Central Maine Power

CONFIDENTIAL
MATERIALS
ATTACHED

September 10, 2009

Karen Geraghty
Administrative Director
Maine Public Utilities Commission
State House Station #18
242 State Street
Augusta, Maine 04333-0018

Re: CENTRAL MAINE POWER COMPANY and PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE, Request for Certificate of Public Convenience and Necessity for Maine Power Reliability Program Consisting of Construction of Approximately 350 miles of 345 kV and 115 kV Transmission Lines
Docket No. 2008-255

Dear Ms. Geraghty:

Enclosed in the above-captioned proceeding, please find Central Maine Power Company's Evaluation Summary of the Yarmouth Intervenors' Alternatives.

The attached maps are confidential and are being provided under the terms and conditions of First Revised Protective Order No. 2, Critical Energy Infrastructure Information, dated August 27, 2008.

Sincerely,

Ruth Harris
Analyst, Regulatory & Tariffs

Yarmouth Intervenors Alternatives Evaluation Summary

Introduction

This document provides a summary of three alternatives evaluated by Central Maine Power (CMP) to a new 345kV transmission line in Yarmouth, Maine and a new substation proposed in Cumberland, Maine proposed as part of the Maine Power Reliability Program (MPRP). These alternatives have been developed in response to concerns expressed by the Yarmouth Intervenors concerning the proposed 345kV transmission line which as planned would run along an existing CMP corridor near several homes in two subdivisions in Yarmouth. The proposed 345kV transmission line, identified as Section 3020, would extend 12.9 miles along existing CMP corridors beginning at the existing Surowiec Substation in Pownal, Maine and extending to a new Raven Farm Substation in Cumberland. As proposed by CMP, the line would utilize H-frame construction and existing rights of way.

Each of the alternatives evaluated and summarized in this document move the transmission line away from the existing subdivisions. The first alternative involves completely relocating the substation to another site, leaving the area near the Yarmouth Intervenors' homes unchanged. The second alternative involves a minor shift in the alignment designed to allow a vegetated buffer to remain within the existing corridor between the new transmission line and the Yarmouth neighborhood. The final alternative involves placing the proposed 345kV transmission line underground. The following describes each alternative, including real estate considerations, environmental impacts, design considerations and estimated costs.

Relocated Substation Site Alternative

The first alternative is based on a concept discussed in the November 17, 2008 technical conference, described in the Direct Testimony of William H. Dunn, Jr (page 12), and further defined in ODR-03-15. The purported goal of this alternative is to provide the same electrical benefit as the Raven Farm Substation, but to do so at a different location. To maintain this electrical equivalency the following needs were identified for the proposed alternate site:

- Allow interconnection of a new 345kV line from Surowiec with existing Section 386 at a breaker-and-a-half bus;
- Add an autotransformer;
- Terminate Sections 164 and 165 at a breaker-and-a-half bus; and
- Provide a means of reinforcing the South Portland Loop via a future 115kV line into the E. Deering area.

Using these electrical criteria, the following real estate parameters were defined for the proposed site:

- Must be adjacent to existing the corridors;
- Must be within 2 or 3 miles to the north or south of the intersection of S386 and S166/167 (any further would increase costs substantially);
- Must be large enough for a substation site (~20 acres); and
- Must have acceptable means of access.

With these parameters, a desk top real estate survey was completed using aerial photography, tax maps and other information readily available on the internet. This effort identified three potential sites:

- Alternate S/S Site #1: Located approximately 2.3 miles south of the intersection of S386 and S166/167 on the east side of the corridor in Westbrook near Lorenzen Hill. See Figure 1.
- Alternate S/S Site #2: Located just to the northeast of the intersection of S386 and S166/167 on the Falmouth-Westbrook town line. See Figure 2.
- Alternate S/S Site #3: Located approximately 1.83 miles north of the intersection of S386 and S166/167 on the west side of the corridor in Falmouth. See Figure 3.

Evaluation of Sites

The three potential sites were evaluated considering environmental features, design feasibility and availability of real estate. These evaluations are summarized below.

Environmental Evaluation

An assortment of environmental data from publically available sources was assembled to identify and evaluate the feasibility of the three alternate locations for the Raven Farm Substation. Potential environmental constraints included wetlands and sensitive wildlife habitats.

National Wetland Inventory (NWI maps) prepared by the US Fish and Wildlife Service were reviewed for each site. Based on this information, no significant wetlands were identified at any of the three potential alternate locations on these maps.

Habitat maps prepared by the Maine Department of Inland Fisheries and Wildlife were also reviewed for each site. No protected wildlife habitats such as bald eagle nests, deer wintering areas, waterfowl and wading bird habitats or habitat for federal or state-listed endangered or threatened species were identified on or near any of the three potential alternate substation locations.

