200 ft		ROW	Link
							Residential (ft.)	Commercial / Industrial (ft.)	Undeveloped (ft.)	Central Business Districts (ft.)		Length Within Road	Length Within T-Line ROW	
30	2.63	0	0	0	5%		8300	4100	0	1500	9	13900	0	30
31	0.13	0	0	0	3%		0	700	0	0	0	700	0	31
32	0.10	2	0	0	3%		0	700	0	0	0	450	0	32
33	0.34	0	0	0	3%		0	1900	0	0	0	1900	0	33
34	0.31	1	0	0	3%		0	800	0	0	0	800	0	34
35	0.48	1	0	0	3%		0	0	0	2400	1	2400	0	35
36	0.24	0	0	0	3%		0	800	0	0	0	0	0	36
37a	0.96													37a
37b	0.55													37b
38a	1.72													38a
38b	6.97													38b
39a	1.73													39a
39b	14.04													39b
40	4.10	3	2	2	7%		4140	13760	0	4000	0	21900	0	40
41	4.08	1	0	0			0	0	0	0	0	21500	0	41
41z	4.08	2	0	0			0	0	0	0	0	21500	0	41z
42	7.19	0	0	0			0	0	0	0	0	37900	37900	42
43	3.09	0	1	2	6%		0	13800	1500	0	0	15300	0	43
44	4.99	2	1	3	8%		1600	19100	0	2000	4	22700	0	44
44sc	4.47													
45	1.24	2	0	0			0	0	0	0	0	5200	0	45
46	1.42	1	0	0			0	0	0	0	0	7500	7500	46
46z	1.42	2	0	0			0	0	0	0	0	7500	7500	46z
47	0.76	1	0	2	7%		2600	2600	1000	0	2	6200	0	47
48	0.82	0	0	0			0	0	0	0	0	0	0	48
49	0.84	0	0	0			0	0	0	0	0	4400	4400	49
50a	2.07	4	0	0			0	0	0	0	0	9300	0	50
50b	0.80													
51a	2.81													51a
51b	1.52													51b
52	5.02													52

z: Used when different combinations of segments results in additional angles for particular routes.

