Muskrat Falls Project Oversight Committee

Committee Report – Period Ending September 2014

Newfoundland Labrador

Table of Contents

Introduction

The Muskrat Falls Project (the Project) is one of the Province's largest and most important major capital projects. With current construction cost estimates of $6.99 billion[1], a project of this magnitude requires strong oversight and as such, all stakeholders, including the Government of Newfoundland and Labrador, the Government of Canada and Nalcor Energy have implemented various oversight mechanisms. In March 2014, to strengthen existing oversight on behalf of the people of the province, the Provincial Government established the Muskrat Falls Oversight Committee (the Committee) to focus on cost, schedule and risk management for the construction phase of the Project.

1 Total Project costs include construction costs of $6.99 billion plus interest and other financing costs of $1.3 billion that will be incurred during construction, for an estimated total of $8.29 billion.

The Committee's first report, issued on July 31, 2014, detailed the Oversight Framework that would guide the future work of the Committee, including the following terms of reference:

1. **The Project cost and schedule is well managed** – the Committee will examine issues such as whether management processes and controls are well-designed and followed, contracts are being managed diligently and financial drawdowns comply with established processes;

2. **The Project is meeting the cost and schedule objectives** – the Committee will examine issues such as how schedule performance and forecast compare to the plan, how cost performance and forecast compare with the budget, how cost and schedule forecasts compare with current performance, and how cash flow forecasts reflect the project's funding requirements; and,

3. **The cost and schedule risks are being reasonably anticipated and managed** – the Committee will examine issues such as whether risks are being sufficiently identified and addressed and whether Nalcor has established adequate contingency to address outstanding Project risks.

The Framework also identified the information the Committee would need to fulfil its mandate. A protocol was established with Nalcor to receive this information including monthly reports prepared for the Independent Engineer, the Nalcor Board of Directors and the Nalcor Executive. Committee representatives also participate in meetings and site visits with the Independent Engineer.

This report details the Committee's observations and summarizes the progress reported for the Project to the end of September 2014.

Muskrat Falls Project Overview

The Muskrat Falls Project consists of the following three sub-projects:

- Muskrat Falls Generating Facility;
- Labrador-Island Transmission Link; and,
- Labrador Transmission Assets.

Muskrat Falls Generating Facility

The Muskrat Falls Generating Facility is an 824 megawatt hydroelectric generating facility consisting of the dams and a powerhouse at Muskrat Falls in Labrador.

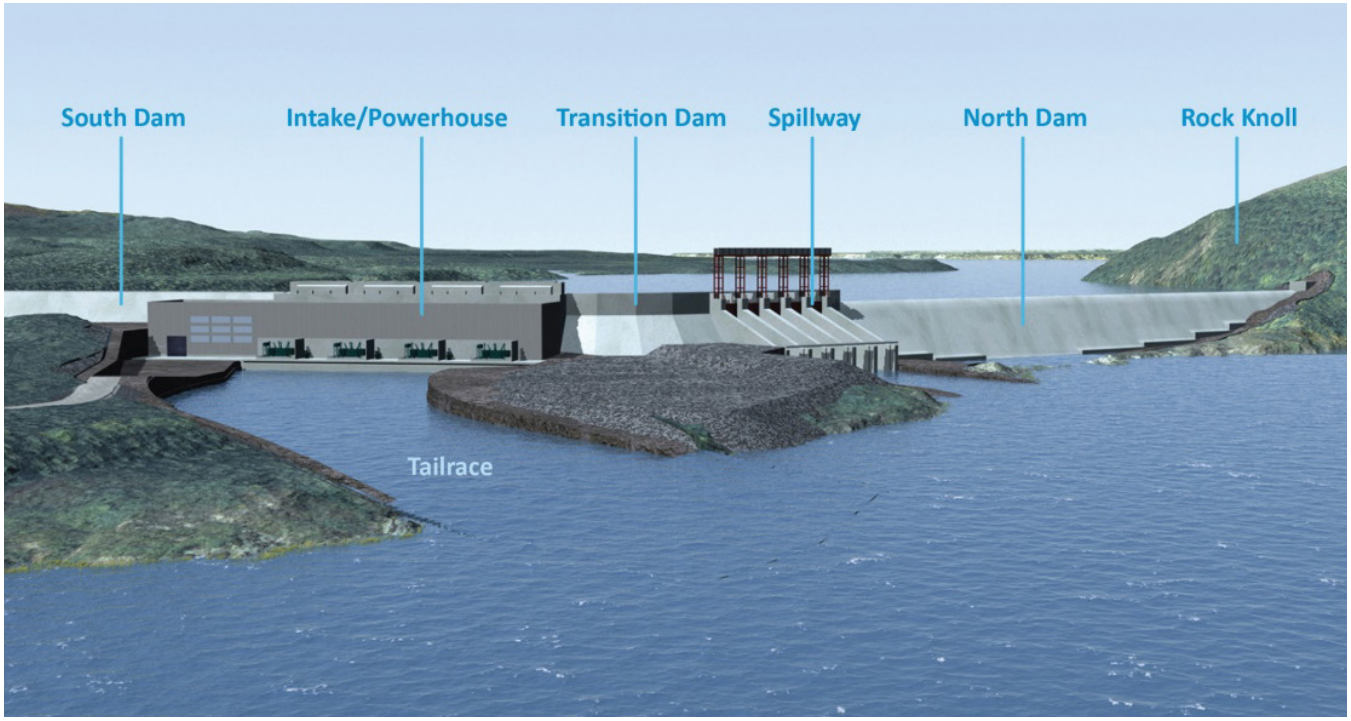


Figure showing the Muskrat Falls Generating Facility

The major construction activities for this sub-project include:

- Constructing camp dormitories, administrative buildings, utilities and roads;
- Clearing the reservoir area to remove trees that could impact operation of the generating facility or affect navigation;
- Excavating bulk rock for the intakes, powerhouse and spillway structures;
- Constructing the powerhouse and spillway structures;
- Erecting the Integrated Cover System to facilitate seasonal activity;
- Building temporary transition dams to allow the structures to be constructed in a dry environment;
- Installing the turbines and generators for the hydroelectric facility;
- Constructing a cutoff wall, till blanket, improved drainage, slope regrading and stabilization works on the North Spur to meet Canadian Dam Association standards;
- Constructing a dam on each side of the Spillway (the north and south dams); and,
- Filling the reservoir (impoundment) when both dams have been constructed.

