

**From:** [Mackay, Michel](#)  
**To:** [Lalonde, Nadine](#); [Gagnon, Nathalie](#)  
**Subject:** TR: Rev.1Lower Churchill Risk assesement SNC-Lavalin Method April 2013 (2).doc  
**Date:** Monday, April 22, 2013 1:09:00 PM  
**Attachments:** [Lower Churchill Risk assesement SNC-Lavalin Method April 2013-Rev JDT 20130421.doc](#)

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Les derniers commentaires de JD

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**De :** Tremblay, Jean-Daniel  
**Envoyé :** 22 avril 2013 11:18  
**À :** Bechard, Normand; Mackay, Michel; Vidal-Andrews, Antoine  
**Cc :** Guerette, Serge; Gagné, Bernard  
**Objet :** RE: Rev.1Lower Churchill Risk assesement SNC-Lavalin Method April 2013 (2).doc

Ci-joint mes commentaires qui couvrant les 4 premieres sections de la premiere version transmise samedi.

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**From:** Bechard, Normand  
**Sent:** April 22, 2013 9:31 AM  
**To:** Mackay, Michel; Vidal-Andrews, Antoine  
**Cc:** Guerette, Serge; Tremblay, Jean-Daniel; Gagné, Bernard  
**Subject:** FW: Rev.1Lower Churchill Risk assesement SNC-Lavalin Method April 2013 (2).doc

Voici ma revue, faites attention j'ai retire du texte plusieurs mots faisant reference aux resultats de soumissions puisque nous ne sommes pas au courant de ces résultats .

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**From:** Vidal-Andrews, Antoine  
**Sent:** April 21, 2013 10:23 AM  
**To:** Bechard, Normand  
**Subject:** TR: Rev.1Lower Churchill Risk assesement SNC-Lavalin Method April 2013 (2).doc



Voici ce que j'ai transmis à Michel hier.  
Je dois le repasser les deux rapports avec lui aujourd'hui.  
Antoine

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**De :** Vidal-Andrews, Antoine  
**Envoyé :** 20 avril 2013 19:03  
**À :** Mackay, Michel  
**Objet :** Rev.1Lower Churchill Risk assesement SNC-Lavalin Method April 2013 (2).doc

Rev 1. Mes commentaires.  
Demain, on passera les commentaires de Normand.

Regarde voir si le rapport à du sens. J'ai éliminé les « critiques » de l'ancien rapport. Pas nécessaire de lister les differences.

	Lower Churchill Risk Report	 SNC-LAVALIN
	Project 505573	

**SNC-LAVALIN RISK ASSESSMENT**  
**METHOD FOR LOWER CHURCHILL PROJECT**  
**PRESENTED TO NALCOR .**

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**APPROVALS**

PREPARED BY	TITLE	Signature	DATE
Michel Mackay	Project Risk Manager		April 23, 2013
APPROVED BY	TITLE		DATE
Normand Bechard	Project Manager		
Marc O'Connor	General Manager		
Claude Létourneau	Senior Vice President		
Dale Clarke	Executive Vice-President		



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Risk Review for Lower Churchill Project

505507 DATE

April 2013

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1. INTRODUCTION

The project under development is comprised of the Muskrat Falls Hydroelectric Plant and associated transmission lines and DC specialties. It is comprised of three discrete physical Components, as follows:

- o Component 1: Muskrat Falls Hydroelectric Development
- o Component 3: High voltage direct current transmission system specialties
- o Component 4: High voltage overhead transmission lines (ac and dc) including:
  - Sub-component 4A: HVdc overhead transmission lines Muskrat Falls to Soldiers Pond
  - Sub-component 4B: HVac overhead transmission lines Muskrat Falls to Churchill Falls

The subsea cable across the Strait of Bell Isle is not part of the SLI scope.

This project Risk assessment has been performed solely by SNC-Lavalin Experts at the demand of SNC-Lavalin Project Director on Lower Churchill Project (LCP). In light of the actual current situation developing upon review of the bids received the Project Director has requested Corporate support for to conducting a risk assessment using SNC-Lavalin Risk assessment methods and practice applied on all SNC-Lavalin projects. This Risk assessment was conducted By Montreal M&M division Risk Director with the support of an experienced Hydro power project general managers having successfully completed James Baie power development programs and referred to in this report as the SNC Risk Team.

This review was conducted at SNC-Lavalin's cost in light of currently unfolding events leading SNC management to believe the LCP Project Schedule could be severely impacted delaying completion by several months and that cost could deviate by more than 25% of the original budget.

2. KEY ELEMENTS OF THE LCP RISK MANAGEMENT PROCESS:

- o The SNC Risk Team reviewed the Risk Register in force on the project. The Risk management system implemented on the LCP does not provide for the quantitative evaluation of Risk exposure focusing rather on qualitative risk assessment aimed at providing visibility and monitoring of actions supporting Risk mitigation strategies. As such it does not provide a clear evaluation and visibility of the dollar value of each risks and the resulting total project Risk exposure of the LCP.
- o Big differences exist between the Risk management process flow presented in the Project Execution Plan (Figure 14.2 Sample Risk Report) and the Risk Register currently in force.

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- o The LCP register's qualitative assessment before and after gives the impression that risks are being reduced by registered actions while effectiveness of those actions cannot be measured in project execution;
- o The logged addressing actions do not provide intended outcome, status or conclusion of actions once completed;
- o Qualitatively assessing post-mitigation risk levels provides false impression of controlling project risks;
- o The very high consequence risks identified as part of this study will be presented to SNC-Lavalin and Nalcor senior management in support of their respective review and ensuing discussions;
- o Risks (both threats and opportunities) that could arise either during and/ or after project completion were considered;
- o Risks assessment and evaluation are managed through the SNC-Lavalin standard risk management tool, MOINS – RISC – LESS (based on Dyadem International's Stature platform).

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3. MANDATE

Appointed task force dedicated to the preparation and issue of a report presenting conclusion resulting from a high level risk review and assessment of the Lower Churchill project and identify high level mitigation strategies and supporting action plan using the standard SNC-Lavalin methodology and tools.

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4. EXECUTIVE SUMMARY REPORT

The first project risk register supporting the preparation of this reports was populated on April 17<sup>th</sup>, 2013 by a group of selected members appointed by Senior Management at the Montreal, Panama and Newfoundland offices. A second project risk assessment review was also conducted on April 18<sup>th</sup> and 19, 2013 by selected team members from same offices. These reviews were conducted in light of the actual current conditions resulting from bid openings of several packages.

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The current trend is that market response to issued tenders is limited to a few players and the pricing are significantly above original budget estimates. The quantification and value of risk exposure is greater than, reasonably foreseeable suggesting up to 25% deviation from budget and Project completion several months behind baseline schedule,

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Following review and discussions surrounding the current format and content of the current LCP risk register, the SNC Risk Team elected to prepare a new risk register using on SNC-Lavalin standard methodology and tools to better reflect the current, actual project risk conditions,

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This review was approved by the SNC-Lavalin Senior Management in support of SNC-Lavalin Lower Churchill project Project Director request. It was facilitated by the Montreal Mines and Metallurgy division Risk Director supported by seasoned and skilled Hydro Power Project general managers.

The objective of identifying all of the most significant potential risks to which the LCP is exposed was attained.

A quantitative risk assessment was performed based on the experience of the task force appointed. The current calculated risk exposure for the LCP amounts to is 3,218 billion CDN (please refer to Risk Register Table 1). This figure represents cost overruns of an order of magnitude totalling nearly 50% of the approved project budget.

This report is however at a relatively preliminary stage, and has not been distributed to all the original participants for their review and comments, given the urgency to present this risk assessment to Executive SNC-Lavalin Management prior to scheduled discussions with Nalcor executives.

Out of the 47 (JDT: number of risks to be updated) risks originally identified, 5 were retired due to redundancy of considered risk value (double dipping). Out of the 42 remaining Project risks evaluated, 26 are considered to be Very High Risks, 5 High, 9 Medium and 2 Low.

The Very High level risks represent 62% of the total identified LCP risk exposure value. The report indicates mitigation strategies and supporting actions plans normally part of a report of this nature. LCP Risk Reviews should be performed with Nalcor Energy representatives at a later stage.

Value-wise (quantitative assessment), 9 Very High risk represent 59% of the estimated risk exposure value, and evaluated at 1,914 Billion CDN.

Risk elements:

All of these 9 Prime Contract risks evaluated are considered to be Very High Risks given the context of the present situation.

The Very High Risks represents 2,918 billion and has been evaluated in regards of the actual contractual situation.

We highlight herein below the 9 major risks captured. They are:

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- 2. N
- 3. N

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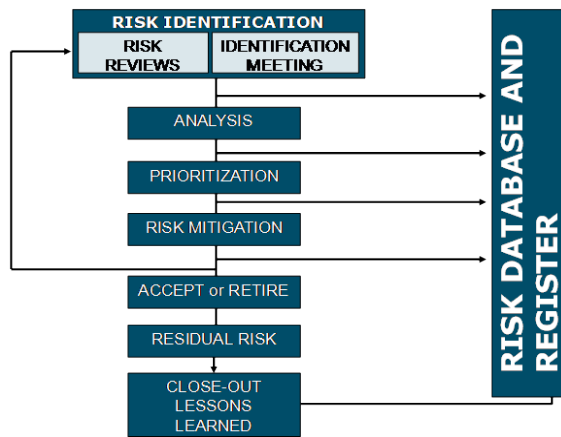
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### Risk Management Process



The first step in this process was to identify risks based on the components of the project ( Muskrat Falls Hydroelectric Development, High voltage direct current transmission system specialties and High voltage overhead transmission lines (ac and dc))**Risk titles and concise descriptions were developed and agreed upon by the panel.** The risk was determined to be a either Component 1,3 or 4 or concerning all the project. We haven nane any risk owner but this should done at a later date.

The next phase was to provide a qualitative analysis that served to provide an order of magnitude basis of comparison for each risk. The objective of providing an order of magnitude was to be able to identify the most critical risks (+ or – 50%).

The panel was asked to select a consequence level (from VERY LOW to VERY HIGH), which is determined by a percentage scale based on the project’s CAPEX or OPEX. In this case, the CAPEX was concluded to be \$6100M, representing the dollar value of Lower Churchill project. The table below demonstrates the Consequence breakdown:





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CAPEX Consequence Level

Consequence Level	Minimum (% CAPEX)	Minimum (\$ M CAD)	Maximum (% CAPEX)	Maximum (\$ M CAD)
Very High	1.00%	\$ 61	5.00%	\$305
High	0.75%	\$ 45.75	1.00%	\$ 61
Medium	0.50%	\$ 30.50	0.75%	\$ 45.75
Low	0.25%	\$ 15.25	0.50%	\$30.50
Very Low	-	\$ 0.0	0.25%	\$15.25

The following step included selecting the probability of the risk occurring and the manageability level. Similar tables are illustrated below:

Probability of Occurrence

Probability Level	Probability	Description
Very High	70% to 80%	Will probably occur in most circumstances
High	50% to 70%	Might occur under most circumstances
Medium	30% to 50%	Might occur at some time
Low	10% to 30%	Could occur at some time
Very Low	< 10%	May occur in exceptional circumstances

Manageability

Manageability Level	Probability	Description
Very High	80%	Can easily be managed
High	60%	In most circumstances can be managed
Medium	40%	Can be managed



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Low	20%	In most circumstances difficult to be managed
Very Low	0%	Virtually impossible to manage

The risk software then computed the **Probable Consequence** and classified the average risk exposure based on the following calculation and table below:

**Probable Consequence = Consequence x Probability x (1- Manageability)**

CAPEX Probable Consequence

Probable Consequence Level	% CAPEX Value	Minimum (\$ M CAD)	Maximum (\$ M CAD)
Very High	0.65% and up	\$39.65	-
High	0.35% to 0.65%	\$21.35	\$39.65
Medium	0.17% to 0.35%	\$10.37	\$21.35
Low	0.03% to 0.17%	\$1.83	\$10.37
Very Low	0% to 0.03%	\$ 0.0	\$1.83

Once the overall risk levels (probable consequences) had been identified, the panel was able to compare and prioritize the risks. The following step in the process was to create very detailed mitigations plans for each risk, including actions. These items were developed in the action log tab of the software due dates and action owners show be develop at later date. This portion of the risk workshop was the most labour intensive in terms of time and overall discussion amongst the panel members.

The team was also able to provide several comments and revisions to all aspects of the elements in the software (risk title, description, mitigation plans, actions, consequence, probability & manageability) towards the end of the third workshops. In addition, several risks were retired due to the fact that they were included in other risks or they were perceived as double dip risk by the panel.

7. RISK REGISTER SUMMARY

8. TABLE 1