Route Data

Route	Total Route Length (miles)	Angles >= 45 Degrees (no.)	Wetlands Waterbodies Watercourses (no.)	Rock Locations (no.)	Maximum Grade	Structures in Expanded R/W	Land Use				Public Facilites Within 200 ft. (no.)	Length Within Road (ft.)	ROW	Route	
							Residential (ft.)	Commercial / Industrial (ft.)	Undeveloped (ft.)	Central Business Districts (ft.)			Length Within T-Line ROW (ft.)		
Scovill Rock Substation to Beseck Substation														***Scovill Rock Substation to Beseck Substation***	
A1	2.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	A1	1
A2	7.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	A2	2a,2b
A3	9.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	A3	2a,2u
A4	2.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	A4	3a,3b
A5	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	A5	3a,3u,3v
Beseck to East Devon Substation														***Beseck to East Devon Substation***	
B1	34.3	15	117	31	#VALUE!	0	65,300	12,300	101,600	0	4	23,700	158,900	B1	4,8,9,12,17z,19,20
B2	33.4	11	131	30	#VALUE!	0	55,750	7,600	115,150	0	2	0	178,500	B2	4,8,9,12,17,21a
B3	35.3	16	100	35	#VALUE!	0	70,200	12,300	49,400	0	5	55,000	133,100	B3	4,8,9,12z,18,19,20
B4	34.4	14	114	34	#VALUE!	0	60,650	7,600	55,550	0	3	31,300	152,700	B4	4,8,9,12z,18z,21a
B5	30.8	15	30	17	#VALUE!	0	76,850	51,450	29,800	0	7	120,600	43,400	B5	4,8z,11,14,16,20
B6	31.6	19	51	22	#VALUE!	0	96,650	30,950	29,000	1,000	12	97,000	69,200	B6	4,8z,11,15z,17z,19,20
B7	30.7	15	65	21	#VALUE!	0	87,100	26,250	42,550	1,000	10	73,300	88,800	B7	4,8z,11,15z,17,21
B8	32.6	18	34	26	#VALUE!	0	101,550	30,950	33,000	1,000	13	128,300	43,400	B8	4,8z,11,15,18,19,20
B9	31.7	16	48	25	#VALUE!	0	92,000	26,250	39,150	1,000	11	104,600	63,000	B9	4,8z,11,15,18z,21
B10	19.6	10	25	15	0	0	55,750	16,850	11,700	0	3	47,800	39,900	B10	3v,5u,6z,9,12,17z,19,20
B11	33.0	10	102	23	1	0	65,600	12,150	81,450	0	2	24,100	135,100	B11	3v,5u,6z,9,12,17,21a
B12	35.0	15	71	28	1	0	80,050	16,850	15,700	0	5	79,100	89,700	B12	3v,5u,6z,9,12z,18,19,20
B13	34.1	13	85	27	1	0	70,500	12,150	21,850	0	3	55,400	109,300	B13	3v,5u,6z,9,12z,18z,21a
B14	30.4	12	1	10	0	0	86,700	56,000	2,000	0	7	144,700	0	B14	3v,5u,6,11,14,16,20
B15	31.3	16	22	15	0	0	106,500	35,500	1,200	1,000	12	121,100	25,800	B15	3v,5u,6,11,15z,17z,19,20
B16	30.3	12	36	14	0	0	96,950	30,800	14,750	1,000	10	97,400	45,400	B16	3v,5u,6,11,15z,17,21a
B17	32.3	15	5	19	0	0	111,400	35,500	5,200	1,000	13	152,400	0	B17	3v,5u,6,11,15,18,19,20
B18	31.4	13	19	18	0	0	101,850	30,800	11,350	1,000	11	128,700	19,600	B18	3v,5u,6,11,15,18z,21a
B19	29.2	11	83	17	0	0	56,800	7,900	57,000	0	4	23,700	101,400	B19	3v,5u,7u,12,17z,19,20
B20	28.2	7	97	16	0	0	47,250	3,200	70,550	0	2	0	121,000	B20	3v,5u,7u,12,17,21a
B21	30.2	12	66	21	0	0	61,700	7,900	4,800	0	5	55,000	75,600	B21	3v,5u,7u,12z,18,19,20
