

Date : 11/10/2014 8:40:39 AM
From : "Khan, Haseen"
To : "Goebel, Martin"
Subject : RE: Key Messages on North Spur/Dam Safety
Attachment : KM - North Spur and Dam safetyENVCNovember102014.doc;image001.jpg;
Martin;

Please see updated key messages on North Spur stabilization. Thanks.

From: Goebel, Martin
Sent: Friday, November 07, 2014 4:23 PM
To: Khan, Haseen
Cc: Thomas, Deborah
Subject: FW: Key Messages on North Spur/Dam Safety

Haseen:

Could you please review these key messages. While I think they are true enough, they need to be translated into our perspective, not NALCORS.

Regards, Martin

From: Thomas, Deborah
Sent: Friday, November 07, 2014 2:47 PM
To: Goebel, Martin
Subject: FW: Key Messages on North Spur/Dam Safety

Will these do?

From: Quinton, Diana
Sent: Tuesday, July 08, 2014 1:19 PM
To: Thomas, Deborah
Subject: FW: Key Messages on North Spur/Dam Safety

FYI

From: KONEill@nlh.nl.ca [<mailto:KONEill@nlh.nl.ca>]
Sent: Tuesday, July 08, 2014 12:44 PM
To: Quinton, Diana; Brown, Milly
Cc: Bown, Charles W.; Hynes, Darrell; Morris, Paul J.; Mullaley, Julia; English, Tracy; Howard, Jacquelyn; Williams, Tina
Subject: Key Messages on North Spur/Dam Safety

Hi Diana, here are our most recent KM as requested.

Thanks
Karen



Karen O'Neill
Senior Communications Advisor
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You owe it to yourself, and your family, to make it home safely every day. What have you done today so that nobody gets hurt?

C:\Users\mgoebel\Documents\Water Resources Division\KM - North Spur and Dam safety - 8Jul2014.docx

Key Messages
Muskrat Falls – North Spur/Dam Safety

November 10, 2014

- During last six months or so the issue of dam safety in general and North Spur stabilization in particular in reference to the Lower Churchill Project (LCP) has been the topic of discussion in the media.
- As a part of the project design and the environmental assessment process, Nalcor undertook various dam break studies that examined numerous dam failure scenarios. These studies met the requirements of the *CDA Dam Safety Guidelines, 2007* and were deemed adequate by ENVC. The *CDA Dam Safety Guidelines* require evaluation of the failure scenario that would result in the worst case consequences. ENVC does not consider that the warning time available to populations at risk for failure of a stabilized North Spur would be less than that available for monolithic failure of the North RCC Dam.
- The engineering design for the North spur has been undertaken by qualified geotechnical engineers with SNC Lavalin, and has had the benefit of extensive field investigations to support the engineering design. The design includes several preventative barriers and practices that will help to address the issue of the stability of the North Spur including:
 - Flattening both the upstream and downstream slopes to increase the overall safety factor against sliding failures.
 - Placement of rockfill and riprap slope erosion protection on all areas of the upstream and downstream slopes.
 - Placement of stabilizing fill in selected areas of the downstream slope to improve local toe stability.
 - Construction of an impervious fill blanket at the upstream slope and instillation of a cut-off wall at the base of the blanket to block water seepage into the spur from the reservoir.
 - Construction of a second cut-off wall across the north end of the spur to cut off seepage from the high ground north of the river.
 - Construction of toe relief drains and a major drainage trench to further lower the water table in the North Spur.
 - Lowering of the groundwater piezometric level through pumping.
 - Long term monitoring of the piezometric conditions within the spur during operation of the reservoir.
 - Diversion and stabilization of discharge from the Kettle Lakes to the north
 - Consultation with and planned oversight of contractors concerning best management practices and work procedures to meet design objectives during the construction phase (e.g., avoiding human activity such as pile driving that could induce landslides, having a geotechnical expert on-site during construction, instrumentation to monitor groundwater, etc.). Design includes temporary works for interim slope stability.

- The presence of “quick clay” in the North Spur area was initially identified back in the 1960’s. While there is evidence of landslides both upstream and downstream of the North Spur, the main trigger for all landslides in the area has been toe erosion of stream banks.
- It is also expected that the reservoir impoundment for the Muskrat Falls Facility will result in an increase in frequency of landslides in the first 10-20 years followed by long-term stabilization of shoreline banks in the area.
- The most likely mechanism of failure for the North Spur has been identified as seismic activity. The geotechnical design criteria for the Muskrat Falls dams include provision for seismic activity for a risk classification of Extreme as per the CDA *Dam Safety Guidelines*. Earthquake loading for the North Spur meets minimum criteria for resistance to a design earthquake with an annual exceedance probability of 1/10,000.
- The design of the Muskrat Falls dam has been an iterative process that has occurred over decades. This timeframe has ensured that the design is as robust as possible, ensuring a standard of care equivalent to that of the risk posed by the dam. Initial field work and investigations have been repeated and expanded to provide a comprehensive hazard assessment.
- The North Spur engineering design has also been reviewed by independent third parties including MWH International, and a Cold Eye Review undertaken by Hatch. Opinion from these reviews is that the current design is adequate.
- ENVC will continue to review reports produced by Nalcor that deal with hydrotechnical aspects of the LCP at Muskrat Falls, and will deal with Nalcor to address any issues.
- Extensive works to stabilize the North Spur have been proposed and ENVC is confident in the approach that has been developed.
- Stabilization work required on the North Spur at Muskrat Falls is scheduled to begin later this year and will be completed prior to impoundment, which will take place in the later years of construction of the Muskrat Falls hydroelectric generating facility.
- Nalcor is required to submit to ENVC the dam safety plans pursuant to the Water Resources Act. These documents are required prior to impoundment of the reservoir.