Labrador-Island Transmission Link

The Labrador-Island Transmission Link is a 1,100 kilometre High Voltage direct current (HVdc) transmission line from Muskrat Falls to Soldiers Pond on the Avalon Peninsula.

The major construction activities for this sub-project include:

- Building the Strait of Belle Isle transition compounds on each side of the Strait, which act as the transition points between the subsea cables and overhead transmission line;
- Surveying and constructing infrastructure (access roads, bridges, marshalling yards and temporary construction camps);
- Clearing and preparing for the transmission line right-of-way and other transmission infrastructure;

Figure showing the Labrador-Island Transmission Link route

- Installing foundations for the transmission towers;
- Assembling and installing the transmission towers;
- Installing conductor and grounding systems;
- Building a converter station at Muskrat Falls and at Soldiers Pond;
- Building a switchyard and synchronous condenser facility at Soldiers Pond;
- Installing electrodes at L'Anse au Diable and at Dowden's Point; and,
- Inspecting and commissioning the transmission line.

Labrador Transmission Assets

The Labrador Transmission Assets is a 250 kilometre High Voltage alternating current (HVac) transmission line between Muskrat Falls and Churchill Falls.

The major construction activities for this sub-project include:

- Surveying and constructing infrastructure (access roads, bridges, marshalling yards and temporary construction camps);
- Clearing and preparing for the transmission line right-of-way and other transmission infrastructure;
- Installing foundations for the transmission towers;
- Assembling and installing the transmission towers;
- Installing conductor and grounding systems;
- Constructing the switchyards at the Churchill Falls and Muskrat Falls locations; and,
- Inspecting and commissioning the transmission line.

Figure showing the Labrador Transmission Assets

Project Performance

In this report, the Muskrat Falls Project performance is reported on an overall Project basis as well as for each of the three sub-projects. The Project cost and schedule performance is reported in two ways:

1. Long–term costs and schedule (to Project completion)
   a. Project budget is compared to Project forecast cost
   b. Project milestone[2] schedule is monitored for changes

2. Current costs and schedule (cumulative to date)
   a. Incurred costs to date are compared to planned costs
   b. Actual schedule progress is compared to planned schedule progress

	Long-term Forecast	Current Reporting Period
Cost	Project Budget vs. Project Forecast Cost	Incurred Costs vs. Planned Costs
Schedule	Milestone Schedule	Actual Progress vs. Planned Progress

These two time horizons provide the reader with both the current performance and the projected long-term performance of the Project based on the project plans and schedule.

2 In Project Management, Milestones are used to mark specific points along a project timeline that must be reached to achieve project success. These points signal anchors such as major progress points and a project end date.

Long-term Cost and Schedule

Committee Observations at September 2014

- Project capital budget of $6.99 billion remains unchanged
- No significant variances between Project Budget and Project Forecast Cost
- Contingency budget has not been drawn upon
- Critical path to first power for December 2017 remains unchanged
  - Milestone for North Spur Works Ready for Diversion changed

Long Term Costs

The total project construction budget of $6.99 billion is allocated among the three sub-projects, as illustrated in Table 1 below. Total incurred costs to the end of September 2014 are $1.75 billion or 25 per cent of the total budget.

Table 1
Budget and Incurred Costs by Sub-Project (in $ thousands)

Muskrat Falls Project: Sub-Project	Percentage of Total Budget	Project Budget at June 2014	Incurred Costs as of September 2014	Percentage of Budget Incurred
Muskrat Falls Generating Facility	48.2%	$3,371,988	$1,070,123	31.7%
Labrador-Island Transmission Link	39.9%	$2,786,481	$430,603	15.5%
Labrador Transmission Assets	11.9%	$831,945	$248,953	29.9%
Total	100.0%	$6,990,414	$1,749,679	25.0%

Table 2 shows Project incurred costs to the end of September 2014 by expenditure category for each of the sub-projects. This table also includes the Project Budget, as approved by the Nalcor Board of Directors in June 2014, compared to the Project Forecast Cost, which is the projected cost based on current incurred costs and schedule performance. Overall Project Forecast Cost is $6.99 billion, so accordingly, the Project construction budget has not changed.

Table 2

Summary of Project Budget vs. Project Forecast Cost (in $ thousands)

Muskrat Falls Generating Facility	Project Budget at June 2014	Incurred Costs at Sept. 2014	Project Forecast Cost at Sept. 2014	Variance PFC from Budget
Expenditure Category	A	B	C	D=A-C
NE-LCP Owners Team, Admin & EPCM Svcs	$382,811	$229,199	$387,723	($4,912)
Feasibility Engineering	$17,949	$17,949	$17,949	$0
Environmental & Regulatory Compliance	$24,312	$15,140	$25,062	($750)
Aboriginal Affairs	$13,314	$5,297	$13,314	$0
Procurement & Construction	$2,786,766	$788,779	$2,772,790	$13,976
Commercial & Legal	$25,989	$13,759	$25,239	$750
Contingency	$120,847	$0	$129,911	($9,064)
Total for Sub-project	$3,371,988	$1,070,123	$3,371,988	$0
Labrador Island Transmission Link	**Project Budget at June 2014**	**Incurred Costs at Sept. 2014**	**Project Forecast Cost at Sept. 2014**	**Variance PFC from Budget**
Expenditure Category	A	B	C	D=A-C
NE-LCP Owners Team, Admin & EPCM Svcs	$225,814	$101,036	$224,364	$1,450
Feasibility Engineering	$21,252	$21,252	$21,252	$0
Environmental & Regulatory Compliance	$22,306	$8,454	$22,306	$0
Aboriginal Affairs	$2,244	$454	$2,244	$0
Procurement & Construction	$2,426,095	$287,278	$2,439,830	($13,735)
Commercial & Legal	$16,490	$12,129	$16,490	$0
Contingency	$72,280	$0	$59,995	$12,285
Total for Sub-Project	$2,786,481	$430,603	$2,786,481	$0
Labrador Transmission Assets	**Project Budget at June 2014**	**Incurred Costs at Sept. 2014**	**Project Forecast Cost at Sept. 2014**	**Variance PFC from Budget**
Expenditure Category	A	B	C	D=A-C
NE-LCP Owners Team, Admin & EPCM Svcs	$99,973	$63,202	$100,594	($621)
Feasibility Engineering	$220	$220	$220	$0
Environmental & Regulatory Compliance	$710	$708	$667	$43
Aboriginal Affairs	$188	$0	$188	$0
Procurement & Construction	$696,322	$182,758	$681,521	$14,801
Commercial & Legal	$3,141	$2,065	$3,141	$0
Contingency	$31,391	$0	$45,614	($14,223)
Total for Sub-Project	$831,945	$248,953	$831,945	$0
Total Project	$6,990,414	$1,749,679	$6,990,414	$0