B22	29.3	10	80	20	0	0	52,150	3,200	10,950	0	3	31,300	95,200	B22	3v,5u,7u,12z,18z,21a
B23	30.4	12	1	10	0	0	86,700	56,000	2,000	0	7	144,700	0	B23	3v,5u,6,11,14,16,20
East Devon Substation to Singer Substation														***East Devon Substation to Singer Substation***	
C1	8.3	6.0	0.0	0.0	0.1	0.0	0.0	2,200.0	0.0	2,400.0	1.0	3,550.0	0.0	C1	21b,22a,22u,22v,27a,25b,31,32,35,36
C2	8.1	4.0	0.0	0.0	0.1	0.0	0.0	3,400.0	0.0	0.0	0.0	3,400.0	0.0	C2	21b,22a,22u,22v,27a,25b,31,33,34
C3	4.7	7	2	2	0	0	8,000	25,100	0	0	0	22,500	5,600	C3	22v,28,34
C4	10.4	14.0	35.0	15.0	0.3	12.0	11,270.0	11,050.0	18,280.0	2,400.0	1.0	3,550.0	38,400.0	C4	21c,23,24z,27a,25b,31,32,35,36
C5	10.2	12.0	35.0	15.0	0.3	12.0	11,270.0	12,250.0	18,280.0	0.0	0.0	3,400.0	38,400.0	C5	21c,23,24z,27a,25b,31,33,34
C6	8.9	11	36	15	0	12	11,270	16,250	18,280	0	0	6,000	38,400	C6	23,24,28,34
C7	9.3	5.0	12.0	9.0	0.2	11.0	7,720.0	5,800.0	7,080.0	2,400.0	1.0	3,550.0	18,400.0	C7	21c,23,25a,25b,31,32,35,36
C8	9.1	3.0	12.0	9.0	0.2	11.0	7,720.0	7,000.0	7,080.0	0.0	0.0	3,400.0	18,400.0	C8	21c,23,25a,25b,31,33,34
C9	11.4	6.0	21.0	18.0	0.4	27.0	24,770.0	22,100.0	8,830.0	1,500.0	9.0	22,350.0	34,600.0	C9	21c,23,26,29,30,32,33,34
C10	11.4	4.0	21.0	18.0	0.4	27.0	24,770.0	19,500.0	8,830.0	3,900.0	10.0	21,600.0	34,600.0	C10	21c,23,26,29,30,35,36
C11	8.1	4.0	0.0	0.0	0.1	0.0	0.0	3,400.0	0.0	0.0	0.0	3,400.0	0.0	C11	21b,22a,22u,22v,27a,25b,31,33,34
C12	8.1	4.0	0.0	0.0	0.1	0.0	0.0	3,400.0	0.0	0.0	0.0	3,400.0	0.0	C12	21c,22a,22b,22c,22v,27a,25b,31,33,34
C13	10.2	11.0	35.0	15.0	0.3	12.0	11,270.0	12,250.0	18,280.0	0.0	0.0	3,400.0	38,400.0	C13	21c,23,24,27a,25b,31,33,34
Singer Substation to Norwalk Substation														***Singer Substation to Norwalk Substation***	
D1	20.1	2	0	3	0	0	8,300	10,200	0	3,900	10	21,600	0	D1	36,35,30,29,39a,39b
D2	18.6	4.0	1.0	5.0	0.3	0.0	12,500.0	26,600.0	1,000.0	5,900.0	16.0	45,200.0	0.0	D2	36,35,30,38a,38b,44,47,50b
D3	15.5	6.0	4.0	9.0	0.3	0.0	8,340.0	50,060.0	2,500.0	6,000.0	6.0	66,100.0	0.0	D3	36,37a,37b,40,43,44,47,50b
D4	20.2	4	0	3	0	0	8,300	12,800	0	1,500	9	22,350	0	D4	34,33,32,30,29,39a,39b
D5	18.6	6.0	1.0	5.0	0.3	0.0	12,500.0	29,200.0	1,000.0	3,500.0	15.0	45,950.0	0.0	D5	34,33,32,30,38a,38b,44,47,50b
D6	18.6	6.0	1.0	5.0	0.3	0.0	12,500.0	29,200.0	1,000.0	3,500.0	15.0	45,950.0	0.0	D6	34,33,32,30,38a,38b,44,47,50b
D7	19.6	0	0	0	0	0	0	800	0	0	0	0	0	D7	36,37a,51a,51b,39b
D8	25.3	11	32	12	0	17	12,300	13,150	12,950	2,400	1	3,550	36,200	D8	36,35,32,31,25b,27a,24,26,39a,39b
D9	19.6	0	0	0	0	0	0	800	0	0	0	0	0	D9	36,37a,51a,51b,39b
D10	20.6	1.0	0.0	0.0	0.1	0.0	8,300.0	4,900.0	0.0	3,900.0	10.0	16,300.0	0.0	D10	36,35,30,38a,51b,39b
D11	24.2	3.0	9.0	6.0	0.2	16.0	8,750.0	7,900.0	1,750.0	2,400.0	1.0	3,550.0	16,200.0	D11	36,35,32,31,25b,25a,26,39a,39b
D12	17.5	3.0	1.0	5.0	0.2	0.0	4,200.0	22,500.0	1,000.0	2,000.0	6.0	28,900.0	0.0	D12	36,37a,51a,38b,44,47,50b