The Maine Natural Areas Program in the Department of Conservation also maintains a database on the location of rare, threatened or endangered plants. No rare, threatened or endangered plants were documented at any of the three potential alternate substation locations.

Soil survey maps prepared by the US Natural Resource Conservation Service (NRCS) were reviewed. Given the very strong correlation between wetlands and hydric soils which exhibit "very poorly", "poorly" or "somewhat poorly drained" conditions, these maps are therefore useful for providing an indication of the occurrence of wetlands. NRCS soil maps do not show hydric soils to be present at Alternate S/S Site #1 or 2. However, although much of Alternative S/S Site #3 is mapped to be underlain by non-hydric soils represented by the Hollis, Paxton, Peru and Woodbridge soils series, poorly drained Ridgebury soils are identified to occur near the interior of the site and are estimated to cover an area of 5 to 8 acres. In addition, topographic contours suggest a west flowing stream channel likely occurs at the north end of the site roughly parallel to Hidden Oaks Way.

Aerial photography available on the City of Westbrook's GIS website (dated April 2006) shows that the 30+ lot Presidential View residential subdivision now occupies the southerly area of Alternative S/S Site #2, and a single house accessed through this subdivision via Starlight Way occupies the northerly area identified as a potential option for locating a substation.

In summary, while the information available for review provided no indication that environmental constraints would prevent the construction of the substation options, existing residential development adjacent to Alternate S/S Site #2 would likely complicate environmental and local permitting at this site.

Design

Each of the three sites was reviewed from a design perspective considering proximity to the existing facilities, accessibility and terrain (based on publicly available topographic data). Based on this preliminary evaluation each site was deemed worthy of further investigation as a potential site.

Real Estate

With the three alternative sites vetted for insurmountable obstacles from the environmental and design perspective, landowners were contacted to gauge their interest and to request right of entry (ROE), so that a more detailed analysis of each alternative site could be executed that included site visits. Alternate S/S Sites

#2 and #3 are owned by the same person. This owner decided that she had no interest in selling either site for use as a substation site. The owners of the parcels that make up Alternate S/S Site #1 were interested and allowed a more detailed survey of the site.

Based on the unwillingness of the landowner to consider selling the sites for Alternatives #2 and #3, Alternate S/S Site #1 was selected as the preferred site for further real estate, environmental and design evaluation.

Alternate S/S Site #1 – Detailed Assessment

In order to obtain current aerial photography, and to allow collection of topographic data CMP commissioned an aerial survey of Alternative S/S Site #1. From this data the surveyor extracted 2 foot contours over the extents of the site. This data was used to determine if any recent developments had taken place on the site, and the extent of site grading likely required for the site.

An environmental field evaluation of Alternate S/S Site #1 was also conducted. Although on the flatter side of the Lorenzen Hill, topographic relief is approximately 50 vertical feet within the footprint needed for a substation at this location. NRCS soil mapping of the area indicates the site is underlain by the Hollis Series (HsC) which is designated as "somewhat excessively drained" and therefore not a hydric soil that is characteristic of wetlands. Bedrock is encountered at a shallow depth beneath this soil series and commonly within 12-to-14 inches of the land surface. Bedrock beneath the site is identified as granite (CDg) by the Maine Geological Survey. Outcrops of bedrock are also common on the adjoining transmission line and other parts of Lorenzen Hill. Due to the steep slopes and occurrence of bedrock approximately 12 acres of the site would need to be blasted or filled to prepare a footprint suitable for a substation.

During the course of the field review, wetlands were also identified at the site. The forested wetlands are associated with, and inter-connected by, a network of streams forming the headwaters of Mill Brook. This type, size, and configuration of wetland is not readily depicted on NWI or NRCS soils maps. The extent of the wetlands were delineated in the field and located by GPS survey methods. The wetlands are generally confined to a semi-circle from north to south around the east side of the parcel. Although a sizeable area of upland with little wetland is located west of this semi-circle, this area is crossed by more than 1,000 feet of stream channels that interconnect wetlands contributing to the base flow of Mill Brook.

Therefore, while published information available for review provided no indication environmental constraints would cause Alternate S/S Site #1 to be unsuitable, field studies indicate intensive site preparation and stream and wetland impacts would result from construction of a substation at this site.