While the overall Project Budget remains unchanged, variances between the Project Budget and the Project Forecast Costs have occurred within and among the expenditure categories (refer to Appendix A for a description of these categories). Variances occur for a number of reasons. For example, if savings are achieved in a contract, the forecast cost for this contract is reduced and a corresponding increase is made to the contingency budget for that sub-project. Occurrences of such variances will continue as the Project moves forward and are a normal part of any major capital project. The Committee monitors variances on a monthly basis and seeks explanation from Nalcor as necessary. There are no significant variances reported by Nalcor between Project Budget and Project Forecast Costs at the end of September 2014.

The Committee notes that the contingency budget for the Project of $224.5 million[3] has been established by Nalcor at the lower range of the industry standard[4] used. Nalcor advises that the lower range was appropriate as the engineering was 98 per cent complete, with 90 per cent of contract values awarded, and therefore, there is a high degree of confidence in the maturity level of the Project estimate. Nalcor acknowledges that this is an aggressive approach to the contingency budget and it is driving its efforts to keep within that contingency. As of September 2014, the contingency budget has not been drawn upon and current forecast for contingency has increased to $235.5 million.

Long Term Schedule

As shown in Table 3, all but one of the Milestone Dates remain unchanged. The planned date for the North Spur Works Ready for Diversion Milestone has been revised from November 2015 to September 2016, a change of approximately 10 months from the original planned schedule. The Committee requested and received explanations from Nalcor (refer to Appendix B) on the reasons for the delay and associated impacts on the overall Project. Nalcor reports that this schedule change allows Project activities to be spread over three seasons rather than two. This approach reduces cost and schedule risk and ensures activities are completed using the most efficient use of resources. Nalcor further advises that this change will have no impact on the critical path[5] for completion of the river diversion in November 2016 and first power for Muskrat Falls in December 2017.

3 The $224.5 million contingency budget is allocated as follows: Muskrat Falls Generating Facility-$120.8 million; Labrador-Island Transmission Link-$72.3 million; and Labrador Transmission Assets-$31.4 million.
4 The Association for the Advancement of Cost Engineering International - AACE I 69R-12 Cost Estimate Classification-Hydro power Industry standard.
5 In Project Management, the Critical Path is the longest sequence of activities in a project plan that must be completed on time for the project to complete on its due date. An activity on the critical path cannot be started until its predecessor activity is complete; if it is delayed for a day, the entire project will be delayed for a day.

Table 3

Milestone Schedule

Muskrat Falls Generating Facility	Planned Date July 2014	Actual/Forecast September 2014	Status
Project Sanction	December 2012	December 2012	Complete
North Spur Works Ready for Diversion	November 2015	September 2016	Revised Forecast
River Diversion Complete	November 2016	November 2016	No change
Reservoir Impoundment Complete	November 2017	November 2017	No change
Powerhouse Unit 1 Commissioned - Ready for Operation	December 2017	December 2017	No change
First Power from Muskrat Falls	December 2017	December 2017	No change
Powerhouse Unit 2 Commissioned - Ready for Operation	February 2018	February 2018	No change
Powerhouse Unit 3 Commissioned - Ready for Operation	April 2018	April 2018	No change
Powerhouse Unit 4 Commissioned - Ready for Operation	May 2018	May 2018	No change
Full Power from Muskrat Falls	May 2018	May 2018	No change
Commissioning Complete - Commissioning Certificate Issued	June 2018	June 2018	No change
Labrador Island Transmission Link	**Planned Date**	**Actual/Forecast**	**Status**
Project Sanction	December 2012	December 2012	Complete
Strait of Belle Isle Cable Systems Ready	October 2016	October 2016	No change
MF Switchyard and Converter Station Ready for Operation	February 2017	February 2017	No change
HVdc Transmission Line Construction Complete and Connected	June 2017	June 2017	No change
Soldier's Pond Switchyard & Converter Stn. Ready for Operation	October 2017	October 2017	No change
Ready for Power Transmission	October 2017	October 2017	No change
Soldier's Pond Synchronous Condenser Ready for Operation	November 2017	November 2017	No change
Commissioning Complete - Commissioning Certificate Issued	June 2018	June 2018	No change
Labrador Transmission Assets	**Planned Date**	**Actual/Forecast**	**Status**
Project Sanction	December 2012	December 2012	Complete
Hvac Transmission Line Construction Complete	June 2016	June 2016	No change
Churchill Falls Switchyard Ready to Energize	May 2017	May 2017	No change
Muskrat Falls Switchyard Ready to Energize	May 2017	May 2017	No change
Ready for Power Transmission	May 2017	May 2017	No change
Commissioning Complete - Commissioning Certificate Issued	June 2018	June 2018	No change

Current Cost and Schedule to September 2014

Committee Observations

- Incurred costs: $1.75 billion. Planned costs: $1.739 billion. Variance of $11 million, or 0.6 per cent
- Actual construction progress 20.7 per cent. Planned progress 20.9 per cent. Variance of 0.2 per cent
  - Progress on the Muskrat Falls Generation Facility has been tracking slower than planned
  - Progress on the Labrador-Island Transmission Link is tracking as planned
  - Progress on the Labrador Transmission Assets is tracking ahead of plan
- Actual progress for the supply and installation of the Turbine and Generators is tracking behind the original contract schedule, but remains on track to meet planned delivery date Milestones.

Muskrat Falls Project

This section provides an overview of current costs and schedule, first on a overall Project basis, and then by each of the sub projects.

Current Cost

Cumulative to the end of September 2014, the incurred costs for the Muskrat Falls Project totaled $1.75 billion as compared to the planned costs of $1.739 billion, a variance of $11 million or 0.6 per cent higher than planned.

Current Schedule

Nalcor monitors and reports schedule progress on all activities, both construction and manufacturing. Construction activities include all those activities occurring at site locations in the province. Manufacturing activities include those supply/install contracts that take place outside the Province (e.g. the generators are being manufactured in China).