Primary route
Dropped route

Alternate A (UG to Singer-Hawthorne) variations
Alternate B (All-overhead) variations

Witness: **Cyril J. Welter**
Request from: **Towns of Durham and Wallingford**

Question:
Reference Table H-2 of the Application.

a Provide copies of the Documents that form the basis for the conclusions for each location presented in the column in Table H-2 titled "Overhead Alternative Routes."
b. Provide copies of the Documents that form the basis for the conclusions for each location presented in the column in Table H-2 titled "Underground Alternative Routes – Along Existing Transmission Corridors."
c. Provide copies of the Documents that form the basis for the conclusions for each location presented in the column in Table H-2 titled "Underground Alternative Routes – Along Existing Roads."
d. Provide copies of the Documents that form the basis for the conclusions for each location presented in the column in Table H-2 titled "Overhead/Underground Combined Alternative Route."

Response:
Please see the response to Data Request D-W-01, Q-D-W-027.

Witness: **Cyril J. Welter**
Request from: **Towns of Durham and Wallingford**

Question:
Reference Table H-3 of the Application.

a Provide copies of the Documents that form the basis for the conclusions for each location presented in the column in Table H-3 titled "Overhead Alternative Routes."
b. Provide copies of the Documents that form the basis for the conclusions for each location presented in the column in Table H-3 titled "Underground Alternative Routes – Along Existing Transmission Corridors."
c. Provide copies of the Document that form the basis for the conclusions for each location presented in the column in Table H-3 titled "Underground Alternative Routes – Along Existing Roads."
d. Provide copies of the Documents that form the basis for the conclusions for each location presented in the column in Table H-3 titled "Overhead/Underground Combined Alternative Route."

Response:
Please see the response to Data Request D-W-01, Q-D-W-027.

Witness: **Cyril J. Welter**
Request from: **Towns of Durham and Wallingford**

Question:
Reference Table H-4 of the Application.

a Provide copies of the Documents that form the basis for the conclusions for each location presented in the column in Table H-4 titled "Overhead Alternative Routes."
b. Provide copies of the Documents that form the basis for the conclusions for each location presented in the column in Table H-4 titled "Underground Alternative Routes – Along Existing Transmission Corridors."
c. Provide copies of the Documents that form the basis for the conclusions for each location presented in the column in Table H-4 titled "Underground Alternative Routes – Along Existing Roads."
d. Provide copies of the Documents that form the basis for the conclusions for each location presented in the column in Table H-4 titled "Overhead/Underground Combined Alternative Route."

Response:
Please see the response to Data Request D-W-01, Q-D-W-027.

Witness: **Anne Bartosewicz**
Request from: **Towns of Durham and Wallingford**

Question:
Reference page H-42 of the Application. Provide copies of Documents for the estimated capital costs of the proposed Middletown to Norwalk Project and all alternatives examined by or for CL&P.

Response:
The attached Excel spreadsheets, described below, provide cost information for the Proposed Route with Supported Changes, the Proposed Route, Alternative A and Alternative B. Specific cost estimates have been redacted from the spreadsheets in order to maintain the integrity of the competitive bidding process. The Companies would make the unredacted cost estimates available with appropriate confidentiality protection.

Description of Attachments

Attachment 1: Summary of Cost Estimates
Attachment 2: Property Cost Estimates
Attachment 3: Overhead Cost Estimates
Attachment 4: Underground Cost Estimates
Attachment 5: Substation Cost Estimates
Attachment 6: Gennerator Interconnection Cost Estimates

* Due to the bulk nature of this material, the Companies request bulk filing status.


Att6 DW-031 Gen Connection Costs Redacted.xls
Att2 DW-031 MN 345 Property Costs.xls
Att3 DW-031 Overhead Costs Redacted.xls
Att4 DW-031 Underground Costs Redacted.xls
Att5 DW-031 Substation Costs Redacted.xls
Att1 DW-031 MN 345 Cost Summary.xls

Witness: **Anne Bartosewicz**
Request from: **Towns of Durham and Wallingford**

Question:
Reference page H-42 of the Application. Provide copies of Documents that compare the capital costs of the proposed route of the Middletown to Norwalk Project with the capital costs of any alternative route(s).

Response:
Please see the response to Data Request D-W-01, Q-D-W-031.

Witness: **Peter T. Brandien**
Request from: **Towns of Durham and Wallingford**

Question:
Reference pages H-49 through H-51 and Section H.7 of the Application.

a Provide copies of Documents related to the examination/investigation of the expansion or addition of underground beyond that included in the proposed route.
b. Provide copies of Documents that examined/investigated the additional technical and/or operational risks that would result from expanding or adding additional underground sections of the proposed Middletown to Norwalk Project beyond that included in the proposed route.
c. Provide copies of Documents that examined/investigated the additional technical and/or operational risks that would result from combining overhead and underground sections in the proposed Middletown to Norwalk Project in the manner described as porpoising in the Application.
d. (Page H-50) Provide copies of Documents related to the examination/investigation of the technical or operational impact of including additional underground segments on the Beseck to East Devon circuit.
e. (Page H-50) Provide copies of Documents related to the examination/investigation of the cost of including additional underground segments on the Beseck to East Devon circuit.
f. (Page H-50) Provide copies of Documents related to the examination/investigation of the technical or operational impact of including additional underground segments on the other 345-kV circuits that will connect to the Beseck switching station.
g. (Page H-50) Provide copies of Documents related to the examination/investigation of the cost of including additional underground segments on the other 345-kV circuits that will connect to the Beseck switching station.
h. Provide copies of the Documents for the comparison of the economic costs of overhead and underground construction between East Devon and Norwalk.

