

Information Note
Department of Municipal Affairs and Environment

Title: Muskrat Falls Independent Dam Safety Program Audit

Issue: To provide an overview of the Hatch Dam Safety Audit #2 report findings. This note is prepared for information purposes only.

Background and Current Status:

- Nalcor hired the engineering consulting firm Hatch to undertake an independent audit of the Muskrat Falls Dam Safety Program as a proactive safety approach and to determine the level of compliance with best practice as per the Canadian Dam Association (CDA), Canadian Dam Safety Guidelines. The Muskrat Falls Dam Safety Program relates to the operational practices in place to manage the dam structures including the North Spur. It does not constitute an engineering design review of the various structures.
- The audit of the Dam Safety Program at the Muskrat Falls construction site was performed between April 16 and April 20, 2017. The report was based on observations made during the site visit and information received from Nalcor. The Audit 2 report (Annex A), received by Government on October 3, 2017.
- Hatch completed an earlier review and prepared a report (Audit 1) in February 2017. The report at the time concluded:
 - the dam safety management program at the site meets and exceeds industry best practices;
 - the dam safety organization is appropriate and staff are experienced;
 - emergency preparedness planning and operations and maintenance procedures are in accordance with industry best practice;
 - the dam safety management program is in compliance with the CDA guiding principles;
 - the practices as witnessed are appropriate to reduce dam safety risks such that the probability of a significant dam safety incident are very low; and that
 - there were areas of improvement suggested in the report that may further enhance the existing program including:
 - documentation of the rationale for not undertaking data readings (water level and flow) at the Kettle Lake Outlet Weir during the winter;
 - written roles and responsibilities for dam safety personnel; and
 - documentation of training in Emergency Preparedness and dam safety inspections.

Analysis:

- The Audit 2 report also examined the project cofferdam and north spur behavioral characteristic under partial impoundment and documents improvements in the areas identified in the Audit 1 report. In general it concludes:
 - the dam safety management program at the site meets and exceeds good industry practice (e.g., having a meteorological station on-site);
 - the dam safety organization is appropriate and staff are experienced;
 - emergency preparedness planning and operations and maintenance procedures are in accordance with good industry practice;
 - the dam safety management program is in compliance with the CDA guiding principles;

- the practices as witnessed relating to the overall operation and maintenance are appropriate to reduce dam safety risks such that the probability of a significant dam safety incident are very low;
- the upstream cofferdam remedial works program was effective; and
- there were further areas of improvement suggested that may enhance the existing program including:
 - Providing a mechanism for obtaining continuous seepage flow measurements at the Kettle Lake Outlet Weir year round (right now it only monitored during non-freezing period);
 - Verify readiness of all third party stakeholders (HVGB, Mud Lake, RCMP, Municipal Affairs and Environment's (MAE) Emergency Services Division) with an emergency response exercise; and
 - Consider undertaking a formal dam safety failure mode analysis of the dam structures as per CDA guidelines to better define potential hazardous conditions and failure modes for monitoring and remedial solutions.
- MAE received the final report of the Independent Review of the Mud Lake flooding incident on September 29th, 2017. In line with the recommendations of the report, MAE recommends the development and implementation of a Flood Management Plan, River Management Plan and Community Safety Plan in consultation with residents of Mud Lake and Happy Valley-Goose Bay and Nalcor.
- MAE has already initiated work in a number of areas as outlined in the "Action Being Taken" section in order to ensure future public safety.
- A Community Safety Plan will include for areas prone to flooding (low risk, medium risk and high risk); mitigation measures (no development, water proofing, raising elevations of affected infrastructure and residences, etc.), community monitoring program (information on ice jam, water levels, flood levels, ice thickness, etc.), emergency exercises, public warning system, and an evacuation plan. This plan will be based on the work completed under flood management and river management plans and will include all relevant stakeholders.
- The audit did not identify any gaps in the dam safety program that would constitute a dam safety problem.
- While the report indicates Hatch recommends an additional audit was to be completed in September 2017, Nalcor advises that they will not be completing another audit until at least impoundment to 25 meters has been achieved. This is acceptable to MAE as there is no significant change in the Muskrat Falls reservoir impoundment.

Action Being Taken:

- Nalcor will be posting the report during the week of Oct 9, 2017 to the Lower Churchill Project website.
- MAE has initiated work on a Flood Management Plan. The water and weather monitoring network along the river is being expanded.
- MAE has been and will continue to be engaged with Nalcor on emergency preparedness documents and will facilitate any required linkages between Nalcor and emergency management partners.

- MAE is preparing a budget request for the development of flood risk mapping and flood/ice forecasting models for Mud Lake and Happy Valley-Goose Bay. Flood risk mapping is a one-time task which will require services of a professional consultant and could be completed at a cost of about one million dollars over a period of 12 months. Flood forecasting is an annual operational activity at an annual cost of about \$200,000.
- It would be useful to clarify if Nalcor will issue a news release concerning the audit or just post the audit to the Lower Churchill Project website.

Prepared/Approved by: P.Dawe/H.Khan/D. Spurrell

Ministerial Approval:

October 6, 2017

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Reviewed by: K. Quinlan, Cabinet Secretariat
Ministerial Approval:

October 10, 2017