Construction activities are mainly monitored and reported on an ongoing installation/ construction progress basis, while Manufacturing activities are generally monitored and reported based on a Milestone and/or delivery date basis.

1. Construction Activities

Construction has advanced on all components of the Muskrat Falls Project during this period. As outlined in Table 4, overall project schedule progress is 20.7 per cent compared to planned schedule progress of 20.9 per cent with the Muskrat Falls Generating Facility tracking behind schedule, the Labrador-Island Transmission Link tracking on schedule and the Labrador Transmission Assets tracking ahead of schedule.

Table 4

Planned Construction Schedule Progress vs. Actual Schedule Progress[6] – September 2014

Muskrat Falls Project: Sub-Project	Planned Schedule Progress – September 2014	Actual Schedule Progress – September 2014	Variance
Muskrat Falls Generating Facility	25.1%	23.3%	-1.8%
Labrador-Island Transmission Link	15.4%	16.2%	0.8%
Labrador Transmission Assets	24.0%	26.5%	2.5%
Muskrat Falls Project Total[7]	20.9%	20.7%	-0.2%

6 This schedule progress does not include manufacturing activities.
7 All schedule progress is measured as a percentage of the total work to be completed.

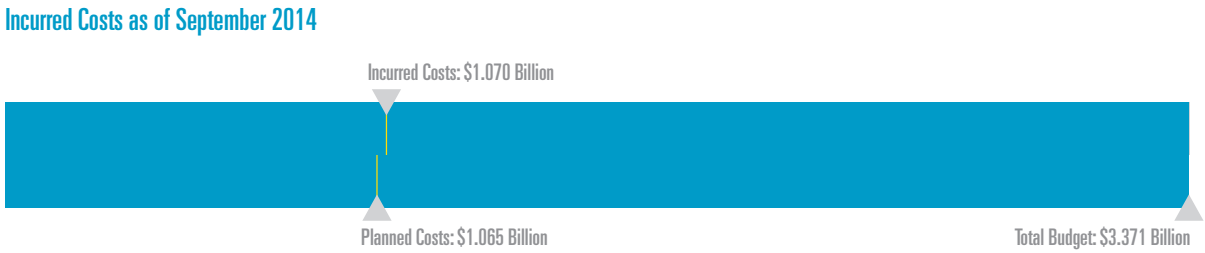
2. Manufacturing Activities

To date, the following four material manufacturing supply and installation contracts have been awarded: Turbines and Generators; Powerhouse Hydro-Mechanical Equipment; HVdc Converters and Transition Compounds and; the Submarine Cable for the Strait of Belle Isle crossing. As of September 2014, the Powerhouse Hydro-Mechanical Equipment, the Submarine Cable for the Strait of Belle Isle crossing and the HVdc Converters and Transition Compounds are tracking on or ahead of schedule. The Turbine and Generators contract is tracking behind the original contract schedule, however Nalcor advises it is within contract schedule variance tolerances and is on track to meet the planned delivery date Milestones.

Sub-Project: Muskrat Falls Generating Facility

Current Cost

The generating facility comprises 48.2 per cent of the total Project Budget. Cumulative to the end of September 2014, the incurred costs for the generating facility totaled $1.07 billion as compared to the planned costs of $1.065 billion, which was $5 million or 0.5 per cent higher than planned.



Information requested by the Committee on reasons for this variance indicates that this variance of 0.5 per cent is comprised of multiple smaller variances and there was no single activity that accounts for any material amount of the variance.

Current Schedule

Cumulative to the end of September 2014, the actual construction progress for the generating facility was 23.3 per cent complete as compared to a planned progress of 25.1 per cent complete, a variance of 1.8 per cent behind planned schedule.

A further review indicated that this progress slippage was mainly attributable to slower-than-planned construction activities on the Spillway & Gates and the Powerhouse & Intake. Actual progress on the Spillway & Gates was 17.8 per cent, compared to planned progress of 20.0 per cent; actual progress on the Powerhouse & Intake was 9.2 per cent compared to planned progress of 12.1 per cent.

Overall, the Committee has observed that the incurred costs were higher than planned and the actual progress was behind schedule. Information requested by the Committee from Nalcor (see Appendix C) indicates that the higher-than-planned costs and slippage in project schedule is largely due to a slower-than-anticipated mobilization and start up by the contractor Astaldi Canada. Nalcor is working closely with the contractor and measures have been put in place to address issues affecting progress. Nalcor further notes the contract format requires Astaldi to meet certain milestones or pay liquidated damages if the milestone is not achieved.

The Committee will continue to closely monitor progress on the activities for the Spillway & Gates and the Powerhouse & Intake.

Sub-Project: Labrador-Island Transmission Link

Current Costs

The Labrador-Island Transmission Link comprises 39.9 per cent of the total Project Budget. Cumulative to the end of September 2014, the incurred costs for the Labrador-Island Transmission Link totaled $430.6 million as compared to the planned costs of $409.9 million which was $20.7 million or 5.1 per cent higher than planned.

Information requested by the Committee on reasons for this variance indicates that there were multiple variances in activities, but the main cost variance drivers were an earlier than planned start of HVdc line construction ($14 million) and advancement of earthworks at the Strait of Belle Isle ($5 million).

Current Schedule

Cumulative to the end of September 2014, the actual construction progress for the Labrador-Island Transmission Link was 16.2 per cent complete as compared to a planned progress of 15.4 per cent complete, a variance of 0.8 per cent ahead of planned schedule.

The schedule variance related primarily to work on the Strait of Belle Isle, particularly the Transition Compounds which had progressed ahead of schedule.

Sub-Project: Labrador Transmission Assets

Current Costs

The Labrador Transmission Assets comprise 11.9 per cent of the total Project Budget. Cumulative to the end of September 2014, the incurred costs for the Labrador Transmission Assets totaled $248.9 million as compared to the planned costs of $264.2 million which was $15.3 million or 5.8 per cent lower than planned.

Information requested by the Committee on reasons for this variance indicates that there were multiple variances in activities, but the main cost variance drivers were the Transmission line construction that represents $11 million or 72 per cent of the $15.3 million below plan variance. Lower than planned earthworks incurred costs at Muskrat Falls/Churchill Falls sites also accounts for $3 million.

