

Date : 3/12/2013 11:15:38 AM

From : KONEill@nlh.nl.ca

To : "Bown, Charles W." , "English, Tracy" , "Maclean, Heather"

Cc : "DawnDalley@nalcorenergy.com" , "GBennett@nalcorenergy.com"

Subject : Briefing note on North Spur

Attachment : Background on the North Spur_March 12 2013.docx;ATT248737.jpg;



Karen O'Neill

Senior Communications Advisor
Corporate Communication & Shareholder Relations
Nalcor Energy - Lower Churchill Project

t. 709.737.1427 c. 709.690.2012 f. 709.737.1816

e. koneill@nalcorenergy.com

w. nalcorenergy.com

1.888.576.5454

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Information Note

Department of Natural Resources

Title: Issues have been raised over the need to complete stabilization work required on the north spur of the Muskrat Falls Project.

Issue: Cabot Martin has published a research presentation stating that Nalcor has not done enough work on the stabilization of the north spur at Muskrat Falls. Following the release of his presentation, project critics are raising questions about the viability of moving forward with the project given the risk associated with the instability of the north spur as it relates to landslides.

Background on the North Spur:

What is the North Spur?

The north spur (or north side of the lower Churchill River at Muskrat Falls) forms a natural earthfill dam which infills the preglacial valley of the Churchill River, and currently has a head of 16m across it from river levels of about 19m upstream to 3m downstream. After reservoir impounding, the head across the spur will increase to about 36m

Previous engineering studies on the Muskrat Falls site identified landslide activity along the river and spur as a significant problem of development.

Feasibility investigations in 1979-80 showed the Muskrat Falls site is a viable site for a hydroelectric development, although stabilization measures would be necessary to prevent continued land sliding from breaching the spur under existing conditions. In 1982, an interim system of 22 pump wells were installed on the spur to lower the groundwater table and prevent continued regression of the slopes due to landslide activity. The interim pump well system has performed well and no landslides have occurred at Muskrat Falls in the last 17 years. However, in 2010, a landslide did occur further upstream at Edward's Brook.

Engineering and Stabilization work on the North Spur

The Muskrat Falls North Spur has been investigated from a geotechnical perspective in previous field programs and has undergone multiple studies. The information gathered in those programs supported the design, installation and operation of a well point system that helped maintain the north spurs stability for the last 30 years and provided information that helped the development of a conceptual long-term solution. The conceptual design was used to inform Decision Gate 3. The plan for geotechnical work on the north spur has been deemed to be reliable and cost effective. Following Decision Gate 3, Nalcor Energy with SNC-Lavalin is now preparing to commence detailed engineering on the north spur to refine the conceptual solution. The information gathered in this program will be used as input into the detailed design.

Key Messages:

- The North spur has been subject of multiple studies and the geotechnical conditions at the north spur are well understood.
- The work required for the stabilization of the north spur was included in Nalcor's decision gate 3 project estimate.
- Stabilization of the north spur is required and can be done both economically and reliably with the expansion of the existing pumpwell system, along with:
 - provision of downstream erosion protection and downstream stabilizing fill;
 - local topcutting and unloading of portions of the high, steep side slopes;
 - provision of erosion protection and a stabilizing upstream berm at the upstream slopes;
 - protection of other areas of the reservoir rim from slope failures is not necessary.
- The north spur was discussed at great length during the Environmental Assessment hearing for the generation project.
- The stabilization work on the north spur at Muskrat Falls will be completed prior to impoundment, which will take place in the later years of construction of the Muskrat Falls hydroelectric generating facility.
- Nalcor anticipates that later in 2013 the RFP for this work will be issued which will ensure this work is completed prior to impoundment. This information is posted on Nalcor's procurement section of its website and includes:
 - Groundwater control of the North spur
 - Drainage works in the North spur
 - Stabilization works of the North spur
 - Minor Electrical works related to the pumpwell system
 - Minor Mechanical works related to the pumpwell system

Questions and Answers:

1. **Why hasn't Nalcor completed the required work on the north spur prior to sanction? If they don't know yet if the north spur can be stabilized then billions of dollars might be wasted and the project will not work.**

The Muskrat Falls North Spur has been investigated from a geotechnical perspective in previous field programs and has undergone multiple studies. The information gathered provided information that helped the development of a conceptual long-term solution. The conceptual design was used to inform Decision Gate 3. The plan for geotechnical work on the north spur has been deemed to be reliable and cost effective.

2. When will this work be completed by Nalcor? How much will this work cost?

The stabilization work on the north spur at Muskrat Falls will be completed prior to impoundment, which will take place in the later years of construction of the Muskrat Falls hydroelectric generating facility. By the end of 2013 the request for proposals for this work will be issued. The scope of this work has been posted on Nalcor's procurement section of its website.

The cost of this work was included in Nalcor's DG3 cost estimates. Nalcor cannot release the cost of this work as it would compromise the competitive bid process for this work.

3. What will happen if Nalcor can't stabilize the north spur and billions of dollars has been wasted on the project?

The North spur has been subject of multiple studies and the geotechnical conditions at the north spur are well understood. It is well documented that stabilization of the north spur is required and can be done both economically and reliably with the expansion of the existing pumpwell system, along with other protection work on the north spur.

4. Has Nalcor's work been reviewed/accepted by other independent experts?

The Joint Panel asked NRCAN to review Nalcor's documentation with respect to the North Spur issue. NRCAN's replied that it does not have the engineering expertise to review and comment on the specific technical details of the proposed spur stabilization measures presented in SNC-AGRA (1999a). It is NRCAN's opinion, however, "that the proponent (Nalcor) has an adequate fundamental understanding of the geotechnical and groundwater conditions that contribute to the existing instabilities as well as those that will arise from the creation of the Muskrat Falls reservoir. The proposed stabilization approaches thus seem reasonable. NRCAN notes that 6.0 Future work, Appendix C (p. 6-1) identifies that additional field investigations are required for the final design of seepage control measures on the spur."

Prepared by: Karen O'Neill, Senior Communications Advisor, Lower Churchill Project

Prepared on: March 12, 2013

Approved by: Gilbert Bennett, Vice President, Lower Churchill Project