Response:

a, b, c, d) Please refer to the Supplemental Filing filed December 16, 2003.

e) Please see the response to D-W-01, Q-D-W-016 (d). In addition, please see the attached spreadsheet which contain direct costs. Specific costs estimates have been redacted from the spreadsheets in order to maintain the integrity of the competitive bidding process. The Companies would make the cost estimates available with appropriate confidentiality protection.

To the extent this question seeks more detailed cost information, the Companies object for the reasons set forth in the objection to D-W-01, Q D-W-001. In addition, more detailed information concerning the Companies' detailed cost assumptions, could adversely influence the competitive bidding process, and therefore must be kept confidential.

f) The Companies did not examine or investigate technical or operational impacts of undergrounding these transmission lines. Underground construction of the 345-kV lines into the Beseck Substation (excluding the Beseck to East Devon line) could restrict the output of Millstone Generating Station, compromise the reliability of off-site power to the nuclear generating station and could adversely impact grid reliability. This is one of the primary reasons for not investigating underground construction of the 345-kV lines into Beseck Substation. Faults on underground cable systems are virtually always permanent, and energizing a permanently faulted cable can result in significant additional damage. This is a very important consideration at Beseck Substation where the design includes the termination of the 345-kV transmission line from the Millstone Generating Station. Installing a small underground section, without additional switching stations, in the existing 345-kV line from Millstone would require the Companies to remove automatic reclosing operations and require manual on site inspections of the entire 345-kV line prior to reenergizing the line. Accordingly, there are no such documents.

g) The Companies did not conduct a specific "examination/investigation of the cost of including additional underground segments on the other 345-kV circuits that will connect to the Beseck switching station". Accordingly, there are no documents related to such examination/investigation.

h) Please see the response to D-W-01, Q-D-W-031. To the extent this question seeks other "Documents" the Companies object to it for the reasons stated in response to D-W-01, Q-D-W-001.

MN 345 Porpoise Cost Estimates Redacted.xls

Porpoise Transition Station - 3 345kV Risers

Description	*Unit*	*Qty. Required*	*Material Price*	*Labor Price*	*Total Price*
MAJOR EQUIPMENT					
345kV, 75-150 MVAR Shunt Reactor (3-Ph)	Ea	3			
345-kV Breaker (Dead Tank w/ Synch Closing)	Ea	8			
345-kV Breaker (Live Tank w/ Synch Closing)	Ea	3			
345-kV Disconnect Switch	Ea	15			
345-kV Motor Operated Disconnect Switch	Ea	4			
345-kV Surge Arrestor (1-Phase)	Ea	45			
345-kV Single Cable Termination	Ea	9			
345-kV CVT (1-Phase)	Ea	18			
HPFF Cable Oil Pressurization Station	Ea	1			
Station Service Transformer	Ea	2			
Emergency Station Generator	Ea	1			
TOTAL MAJOR EQUIPMENT					
STEEL STRUCTURES					
345-kV Deadend Structure	Ea	1			
345-kV Low Switch Stand	Ea	12			
345-kV High Switch Stand	Ea	6			
345-kV 3-Ph High Bus Support	Ea	8			
345-kV 3-Ph Low Bus Support	Ea	9			
345-kV CVT Stand	Ea	18			
345-kV Cable Termination Stand	Ea	9			
345-kV Surge Arrester Stand	Ea	45			
Lightning Mast	Ea	11			
TOTAL STEEL STRUCTURES					
FOUNDATIONS					
345-kV Deadend Structure Foundation	30 CU. YD.	4			
345-kV Low Switch Stand Foundation	5 CU. YD.	48			
345-kV High Switch Stand Foundation	7.1 CU. YD.	24			
345-kV 3-Ph High Bus Support Foundation	7.1 CU. YD.	16			
345-kV 3-Ph Low Bus Support Foundation	5 CU. YD.	18			
345-kV CVT Stand Foundation	3.5 CU. YD.	18			
345-kV Cable Termination Stand Foundation	3.5 CU. YD.	9			
345-kV Surge Arrester Stand Foundation	3.5 CU. YD.	45			
345-kV Breaker Foundation	15 CU. YD.	11			
Firewall/Sound Barrier Wall	75 CU. YD.	3			
Lightning Mast Foundation	12 CU. YD.	11			
345kV, 75-150MVAR Shunt Reactor Fdn	70 CU. YD.	3			
Oil Containment	120 CU. YD.	3			
Control Building	2.5 CU. YD.	15			
TOTAL FOUNDATIONS					
MISC. EQUIPMENT/CONSTRUCTION					
Control Building	SQ-FT	1760			
Site Work	1 Lot	1			
Relay/Comm Equipment	Ea	15			
Batteries/Chargers	Ea	2			
SCADA RTU	Ea	1			
Grounding	1 Lot	1			