Current Schedule

Cumulative to the end of September 2014, the actual construction progress for Labrador Transmission Assets was 26.5 per cent complete as compared to a planned progress of 24.0 per cent complete, a variance of 2.5 per cent ahead of planned schedule.

The schedule variance related primarily to work at the Churchill Falls Switchyard which was progressing ahead of schedule.

Project Risks

Given the size and complexity of the Muskrat Falls Project, it is important that risks are proactively identified and monitored, and that mitigation measures are implemented as appropriate. The Committee reviews Nalcor's monthly risk report and meets regularly with Nalcor officials to discuss major project risks and mitigation strategies.

Based on the Committee's review of the risk reports, the approaching winter season and the Committee's observations regarding cost and schedule for Muskrat Falls Generating Facility, the Committee focused on the following risks for the purpose of this report:

1. Weather impact on Project schedule
2. Contractor performance impact on Project schedule
3. Major contracts not yet awarded
4. North Spur stability

The Committee notes that all of the above risks have been identified by Nalcor and Nalcor has risk mitigation measures in place for each risk. The Committee will continue to monitor implementation of Nalcor's mitigation measures.

1 Weather impact on Project schedule

The Committee sought information from Nalcor on mitigating measures being taken against weather impacts on the project schedule.

Nalcor advises that the main civil contractor at the Muskrat Falls site, Astaldi, is utilizing various means to enable winter construction including a temporary Integrated Cover System over the powerhouse to achieve a climate-controlled work front. Site preparation contracts, such as bulk excavations, have been scheduled to carry out the work in summer. Strait of Belle Isle cable installation will be carried out in summer. Transmission construction and right of way clearing are year-round activities but could be impacted by extreme weather conditions; if so, additional work fronts can be opened in summer months to recover lost time.

2 Contractor performance impact on Project schedule

The Committee asked Nalcor what actions the company is undertaking to mitigate against schedule delays due to contractor performance.

Nalcor advises that they are confident in the contractors and suppliers selected and their proven track records of completing contracts on time. Contract clauses also include liquidated damages to ensure each contractor meets required schedule dates. Nalcor Site teams are monitoring performance on a daily basis and Nalcor meets with senior contract management to ensure full corporate alignment and commitment. In instances where issues are noted, such as the Astaldi contract, Nalcor is taking measures to mitigate scheduling impacts. (See Appendix C, question 2 for further details on mitigation measures)

3 Major contracts not yet awarded

Three major contracts for Muskrat Falls Generating Facility, valued at approximately 5 per cent of the total Project budget have not yet been awarded, including the construction of the North Spur Stabilization Works; the construction of the North and South Dams; and, the supply and installation of the Mechanical and Electrical Auxiliaries. The Committee asked Nalcor when the company anticipates awarding these contracts as until they are awarded, the associated costs remain uncertain.

Nalcor advises the procurement process for these contracts has begun and they expect to award them in 2015.

4 North Spur stability

The Committee asked Nalcor what actions it has undertaken to confirm its engineering design for the stabilization of the North Spur.

Nalcor advises that its design for the North Spur has been informed by numerous engineering studies, resulting in the incorporation of specific features to ensure long-term stability. The design has been validated by the Project's Independent Engineer, and by Hatch Ltd., an international project and construction management firm operating in the mining, metallurgical, energy and infrastructure sectors. In addition, Nalcor advises that Professor Izzat Idriss, a seismic hazard expert from the University of California and Dr. Serge Leroueil, an expert in sensitive soils from Laval University, have both reviewed the geotechnical assessments and studies for the North Spur. The full details of the Committee's questions and Nalcor's responses regarding the North Spur are included in Appendix D.

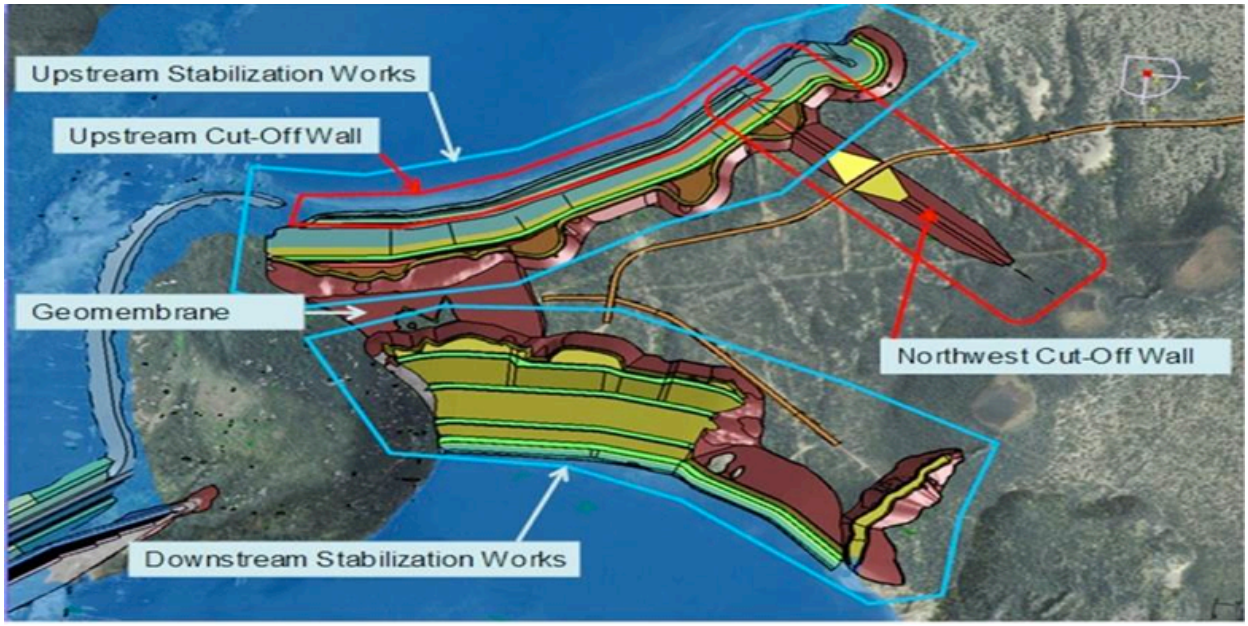


Figure showing the planned North Spur Stabilization Works

Other Oversight Activities

As outlined in the Committee's July 2014 report, significant oversight processes already exist for the Project and it is important that the Committee understand the assurances these processes provide, avoid unnecessary duplication, and identify other activities that can be undertaken to provide additional assurance with respect to the Project cost and schedule.