Using the information gathered in this phase, a conceptual layout was developed for the alternate system configuration. Figure 4 shows the Relocated Substation Site Alternative overlain with the CMP proposed Raven Farm solution. Additionally, a site layout for Alternate S/S Site #1 was developed. This configuration is shown in Figure 5. The following summary items are worth noting at this site:

- 1.5 acres of wetland impact are estimated
- 1146 feet of stream are impacted
- 50 feet of vertical relief exist on the site
- 2,000 feet of new access road is required for this site

Alternate S/S Site #1 – Analysis of Estimated Costs

In order to remain electrically equivalent to the proposed Raven Farm Substation, the Alternate S/S Site #1 required the following components:

- A new 17.6 mile 345kV line from Surowiec to Alternate S/S Site #1 utilizing H-frame structures on existing right of way

- Rebuild 1.8 mile portion of S166 and 167 on single circuit single pole structures to make additional ROW available
- Double circuit 2.4 miles of S165 and 167 to make additional ROW available
- A new 345/115 kV Substation, located at Alternate S/S Site #1
- A future 115kV line from Alternate S/S Site #1 to Cape Substation, via Prides Corner and East Deering Substations
- Expansion of the Prides Corner Substation
- Expansion of the E. Deering Substation
- Expansion of the Cape Substation

Drawing largely from the results of the MPRP Transmission Cost Allocation Application to ISO-NE (filed in this docket on January 23, 2009) the estimated cost of this alternative was calculated as $131,350,000. A breakdown of these estimated costs is provided in Table 1. For reference, the components of the CMP proposed alternative that would be replaced by this alternative total to an estimated $115,348,000 and are summarized in Table 2. Therefore, the estimated incremental cost increase to relocate the proposed substation to Alternate S/S Site #1 is $16,002,000, as shown in Table 3.

The cost estimate shown below in Table 1 for Alternate S/S Site #1 itself (Item 1C) is the same as that estimated for the Raven Farm Substation. In light of the similarity of the equipment and overall foot print of the two sites, the use of the Raven Farm estimate provides a useful guide to the cost of the Relocated Substation Site Alternative. However, several factors differ between the two sites, the most notable being the anticipated site grading costs. As noted above, the Relocated Substation Site Alternative would involve approximately 50 feet of vertical relief across the proposed site footprint. Based on the field observations and review of soil maps, it is very likely that much of the required excavation would be through ledge. Although the quantity of cut and fill was not calculated for this site, excavation costs for the Relocated Substation Site Alternative could easily exceed the costs estimated for the Raven Farm site by millions of dollars, further widening the incremental cost increase for the Relocated Substation Site Alternative relative to MPRP.

Table 1: *Yarmouth* Relocated Substation Site Alternative Cost Detail		
Item	Description	Estimated Cost, $
1A[1]	17.6 mile 345kV transmission line from Surowiec S/S to the Alternate S/S Site #1 in Westbrook, ME utilizing H-frame construction on existing ROW	$33,968,000
1B[2]	Rebuild approximately 2.4 miles of Sections 165 and 167 to double circuit single pole structures	$3,931,000
1C[3]	345kV/115kV Substation (Alternate S/S Site #1)	$38,271,000
	Total Initial Cost	**$76,170,000**
1D[4]	Westbrook to E. Deering, Single Circuit Line, 8.9 miles (re-using existing S167A)	$10,680,000
1E[5]	Expand Prides Corner Substation	$1,200,000
1F[6]	E. Deering Expansion	$3,700,000
1G[7]	E. Deering to Cape, Single Circuit 115kV Underground	$38,400,000
1H[8]	Cape Expansion	$1,200,000
	Total Future Cost	**$55,180,000**

1. Cost per mile of $1,930,000 assumed per TCA application, Attachment P, Page 1 without escalation and contingency.
2. See Attachment 1 for details.
3. See MPRP TCA application, Attachment P, Page 58 for details. Escalation and contingency have been removed.
4. Cost per mile of $1.2M assumed based on results of similar lines estimated in the TCA application (e.g. TCA attachment P, Pages 8, 16. 20, 21, 23, 24, 25, 27, 31, 32, 34, 35, 36).
5. Estimated cost assumed equal to Item 1H.
6. See Petition, Page 56.
7. See Petition, Page 55.
8. See Petition, Page 56.