Raceway/Wiring	1 Lot	1			
HV Bus/Conductor/Fittings	1 Lot	1			
Field Electrical Testing	1 Lot	1			
TOTAL MISC. EQUIP./CONSTRUCTION					
ENGINEERING					
Engineering & Field Inspection	1 Lot	1			
Survey	1 Lot	1			
Soil Investigation	1 Lot	1			
TOTAL ENGINEERING					
PROPERTY ACQUISITION					
TOTAL W/O CONTINGENCY					
CONTINGENCY					
TOTAL					**$ 18,309,461**

	Unit	Qty. Required	Material Price	Labor Price	Total Price
Site Work					
Site access drive	1 Lot	1			
Site clearing	1 Lot	1			
Site grading	1 Lot	1			
Crushed rock surfacing	1 Cu-Yd	6620			
Soil sterilant	1 Lot	1			
Drainage culverts	1 Lot	1			
Site restoration and seeding	1 Lot	1			
Perimeter Fencing and gates	Linear-Ft	2360			
Oil Containment piping	1 Lot	1			
Yard Lighting	1 Lot	18			
Mobilization/Demobilization	Ea	1			
Contractor's field office	Ea	1			
Field Testing	1 Lot	0			
TOTAL SITE WORK					
Raceway/Wiring					
Yard Conduit	1 Lot	1			
Precast Cable Trench	1 Lot	1			
Trench Protective barrier	1 Lot	1			
Yard Wiring	1 Lot	1			
TOTAL RACEWAY/WIRING					
Grounding					
Main & perimeter ground grid	1 Lot	1			
Fence grounding	1 Lot	1			
Structure & Equipment grounding	1 Lot	1			
Cable Trench Grounding	1 Lot	1			
Switch Operator Mats	Ea	19			
TOTAL GROUNDING					
HV Bus/Conductor					
5" Bus with fittings	Ft	3,200			
345-kV Jumper Installed	Ea	57			
345-kV Station Post Insulator	Ea	51			
TOTAL HV BUS / CONDUCTOR					
Control Building					
Control wiring	1 Lot	1			
Power Panelboards	1 Lot	1			
Control Building with HVAC	1 Lot	1			
Control Building Foundation	1 Lot	1			
TOTAL CONTROL BUILDING					
B&MCD In-House					
Project Management	1 Lot	1			
Engineering & Design	1 Lot	1			
Procurement	1 Lot	1			
Administration	1 Lot	1			
Field - constr management	1 Lot	1			
Soil Investigations	1 Lot	1			
TOTAL BMCD IN-HOUSE					

Porpoise Transition Station - 2 345kV Risers

Description	*Unit*	*Qty. Required*	*Material Price*	*Labor Price*	*Total Price*
MAJOR EQUIPMENT					
345kV, 75-150 MVAR Shunt Reactor (3-Ph)	Ea	2			
345-kV Breaker (Dead Tank w/ Synch Closing)	Ea	7			
345-kV Breaker (Live Tank w/ Synch Closing)	Ea	2			
345-kV Disconnect Switch	Ea	12			
345-kV Motor Operated Disconnect Switch	Ea	3			
345-kV Surge Arrestor (1-Phase)	Ea	42			
345-kV Single Cable Termination	Ea	6			
345-kV CVT (1-Phase)	Ea	15			
HPFF Cable Oil Pressurization Station	Ea	1			
Station Service Transformer	Ea	2			
Emergency Station Generator	Ea	1			
TOTAL MAJOR EQUIPMENT					
STEEL STRUCTURES					
345-kV Deadend Structure	Ea	1			
345-kV Low Switch Stand	Ea	12			
345-kV High Switch Stand	Ea	4			
345-kV 3-Ph High Bus Support	Ea	8			
345-kV 3-Ph Low Bus Support	Ea	10			
345-kV CVT Stand	Ea	15			
345-kV Cable Termination Stand	Ea	6			
345-kV Surge Arrester Stand	Ea	42			
Lightning Mast	Ea	11			
TOTAL STEEL STRUCTURES					
FOUNDATIONS					
345-kV Deadend Structure Foundation	30 CU. YD.	4			
345-kV Low Switch Stand Foundation	5 CU. YD.	48			
345-kV High Switch Stand Foundation	7.1 CU. YD.	16			
345-kV 3-Ph High Bus Support Foundation	7.1 CU. YD.	16			
345-kV 3-Ph Low Bus Support Foundation	5 CU. YD.	20			
345-kV CVT Stand Foundation	3.5 CU. YD.	15			
345-kV Cable Termination Stand Foundation	3.5 CU. YD.	6			
345-kV Surge Arrester Stand Foundation	3.5 CU. YD.	42			
345-kV Breaker Foundation	15 CU. YD.	8			
Firewall/Sound Barrier Wall	75 CU. YD.	2			
Lightning Mast Foundation	12 CU. YD.	11			
345kV, 75-150MVAR Shunt Reactor Fdn	70 CU. YD.	2			
Oil Containment	120 CU. YD.	2			
Control Building	2.5 CU. YD.	15			
TOTAL FOUNDATIONS					
MISC. EQUIPMENT/CONSTRUCTION					
Control Building	SQ-FT	1760			
Site Work	1 Lot	1			
Relay/Comm Equipment	Ea	15			
Batteries/Chargers	Ea	2			
SCADA RTU	Ea	1			
Grounding	1 Lot	1			

Raceway/Wiring	1 Lot	1			
HV Bus/Conductor/Fittings	1 Lot	1			
Field Electrical Testing	1 Lot	1			
TOTAL MISC. EQUIP./CONSTRUCTION					
ENGINEERING					
Engineering & Field Inspection	1 Lot	1			
Survey	1 Lot	1			
Soil Investigation	1 Lot	1			
TOTAL ENGINEERING					
PROPERTY ACQUISITION					
TOTAL W/O CONTINGENCY					
CONTINGENCY					
TOTAL					**$ 14,748,572**

	Unit	Qty. Required	Material Price	Labor Price	Total Price
Site Work					
Site access drive	1 Lot	1			
Site clearing	1 Lot	1			
Site grading	1 Lot	1			
Crushed rock surfacing	1 Cu-Yd	5900			
Soil sterilant	1 Lot	1			
Drainage culverts	1 Lot	1			
Site restoration and seeding	1 Lot	1			
Perimeter Fencing and gates	Linear-Ft	2230			
Oil Containment piping	1 Lot	1			
Yard Lighting	1 Lot	15			
Mobilization/Demobilization	Ea	1			
Contractor's field office	Ea	1			
Field Testing	1 Lot	0			
TOTAL SITE WORK					
Raceway/Wiring					
Yard Conduit	1 Lot	1			
Precast Cable Trench	1 Lot	1			
Trench Protective barrier	1 Lot	1			
Yard Wiring	1 Lot	1			
TOTAL RACEWAY/WIRING					
Grounding					
Main & perimeter ground grid	1 Lot	1			
Fence grounding	1 Lot	1			
Structure & Equipment grounding	1 Lot	1			
Cable Trench Grounding	1 Lot	1			
Switch Operator Mats	Ea	15			
TOTAL GROUNDING					
HV Bus/Conductor					
5" Bus with fittings	Ft	3,000			
345-kV Jumper Installed	Ea	48			
345-kV Station Post Insulator	Ea	69			
TOTAL HV BUS / CONDUCTOR					
Control Building					
Control wiring	1 Lot	1			
Power Panelboards	1 Lot	1			
Control Building with HVAC	1 Lot	1			
Control Building Foundation	1 Lot	1			
TOTAL CONTROL BUILDING					
B&MCD In-House					
Project Management	1 Lot	1			
Engineering & Design	1 Lot	1			
Procurement	1 Lot	1			
Administration	1 Lot	1			
Field - constr management	1 Lot	1			
Soil Investigations	1 Lot	1			
TOTAL BMCD IN-HOUSE					