The Committee provides the following update with respect to additional oversight activities.

Independent Engineer

The report of the Independent Engineer, summarizing the results of their July 2014 site visits and meetings was released on October 28, 2014. A copy of this report can be found at: www.muskratfalls.nalcorenergy.com/wp-content/uploads/2014/10/Lower-Churchill-Project-July-2014-IE-Site-Visit-issued-Oct-2014.pdf or through the link at the Committee website. The Independent Engineer summarizes their comments and conclusion to that report as follows:

- Work on the directionally drilled boreholes for the Strait of Belle Isle crossing was at an advanced stage during the site visits. The drilling operations, which are using state-of-the-art oil field technology, are being carried out to a high standard. As far as could be seen during the site visit, the work fully meets the requirements of the project.

- At Muskrat Falls the major excavations for the powerhouse /tailrace and the spillway channels have been completed. The blasting quality is excellent. The line drilled and pre-spit permanent faces have very little overbreak and blasting damage is minimal. Rock support installations are adequate and no significant rock slope stability issues have developed.

- Astaldi was still mobilizing to the Muskrat Falls site at the time of the site visit and was carrying out work on various civil structures. It is understood that there has been some schedule slippage by Astaldi, but the Independent Engineer was assured by Nalcor that can be easily recovered once Astaldi's full mobilization is complete.

- During the Independent Engineer site visit work was underway at the first four base slabs of the spillway. Concrete works for the powerhouse and intake have commenced. Formwork was being erected at the time of the Independent Engineer site visit.

- The Independent Engineer considers that the North Spur seismicity, hydrogeology and stability studies carried out during 2014 have satisfied the various geotechnical concerns for that feature. These studies confirm that the designed remediation and stabilization works are adequate and that there is no significant hazard from stability problems related seepage, strength reductions in sensitive soils and/or earthquake shaking during construction or operation of the project. The Independent Engineer also agrees with the plan that further geotechnical observations and measurements will be made as the remedial works progress and as new geotechnical monitoring is performed. These observations will be calibrated against the expectations of the various analysis reports. Designs will be amended if any significant surprises or discrepancies are encountered.

- Site camps and infrastructure are adequate to handle the planned construction works. Roads are generally good, and are up the normal standard for a hydroelectric construction site.

- The Independent Engineer team visited construction operation at the HVac transmission line between Muskrat Falls and Churchill Falls. The quality of the line clearing and transmission tower construction work is very good. All work is being carried out in a very safe manner, in accordance with Nalcor safety guidelines and regulations.

- The Independent Engineer team made site visits to inspect site preparation works at the Churchill Falls New 315 kV Substation and Switchyard in Labrador and the Soldier's Pond - New 230 kV Switchyard, Synchronous Converter and HVdc Converter Site near Holyrood in Newfoundland. Cut and fill operations have been underway at each of these sites since the spring of 2014. The purpose of the current work is to level and prepare each site for the planned electrical installations. This work is being carried out to a high standard at each location and is on schedule.

- Schedule achievements are very good. Construction work will continue throughout the winter. The major works will be covered by large weatherproof shelters to enable civil works construction during winter conditions.

- At all sites, construction works are being carried out in compliance with very high standards of safety and environmental criteria.

The Independent Engineer made additional site visits and attended workshops November 24 to 27, 2014. Committee representatives and Ernst & Young, LLP (EY) as Committee advisor, accompanied the Independent Engineer for the workshops and site visits. The Independent Engineer's report on the site visit is anticipated in early 2015.

Nalcor's External Auditor

In its Report for July 2014, the Committee indicated it had asked Nalcor to direct its independent external auditor to conduct additional auditing procedures with respect to the validity of costs charged to the Project. A letter was issued to Nalcor on July 31, 2014 detailing the specific audit procedures requested. The request was approved by Nalcor's Audit Committee and Nalcor engaged its external auditor to undertake these procedures in conjunction with its annual audit for the year ended December 31, 2014. Nalcor will report back to the Committee on the results of these procedures.

To provide increased transparency the Committee further requested Nalcor direct its external auditor to prepare combined annual financial statements for the Project, separate from Nalcor's annual financial statements for the year ended December 31, 2013 and for subsequent years in conjunction with Nalcor's corporate financial statements. The combined annual financial statements for the Project for the year ended December 31, 2013 have been prepared by the external auditor and have been released. Copies of these statements can be found through the link at the Committee website at:
www.gov.nl.ca/mfoversight/pdf/Signed_2013_LCP_Combined_Stmts.pdf

Other Assurance Reviews

In fulfilling its mandate, throughout the construction period the Committee will examine issues such as whether management processes and controls are well-designed and followed. At this time, the Committee has identified the following two areas of focus for review:

1. Project Controls for Risk Management

In July 2014, the Committee reviewed Nalcor's Internal Audit Plan for the two-year period 2014 and 2015 for the Project and requested Nalcor to advance a planned review of the Project Controls and procedures for risk management.

As a result of the Committee's request, during the month of October 2014 the Internal Audit Department initiated its review of the Project Controls and procedures for risk management. As of the date of this report, the Department was completing its work and the results of the audit review will be available to the Committee in early 2015.

2. Project Controls for Cost and Schedule

The Committee has engaged EY to undertake a review of the project controls for cost and schedule. This will include assessing the methods for calculating and reporting costs and schedule progress and confirming the completeness and accuracy of the information reported on cost and schedule.

Next Report

The Committee will continue its oversight of the construction of the Project in accordance with its mandate and the Oversight Framework. The next report will be for the quarter ended December 2014.

Appendix A

Project Budget Summary Expenditure Categories

The summary expenditure categories are described as follows:

NE-LCP Owners Team, Admin and EPCM Services: includes the labour, facilities and overhead costs of the Nalcor Energy – Lower Churchill Project team as well as costs of SNC Lavalin.

Feasibility Engineering: includes the cost of early stage engineering activities which are now complete.

Environmental & Regulatory Compliance: includes costs associated with environmental assessment, permits, licenses and similar such costs.

Aboriginal Affairs: includes costs associated with activities in the Aboriginal communities along with obligations under the Industrial Benefits Agreement.

Procurement & Construction: includes costs associated with the major construction activities and the award of contracts.

Commercial & Legal: includes costs associated with insurance, legal and other commercial activities.

Contingency: provision for additional expenditure, if required.

Appendix B

Milestone-North Spur Works Ready for Diversion

The Committee asked the following questions with respect to the change in the Milestone for the North Spur Works Ready for Diversion:

1. Why was the schedule changed from the original Milestone date for the "North Spur Works Ready for Diversion" from September 2015 to November 2016?

2. What impact does this change in Milestone date for the North Spur Works Ready for Diversion have on the Project's critical path and delivery of power by the dates outlined in the Milestone schedule or any other Milestone schedules?

3. The "North Spur Works Ready for Diversion" Milestone date is November 2016, but Nalcor has advised there is still work planned for 2017 for this activity. What work is planned for 2017 given the Milestone date is November 2016?

1. Why was the schedule changed from the original Milestone date for the "North Spur Works Ready for Diversion" from September 2015 to November 2016?

While the completion date for the North Spur Works Ready for Diversion has shifted later in the project work schedule from the original Milestone schedule, this shift does not impact the schedule for first power from Muskrat Falls. This schedule change allows project activities to be spread over three seasons rather than two. This approach reduces cost and schedule risk and ensures activities are completed using the most efficient use of resources. The 2016 date aligns with the planned diversion timelines.

2. What impact does this change in Milestone date for the North Spur Works Ready for Diversion have on the Project's critical path and delivery of power by the dates outlined in the Milestone schedule or any other Milestone dates?

The Project Critical Path, including delivery of first power, is not impacted as a result of this change. The revised Milestone date of September 2016 will still facilitate complete river diversion milestone of November 2016.

3. The "North Spur Works Ready for Diversion" Milestone date is November 2016, but Nalcor has advised there is still work planned for 2017 for this activity. What work is planned for 2017 given the Milestone date is November 2016?

In order to understand the work that is planned to be carried out after the North Spur Milestone of November 2016 it is important to discuss the river management strategy during the construction of the Muskrat Falls facilities. A high level summary is as follows:

- By late summer 2016 the plan is to have all water in the river diverted through the Spillway, hence the spillway is on the project schedule critical path.
- Following diversion of the river through the spillway, the spillway gates can be operated to control the flow.
- The plan is to use the spillway gates to create a partial impoundment by creating a headpond upstream of Muskrat Falls at elevation 25m in November 2016.

- The 25m headpond will create a stable ice cover upstream of MF.

- The upstream stable ice cover will prevent the generation of the hanging ice dam downstream of Muskrat Falls which will lower the downstream river elevations and will facilitate the construction of the remaining structures at Muskrat Falls planned to be carried out from November 2016 to November 2017.

- The North Spur stabilization work is therefore synchronized to the river management plan. The North Spur stabilization work required to be complete by November 2016 is to allow the impoundment to 25m which is only part of the full scope and the full scope of the North Spur stabilization work is required to be complete prior to full impoundment which is planned to be carried out November 2017. Therefore, the stabilization work planned to be carried out between the partial impoundment November 2016 and the full impoundment November 2017 is above the 25m elevation (plus a 2m buffer) of the North Spur and the Full Supply Level of 39m.

Appendix C

Muskrat Falls Generating Facility

Current Project Performance - September 2014

The Committee asked the following questions regarding the schedule and costs for the Muskrat Falls Generating Facility:

1. What caused the schedule slippage on the Powerhouse & Intake and the Spillway & Gates and does the slippage impact the Milestone Schedule or Project Budget?

2. What actions are being undertaken to address this schedule slippage?

3. Nalcor has reported that the construction of the full integrated covers systems to accommodate winter construction of the Powerhouse & Intake will not be concluded prior to the onset of Winter 2014/2015. What impact will this schedule slippage have on the progress at site during this winter season and the overall Project schedule?

1 What caused the schedule slippage on the Powerhouse & Intake and the Spillway & Gates and does the slippage impact the Milestone Schedule or Project Budget?

Overall, the Muskrat Falls Project remains on schedule and construction progress for the Muskrat Falls generating facility work is generally where we anticipated it to be at this point. The slippage in project schedule is largely due to a slower than anticipated mobilization and start up by Astaldi Canada. Nalcor is working closely with the contractor and measures have been put in place between Nalcor and Astaldi to address issues affecting progress. Based on the completed work to date, there are no impacts on the Milestone schedule and first power is on target for late 2017.

2 What actions are being undertaken to address this schedule slippage?

Nalcor is working closely with Astaldi to address their work progress. Astaldi is responsible to take all necessary actions to address any variances between planned and actual progress on the Powerhouse & Intake and Spillway & Gates (Contract CH0007). The contract format requires Astaldi to meet certain milestones or pay liquidated damages; this only could occur if/when a milestone is not achieved.

There are mitigating measures being taken on a number of fronts with Contract CH0007. These include:

- Regular dialogue between Nalcor and Astaldi leadership to address issues affecting progress.
- Astaldi is mobilizing additional management resources and Nalcor is supporting the Astaldi initiatives to improve performance.
- Astaldi has mobilized additional plant material and equipment.
- Additional equipment being procured where required.
- Working groups have been formed to address key focus areas including the Integrated Cover System (ICS), Powerhouse/Intakes, Winterization, Spillway, and Productivity.
- Review of methods to capitalize on opportunities i.e., combining pours, prefabrication opportunities, more work in the winter months than planned.

These actions taken by both Nalcor and Astaldi are designed to improve production, productivity and regain the schedule to ensure there is no impact on the first power milestone date.

3 Nalcor has reported that the construction of the full integrated covers systems to accommodate winter construction of the Powerhouse & Intake will not be concluded prior to the onset of Winter 2014/2015. What impact will this schedule slippage have on the progress at site during this winter season and the overall Project schedule?

The construction and in service date of the Integrated Cover System (ICS) does not impact the overall schedule for the Muskrat Falls Project and it is not a requirement for the Muskrat Falls Project construction.

Work on the ICS is ongoing and it is a priority by Astaldi. Work is ongoing on pouring the concrete at the spillway, and progress is being made on the powerhouse. It's important to note that concrete can be poured throughout the winter regardless of the weather.

The construction of the ICS is being executed in accordance with Astaldi's baseline schedule for the project. The contractor has already commenced installation of structural steel for the portion of the ICS covering the intake and powerhouse for unit #3. The foundations and backfill work required to facilitate the installation of the structure across the remaining units has already been completed. Work is underway to provide a temporary wall between units #2 and #3 to facilitate the commencement of work for units #1 and #2.

Concrete work has commenced on the intakes for units #1, #2, #3 and #4 as well as the South Service Bay.

Timelines may change for individual work within the overall project, such as on the cover structure; however, this has not impacted the end date.

In addition, the majority of the work on the hydroelectric generating facility is currently taking place in the spillway and not in the powerhouse. This work is taking place outside as planned. The Integrated Cover System is one way to provide shelter from the winter conditions, Astaldi are also using other equally successful methods of weather protection on the spillway construction using temporary cover systems and heating, Astaldi and Nalcor will assess how best to achieve the weather protection for the powerhouse and achieve the schedule Milestones.

Appendix D

North Spur Stabilization

The Committee's questions with respect to these risks, and Nalcor's responses, follow:

1. Did Nalcor's engineering design for the stabilization of the North Spur consider the clay formations forming part of that physical structure?

2. What actions has Nalcor undertaken to confirm its engineering design?

1 Did Nalcor's engineering design for the stabilization of the North Spur consider the clay formations forming part of that physical structure?

Early in the Project planning and design, Nalcor identified the stability of the North Spur as a Project risk. Mitigation measures have been designed and developed for the stability of the North Spur and these have been reviewed by independent experts.

The North Spur is a 1,000m long, 500m wide and 45 to 60m high ridge that connects the Muskrat Falls rock knoll to the north bank of the river. When the reservoir is impounded this feature will form a natural dam and become a major part of the river impoundment system.

The feature is composed of unconsolidated mixed sand and marine silt/clay sediments. The depth to bedrock underneath the spur is in the range of 200 to 250m. It contains a significant amount of glacio-marine silt/clay sediments, including horizons of highly sensitive clay strata, mixed with some sandy layers. The upstream and downstream slopes of this feature are subject to ongoing river erosion and mass wasting. This has contributed to local over-steepening of the slope, which triggers rotational sliding on both the downstream and upstream sides of the spur.

As part of the water retention system, the importance of stabilizing the North Spur has been an underlying design criterion for several decades.

The solution for the North Spur has been addressed in numerous engineering studies and investigations by competent and qualified geotechnical engineers. The geotechnical conditions at the North Spur are well understood by Nalcor and its engineering consultants. The design has been based on the results of site investigations and the properties of the materials comprising the North Spur.

Nalcor's project engineers and designers have incorporated special features to ensure long-term stability. These include slope modifications, the installation of a cutoff wall under the upstream slope, a drilled well system, special drainage measures and the placement protective zones to protect against erosion.

The type of clay on the North Spur is "sensitive clay" and the design has taken all geotechnical and other factors into account in the design of the North Spur stabilization scope.

The engineering design for stabilization of the North Spur has been undertaken by qualified geotechnical engineers, and extensive field investigations have been completed to support the engineering design. The design for the North Spur has been further validated through independent reviews by the Project's Independent Engineer as well as Hatch Ltd.

The Independent Engineer (IE) has reviewed Nalcor's design in detail and commented as follows:

"Concerns have been raised during earlier project reviews about potential liquefaction of the sensitive silt/clay strata during the design earthquake. In the fall of 2013 the IE and other reviewers commented that the stability studies had not considered the special liquefaction and strength loss strength properties under earthquake loadings and that further studies were needed to deal with this issue. New studies to address these issues were subsequently carried out during the first half of 2014. Nalcor and SNC presented the results of the studies in a meeting on July 20, 2014. This presentation was based on the following reports, which were submitted to the IE at that time.

- Report No. 1: "Earthquake Hazard Analysis - Muskrat Damsite, Lower Churchill, Labrador", issued by Gail M. Atkinson Ph. D., on May 22, 2014.

- Report No 2: "Three Dimensional (3D) Hydrogeological Study for the North Spur", Report no. H346252-0000-00-124-0001, Rev A, issued by Hatch on June 16, 2014.

- Report No. 3: "North Spur Stabilization Works – Dynamic Analysis Study – Phase 2", Nalcor Doc No. MFA-SN-CD-2800-GT-RP-0007-01, Rev A1, issued by SNC-Lavalin in May 2014.

The geotechnical assessments and dynamic studies were reviewed by Professor Idriss and Dr. Serge Leroueil. Professor Idriss is an internationally renowned expert of seismic hazard analyses and dynamic analyses of earthworks and civil structures. Dr. Leroueil is recognized for his expertise in dealing with sensitive soils, particularly the slopes of the St. Lawrence Valley in Quebec. With the involvement of these two experts, Nalcor can rest assured that analytical work of the North Spur has been done to a world class standard.

The IE considers that the various geotechnical concerns for the North Spur have generally been satisfied by the studies described above. These studies confirm that the designed remediation and stabilization works are adequate and that there is no significant hazard from stability problem-related seepage, strength loses in sensitive soils and/or earthquake shaking during construction or operation of the project. The IE also agrees with the plan that further geotechnical observations will be made as the remedial works progress and as new geotechnical monitoring is performed. These observations will be calibrated against the expectations of the various analysis reports. Designs will be amended if any significant surprises or discrepancies are encountered".

2 What actions has Nalcor undertaken to confirm its engineering design?

The North Spur design has been implemented by qualified and competent engineering consultants and has been subjected to multiple 'cold eyes' reviews to ensure the adequacy of the design to meet its intended objectives. The planned work has also been reviewed by the Independent Engineer.

As noted above in comments from the Independent Engineer following its July 2014 site visit report, "The IE considers that the various geotechnical concerns for the North Spur have generally been satisfied by the studies described above. These studies confirm that the designed remediation and stabilization works are adequate and that there is no significant hazard from stability problem-related seepage, strength loses in sensitive soils and/or earthquake shaking during construction or operation of the project. The IE also agrees with the plan that further geotechnical observations will be made as the remedial works progress and as new geotechnical monitoring is performed. These observations will be calibrated against the expectations of the various analysis reports. Designs will be amended if any significant surprises or discrepancies are encountered".

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 landsliding from breaching the spur under existing conditions. In 1982, an interim system of 22 pump wells was 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.

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 commenced detailed engineering on the North Spur to refine the conceptual solution. The information gathered in this program has been used as input into the detailed design.

Muskrat Falls Oversight Committee
P.O. Box 8700
St. John's, NL
A1B 4J6

Newfoundland Labrador