Table 2: Equivalent Elements of CMP Proposed Raven Farm Site		
Item	Description	Estimated Cost, $
0A[1]	12.9 miles of 345kV transmission line from Surowiec S/S to Raven Farm S/S utilizing wood H-frame construction on existing ROW	$24,897,000
0B[2]	345kV/115kV Substation (Raven Farm)	$38,271,000
	Total Initial Cost	**$63,168,000**
0C[3]	Raven Farm to E. Deering, Single Circuit 115kV, 7.4 miles (along railroad route)	$8,880,000
0D[4]	E. Deering Expansion	$3,700,000
0E[5]	E. Deering to Cape, Single Circuit 115kV Underground	$38,400,000
0F[6]	Cape Expansion	$1,200,000
	Total Future Cost	**$52,180,000**

1. See MPRP TCA application, Attachment P, Page 1 for details. Escalation and contingency have been removed.
2. See MPRP TCA application, Attachment P, Page 58 for details. Escalation and contingency have been removed.
3. Cost per mile of $1.2M assumed based on results of similar lines estimated in the TCA application (e.g. TCA attachment P, Pages 8, 16. 20, 21, 23, 24, 25, 27, 31, 32, 34, 35, 36).
4. See Petition, Page 56.
5. See Petition, Page 55.
6. See Petition, Page 56.

Table 3: Yarmouth Relocated Substation Site Alternative Cost Summary			
Item	Description	Estimated Cost, $	Incremental Cost, $
BASE	12.9 miles of 345kV transmission line from Surowiec Substation to the Raven Farm Substation utilizing wood H-frame construction on existing ROW. A new 345kV/115kV Raven Farm Substation located in Cumberland. Future reinforcement of the Portland area from the Raven Farm Substation with a 115kV line to Cape via E. Deering.	$115,348,000	$0
ALT 1	17.6 mile 345kV transmission line from Surowiec Substation to the Alternative S/S Site #1 in Westbrook, ME utilizing H-frame construction on existing. A new 345kV/115kV Substation located at Alternate S/S Site #1 in Westbrook. Rebuild approximately 2.4 miles of 115kV Sections 165 and 167 to double circuit single pole structures to make space available in the existing ROW for the 345kV line. Future reinforcement of the Portland area from Alternate S/S Site #1 with a 115kV line to Cape via Prides Corner.	$131,350,000	$16,002,000

Shifted Alignment Alternative

The second alternative considered in this evaluation was a shift in the alignment of the proposed Section 3020 in the vicinity of the Yarmouth neighborhood to allow a vegetated buffer to remain on the existing corridor. In this alternative the alignment would be shifted to a newly acquired corridor 170 ft wide located parallel and adjacent to the existing corridor. The existing vegetation on the unused portion of the current corridor (approximately 120 ft) would remain as a visual buffer to the transmission line. The Shifted Alignment Alternative is shown in Figure 6.

Landowners affected by the proposed shift in alignment were contacted to gauge their interest in selling the required rights and to request a Right of Entry (ROE) to allow for more detailed field study by engineering and environmental personnel. Of the nine parcels affected by the proposed shift, one landowner refused to communicate with the project in spite of repeated attempts. Two owners refused to allow ROE or to consider accommodating the proposed shift, and two others said they would not sell the project the additional required property. Lack of landowner willingness to negotiate for the property rights needed for the proposed shift makes this alternative not viable from a real estate perspective.

Given that the majority of the ROE agreements were not obtained for this alternative, environmental evaluation was limited to a desktop study using publicly available data. This evaluation did not identify any insurmountable environmental obstacles.

Despite the lack of success in obtaining interest from landowners for this alternative, CMP prepared a cost estimate for shifting the line to the new corridor. Due to the addition of several angles in the alignment, this alternative adds approximately $498,000 to the estimated construction cost of Section 3020 (not including real estate acquisition costs).

Underground Alternative

Underground construction of approximately 6800 ft of the proposed Section 3020 was evaluated as the third alternative. The approximate start and end points of the underground portion are shown in Figure 7. Based on a desktop evaluation of the route, the estimated cost of installing the 6,800 ft of underground transmission would be approximately $21.6M. The estimated cost of Section 3020, including the 6,800 ft of underground construction is summarized in Table 4. Details of the underground estimate are provided as Attachment 2.

Table 4: Yarmouth Shifted Alignment and Underground Cost Summary

Item	Description	Estimated Cost, $	Incremental Cost, $
BASE	12.9 miles of 345kV transmission line from Surowiec S/S to Raven Farm S/S utilizing wood H-frame construction on existing ROW.	$24,897,000	$0
Shifted Alignment	12.9 miles of 345kV transmission line from Surowiec S/S to Raven Farm S/S utilizing wood H-frame construction on a partially expanded ROW. Includes approximately 1.25 miles in the vicinity of existing Section 102, Structures 116 to the Elm St Substation in which the centerline is shifted to a new ROW. Cost shown does not include additional real estate costs required to expand the corridor as the **real estate is not available**.	$25,395,000	$498,000
Underground	12.9 miles of 345kV transmission line from Surowiec S/S to Raven Farm S/S utilizing wood H-frame construction on existing ROW for 11.6 miles and underground construction for 6800 ft.	$44,173,000	$19,276,000