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Forensic Audit Report to the Commission of Inquiry Respecting the Muskrat Falls Project

Construction Phase – December 7, 2018

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December 7, 2018

Dear Commissioner LeBlanc:

FORENSIC AUDIT REPORT – CONSTRUCTION PHASE

We enclose our report of the findings and observations with respect to the forensic audit of the Construction Phase of the Muskrat Falls Project.

We would like to take this opportunity to thank the Commission, Nalcor and the Province for their support throughout this project. We would also like to thank all current and past employees and contractors of Nalcor, other participants and their respective legal counsel for their co-operation throughout this engagement.

Yours sincerely,

Grant Thornton LLP

Scott Shaffer

Scott Shaffer, CCA, CPA, CFE, MBA
Forensic Advisory Services
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Background

In 2007, the Government of Newfoundland and Labrador ("GNL") released the Provincial Energy Plan ("Energy Plan"). The Energy Plan refers to the development of the Lower Churchill as a cornerstone public policy action. Nalcor Energy ("Nalcor"), the Newfoundland and Labrador crown corporation which owns Muskrat Falls Corporation with Emera Inc. (a company based in Nova Scotia), undertook the Lower Churchill Project ("LCP, "the Project"). The following is a summary of the components of the Muskrat Falls Project ("Project" or "Muskrat Falls").

- Muskrat Falls Generating ("MFG") facility, an 824 megawatt ("MW") hydroelectric generating facility consisting of two dams and a powerhouse at Muskrat Falls;
- Labrador-Island transmission link ("LIL"), an 1,100 kilometre ("km") High Voltage direct current ("HVdc") transmission line from Muskrat Falls to Soldiers Pond on the Avalon Peninsula, including a 35 km subsea cable across the Strait of Belle Isle;
- Labrador transmission assets ("LTA"), two 250 km High Voltage alternating current ("HVac") transmission lines between Muskrat Falls and Churchill Falls; and
- Maritime Link ("ML"), a 500MW HVdc transmission link between Newfoundland and Nova Scotia.

Our work focused on the components of the Project undertaken by Nalcor, and as such, excludes the ML component which was executed by Emera.

At the time the Project was sanctioned in 2012, the capital cost estimate amounted to approximately $6.2 billion (excluding financing costs) with first power from Muskrat Falls scheduled for 2017. To date, excluding financing costs, the capital cost estimate has been revised and is currently in excess of $10.1 billion[1&2] and first power from Muskrat Falls is not scheduled to occur until 2019 (full power in 2020).[3] Due to the cost overruns, schedule delays and the public's request for greater transparency, the provincial government established the Commission of Inquiry Respecting the Muskrat Falls Project ("Commission").

We were engaged by the Commission to conduct a forensic audit and to prepare a report of the findings ("Forensic Audit").

Note – the page numbers referenced in the footnotes throughout this report reflect the page numbers from the pdf document and not the page number noted on the document itself.

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[1] NAL0020789 – Construction Report Muskrat/LTA Project Finance Agreement – December 31, 2017 – Page 5 & 6
[2] NAL0020767 – Construction Report LIL Project Finance Agreement – December 31, 2017 – Page 4
[3] Understanding Muskrat Falls – Stan Marshall, CEO Nalcor Energy – February 15, 2018 – Page 6

Scope of Work

In accordance with our engagement agreement[4], our Forensic Audit was divided into two distinct phases:

1 Sanctioning Phase – Decision Gate 2 ("DG2") (November 2010) to the Decision Gate 3 ("DG3") sanctioning decision (December 17, 2012) *(Please note - the results of our forensic audit work pertaining to the Sanctioning Phase were reported separately in our report dated July 16, 2018)*

2 Construction Phase - December 18, 2012 to March 31, 2018.

This report is essentially limited to Construction Phase reporting. The period of the analysis covered by this report with, certain exceptions, is as of the date of sanctioning on December 17, 2012 up to March 31, 2018 ("Period of Review"). There are instances in this report where it was necessary to rely on events that took place prior to sanctioning, but would have had an impact on the cost overruns incurred after sanctioning. For example, a lower contingency amount that was determined prior to project sanctioning, would increase the amount of cost overruns during the construction phase.

The engagement has been conducted in accordance with the Standard Practices for Investigative and Forensic Accounting Engagements[5] of the Chartered Professional Accountants of Canada and was led and supervised by Scott Shaffer, Forensic Advisory Services, Managing Director.

As per our engagement agreement, the Forensic Audit for the Construction Phase was to include the considerations as set out in paragraphs 4(b)(i) to (vi) of the Commission of Inquiry Respecting Muskrat Falls Project Order[6] ("O.C. 2017-339" or "Order") described as follows:

B why there are significant differences between the estimated costs of the Muskrat Falls Project at the time of sanction and the costs by Nalcor during project execution, to the time of this inquiry together with reliable estimates of the costs to the conclusion of the project including whether:

i Nalcor's conduct in retaining and subsequently dealing with contractors and suppliers of every kind was in accordance with best practice, and, if not, whether Nalcor's supervisory oversight and conduct contributed to project cost increases and project delays,

ii the terms of the contractual arrangements between Nalcor and the various contractors retained in relation to the Muskrat Falls Project contributed to delays and cost overruns, and whether or not these terms provided sufficient risk transfer from Nalcor to the contractors,

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[4] Engagement Agreement – Forensic Audit in Respect of the Commission of Inquiry Respecting the Muskrat Falls Project – February 3, 2018

[5] Standard Practices for Investigative and Forensic Accounting Engagements – November 2006

[6] Commission of Inquiry Respecting the Muskrat Falls Project Order under the Public Inquiries Act, 2006 (O.C. 2017-339)

iii the overall project management structure Nalcor developed and followed was in accordance with best practice, and whether it contributed to cost increases and project delays,

iv the overall procurement strategy developed by Nalcor for the project to subdivide the Muskrat Falls Project into multiple construction packages followed industry best practices, and whether or not there was fair and competent consideration of risk transfer and retention in this strategy relative to other procurement models,

v any risk assessments, financial or otherwise, were conducted in respect of the Muskrat Falls Project, including any assessment prepared externally and whether

- the assessments were conducted in accordance with best practice,
- Nalcor took possession of the reports. Including the method by which Nalcor took possession,
- Nalcor took appropriate measures to mitigate the risks identified, and
- Nalcor made the government aware of the reports and assessments, and

vi the commercial arrangements Nalcor negotiated were reasonable and competently negotiated

Generally, as part of our Forensic Audit, we performed the following procedures:

– Identified and reviewed supporting documentation (See Appendix B for a list of documents relied upon);

– Conducted interviews with and/or attended presentations from: Nalcor executives, senior management, other employees and contractors; industry experts; concerned citizens; and, past members of the Muskrat Falls Oversight Committee;

– Submitted requests for information and written questions to Nalcor and the Project Management Team ("PMT") and reviewed written responses to the questions and if applicable, the supporting documentation included in the responses;

– Performed various analyses; and

– Consulted with independent experts.

Reliance on Third Parties and Nalcor's Internal Audit Function

Throughout the course of our work we have relied on the work of three third party experts as follows:

- **R. W. Block Consulting, LLC** - Derek Hennessey - Director
- **Williams Engineering** - Jim Gilliland, Ph.D., P.Eng., LEED® AP -Regional Director, Alberta & Arctic
- **Miller Thomson LLP -** Aaron Atcheson - Partner

During the planning and performance of our forensic audit we identified areas where our analysis could be supplemented with the expertise of the above noted professionals. The results of their analysis, including their conclusions, were documented in writing. We have expressly quoted their work in the applicable section of our report where relevant.

Nalcor's Internal Audit

During our forensic audit we reviewed and considered the work of Nalcor's internal audit department. We have noted the following:

- Nalcor's internal audit function includes an ongoing five year audit plan which prioritizes audit worked based on their assessment of risk. Nalcor's internal audit plan addressed the LCP specifically.[7]
- In 2013, the Institute of Internal Auditors ("IIA") conducted an External Quality Assessment of the Internal Audit Activity at Nalcor Energy. The IIA's report concluded, *"It is our overall opinion that the IA activity generally conforms to the Standards and Definition of Internal Audit… The IIA Quality Assessment Manual suggests a scale of three ratings, "generally conforms," "partially conforms," and "does not conform." "Generally Conforms" is the top rating and means that an internal audit activity has a charter, policies, and processes that are judged to be in conformance with the Standards..."*[8]
- In 2015, Emera conducted a reliance review of Nalcor's internal audit function.[9] Emera's report notes: "*We used the IIA Professional Practices Framework (IPPF) Practice Guide "Reliance By Internal Audit on Other Assurance Providers" as the basis for our review and specifically focused on the following five key principles: 1) Purpose, 2) Independence & Objectivity, 3) Competence, 4) Elements of Practice, and 5) Communication of Results & Impactful Remediation. Our review included an assessment of overall governance in the above noted areas, as well as examining a sample of audit files from both the Labrador Transmission Asset and the Labrador Island Link projects for consistency with stated methodology and approach. We did not evaluate specific findings or challenge results of previous audits performed by the Nalcor team."* The report concludes: "*Based on the results of the work performed, we have concluded that Nalcor's Internal*

[7] NAL0685623 – Audit & Resource Plan 2015-2019 – Slide 1, Slide 7 & Slide 14
[8] NAL3531156 – External Quality Assessment of the Internal Audit Activity at Nalcor Energy – June 2013 – Page 3
[9] NAL0106563 – 15-02 – Emera Conclusion Memo - Nalcor Internal Audit Reliance Review – December 18, 2015 – Page 1 - 2

Audit function meets the necessary standards to allow Emera Internal Audit to place a high level of reliance on work performed."

As a result, we have determined that it is appropriate to rely on the information presented in Nalcor's internal audit reports.

We reviewed Nalcor's Internal Audit plans for 2014 to 2017 and identified audit reports that were relevant to our scope of review. We reviewed the following Nalcor internal audit reports and have referenced them in the applicable section of our report where relevant:

- **13-06 2013 Contracts Award Process** - The report concludes *that "the procurement processes and procedures for the evaluation and awarding of contracts provide reasonable opportunity for a fair and consistent assessment of potential applicants to participate in project opportunities…The review did note some exceptions in the completion of some documentation, all of which were considered as having low inherent risks."*[10]
- **14-34 Contract Administration** – The report concludes: *"There were no issues identified during the audit of Contract Administration on the Lower Churchill Project. It can be concluded that the Supply Chain is working within an appropriate control environment and has developed contract administration procedures that are consistent with best practices."*[11]
- **14-37 Contracts & Compliance** – The report concludes that: *"LCP Supply Chain and Quality Assurance has demonstrated that in most cases there is strict adherence to the plans, procedures, legal templates, and due diligence governing the development, award and execution of each contract…"*[12] This audit identified two issues (one low risk and one medium risk) with a rating of unlikely probability. However, the report noted potential execution issues with CH0007-001 (Astaldi). Nalcor Internal Audit also noted that the package team implemented a number of mitigation procedures. As a result, they did not note any issues for their audit objective.[13]
- **15-07 Invoice Attest and Payable Audit** – The report concludes: *"a review of the internal controls within the Lower Churchill Project (LCP) Accounts Payable Function displays alignment with several of the COSO Internal Control Framework Principles relating to the control environment, risk assessment, and monitoring processes. In addition, the invoice attest processes…displayed internal controls that were effective in mitigating the risk of paying unauthorized costs."*[14]
- **15-17 LCP Payment Certificate Review and Compliance Audit** - The report identifies concluded *"…the controls in place for this process appear to adequately ensure that the contractor is billed only for goods and services received, the goods or services have been inspected and accepted, the payment certificate is correct and complies with the pricing, terms, and conditions of the contract, and the total payments do not exceed the contract limits."* The report goes on to say,

[10] NAL0106555 – 13-06 Contracts Award Process – April 29, 2013 – Pages 2 - 3
[11] NAL0106559 – 14-34 Contract Administration - Page 4
[12] NAL0106561 – 14-37 Contracts & Compliance – December 10, 2015 – Page 2
[13] NAL0106561 – 14-37 Contracts & Compliance – December 10, 2015 – Page 6
[14] NAL0106564 – 15-07 Invoice Attest and Payable Audit – September 22, 2015 – Page 6

"...the appropriate individuals are involved in the Payment Certificate Approval Process and approvals are generally operating in compliance with the Payment Certificate Procedure."[15]

- **Site Purchasing Review** - The objective of this review was to discuss and compliance test site purchasing, receiving, and disbursement of site supplies and tools. It concluded that: *"Generally the LCP Site Purchasing Procedure is being followed, as demonstrated via compliance testing; it does however require an update, which the LCP Supply Chain Manager is already in the process of doing."*[16]

Restrictions and Limitations

We acknowledge that our report will be submitted to the Commission and may become a public document. Our report is not to be reproduced or used for any purpose other than as outlined above without prior written permission in each specific instance. Grant Thornton LLP recognizes no responsibility whatsoever to any third party who may choose to rely on its reports or other material provided to the Commission.

Our scope of work is set out in our engagement agreement dated February 3, 2018. The procedures undertaken in the course of our review do not constitute a financial statement audit of Nalcor's financial information and consequently, we do not express an opinion or provide any assurance on the financial information provided by Nalcor.

Unless stated otherwise, within the body of this report, Grant Thornton LLP has relied upon information provided by Nalcor and third party sources in the preparation of this report, whom Grant Thornton LLP believe to be reliable. Information was obtained from Nalcor through responses to our specific document requests, written responses prepared by Nalcor, evidence submitted by interviewees, and searches performed in the document management system administered by the Commission.

Our work is ongoing. We reserve the right to revise and update this report based on continuing analysis of existing information and the results of our ongoing quality control review. We may supplement our analysis based upon any other information which comes to our attention before our testimony, as well as modify any demonstrative aids herewith, or add or eliminate those submitted herewith. Furthermore, upon testimony, we may prepare aids such as graphs, charts or tables.

[15] NAL0106566 – 15-17 Payment Certificate Review and Compliance – January 28, 2016 – Page 9
[16] NAL4848318 – Internal Audit Memo – Site Purchasing Review – October 26, 2017 – Pages 1 to 3

Detailed Findings and Observations

1 Financial Close

1.1 Background

Sanctioning of the Project occurred following Nalcor's approval to proceed past DG3 in December of 2012. Sanctioning was publically communicated by GNL on December 17, 2012.[17] At the time of project sanctioning the terms and conditions of the Federal Loan Guarantee ("FLG") were still being discussed. The FLG agreement was finalized on November 29, 2013[18] ("Financial Close").

1.2 Costs Incurred and Contracts Awarded

During the period between project sanction and financial close Nalcor continued to advance the LCP. These activities included obtaining bids on work packages, entering into contract negotiations and performing initial construction activities via contractors. According to Nalcor's monthly construction reports from November 2013, approximately $900 million in costs incurred as of financial close.[19&20]

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[17] Government of Newfoundland and Labrador Announces Sanction of the Muskrat Falls Development – December 17, 2012 – Page 1

[18] DISCL-GNL-76398 – 20131129 Intergovernmental Agreement Regarding Federal Loan Guarantee for MF between NL and Canada (Signed by Min Kent) – 2013 OCR.pdf

[19] NAL0020757 – Construction Report Muskrat/LTA Project Finance Agreement – December 20, 2013 – Page 5

[20] NAL0020754 –Construction Report LIL Project Finance Agreement – December 20, 2013 – Page 4

The following is an excerpt from a table provided by Nalcor's Project Management Team ("PMT") that shows a summary of bids received on work packages prior to financial close and those bid prices compared to DG3 budget prices:[21]

Work Package	Date RFP Responses Received	Value ($M) *Note 1*	DG3 Budget ($M)	Variance ($M)	Cumulative Variance ($M)
CH0030 - Supply & Installation of Turbines and Generators	26-Jan-12	[redacted]	205	[redacted] Rank 6	[redacted]
CH0002 - Supply & Installation of MF Accommodations Complex and Utilities	19-Apr-12	[redacted]	85	[redacted] Rank 2	[redacted]
CH0004 - Construction of Southside Access Road	12-May	[redacted]	40	[redacted] Rank 4	[redacted]
CH0006 - Bulk Excavation	02-Aug-12	[redacted]	140	[redacted] Rank 5	[redacted]
CH0024 - Reservoir Clearing (North and South Banks)	15-Nov-12	[redacted]	148	[redacted] Rank 7	[redacted]
CT0319 - Construction of HVac Transmission Line (MF to CF)	15-Jan-13	[redacted]	200	[redacted] Rank 3	[redacted]
CH0007 - Construction of Intake, Powerhouse, Spillway & Transition Dams	16-Apr-13	[redacted]	781	[redacted] Rank 1	[redacted]
Subtotal - Contingency Exhausted		**1,972**	**1,599**	**373** *	**373**
CH0032 - Supply & Installation Hydro-Mechanical Equipment	16-Apr-13	[redacted]	157	[redacted]	[redacted]
CD0503 - Switchyard and Converter Earthworks	31-May-13	[redacted]	68	[redacted]	[redacted]
CD0504 - Civil Works and Buildings at Converter Station and Switchyards	26-Jun-13	[redacted]	29	[redacted]	[redacted]
CD0501 - Supply and Installation of HVdc Converters	26-Jun-13	[redacted]	433	[redacted]	[redacted]
CD0502 - Construction of AC Switchyards (MF, CF & SP)	25-Nov-13	[redacted]	154	[redacted]	[redacted]
Total		**3,039**	**2,440**	**599**	**599**

1-Recommendation for award value inclusive of growth allowance based on identified package risk - actual value awarded may differ

* Cumulative variance under DG3 budget amount = $50 million

[21] Post Sanction – Briefing Note as Requested by Nalcor Legal Counsel McInnes-Cooper– January 2018 – Page 35

As indicated above, prior to financial close, bids were received from contractors whom ultimately were hired which collectively, exceeded the DG3 budget by approximately $600 million, a twenty five percent (25%) overage. The amount of this overage exceeded the DG3 tactical contingency amount ($368 million)[22] by over $230 million. Hence, prior to financial close, Nalcor should have been aware that the contingency amount included in DG3 budget was insufficient. Furthermore, Nalcor should have known that by April 2013 when the CH0007 bids were received (four months after sanctioning) that the DG3 contingency amount was exhausted. Accordingly, Nalcor knew that the remaining budget of $4.2 billion ($5.8 billion which is base plus escalation[23], less $1.6 billion subtotal of DG3 budget at April 2013) after the consideration of CH0007 did not have any contingency remaining.

In an interview with Paul Harrington, LCP Project Director we asked him if there was anything that precluded Nalcor from re-baselining and re-running the Cumulative Present Worth ("CPW") when they knew the contingency was exhausted in April 2013. Mr. Harrington responded *"Not my call."* To clarify, we asked whose call it was. He responded, *"Senior management* [Ed and Gilbert]*…and Government."* [24]

Based on our interviews and documents reviewed, nothing came to our attention to indicate that Nalcor attempted to recalculate the contingency and/or the entire capital cost estimate between April 2013 and financial close (November 2013).

1.3 Construction Schedule

Nalcor was aware that their original schedule was aggressive as this was noted in the DG3 Cost and Schedule Risk Analysis Report dated October 2012.[25] Events that were adding pressure to the schedule included the following:

- The LIL Environmental Assessment ("EA") was delayed more than 6 months. It was assumed at DG3 that the EA release would occur no later than April 2013. The EA was ultimately released on November 26, 2013, three days prior to Financial Close (a delay of six months). [26]

- Financial close was delayed due to the ongoing negotiations of the federal loan guarantee ("FLG") which also delayed the start of the construction of the intake, powerhouse, spillway and transition dams (CH0007).[27] Don Delarosbil, the Astaldi Project Manager explained, *"if you start in November instead of June you're not just losing four months, you're probably losing ten months. You almost lost a year of construction."*[28]

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[22] NAL0020664 – Decision Gate 3 Project Cost and Schedule Risk Analysis Report – October 2012 – Page 13
[23] NAL0019634 – Decision Gate 3 Capital Cost Estimate – December 2012 – Page 13
[24] Interview Summary – Paul Harrington – October 24, 2018 – Page 28
[25] NAL0020664 – Decision Gate 3 Cost and Schedule Risk Analysis Report – October 2012 – Page 286
[26] Timeline of Events – Briefing Note as Requested by Nalcor Legal Counsel – January 2018 – Page 40
[27] Lower Churchill Project 9 – Financial close / Completion Guarantees/ COREA – May 2018 – Page 2
[28] Interview Summary – Don Delarosbil - Astaldi Project Manager – September 14, 2018 – Page 4

The delay of six months prior to financial close resulted in first power shifting from July 2017[29] to December in 2017[30], and full power shifting from December 2017[31] to June 2018.[32] Nalcor's own consultant, Westney Consulting, had indicated that there was a 3% chance the planned schedule would be met.[33] The delays in the EA and FLG demonstrated that this risk was in fact materializing and would result in increased costs.

Since time-risk (i.e. the risk of not achieving first and full power on their expected dates) was included in management reserve in Nalcor's DG3 analysis, costs associated with schedule slippage were excluded from the sanctioned budget. Edward Merrow (the founder of Independent Project Analysis, Inc.) writes, *"Schedule pressure dooms more megaprojects than any other single factor. When there is pressure to move a project along quickly from the outset, corners get cut and opportunists have a field day."* [34] Edward Merrow goes on to say *"But taking risks with megaproject schedules is a fool's game."*[35]

1.4 Federal Loan Guarantee ("FLG")

The following two elements of the FLG were highlighted by the PMT:

- Completion Guarantee by GNL, and
- Cost Overrun Escrow Account ("COREA").

1.4.1 Completion Guarantee

The PMT indicated that the GNL had to provide an equity guarantee for the project as a condition of obtaining the FLG.[36] This was formalized in a commitment letter from Kathy Dunderdale, the Premier of NL on October 18, 2011.[37] The FLG agreement quotes the commitment letter, *"NL Crown commits to do the following…provide the base level and contingent equity support that will be required by Nalcor to support successful achievement of in-service for MF, the LTA and the LIL…"*[38]

During our interview with Derrick Sturge, VP Finance and CFO, we confirmed that Nalcor's Board of Directors knew that Canada could step in and force completion of the project at Nalcor's cost.[39]

Accordingly, if Nalcor did not complete the project after the execution of the FLG, the GNL would have still been required to fund the costs to complete the project under Canada's direction. Therefore, prior to the execution of the FLG, Nalcor had the ability to

[29] NAL0020664 – Decision Gate 3 Cost and Schedule Risk Analysis Report – October 2012 – Page 15
[30] Timeline of Events Briefing Note as Requested by Nalcor Legal Counsel – January 2018 – Pages 48 & 49
[31] NAL0020664 – Decision Gate 3 Cost and Schedule Risk Analysis Report – October 2012 – Page 15
[32] Timeline of Events Briefing Note as Requested by Nalcor Legal Counsel – January 2018 – Page 34
[33] NAL0020664 – Decision Gate 3 Cost and Schedule Risk Analysis Report – October 2012 – Page 321 & 322
[34] Edward Merrow – Industrial Megaprojects Concepts, Strategies, and Practices for Success – 2011 – Page 2
[35] Edward Merrow – Industrial Megaprojects Concepts, Strategies, and Practices for Success – 2011 – Page 3
[36] Lower Churchill Project 9 – Financial close / Completion Guarantees/ COREA – May 2018 – Slide 2
[37] NAL2716594 – Letter to Ed Martin From Kathy Dunderdale – October 18, 2011
[38] NAL0118328 – Federal Loan Guarantee – Terms and Conditions – Pages 16 & 17
[39] Interview Summary – Derrick Sturge – June 20, 2018 – Page 9 - 10

stop the construction of the project without funding the remaining cost to complete. However, once the FLG was executed Nalcor/GNL were committed to funding the project.

1.4.2 Cost Overrun Escrow Account ("COREA")

The FLG also included a term that required cost overruns for the project be funded with equity and/or additional debt as follows:

"Equal annual amounts calculated by dividing such Cost Overrun amount by the number of years remaining until COD [Commercial Operations Date]. *Each annual payment shall be funded no later than the date of the first advance of Guaranteed Debt in each year prior to COD, and the first annual amount shall be funded prior to the first advance under Guaranteed Debt after such calculation is made."* [40]

The PMT described the COREA provision as *"a requirement where any forecasted cost overruns above a set baseline budget must be pre-funded with equity from Nalcor/NL annually"*[41] The PMT also indicated that *"it was understood with Canada and the IE* [Independent Engineer] *that only fixed and firm costs were to be considered in the Cost Overrun calculation. Therefore until there were firm, fixed and executed contract costs available the DG3 estimate costs would be utilized..."*[42]

In response to Grant Thornton's question PTQ1.10 which asked for evidence that supports that Canada understood that only fixed and firm costs were to be considered in the overrun calculation of COREA, it was noted that:

"With respect to an understanding on LCP cost updates and the impact on the COREA calculation, it became formalized in 2015 / 2016 as it related to the ongoing commercial negotiations with Astaldi. It was acknowledged between Nalcor and Canada/Independent Engineer that there was going to be an impact on cost/schedule once a commercial settlement was reached with Astaldi, but at the time of the COREA payments in December 2015 and December 2016 this could not be quantified with certainty. The execution of the December 2016 Completion Contract with Astaldi, and related impacts it had on overall project cost and schedule, was the means by which this eventually got settled. This was documented as the "Ongoing Commercial Negotiations Caveat" in the December 2015 / 2016 COREA certificates issued by the LCP entities, which Canada and the IE accepted."[43]

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[40] NAL0118328 – Federal Loan Guarantee – Terms and Conditions – Pages 12
[41] Lower Churchill Project 9-Financial Close / Completion Guarantees / COREA, May 2018 – Page 4
[42] Lower Churchill Project 9-Financial Close / Completion Guarantees / COREA, May 2018 – Page 5
[43] Response to Grant Thornton Question – PTQ1.10 – Page 1

We reviewed the following communication to the Toronto-Dominion Bank in support of the Project Finance Agreement:

- MF/LTA 2015 Cost Overrun Certificate - December 14, 2015
- MF/LTA 2016 Cost Overrun Certificate - December 13, 2016

We note that these documents include the following commentary which demonstrates what Nalcor communicated to Toronto-Dominion Bank, as collateral agent for the Project's financing. Accordingly, we have assumed that the Independent Engineer and Canada were aware of the below:

"This Cost Overruns Certificate is delivered to you pursuant to subsection 10.28.1 of the Muskrat/LTA Project Finance Agreement. Please note that all of the matters being certified below in paragraphs 2 to 4 and 6 to 8 may be impacted depending on how certain commercial negotiations currently being undertaken ultimately conclude (the "Ongoing Commercial Negotiations Caveat")."[44]

1.5 Independent Engineer Report

The FLG required an Independent Engineer to assist Canada with its monitoring of the FLG Agreement.[45] In August of 2012, Nalcor engaged MWH Canada Inc. as the Independent Engineer to review the Project. The review included the following:[46]

- Reviewed project design and projected performance,
- Reviewed construction plan and schedule,
- Reviewed capital budget,
- Reviewed commercial operation and maintenance services,
- Reviewed project agreements (such as power purchase agreements),
- Reviewed permits and licenses, and
- Reviewed basis of project pro forma financial model.

[44] Response to Grant Thornton Question – PTQ1.10 – Attachment - MF/LTA 2016 Cost Overrun Certificate – December 13, 2016
[45] NAL0118328 – Federal Loan Guarantee – Terms and Conditions – Page 12
[46] DISCL-GNL-490966 – Email – FW: IE Contract – Agreement No. LC-PM-082 For Independent Engineer and Operating and Maintenance Services for The Lower Churchill Project – Page 32

We reviewed three versions of the IE deliveries as noted below (the "Reports"):

1. Draft Report dated November 15, 2013[47] – Draft sent to Nalcor for Comment
2. Report dated November 29, 2013 – Interim Final[48] (Report Publically Released)
3. Final Independent Engineer Report, December 30, 2013[49]

We discussed the versions with Nik Argirov (the Independent Engineer) and legal counsel, Alison Manzer, Cassels Brock & Blackwell LLP and were informed that the Draft Report dated November 15, 2013 was completed by a manager and sent to both Nalcor and Canada for their review.[50] It is unclear to us as to the reason why a report prepared by a manager was released to Nalcor and Canada without Mr. Argirov's review being complete.

Subsequently, Mr. Argirov completed his review and made changes and issued an interim final report dated November 29th. Nalcor published a redacted version of this interim final report on their website.[51] The final report was dated December 30, 2013.[52]

The following are two examples where the original Draft Report November 15, 2013 was subsequently revised to what appears to have been included in the Interim Final November 29, 2013 report and/or the Final December 30, 2013 report:

Example	Draft Report November 15, 2013	Interim Final November 29, 2013	Final December 30, 2013
1	*The IE typically sees contingency allowances in the range of 12 percent to 18 percent at this state of project development.*	*The IE typically sees contingency allowances in the range of ~~12 percent to 18~~* ***6 percent to 10*** *percent at this state of project development.*	*The IE typically sees* ***scope or tactile*** *contingency allowances in the range of ~~12 percent to 18~~* ***8 percent to 12*** *percent ~~at this state of project development~~* ***at comparable DG3 stage gates.***
2	*These contingency values appear low for this stage of project development, in our opinion.*	*These contingency values appear ~~low for this stage of project development, in our opinion~~* ***to be at the low end of the observed range which in our opinion is aggressive.***	*~~These contingency values appear low for this stage of project development, in our opinion~~*

Since Nalcor provided us the IE final report dated December 30, 2013, they should have been aware that the contingency they selected for the LCP (less than 7%) was less than the low end of the range of what the IE typically sees at comparable DG3 stage gates.

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[47] LOWER CHURCHILL PROJECT INDEPENDENT ENGINEER'S REPORT DRAFT NOV 15 2013.pdf – Provided to Grant Thornton by Nik Argirov - Interview – June 22, 2018

[48] https://muskratfalls.nalcorenergy.com/wp-content/uploads/2013/03/November-29-2013-Independent-Engineer-Report1.pdf

[49] NAL0706068 – IE Report December 30, 2013_ATIPP release Dec 2017.pdf.PDF

[50] Interview Summary – Nik Argirov – June 22, 2018 – Page 10-11

[51] https://muskratfalls.nalcorenergy.com/wp-content/uploads/2013/03/November-29-2013-Independent-Engineer-Report1.pdf

[52] NAL0706068 – IE Report December 30, 2013_ATIPP release Dec 2017.pdf.PDF

1.6 Observations and Findings – Financial Close

During our review, we observed and found the following:

- By April 2013 (four months after sanctioning), Nalcor should have known the contingency was exhausted.
- Nothing came to our attention to indicate that Nalcor attempted to recalculate the contingency and/or the entire capital cost estimate between April 2013 and financial close (November 2013).
- Prior to financial close, Nalcor should have been aware that the contingency included in DG3 budget was insufficient.
- At the time of financial close, the project schedule was delayed by six months, demonstrating that the 97% chance of schedule slippage determined at sanctioning was in fact materializing.
- Nalcor had the ability to stop the project prior to execution of the FLG and financial close without funding the remaining costs to complete.
- Once the FLG was executed, Nalcor/GNL were committed to funding the project at their costs regardless of if the project was stopped or not. Under the FLG, Canada had the right to complete the project with Nalcor/GNL funding it.
- Nalcor should have been aware that the contingency they selected for the LCP (less than 7%) was less than the low end of the range of what the IE typically sees at comparable DG3 stage gates.

2 Costs – Estimate and Actual

2.1 Mandate

Reference 4. (b) *"Why there are significant differences between the estimated costs of the Muskrat Falls Project at the time of sanction and the costs by Nalcor during project execution, to the time of this inquiry together with reliable estimates of the costs to the conclusion of the project…"*[53]

2.2 Background

There was a difference between the costs estimated at sanction and the costs incurred by Nalcor during the construction phase of the Project. Throughout this report we provide further details on this issue.

2.3 Cost Updates

The PMT provided us a *"…history of briefing decks and associated emails and meetings calls that were used to inform Nalcor executive of the cost and schedule increase as they were first identified by the Project team."*[54] During an interview with Paul Harrington, we confirmed that he had prepared the explanatory notes that accompanied the documents that were submitted to us for review on this matter.[55]

These briefing decks indicated that throughout construction, Nalcor's PMT monitored the forecasted cost to complete the project. These forecasts were communicated to Nalcor Executives including Ed Martin, former Nalcor CEO, Gilbert Bennett, VP-LCP. Monthly project budget monitoring and communication to financiers was based on the authorization for expenditure ("AFE") (the budget approved by the Board of Directors).

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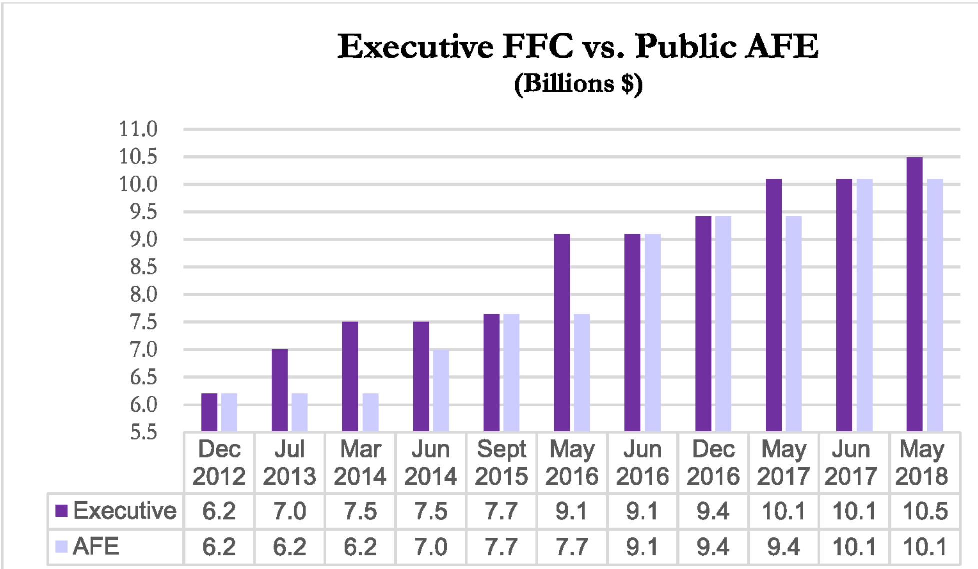
[53] NEWFOUNDLAND AND LABRADOR REGULATION 101/17 - *Commission of Inquiry Respecting the Muskrat Falls Project Order* under the *Public Inquiries Act, 2006* (O.C. 2017 - 339) – Page 2
[54] DISCL-MFPT-21 – Introduction – Page 1
[55] Interview Summary – Paul Harrington – October 24, 2018 – Page 16

The chart below compares the PMT's forecast final cost ("FFC") of the project, as was communicated to Nalcor's Executives, to the AFE[56] approved by the Board and communicated to the public over time.



The above chart illustrates that throughout the period of construction there were instances where the forecasted cost to complete the project that was communicated to the Nalcor Executives exceeded the AFE approved by the Board of Directors.

2.3.1 Communication with Nalcor Executives

The following table summarizes the briefings the PMT gave to Nalcor Executives where the forecasted final cost increased from the original $6.2 billion budget at DG3. In the following table, the PMT Comments column refers to the summary prepared by Paul Harrington, and the Communication to Executive column in the table below shows excerpts from the documentation that supports whether the update was communicated to Nalcor Executives:

Date	PMT Comments 2018	Communication to Executive	Excerpt from Presentation
Jul 2013	• *"July 2013 Final Forecast Cost deck presented by Project team to CEO of ~$7.0B"*[57]	• Email from Paul Harrington to Gilbert Bennett July 22, 2013 states *"…here is the deck that has been produced for you and Ed"*[58]	• *"We are forecasting the FFC to be ~$7.0B which is 12% beyond the DG3…"*[59] • *"Exposure if mitigations are successful…FFC would be reduced to $6.8 B"*[60]

[56] Post-Sanction – Briefing Note as Requested by Nalcor Legal Counsel McInnes-Cooper – Page 16 & 17
[57] DISCL-MFPT-33 – Jul 2013 $7.0B – Page 1
[58] DISCL-MFPT-33 – Jul 2013 $7.0B – Page 12
[59] DISCL-MFPT-33 – Jul 2013 $7.0B – Page 17
[60] DISCL-MFPT-33 – Jul 2013 $7.0B – Page 19

Date	PMT Comments 2018	Communication to Executive	Excerpt from Presentation
	AFE revision 1 in June 2014 for $6.99 billion (11 months later)		
Aug 2013	• *"Aug 2013 Final Forecast Cost update presented by the Project team to CEO indicating FFC of $6.9 B"* [61]	• Meeting invite August 30, 2013 including Ed Martin and Gilbert Bennett (and others) [62] • Email from Paul Harrington to PMT members bcc Ed Martin and Gilbert Bennett on August 31, 2013 *"…our meeting with Ed on Friday was not an easy task…"* [63] • Email from Paul Harrington to Lance Clarke and Jason Kean on September 3, 2013 *"…I have reflected on out discussion with Ed last Friday…we need to put the FFC into some other format…"* [64]	• *"We are forecasting the FFC to be ~$6.9B which is 10% beyond the DG3…"* [65] • *"Exposure if mitigations are successful…FFC would be reduced to $6.8 B"* [66]
	AFE revision 1 in June 2014 for $6.99 billion (10 months later)		
Sept 2013	• *"Sept 2013 Briefing deck presented by Project team to CEO and VP Cap costs in the range of $6.7B and $6.95B"* [67]	• Handwritten notes: *"as presented to EJM* [Ed Martin] *12-Sep-2013"* [68]	• *"We are forecasting the FFC to be the range of ~$6.7B to $6.95B (8 to 12% beyond the DG3 estimate) DG3…"* [69] • *"Exposure if mitigations are successful…FFC would be reduced to $6.8 B"* [70]

[61] DISCL-MFPT-32 – Aug 2013 $6.9B – Page 1
[62] DISCL-MFPT-32 – Aug 2013 $6.9B – Page 44
[63] DISCL-MFPT-32 – Aug 2013 $6.9B – Page 3
[64] DISCL-MFPT-32 – Aug 2013 $6.9B – Page 2
[65] DISCL-MFPT-32 – Aug 2013 $6.9B – Page 25
[66] DISCL-MFPT-32 – Aug 2013 $6.9B – Page 30
[67] DISCL-MFPT-31 – Sept 2013 $6.95B – Page 1
[68] DISCL-MFPT-31 – Sept 2013 $6.95B – Page 13
[69] DISCL-MFPT-31 – Sept 2013 $6.95B – Page 15
[70] DISCL-MFPT-31 – Sept 2013 $6.95B – Page 20

Date	PMT Comments 2018	Communication to Executive	Excerpt from Presentation
	AFE revision 1 in June 2014 for $6.99 billion (9 months later)		
Mar 2014	• *"Mar 2014 Briefing to CEO by Project team plus emails associated with Nalcor Board update and updated AFE's"*[71]	• Various meeting requests regarding the AFE with Ed Martin and Gilbert Bennett however, no clear link to the FFC presentation.[72]	• *"AFE Rev 2 $7,517*[Millions]*"*[73]
	AFE revision 2 in September 2015 for $7.65 billion (18 months later)		
May 2014	• *"May 23 2014 Briefing deck presented by Project team to CEO $7.27 to $7.5B range"*[74]	• Handwritten notes: *"as presented to EJM* [Ed Martin] *by P. Harrington"*[75]	• *"Mgt. Outlook for project duration $7.50B"*[76]
	AFE revision 2 in September 2015 for $7.65 billion (16 months later)		
Feb 2015	• *"Feb 13 2015 Briefing deck which indicated project costs between $7.5B and $7.77B presented by Project team to CEO, VP, Finance"*[77]	• Calendar invite *"LCP Project Costs"* February 13, 2015 includes: Paul Harrington, Ed Martin, Gilbert Bennett and others[78]	• *"Remaining 3 contracts bids received – total $682M…Project Cost at Completion to $7.77B"* • *"AFE Rev 2 $7.49B required to award upcoming contracts"*[79]
	AFE revision 2 in September 2015 for $7.65 billion (7 months later)		

[71] DISCL-MFPT-30 – Mar 2014 $7.5B – Page 1
[72] DISCL-MFPT-30 – Mar 2014 $7.5B – Page 1-20
[73] DISCL-MFPT-30 – Mar 2014 $7.5B – Page 14
[74] DISCL-MFPT-29 – May 2014 $7.5B – Page 1
[75] DISCL-MFPT-29 – May 2014 $7.5B – Page 6
[76] DISCL-MFPT-29 – May 2014 $7.5B – Page 8
[77] DISCL-MFPT- 28 – Feb 2015 $7.5 to $7.7 B – Page 1
[78] DISCL-MFPT- 28 – Feb 2015 $7.5 to $7.7 B – Page 2
[79] DISCL-MFPT- 28 – Feb 2015 $7.5 to $7.7 B – Page 24

Date	PMT Comments 2018	Communication to Executive	Excerpt from Presentation
Mar 2015	*'Mar 2015 Briefing on costs leading to AFE rev 2 given to CEO, VP and Finance team'*[80]	Handwritten notes: *'Presented to Ed with Lance, Brian, Paul, Gilbert, and Jim Meaney"*[81]	"AFE Rev 2…amount - $7.499M"[82]
	AFE revision 2 in September 2015 for $7.65 billion (6 months later)		
May 2016	*'May 2016 Briefing AFE rev $9.1B'*[83]	Meeting request *'Muskrat Falls & Lower Churchill Project"* with Stan Marshall, Paul Harrington, Gilbert Bennett and others.[84] CEO Briefing Document *'Presented to Stan Marshall 11-May-2016 (Hydro Place – 0830 to 1200). Meeting attended by Nalcor VPs'*[85]	*"Overall cost requirement to P75 is ~$8.55 billion, plus Astaldi deal.'*[86]
	AFE revision 3 in June 2016 for $9.1 billion (1 month later)		
May 2017	*'May 2017 Briefing to CEO and EVP AFE Rev 5 MF $5.5B Project $10.1B'*[87]	Meeting request *'Muskrat Falls Monthly Update"* May 18, 2017 with Gilbert Bennett, Stan Marshall, Paul Harrington and others.[88] Hand written notes: *'Presented to CEO 18 May 2017 + spreadsheet'*[89]	*'MFG to approximately C$5.5 billion at P75'*[90]
	AFE revision 5 in June 2017 for $10.1 billion (1 month later)		

[80] DISCL-MFPT-27 – Mar 2015 $7.5B – Page 1
[81] DISCL-MFPT-27 – Mar 2015 $7.5B – Page 23
[82] DISCL-MFPT-27 – Mar 2015 $7.5B – Page 9
[83] DISCL-MFPT-24 – May 2016 $9.1B – Page 1
[84] DISCL-MFPT-24 – May 2016 $9.1B – Page 16
[85] DISCL-MFPT-24 – May 2016 $9.1B – Page 18
[86] DISCL-MFPT-24 – May 2016 $9.1B – Page 36
[87] DISCL-MFPT-23 – May 2017 MF $5.5B –Page 1
[88] DISCL-MFPT-23 – May 2017 MF $5.5B –Page 3
[89] DISCL-MFPT-23 – May 2017 MF $5.5B –Page 4
[90] DISCL-MFPT-23 – May 2017 MF $5.5B –Page 6

Date	PMT Comments 2018	Communication to Executive	Excerpt from Presentation
May 2018	*'May 2018 Briefing to CEO and EVP by email'*[91]	Email from Paul Harrington to Stan Marshall, Gilbert Bennett and others.[92]	*'MFG expected project cost is C$5.67 billion'*[93]
	No new AFE as of the date of this report		

We noted from our review of the information provided that the revised AFE's for the July 2013 and March 2014 forecasted final cost updates occurred after Nalcor Executives were notified by 11 and 18 months respectively. The AFE for the July 2013 update of $7 billion was revised in June 2014. The AFE for the March 2014 update of $7.5 billion was revised in September 2015.

2.4 Best Practice

2.4.1 – Project Budgeting

We reviewed the Project Management Institute's Guide to Project Management Body of Knowledge ("PMBOK") to consider best practice for budgeting. It states the following: *'Management reserves…are* ***added to the cost baseline*** *to produce the project budget. As changes warranting the use of management reserves arise, the change control process is used to obtain approval to move the applicable management reserve funds into the cost baseline.'*[94]

Nalcor did not add the management reserve (strategic risk exposure) to the DG 3 Base Estimate of $6.2 billion at Sanction. PMBOK suggests that management reserves should be included as part of the project budget. It is clear from the above that in preparing the DG3 Base Estimate for the project the PMBOK guidance was not followed.

2.4.2 – Forecasting

It states the following:

"…if it becomes obvious that the BAC [budget at completion] *is no longer viable, the project manager should consider the forecasted EAC* [estimate at completion]. *Forecasting the EAC involves making projections of conditions and events in the project's future based on current performance information and other knowledge available at the time of the forecast…'*[95]

The March 2014 Nalcor Executive briefing documents that were provided to us by Paul Harrington indicates the following: *'It was clearly identified in the deck that the $7.5B was based on*

[91] DISCL-MFPT-22 – May 2018 MF $5.67B to $5.87B –Page 1

[92] DISCL-MFPT-22 – May 2018 MF $5.67B to $5.87B –Page 2

[93] DISCL-MFPT-22 – May 2018 MF $5.67B to $5.87B –Page 4

[94] Project Management Institute - Guide to Project Management Body of Knowledge – Sixth Edition – Page 254

[95] Project Management Institute – Guide to Project Management Body of Knowledge – Sixth Edition – Page 264

certain assumptions with the key caveat being that there was no allowance for any cost increase in the Astaldi Contract because of delays and performance.'[96]

It is clear from the above that in preparing the forecasted final cost for the project (at least for March 2014), that the PMBOK guidance was not followed.

2.5 Work Package Selection

We reviewed the Project Cost Status report from March 28, 2018 which provides the original sanction budget ($6.2 billion) and the March 2018 forecast final cost ($10.1 billion) by work package.[97] The original cost includes the base estimate (estimated cost of a specific work package) plus escalation (provision for changes in price levels i.e. inflation). Based on this report we calculated the variance between the project's original budget and the March 2018 forecast. We selected variances which exceeded $100 million for further review, as summarized below:

Work Package ($ Millions)	Original	March 2018 Forecast	Variance	(%) of Total Variance
CH0007 - Intake, Powerhouse, Spillway & Trans Dam	$ 752	$ 1,959	$ 1,207	31%
CT0327 including related packages	735	1,523	788	20%
EPCM and Owner's Cost	712	1,118	406	10%
CH0009 - North and South Dams	[redacted]	[redacted]	[redacted]	[redacted]
CH0032 - Hydro-Mechanical Equipment	[redacted]	[redacted]	[redacted]	[redacted]
CH0031 - Mechanical and Electrical Auxiliaries	[redacted]	[redacted]	[redacted]	[redacted]
Other	3,670	4,561	891	23%
Total	**$ 6,202**	**$ 10,117**	**$ 3,915**	**100%**

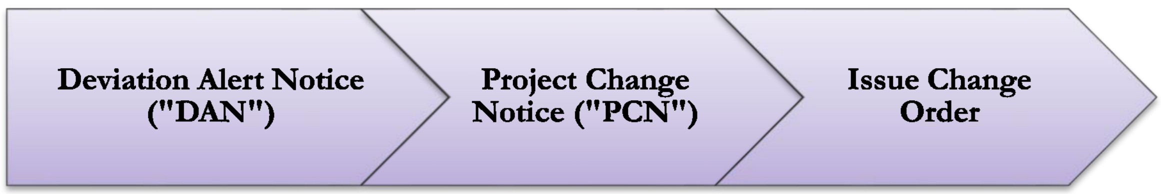
Combined, the six work packages selected represent approximately $3.0 billion (77.5%) of the $3.9 billion cost variance as of March 31, 2018. Further analysis of these six work packages follows in this report. The remaining $891 million variance was spread across multiple work packages, which we did not review in detail. After completing our review, we noted that the variances noted above are not entirely cost overruns as there are some transfers between work packages. The transfers and the actual overruns for each package are noted below in the respective sections for each work package.

[96] DISCL-MFPMT-30 – Mar 2014 $7.5B – March 2014 – Page 1

[97] NAL0285545 – Project Cost Status – March 28, 2018

2.6 Change Order Process

For our review of the six work packages that we selected, it was necessary to understand the process for a change order to be approved. A Project Change is defined as *"a deviation which represents a change or departure from the Project baseline scope, estimate, schedule, intended quality, HSE targets, project policy, or execution plan that results in addition or reduction in the Original Control Budget."*[98] The process to approve a project change is outlined in the following diagram:[99]



As summarized in the above diagram, the first step is to issue a Deviation Alert Notice ("DAN") which is *"the mechanism used to facilitate the process of potential Project Deviations… A Deviation Alert Notice may originate from any member of the Project Delivery Team… may be reviewed by the Change Control Board to obtain direction on how they shall be addressed or resolved."*[100] Once the DAN is justified, a Project Change Notice ("PCN") is required, and once approved, a Change Order is issued to make the change at the contract level. A change order may also be issued without a DAN or PCN if the change is only at the contract level and does not impact the overall control budget.[101]

2.7 Observations and Findings

We considered why there are significant differences between the estimated costs of the Muskrat Falls Project at the time of sanction and the costs by Nalcor during project execution. We reviewed Nalcor's process for monitoring and updating the forecasted cost to complete the project and considered how this information was communicated within Nalcor. Based on this review we have concluded the following:

- Nalcor's PMT monitored the forecasted cost to complete throughout construction.
- While the PMT was following best practices by updating the financial forecast, we observed that the March 2014 forecast did not include any additional forecasted costs due to Alstaldi's performance and delays. Accordingly, at least for the March 2014 forecast, best practices as recommended by the Project Management Institute were not followed.
- There were instances where the Nalcor Executives knew that the cost for the project increased months before the budget increase was approved by the board of directors through the AFE process.

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[98] NAL0017739 – Change Management Plan – December 23, 2014 – Page 6 & 7
[99] NAL0017739 – Change Management Plan – December 23, 2014 – Page 24
[100] NAL0017739 – Change Management Plan – December 23, 2014 – Page 6
[101] NAL0017739 – Change Management Plan – December 23, 2014 – Page 24

– Six of the work packages represent approximately $3.0 billion (77.5%) of the $3.9 billion of the cost variances as of March 31, 2018. Further analysis of these packages follows in this report.

3 CH0007 - Construction of Intake and Powerhouse, Spillway and Transition Dams

3.1 Mandate

Reference 4. (b) *"Why there are significant differences between the estimated costs of the Muskrat Falls Project at the time of sanction and the costs by Nalcor during project execution, to the time of this inquiry together with reliable estimates of the costs to the conclusion of the project…"*[102]

3.2 Summary of Overrun

CH0007 - Construction of Intake and Powerhouse, Spillway and Transition Dams was the largest work package. It accounted for approximately $1.2 billion dollars (31%) of the total cost variance of $3.9 billion as of March 2018 as summarized below (since there were no transfers from other work packages to this work package, the variance was all due to cost overruns):

		$ Millions
Forecast (March 2018)		1,959
Base Estimate	688	
Escalation	64	
Transfers from other work packages	-	
DG3 estimate		752
Overrun		1,207

3.3 DG3 Base Estimate

The DG3 base estimate of $688 million[103] was prepared by SNC Lavalin Inc. ("SNC") with an additional $64 million[104] in escalation to bring the total DG3 estimate for this scope of work $752 million.

102 NEWFOUNDLAND AND LABRADOR REGULATION 101/17 - *Commission of Inquiry Respecting the Muskrat Falls Project Order* under the *Public Inquiries Act, 2006* (O.C. 2017 - 339) – Page 2
103 NAL0019634 – DG3 Capital Cost Estimate – December 11, 2012 – Page 28
104 NAL0436468 – CH0007 Recommendation for Award Summary Report – September 24, 2013 – Page 44

3.4 RFP and Bidding

Nalcor completed a prequalification process prior to issuing a request for proposal ("RFP") for this work package.[105] This process assessed technical and commercial qualifications of potential bidders with the purpose of selecting the most qualified contractors to bid on the RFP. [106] Nine contractors participated in the prequalification process[107] of which four contractors were selected to participate in the RFP.[108]

The RFP was issued on September 28, 2012.[109] Bids were received on April 16, 2013. The bids received were as follows:[110]

	IKC	Astaldi	Aecon JV	Salini JV
Total evaluated price (Billions)	$2.05	$1.14	$2.03	$1.16
Total labour hours included in bid (Millions)	9.51	6.82	6.89	5.85

Note 1 – Evaluated price includes all cost components of the bid including LMAX (if applicable) and escalation.

An important fact to emphasize is that the DG3 estimate included 3.66 million labour hours. The total labour hours included in the bids ranged from 5.85 million to 9.51 million, an increase ranging from 60% to 160% over the DG3 estimate.

The above bids were evaluated based on the following weightings:[111]

	Weighting
Commercial and provincial benefits	70%
Quality program and risk management	5%
Execution of the work	20%
Labour hiring strategy	5%
Total	**100%**

As noted above commercial and provincial benefits accounted for 70% of the weighting. Of this particular weight, 90%[112] was attributed to the low bid price. This means, that all other things being equal, 63% of the total scoring would favor the lowest bidder regardless of lower scores in execution of the work. As such since Salini and Astaldi were low bidders, they were selected for further consideration.[113]

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105 NAL0436468 – CH0007 Recommendation for Award Summary Report – September 24, 2013 – Pages 227 & 228
106 NAL0436468 – CH0007 Recommendation for Award Summary Report – September 24, 2013 – Pages 227 & 228
107 NAL0436468 – CH0007 Recommendation for Award Summary Report – September 24, 2013 – Pages 241 & 242
108 NAL0436468 – CH0007 Recommendation for Award Summary Report – September 24, 2013 – Page 227
109 Request for Proposal: CH0007 - September 28, 2012
110 NAL0436468 – CH0007 – Recommendation for Award Summary Report – September 24, 2013 – P age 16
111 NAL0436468 – CH0007 – Recommendation for Award Summary Report – September 24, 2014, - Page 222
112 NAL0436468 – CH0007 – Recommendation for Award Summary – September 24, 2013 – Page 222
113 NAL0436468 – CH0007 – Recommendation for Award Summary – September 24, 2013 – Page 6

Edward Merrow in his book titled "Industrial Megaprojects Concepts, Strategies and Practices for Success" says the following as it relates to taking a very low bid: *"Acceptance of such bids guarantees that the bidder does not fully understand the project or has made a disastrous bidding error. Either way, the sponsor will lose."*[114] He goes on to say: *"When the "winning" contractors realize the magnitude of their low bids, they immediately started to try to recover their losses. They floated the schedules longer to minimize costs believing (correctly in most cases) that they could avoid liquidated damages."*[115]

3.5 Original Agreement, Bridge Agreement and Completion Contract

The amount of the Astaldi and Salini bids were significantly higher than the DG3 estimate. As already indicated, this was primarily due to the labour hours the contractors were requiring to complete the work being much greater than the labour hours included in the DG3 estimate. Additionally, once Astaldi was chosen (as described below) and work commenced, costs grew significantly. The overrun as of March 2018 was attributable to the bridge agreement and completion agreement, change orders and unallocated scope. A breakdown of the overrun is as follows:

	$ Millions	
Contract award amount	1,024	
DG3 estimate	752	
Contract greater than estimate		272
Supplemental agreement		884
Approved change orders		18
Unallocated budget		33
Reconciled overrun		1,207

3.5.1 Original Agreement

Astaldi was recommended for award in late September of 2013.[116] At this time, Astaldi was issued a Limited Notice to Proceed ("LNTP").[117] The Astaldi contract was signed on November 29, 2013 (the date of financial close) for $1.024 billion (excluding the LMAX of $64 million).[118] The contract included performance security via letters of credit in excess of $200 million, a $150 million performance bond and a parental guarantee from Astaldi, SpA.[119] A further discussion of the contractual arrangements between Nalcor and Astaldi is provided in section 10 of this report.

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[114] Edward Merrow – Industrial Megaprojects Concepts, Strategies, and Practices for Success – 2011 – Page 270

[115] Edward Merrow – Industrial Megaprojects Concepts, Strategies, and Practices for Success – 2011 – Pages 270 & 271

[116] NAL0436468 – CH0007 – Recommendation for Award Summary – September 24, 2013 – Page 1

[117] NAL0019108 – LCP Monthly Progress Report – September 30, 2013 – Page 5

[118] NAL0011236 – Agreement No: CH0007-001 Exhibit 2, Appendix B: Monthly Payment Forecast Schedule – Page 38

[119] NAL0011221 – Contract CH0007-001 – November 29, 2013 – Pages 30-31

3.5.2 Bridge Agreement

Due to Astaldi's less than expected production rate of concrete placement and being behind schedule, an internal analysis was conducted by Lower Churchill Management Corporation ("LCMC") in mid-2015 and concluded, that based on the amount of funds spent on labour during 2014 there was a significant cost gap and that it could range from $500 million to over $800 million to complete the scope of work.[120] With such a significant cost gap other factors needed to be considered such as: [121]

- *"Cost to complete over and above Astaldi contract,*
- *Astaldi's financial strength, i.e. their ability to absorb losses of such magnitude,*
- *The cost of alternative execution approaches given the size of the issue"*

In Astaldi's claims for additional compensation, they informed Nalcor that additional compensation would be required in the amount of $743 million. [122] This was further detailed in a presentation made by Astaldi Canada Inc. titled *"Muskrat Falls Powerhouse and Spillway Cost and Productivity Analyses"* dated October 7, 2015.[123]

Nalcor, with the assistance of Westney Consulting, performed an analysis to determine the best course of action. Westney's report *"Lower Churchill Project – Muskrat Falls Generation (MFG) Astaldi Analysis and Path Forward"* dated February 2016 included a review of alternatives to work with Astaldi or to replace Astaldi. This report concluded that *"negotiating with Astaldi provides the least cost-risk exposure"* to Nalcor.[124]

We reviewed various correspondence between Nalcor and Astaldi and have noted that negotiations continued until the parties executed a bridge agreement for an additional $150 million on July 27, 2016.[125] The agreement dictated that during the bridge agreement period, July to October 2016, all payments for labour and non-labour components for work completed would be made entirely on a pro-rata basis of pre-defined monthly payment values for specified installed volumes of concrete and the erection of specified structural steel components. Actual travel costs would continue to be reimbursed as incurred.[126]

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[120] NAL0277308 – Astaldi Completions Binder 1 – Legal Opinion Extracted – Pages 3 - 4
[121] NAL0277308 – Astaldi Completions Binder 1 – Legal Opinion Extracted – Page 5
[122] NAL0277308 – Astaldi Completions Binder 1 – Legal Opinion Extracted – Page 66
[123] NAL0277308 – Astaldi Completions Binder 1 – Legal Opinion Extracted – Page 77
[124] NAL2296518 – Westney Consulting Group –Lower Churchill Project – Muskrat Falls Generation (MFG) Astaldi Analysis and Path Forward – Page 7
[125] NAL1931411 – Bridge Agreement made and executed on 27 July 2016 – Pages 1 - 2
[126] NAL1931411 – Bridge Agreement made and executed on 27 July 2016 – Page 4

3.5.3 Completion Contract

The bridge agreement was extended until November 30, 2016.[127] While the bridge agreement was in effect, Astaldi continued working at the job site and continued negotiating with Nalcor. These negotiations led to the completion contract which became effective as of December 1, 2016.[128] The total contract price was $1.83 billion and was inclusive of the scope of the original contract and all change orders up to and including November 30, 2016.[129] In addition, PCN-0705[130] was issued to increase the package budget another $78 million for additional travel and escalation related to the completion contract. This settlement of $884 ($806 million+$78 million) resulted in a total package budget of $1.908 billion related to the completion contract.

3.5.4 Cost Growth Subsequent to the Completion Contract

After the completion agreement was signed, work package CH0007 continued to increase to $1.959 billion as of March 28, 2018. [131] This additional expense is attributed to a variety of change orders totaling $18 million and unallocated budget of $33 million.[132]

We reviewed all change orders over $1 million, and have summarized them in the table below. At the time of this report Nalcor continues to face challenges with Astaldi. For example, on October 22, 2018 Nalcor issued a stop work order to Astaldi at which time the Astaldi employees left the Muskrat Falls job site.[133] Furthermore, we understand that as of the date of this report, Nalcor was in dispute with Astaldi.[134] Additionally, Nalcor has terminated Astaldi.[135] We are unable to comment on additional cost overruns, if any, as a result of this developing situation. Cost growth over time is summarized in the table below:

Description	Commentary	$ Millions
CHO-CH0007001-0064	Additional costs due to the demolition and removal of the ICS foundation.[136]	1
CHO-CH0007001-0065	Additional scope and budget added to CH0007-001 including: development of a powerhouse emergency safety services plan, powerhouse rescue and response management, powerhouse air quality and noise monitoring program, and supply of	5

[127] NAL0285273 – CH0007 Completion Contract – December 1, 2016 – Page 3
[128] NAL0285273 – CH0007 Completion Contract – December 1, 2016 – Page 14
[129] NAL0285273 – CH0007 Completion Contract – December 1, 2016 – Page 3
[130] NAL0016769 - Project Change Notice PCN-0705 – January 6, 2017 – Page 1
[131] NAL0285545 – Project Cost Status Report 2018-03-01 to 2018-03-28 – Page 1
[132] NAL0285545 – Project Cost Status Report 2018-03-01 to 2018-03-28 – Page 1
[133] https://www.cbc.ca/news/canada/newfoundland-labrador/uncertainty-for-muskrat-falls-workers-after-astaldi-booted-from-site-1.4872548
[134] https://www.cbc.ca/news/canada/newfoundland-labrador/astaldi-supreme-court-decision-workers-1.4876672
[135] https://www.thetelegram.com/news/astaldi-canada-nalcor-energy-dispute-hits-muskrat-falls-inquiry-260343/
[136] CHO-CH0007001-0064 – January 22, 2018 – Page 1

Description	Commentary	$ Millions
	materials and equipment required for safety support services.[137]	
CHO-CH0007001-0066	Services in Common Areas (i.e. snow clearing, maintenance, etc.) to the end of March 2018[138]	4
CHO-CH0007001-0071	Services in Common Areas (i.e. snow clearing, maintenance, etc.) to the end of March 2018[139]	2
Total		**12**

3.6.1 Labour hours

The following table compares the number of labour hours included in the estimate (after 14 addendums associated with design changes) to the labour hours in Astaldi's bid:[140]

	Indirect person hours	Direct person hours	Total
Astaldi Bid (Millions)	3.69	3.14	6.83
DG 3 Estimate	1.51	2.15	3.66
Variance	**2.18**	**0.99**	**3.17**

As shown above, the total labour hours in the Astaldi bid exceeded the total labour hours in the DG3 estimate by 3.17 million hours. This equated to a $187 million difference between the estimate and the bid primarily due to the excess hours required by Astaldi.

Paul Lemay, the lead SNC estimator, provided the following when we inquired as to the reasons why the estimate was significantly different from Astaldi's bid:

Q: ***"How was the lack of labor availability and competition for labor factored into the base estimate? Was the base estimate adjusted for these issues?"***

A: *"According to my "Ground Rule Estimate Notice" given to all estimator, I asked them to do not factor any production activity, as we would address this issue separately. We have then included in the base estimate a 20% majoration of the labour force to address a possible lack of labor availability and potential unproductivity."*[141]

[137] CHO-CH0007001-0065 – January 22, 2018 – Page 1
[138] CHO-CH0007001-0066 – January 29, 2018 – Page 1
[139] NAL0439915 – Contract: CH0007-001 – Construction of Intake & Powerhouse, Spillway & Transition Dams – Change Orders – Page 4
[140] NAL0436468 – Recommendation for Award Summary CH0007 – September 24, 2013 – Page 44
[141] Email from Paul Lemay to Grant Thornton through SNC's internal counsel Melanie Proulx – June 14, 2018

Q: **"*Astaldi's bid contained 1M more direct labor hours than the estimate for CH0007. What was the underlying cause for that?*"**

A: *"The main reason is because Astaldi has a higher ratio between <u>Staff person</u> and <u>Site Workers</u> than we use to see here in Canada, for similar type of contract. On this CH-0007 bid, one of the bidder (AECON), had the same number of hours (978,000 hrs) than my estimate (930,000 hrs), compared to 1,982,044 hours for Astaldi, which is almost 1 million hours difference. Also, for the direct labor the main reason why I have less man-hours, is because Astaldi has used a productivity average of 7 man-hour/ m3, compared to 5 man-hour/ m3 for my estimate. Let say that I was a little bit more optimistic on my productivity."*[142]

Q: **"*How was location of the project and winter conditions factored into the estimate? How was labor productivity adjusted in the base estimate?*"**

A: *"The factor of the location of the project was address in the Air Travel estimate allowing sufficient time to get to the far Site, back and forth, and has nothing to do with the productivity labor itself. For the winter conditions, the installation of a "complete covered structure" over two Group Units, was included in the estimate, in order to have the workers to work comfortably inside the structure for the winter months."*[143]

Based on these answers, we conclude the following:

- The DG3 base estimate, compiled by Nalcor, included a 20% increase in hours to account for lack of labour availability and productivity;
- Astaldi's bid included a higher ratio of supervisors to workers than what was assumed in the base estimate;
- The base estimate assumed the Integrated Cover System ("ICS") would allow the workers to work comfortably inside the structure during the winter season resulting in no loss of labour productivity due to the climate.

The CH0007 RFP documents indicated that the total amount of concrete to be poured for Astaldi's scope of work would be approximately 478,000 cubic meters.[144] As shown below, the Astaldi bid included a more conservative production rate than the estimate.

Labour hours per cubic meter	DG3 Estimate	Astaldi Bid	Variance
Direct	4.50	6.57	(2.07)
Indirect	3.16	7.72	(4.56)
Total	7.66	14.29	(6.63)

We asked Williams Engineering to review the productivity factor in the Astaldi bid and they noted the following: *"At the tender stage, the productivity rate calculated by Astaldi was reasonable assuming other risks were mitigated appropriately, such as geotechnical conditions, labour scheduling and schedule delays."*[145] Williams goes on to say: *"Significant changes combined with multiple schedule delays can magnify the impact of individual factors on productivity factors. Productivity reductions can be magnified*

[142] Email from Paul Lemay to Grant Thornton through SNC's internal counsel Melanie Proulx – June 14, 2018
[143] Email from Paul Lemay to Grant Thornton through SNC's internal counsel Melanie Proulx – June 14, 2018
[144] 2111 (01) Appendix A2.1 505573-CH0007-51AF-I-2111_01 – September 21, 2012
[145] Williams Engineering Canada – Forensic Review in Support of Commission of Inquiry Respecting the Muskrat Falls Project – November 30, 2018 – Page 7

by 30-60% depending on the severity and number of the changes and delays. A combination of factors resulted in the planned productivity rates not being achieved."[146]

Paul Harrington explained in a July 2013 presentation to executive management that the forecast final cost for CH0007 exceeded the bid for a variety of reasons including:

- *"…contractor risk perception. Contractors view NL as a difficult and expensive place to carry out work, plus the civil/local contractors are feeding this with high pricing and productivity concerns"* [147]
- *"contractors have concerns with the large quantities of concrete, the availability of labour and the complexity of the undertaking…"*[148]

3.6.2 Productivity of Astaldi

Astaldi began mobilization at the end of September 2013, near the end of the construction season for the 2013 calendar year. Don Delarosbil, the current Astaldi Project Manager explained, that due to the inability to work effectively in the winter months that *"if you start in November instead of June you're not just losing four months, you're probably losing ten months. You almost lost a year of construction."*[149]

Astaldi's slow ramp up was identified in the January 2014 monthly progress report which states *"The slow ramp-up of CH0007 Contractor Astaldi Canada Inc. due to the availability of key personnel and other issues has caused some delays in construction; the rectification of these issues are in process through ongoing discussions with Senior Management."*[150] In an interview with Don Delarosbil, the current Astaldi Project Manager it was noted that, *"…if I would have been involved at the time of the signing of the contract, probably would have tried to convince, me personally, probably would have tried to convince everybody to set the start date as March 15 of the following year"*[151] and *"it gets complicated, you need heaters right off the start"*[152]

To achieve the planned concrete production rates Astaldi had planned on implementing an ICS to provide shelter during winter construction. Astaldi's subcontractor Proco began construction of the ICS in July 2014[153] but Astaldi cancelled the contract on *"…December 20, 2014 on grounds that Proco failed to deliver on time, had excessive labour hours and provided poor management and supervision"*[154]

The ICS was originally planned to be completed between March 1, 2014 and September 30, 2014. At Astaldi's request, this schedule was delayed with work planned for May 19, 2014 to December 22, 2014. Proco claims Astaldi made revisions and modifications to the schedule several times and on June 2, 2014 Proco expressed concern that the modifications could result in the work being impacted by winter conditions and increased costs. Additionally,

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146 Williams Engineering Canada – Forensic Review in Support of Commission of Inquiry Respecting the Muskrat Falls Project – November 30, 2018 – Page 7
147 DISCL-MFPT-33 – Jul 2013 $7.0B – July 2013 – Page 9
148 DISCL-MFPT-33 – Jul 2013 $7.0B – July 2013 – Page 9
149 Interview Summary – Don Delarosbil – September 14, 2018 – Page 4
150 NAL0019112 – LCP Monthly Progress Report – January 31, 2014 – Page 7
151 Interview Summary – Don Delarosbil – September 14, 2018 – Pages 10
152 Interview Summary – Don Delarosbil – September 14, 2018 – Pages 3
153 NAL0223466 – RE: Astaldi Canada Inc. – Justification for Incremental Compensation Grievance – Page 18
154 NAL0223466 – RE: Astaldi Canada Inc. – Justification for Incremental Compensation Grievance – Page 18

Proco claimed Astaldi also failed to perform its own obligations under the Subcontract, including initial work site preparations, the timely supply of completed concrete work, crane pads, access roads, electricity, fuel, operational cranes, qualified crane operators, rescue teams, suitable lunch rooms, trailers and dry houses.[155][3]

This contributed to the ICS being less effective than was planned.

In May 2018 the PMT provided a presentation to Grant Thornton about Astaldi which highlighted that Astaldi had an *"Exceedingly slow start in 2013-14 as a result of the following:*[156]

- *Slow pace of ramp-up and missteps,*
- *Slow execution of Integrated Cover System (ICS) and removal issues,*
- *Missed labour contract management opportunities,*
- *Challenging benefits agreements,*
- *Mismanagement of the workforce allocation (production and support workers, particularly during 2014),*
- *Unrealized productivity expectations."*

We discussed this further with Paul Harrington in an interview and he provided a copy of his notes which summarize the timeline of key meetings with Astaldi on this matter.[157] We reviewed this document and have noted that members of the PMT and Nalcor executives (including former Nalcor CEO Ed Martin and VP LCP Gilbert Bennett) met with Astaldi's executives on numerous occasions during 2014 and early 2015 in an attempt to resolve the issues pertaining to Astaldi's performance.

The PMT indicated that from 2013 to May of 2015 there was turnover of Astaldi's site leadership.[158] We discussed this with Georges Bader, the current Astaldi Deputy Project Manager and he confirmed that Astaldi had multiple project managers since he joined the project in July 2014.[159]

Nalcor engaged Westney Consulting Group ("Westney") to perform a LCP Cost and Schedule Risk Assessment – Muskrat Falls Generation. The Westney report was dated March 2016. This document indicates that Astaldi had previously experienced:[160]

- *"Significant crew "stand-around" time,*
- *Limited construction management presence in work areas due to meetings,*
- *Disorganized laydown areas impacting productivity,*

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[155] NAL0214861 Statement of Claim Between Constructions Proco, Inc. and Astaldi Canada Inc. – March 6, 2016 – Page 3-5

[156] PMT Presentation to Grant Thornton – Lower Churchill Project 6 – Astaldi Contract – May 2018 – Page 9
[157] Astaldi Notes P. Harrington – Provided October 25, 2018
[158] PMT Presentation to Grant Thornton – Lower Churchill Project 6 – Astaldi Contract – May 2018 – Page 11
[159] Interview Summary - Georges Bader – September 14, 2018 – Page 5
[160] NAL0019195 - Muskrat Falls Quantitative Cost and Schedule Risk Analysis (Q1-2016) – Page 492

– *Visible debris and clutter creating unnecessary hazards."*

However, at the time of Westney's review they observed the following improvements:[161]

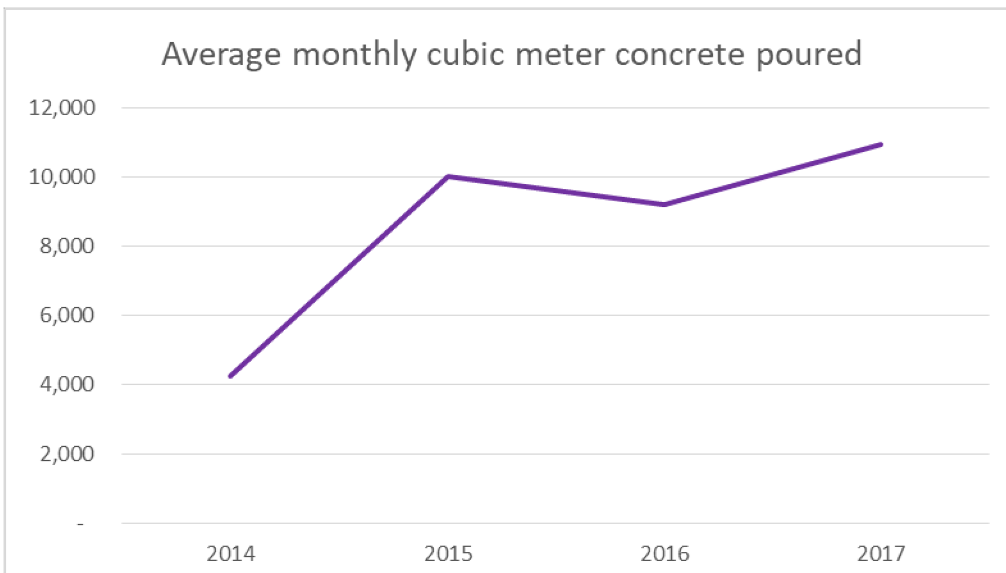
– *"Well organized and motivated labour…*

– *Increased management presence…*

– *Well organized, easily accessible laydown areas*

– *Greatly improved site cleanliness and overall industry standard safety practices..."*

In a response to Grant Thornton's Question 10.25 which requested a summary of the cumulative labour hours incurred by Astaldi compared to the cumulative volume of concrete poured by month from September 2013 to March 2018, Nalcor provided a summary of Astaldi Hours and Concrete Curves.[162] We reviewed this summary and have noted that the average monthly cubic meter of concrete poured improved in 2015. This improvement is demonstrated in the graph below:



It is important to understand that while Astaldi's performance improved, they rarely achieved the concrete placement that the original schedule required. The original schedule required 478,000 m^3 to be placed over a 36 month period. Stated simply, in order to meet that schedule, Astaldi on average would have had to place approximately 13,300 m^3 per month (478,000 m^3/36 months) cubic meters of concrete each month, including the winter months. This production level was attained nine times out of 57 months since commencement of the project in November 2013 (through August 2018). Additionally, the last time Astaldi attained the 13,300 cubic meter threshold was over a year ago in August, 2017.

[161] NAL0019195 - Muskrat Falls Quantitative Cost and Schedule Risk Analysis (Q1-2016) – Page 492
[162] Nalcor Response to Grant Thornton Question 10.25 – October 15, 2018

As already indicated, the Astaldi bid assumed seven direct labour hours per cubic meter and the DG3 estimate assumed five direct labour hours per cubic meter. However, as the below table depicts, the direct labour productivity rate as measured on per cubic meter basis, was never below 14 direct labour hours.[163]

Direct labour hours per cubic meter of concrete placed			
Year	**Direct labour hours incurred for period**	**Cubic meters of concrete placed for period**	**Direct labour hours per cubic meter of concrete placed**
2013	-	-	N/A
2014	456,373	29,754	15
2015	1,646,103	120,012	14
2016	1,894,271	110,162	17
2017	2,011,457	131,189	15
Through 8/31/18	576,602	26,911	21
Total	6,584,807	418,028	16

We reviewed a report titled: Muskrat Falls Corporation/Astadi Canada, Inc., Productivity Study - Phase 2 dated March 7, 2015 prepared by The Ibbs Consulting Group, Inc. ("Ibbs") Ibbs was jointly engaged by Astaldi and Nalcor to conduct a productivity study on LCP. In that report Ibbs notes the following:[164]

1. *Labor productivity is degraded on Muskrat Falls by too much waiting time, too much rework, and not enough overall site coordination.*
2. *Project Critical Issues Scorecard – Craft labor direct loss of productivity*
    a. *December 2014 visit – Severe issues existed. Project recognized issues and was moving to remedy the issues.*
    b. *January 2015 visit – Significant progress made toward craft labor productivity improvement. Many external blockers prevent such progress from yielding results.*
    c. *Feb 17, 2015 info – We understand that most of the blockers still remain, thus preventing material productivity improvement.*
    d. *Score: Astaldi and MFC: Extreme Concern*

In a subsequent report dated September 25, 2015, Ibbs indicated that a target range of 11.5 to 12 labour hours per cubic meter is conceivable however the target range would not be

[163] Nalcor Response to Grant Thornton Question 10.25 – October 15, 2018
[164] Muskrat Falls Corporation/Astadi Canada, Inc., Productivity Study - Phase 2 , prepared by The Ibbs Consulting Group, Inc. – March 7, 2015 – Pages 1 & 4

possible in cold weather.[165] Additionally, in his interview, Don Delarosbil indicated that the labour productivity factor of 6 – 6.5 in the Astaldi bid could not be done and that a good direct labour productivity factor per cubic meter in Canada was 9 hours.[166]

3.6.3 Integrated Cover System ("ICS")

As noted previously, the ICS was an important component in the development of the productivity factor. In a question submitted to Astaldi on September 19, 2018 we asked for details outlining whether the ICS was Astaldi's idea, whether the ICS was contemplated in the RFP, and whether Astaldi had built an ICS in prior projects. Georges Bader, Astaldi Deputy Project Manager provided the following explanation: *"The concept of the ICS was included in Astaldi's proposal to Nalcor. In the RFP, the ICS was a concept design, which was modified as progress with construction advanced. The ICS was reviewed and approved by Nalcor. It was initially contemplated that Astaldi would attend at the site in July, 2013, and commence the design for the ICS. Given the Project start date was delayed and the contract was awarded to Astaldi in November, 2013, design of the ICS started in the first quarter of 2014. Normally design would only start after a survey was conducted, but given the time of the year and the fact the site was snow covered, a survey was not possible. To validate actual foundations elevations. The design of an ICS takes approximately 4-6 weeks, and once the design is completed fabrication takes approximately 3 months. I am not aware of any other projects carried out by Astaldi which utilized an ICS for the purpose as proposed in Labrador, but this process is not uncommon for projects in Canada. It should also be noted that an ICS is simply a temporary steel structure not different than any steel building, warehouses…"*[167]

We engaged Williams Engineering to review the temporary structure and they noted the following: "*The enclosure strategy is not uncommon in cold climates. Attempting to enclose an area as large as the dam structure combined with an overhead crane, material movement system is not common and warranted detailed scrutiny.*"[168] Williams goes on to say: "*Using the temporary building to support a grid of cranes to move buckets of concrete from concrete trucks to the placement location is also not standard. The proposed system appears to be very congested – moving concrete by bucket to concrete pumps.*"[169] Williams also noted that: *"Only the Astaldi bid claimed to be able to place concrete during the winter. Astaldi would rely on the temporary structure enclosure to achieve this. Regardless of the ICS, SLI* [SNC] *did not believe that the required concrete placement schedule was achievable and anticipated including a contingency to address this risk."*[170]

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[165] Astaldi Cost Control and Productivity Analysis Reports: Observations and Recommendations by Dr. William Ibbs – September 25, 2015 – Page 4
[166] Interview Summary – Don Delaorosbil – September 14, 2018 – Page 2
[167] Email from Georges Bader, Deputy Project Manager – November 15, 2018 – Page 1
[168] Williams Engineering Canada – Forensic Review in Support of Commission of Inquiry Respecting the Muskrat Falls Project – November 30, 2018 – Page 5
[169] Williams Engineering Canada – Forensic Review in Support of Commission of Inquiry Respecting the Muskrat Falls Project – November 30, 2018 – Page 17
[170] Williams Engineering Canada – Forensic Review in Support of Commission of Inquiry Respecting the Muskrat Falls Project – November 30, 2018 – Page 28

3.6 Observations and Findings

During our review of CH0007, we observed and found the following which contributed to the differences between the estimated costs of the Muskrat Falls Project at the time of sanction and the costs incurred by Nalcor during project execution:

– $272 million of the $1.207 billion overrun is attributed to the executed contract amount exceeding the base estimate due to design changes and the labour premium (hours) required by Astaldi.

– $884 million of the $1.207 billion overrun was a result of Astaldi's performance issues which included placing concrete at rate that was approximately 2.5 times slower than what they had estimated in their bid.

– Ibbs indicated that a production rate of 11-12 hours per cubic meter was conceivable but not in cold weather. The Astaldi bid indicated 6.6 direct labour hours per cubic meter, a production rate that was approximately 50% faster.

– Nalcor did not perform a formal analysis to consider replacing Astaldi until Westney's March 2016 report despite knowing that for two years Astaldi was having performance issues.

– $18 million of change orders related to additional costs due to items such as the removal of the ICS, development of a powerhouse emergency safety services plan, and common area services.

– The remaining $33 forecasted overrun is an unallocated budget balance as of March 2018.

– As noted by Williams Engineering an enclosure strategy is not uncommon in cold climates however attempting to enclose an area as large as the dam structure combined with an overhead crane, material movement system is not common and warranted detailed scrutiny.

4 CT0327 - Construction of HVdc Transmission Line

4.1 Mandate

Reference 4. (b) *"Why there are significant differences between the estimated costs of the Muskrat Falls Project at the time of sanction and the costs by Nalcor during project execution, to the time of this inquiry together with reliable estimates of the costs to the conclusion of the project…"*[171]

4.2 Summary of Overrun

This work package included the construction of a 1,080km 350kV HVdc transmission line and the Right of Way ("ROW") clearing from Muskrat Falls to Soldier's Pond.[172] The construction phase included tower construction and stringing of 350 kV HVdc cable. The construction of HVdc transmission line was originally four separate packages (CT0327, CT0343, CT0345 and CT0346).[173] Prior to going to market, these work packages were combined into CT0327 on change order PCN-0230.[174]

CT0327 – Construction of HVdc Transmission Line was the second largest work package accounting for approximately $788 million (20%) of the total cost variance of $3.9 billion as of March 2018. Once adjusted for transfers from other work packages and scope changes of $139 million the overrun on this work packs is $649 million as summarized below:

	$ Millions		
	Transmission Line	**ROW**	**Total**
Forecast Final Cost (Mar 2018)	1,054	469	1,523
Base Estimate	527	146	673
Escalation	53	9	62
Transfers from other work packages and scope changes	110	29	139
Subtotal	690	184	874
Overrun ($)	364	285	649

171 NEWFOUNDLAND AND LABRADOR REGULATION 101/17 - *Commission of Inquiry Respecting the Muskrat Falls Project Order* under the *Public Inquiries Act, 2006* (O.C. 2017 - 339) – Page 2

172 NAL1833354 – CT0327 Bidder Selection & Preliminary Award Recommendation – March 31, 2014 – Page 4

173 NAL0019634 – DG3 Capital Cost Estimate – December 11, 2012 – Page 31

174 NAL1833354 – CT0327 Bidder Selection & Preliminary Award Recommendation – March 31, 2014 – Page 5

The $649 million overrun is attributable to a combination of factors including contracts awarded in excess of budget, settlement agreement, and change orders due to items such as geotechnical conditions different from planned and the conductor proud strand issue (net of insurance proceeds) and unallocated budget amounts. A breakdown of the variance and as explained subsequently in this report is as follows:

	$ Millions		
	Transmission Line	ROW	Total
Forecast (March 2018)	1,054	469	1,523
Base Estimate	527	146	673
Escalation	53	9	62
Transfers from other work packages and scope changes	110	29	139
Revised DG3 estimate	690	184	874
Overrun	364	285	649
Reconciliation:			
Contract award amount (Note 1)	809	242	1,051
Revised DG3 estimate	690	184	874
Contract greater than revised estimate	119	58	177
Settlement agreement	245	-	245
Approved change orders	25	187	212
Insurance claim	(25)	-	(25)
Unallocated budget	-	40	40
Reconciled overrun	364	285	649

Note 1 – Please note that the $242 million in contract value for ROW is an estimate. Our review focused on contracts in excess of $10 million. There were other contracts included in this work scope that were less than $10 million.

4.3 DG3 Base Estimate

The DG3 base estimate of $673 million was prepared by SNC with an additional $62 million in escalation allocated to the work package resulting in a total DG3 estimate for this scope of work of $735 million.[175] At the time the base estimate was prepared, the engineering for this work package was 40% complete.[176] The breakdown between the transmission line and ROW is shown on the table above.

The CT0327 package budget was developed with limited geotechnical data due to the environmental assessment restrictions. Jason Kean, the former Nalcor Deputy General Project Manager explained *"We didn't have any geotechnical data because we weren't allowed under the environmental assessment process. We could fly a little mini Kubota excavator on a helicopter to dig down one meter in a few locations. That was it because it would be deemed that we would start construction if we were to have entered into a lot of these remote locations. So that challenged that from an estimating perspective, we had to make assumptions based on mapping and geotechnical data."*[177]

4.3.1 Transfers from other work packages and scope changes prior to RFP

The base estimate for this work package was prepared by SNC when engineering was partially complete. During the period between DG3 and issuing the RFP, engineering continued. There were $139 million in transfers from other work packages and scope changes outlined in the recommendation for award for this work package.[178]

In meetings with the PMT, we were advised that *"A number of design changes were made to increase the design reliability and robustness of the HVdc transmission line in the period of 2013 – 2014,"* as a result of "Dark NL" (the week long power outage that occurred during January 2014).[179]

The Nalcor PMT indicated that: *"The design changes resulting from the Liberty review, which had not been included in the DG3 estimate, were implemented in the HVdc transmission line in order to increase overall system reliability. These changes could not be funded within the DG3 P75 risk adjusted estimate and included changes in routing, structure spotting, tower-type utilization, strength utilization, etc."*[180] (Note – Liberty was engaged by the Board of Commissioners of Public Utilities of Newfoundland and Labrador to review issues surrounding outages experienced in 2013 and 2014.)[181]

In Grant Thornton Question 10.29, we asked if the $139 million increase in the DG3 base estimate was primarily a result of reliability changes in response to Dark NL. Nalcor advised *"the $138.9 million noted in the referenced document is not the result of additional costs for TL* [transmission line] *reliability improvements. Costs associated with changes to improve reliability were included within AFE Rev 1, Rev 2, and Rev 3…"*[182] In their response Nalcor did not indicate the

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175 Response to Grant Thornton Question 6.7 – May 23, 2018 – Page 1
176 NAL0019570 – DG3 Basis of Estimate – May 22, 2013 – Page 213
177 Interview Summary – Jason Kean - May 11, 2018 – Page 9
178 NAL1833354 – Bidder Selection and Award Recommendation CT0327 – Page 40
179 Post Sanction – Briefing Note as Requested by Nalcor Legal Counsel – January 2018 – Page 40
180 Post Sanction – Briefing Note as Requested by Nalcor Legal Counsel – January 2018 – Page 31
181 http://www.pub.nf.ca/applications/NLHGRASUPP2013/PrudenceReview/files/reports/NLH-Amended-GRA-Prudence-Review-Report.pdf
182 Response to Grant Thornton Question 10.29 – November 8, 2018 – Page 1

cause of the $139 million increase. Accordingly, at the time of this report we were unable to conclude on the cause of the $139 million increase.

4.4 RFP and Bidding

Nalcor prepared an RFP for this work package; we understand that Nalcor completed a two phase approach as described below.

The Phase I screening processes scored respondents based on how they responded to questions regarding commercial, technical, health & safety, environmental and quality evaluation criteria.[183] Phase I was from October 1, 2012 to March 31, 2013.[184] Applications for bidder responses were sent out to 23 target companies for Phase I screening.[185] Ten companies responded with an application.[186] Eight of the ten respondents met the minimum requirements of Phase I screening and moved to Phase II.[187]

Phase II took place from April 1, 2013 to January 31, 2014.[188] It provided a more in depth review of the contractors' ability to perform in the more challenging aspects of the construction such as: winter construction, helicopter construction techniques, remote region experience, stringing with large conductor experience, cash flow; as well as the depth and breadth of the team, access to labour pool, and ability to provide acceptable performance security.[189] On March 31, 2014, based on the Phase II review Valard was selected as the only contractor who had the capability of constructing the entire HVdc transmission line.[190]

4.5 Contractor Selection

Contract CT0327-001 was designated for the transmission line only and did not include the ROW portion of CT0327. Contractor selection for CT0327-001 did not involve cost proposals or bids as it was sole sourced to Valard.[191]

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[183] NAL1833354 – CT0327 Bidder Selection & Preliminary Award Recommendation – March 31, 2014 – Page 10

[184] NAL1833354 – CT0327 Bidder Selection & Preliminary Award Recommendation – March 31, 2014 – Page 8

[185] NAL1833354 – CT0327 Bidder Selection & Preliminary Award Recommendation – March 31, 2014 – Page 8

[186] NAL1833354 – CT0327 Bidder Selection & Preliminary Award Recommendation – March 31, 2014 – Page 8

[187] NAL1833354 – CT0327 Bidder Selection & Preliminary Award Recommendation – March 31, 2014 – Page 12

[188] NAL1833354 – CT0327 Bidder Selection & Preliminary Award Recommendation – March 31, 2014 – Page 8

[189] NAL1833354 – CT0327 Bidder Selection & Preliminary Award Recommendation – March 31, 2014 – Page 20

[190] NAL1833354 – CT0327 Bidder Selection & Preliminary Award Recommendation – March 31, 2014 – Pages 35

[191] PMT Documents – 2 CT0327 Contract Strategy - Sole Source – November 1, 2013 – Pages 1 to 3

4.6 Contract

The Lower Churchill Management Corporation ("LCMC") decided to pursue a negotiated agreement using open-book price negotiations with Quanta Services, Valard's parent company, beginning in October 2013 under a non-disclosure agreement.[192] Valard presented an open book estimate and preliminary execution plan on December 16, 2013, with an initial estimate of $1.178 billion for all construction and ROW clearing.[193] A meeting was scheduled between Nalcor, Valard and Quanta on January 23 and 24, 2014 to identify opportunities to reduce the cost. At the meeting, Valard provided a revised estimate of $1.183 billion, which comprised $273 million for ROW clearing and $909 million for transmission line construction.[194] In the meeting it was negotiated that Valard would perform the construction of transmission line scope with a recommendation for award at $820 million.[195] The target for the ROW clearing was set at $200 million, but this decision was not included in the Valard contract.[196]

The contract was ultimately executed with Valard for the transmission line construction for $809 million on August 8, 2014.[197] This contract was known as CT0327-001. The contract was primarily composed of lump sum and unit price components which included labour cost. The DG3 revised estimate for the transmission line was $690 million (which includes escalation and design changes from the base estimate). Therefore, the $809 million award amount with Valard represented $119 million of cost overrun. A further discussion of the contractual arrangements between Nalcor and Valard is provided in section 10 of this report.

The contract with Valard was not the only contract on this work package. This work package was subdivided into many sub-packages beyond the Valard CT0327-001 contract.[198] A majority of these other sub-packages were contracts for different pieces of the ROW Clearing and Access works.

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[192] NAL1833354 – CT0327 Bidder Selection & Preliminary Award Recommendation – March 2014 – Page 35
[193] NAL1833354 – CT0327 Bidder Selection & Preliminary Award Recommendation – March 2014 – Page 36
[194] NAL1833354 – CT0327 Bidder Selection & Preliminary Award Recommendation – March 2014 – Page 36
[195] NAL1833354 – CT0327 Bidder Selection & Preliminary Award Recommendation – March 2014 – Page 37
[196] NAL1833354 – CT0327 Bidder Selection & Preliminary Award Recommendation – March 2014 – Pages 38
[197] NAL0014341 – Contract CT0327-001 Exhibit 2, Appendix A: Schedule of Price Breakdown – August 8, 2014 – Page 194
[198] Response to GT Questions 10.39 – Attachment 1 Project Cost Status Report – October 31, 2018

4.7 Cost Growth from DG3 to March 2018

As already mentioned above, the cost growth from DG3 to March 2018 consisted of the following:

	$ Millions		
	Transmission Line	**ROW**	**Total**
Contract greater than revised estimate	119	58	177
Settlement agreement	245	-	245
Approved change orders	25	187	212
Insurance claim	(25)	-	(25)
Unallocated budget	-	40	40
Total Overrun	364	285	649

4.7.1 Project Management Team Presentation

The PMT provided us with a binder of documents called Post Sanction – Briefing Note as Requested by Nalcor Legal Counsel. In this document they provided their explanation for the overruns as follows:

4.7.1.1 Transmission Line

The $474 million ($364 million overrun + $110 million transfers) in cost growth associated with the transmission line was attributable to the following:[199]

- Reliability driven change
- Environmental assessment driven change
- Performance, productivity and market changes
- Contractor performance

4.7.1.2 Right of Way

The $314 million ($285 million overrun + $29 million transfers) in cost growth associated with the right of way was attributable to the following:[200]

- Constructability driven change
- Reliability driven change
- Contractor performance
- Market place drive change

[199] Post Sanction – Briefing Note as Requested by Nalcor Legal Counsel – January 2018 – Page 45
[200] Post Sanction – Briefing Note as Requested by Nalcor Legal Counsel – January 2018 – Page 45

We reviewed the causes of the overrun and noted the following:

4.7.2 Valard Settlement Agreement

There were two amending agreements between Nalcor and Valard related to this work package. Amending Agreement 1 was to change the method of payment to Valard. Amending Agreement 2 was to settle various issues as described in the following paragraphs.

On June 30, 2017 Nalcor entered into Amending Agreement Number 2 with Valard which brought the total Valard CT0327-001 contract value to $1.054 billion, an increase of $245 million over the original contract value of $809 million.

We reviewed Amendment Agreement Number 2 and noted that it addressed the following: [201]

- Compensation to Contractor for Part A (transmission line construction) and Part B (ROW Clearing and Access)
- Lump sum payments negotiated as part of amending agreement number 1 and number 2
- Fuel escalation costs to Final Completion
- Labour escalation costs to Final Completion
- Compensation due to re-stringing for replacement of defective cable
- Compensation for suspension of stringing between June 3 and September 20, 2016
- All claims, change orders, costs and expenses which are known or unknown prior to and including June 30, 2017
- All back charges that have or could have occurred whether known or unknown prior to and including June 30, 2017
- Costs incurred for any lost time due to and/or associated with missing materials

4.7.2.1 Geotechnical Conditions

Part of Amendment Agreement 2 addressed the issues pertaining to the geotechnical conditions as described in the following paragraphs. This includes claims for cost increases due to sub-surface conditions which caused the use of different types of foundation and modifications of foundations to be installed.[202]

The PMT indicated that: *"The differences in the actual geotechnical conditions versus the geotechnical baseline conditions used for the cost estimate in 2012, resulted in a significant change to the planned versus actual foundations types installed, with a significant increase in solid foundations."*[203]

In an interview with BJ Ducey, Senior Vice President, Quanta Services (Parent company of Valard Construction) he noted that: *"…the actual conditions proved out to be different than what was*

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[201] Binder provided by Quanta Services / Valard - Valard Amending Agreement Number 2 – Page 116 & 117
[202] Interview Summary – BJ Ducey – October 16, 2018 – Page 3
[203] Post Sanction – Briefing Note as Requested by Nalcor Legal Counsel – Page 40

assumed…we [Valard] *didn't participate in FEED, that was SNC Lavalin, that was Nalcor...we* [Valard] *used that information to go into this open book negotiation…The assumed family of foundations were not working…"* Valard's legal counsel confirmed "*That was part of the settlement that was reached, is payment for these modified foundations…"*[204]

We asked Williams Engineering to review the transmission line geotechnical investigations[205&206]. They concluded that: "*The limitations stated in this document indicate that very little field data was available to accurately calculate the foundation design parameters for each transmission tower. In some cases, no data was available at all…Best practice is to attend each tower location and complete a minimum of one borehole per tower location. Depending on soil conditions, a site investigation might include an alternate investigation method such as a test pit (digging a hole), confirmation of bedrock conditions, or other appropriate testing techniques."*[207]

4.7.2.2 Conductor Proud Stranding

The PMT explained that: *"The discovery of a technical/quality condition known as conductor proud stranding on the HVdc line in late spring 2016 led to a decision to halt stringing for three months until the root causes for the phenomenon could be narrowed down and a plan developed to avoid its future occurrence. Following the successful testing of a modified conductor, all non-installed conductor was modified accordingly, with a decision made to remove and replace ~340 km of installed conductor with the modified design."*[208]

In an interview with BJ Ducey, we inquired into the conductor proud stranding issue. He explained that: *"Conductors has core with 100s of strands of aluminum – problem was one of the strands popping out and causing inefficiencies in heating over long distance."*[209]

Amending Agreement Number 2 includes compensation of $9 million for suspension of stringing during the period of June 3, 2016 to September 20, 2016 inclusive.[210] The agreement also included compensation of $27 million for re-stringing during the replacement of defective cable.[211]

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204 Interview Summary – BJ Ducey – October 16, 2018 – Page 3
205 NAL0020638 – Geotechnical Survey Data Acquisition and Analysis
206 NAL0426802 – Geotechnical Baseline Report
207 Williams Engineering Canada – Forensic Review in Support of Commission of Inquiry Respecting the Muskrat Falls Project – November 30, 2018 – Page 38
208 Post Sanction – Briefing Note as Requested by Nalcor Legal Counsel – January 2018 – Page 41
209 Interview Summary – BJ Ducey – October 16, 2018 – Page 11
210 Binder provided by Quanta Services / