

**Date : 7/14/2015 10:40:53 AM**

**From : "Dawe, Paula V"**

**To : "Khan, Haseen"**

**Subject : NALCOR Dam Safety timeline**

**Attachment : LCP Dam Safety Timeline- July 2015.docx;**

Haseen,

Updated timeline is attached.

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Manager

Drinking Water & Wastewater Section, Dam Safety Program



Government of Newfoundland and Labrador  
 Department of Environment and Conservation  
 Water Resources Management Division

July 14, 2015

To: Martin Goebel, P.Eng.

From: Haseen Khan, P.Eng.

**RE: Timeline of Dam Safety Commitments/Requirements for the Lower Churchill Project**

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The following is a chronological history of dam safety commitments and requirements for the Lower Churchill Project at Muskrat Falls by NALCOR:

**Dec 1, 2006** Lower Churchill Project undertaking was registered with Environmental Assessment.

**Apr 18, 2008** NALCOR finalizes Dam Break Study – Volume 1&2. Includes flood inundation mapping for failure of Muskrat Falls North RRC Dam. There will be between 1 and 2 hours of warning time available between the initiation of the breach and the flood wave reaching the populated areas of the downstream reach (Happy Valley – Goose Bay, Mud Lake).

**July 17, 2008** Final EIS Guidelines issued.

**July, 2009** Multiple information responses by NALCOR to the Joint Panel Review noted that the Muskrat Falls dam would be designed and operated in accordance with the *Dam Safety Guidelines* of the Canadian Dam Association.

Information Request No.: JRP.96

- Proponent commits to having an Emergency Response and Preparedness Plan prior to the first filling of the reservoir.
- Proponent commits to providing a map of the areas that would be flooded following a possible dam failure.
- Proponent commits to providing a copy of the Dam Breach Study.
- Proponent commits to providing inundation mapping for cascade failure scenarios incorporating possible failure of Upper Churchill structures.
- Proponent commits to providing mitigation measures to reduce the effects of a possible dam break.

Information Request No.: JRP.159

- Proponent commits to examining the potential impact of a landslide-generated wave on the Muskrat Falls dam.

Information Request No.: JRP.162

- Proponent commits to integrated emergency planning for dam failure scenarios.
- Proponent commits to dam breach analysis for construction phase cofferdams.
- Proponent commits to conducting estimates of economic losses from dam failure.

**Aug 25, 2011**

Recommendations from the Lower Churchill Hydroelectric Generation Project-Joint Review Panel Report include:

- 14.1– Emergency preparation for the possibility of a dam failure
  - Provide inundation mapping
  - Prepare in consultation an Emergency Preparedness Plan
  - Develop evacuation plans and work with emergency response providers
  - Implement flood warning system for Mud Lake and HV-GB
  - Conduct seismographic monitoring of project area
- 14.2– Compensation for losses in the event of a dam failure
- 14.3– Conduct seismic testing

**Mar 15, 2012**

Environmental Assessment Release granted. The *Lower Churchill Hydroelectric Generation Project Undertaking Order* under the *Environmental Protection Act* makes the following conditions of release:

- NALCOR shall abide by all commitments made by it in the Environmental Impact Statement and in submissions to the EA Panel.
- NALCOR shall obtain and abide by the requirements of all permits, etc.

**Nov 6, 2012**

NALCOR finalizes a Project Wide Emergency Response Plan. Section 11.9 of the plan deals with dam related emergencies.

**March 25, 2013**

ENVC receives NALCOR's application for Dams, Powerhouse, Spillway and North Spur Stabilization under Section 48 of the Water Resources Act. In reviewing the proponent application for the permit, the following documents were reviewed to assess the hydrotechnical safety of the dam:

- Probable Maximum Flood (PMF) and Construction Design Flood Study,
- Design Criteria – Hydraulic,
- Design Criteria – Civil,
- Design Criteria – Geotechnical,
- Wind Generated Wave Study, and
- Hydraulic Modeling and Studies Update Report.

**July 10, 2013**

In consultation with ENVC Executives, permit **ALT6933-2013** was finalized and sent to NALCOR. Dam safety requirements included in the permit:

- Annual Dam Safety Inspections
- Dam Safety Review within two years of the start of reservoir filling, and a max of every five years thereafter
- Operation, Maintenance and Surveillance (OMS) Manual within one year of issuance of permit
- Emergency Preparedness Plan (EPP) prior to reservoir filling

**Mar 21, 2014**

Meeting on Dam Safety between ENVC and NALCOR during which ENVC requested:

- Finalized dam failure studies including an evaluation of a possible failure of the North Spur
- Copies of reference hazard assessment reports already completed
- Systems for public safety around dam facilities

**April 15, 2014**

NALCOR makes the following commitments in their LCP Generation and LTA Environmental Assessment Commitments/Requirements Management Plan:

- NALCOR will complete a dam breach analysis based on detailed design to be approved by the Department of Environment and Conservation prior to construction.
- NALCOR will conduct a Dam Safety Review during the detailed design phase that follows the Canadian Dam Association Guidelines.
- NALCOR will model seepage through the dam and provide to appropriate regulator.
- NALCOR will provide details on wells for control of seepage to appropriate regulator.
- NALCOR to complete seismic monitoring during reservoir filling by using seismographs to record ground motion and monitor whether any seismic event occurs during reservoir filling.
- NALCOR will establish a formal Emergency Response Plan for Muskrat Falls in the case of dam failure.
- NALCOR will prepare and maintain an Emergency Preparedness Plan for use by external agencies in the case of dam failure.
- NALCOR to ensure comprehensive emergency preparedness planning is undertaken in consultation with communities identified as potentially at risk from a catastrophic dam failure.

**Aug 5, 2014**

An amendment to permit **ALT 6933-2013** was issued such that the OMS Manual shall be developed prior to reservoir filling.

**Aug 28, 2014**

ENVC clarifies in a letter to NALCOR that it considers the initial diversion of the Churchill River for the next phase of construction during which the water level is to be raised to an elevation of 24-25 m as the official start of reservoir filling.

**Jan 22, 2015**

At the ENVC-NALCOR Quarterly Progress Meeting, ENVC requested a digital file of the dam break inundation area.

- July, 2015** According to communication with NALCOR, an Emergency Preparedness Plan (EPP) is currently in the works.
- Pre-Fall, 2016** As per condition # 14 of the permit **ALT6933-2013**, the proponent is required to submit an EPP to the Water Resources Management Division prior to the construction of upstream coffer dam and diversion of Churchill River.
- As per permit **ALT6933-2013** amendment 2, the proponent is required to submit an OMS Manual for the operation and closure phases of the Lower Churchill Muskrat Falls Dam System.
- Fall, 2016** Expected start of reservoir filling.
- Post-Fall, 2016** Annual dam safety inspections to commence.
- Fall, 2018** The proponent, as per condition #14 of the permit (**ALT6933-2013**), is required to submit a Dam Safety Review Report two years after the start of reservoir filling and every five years after.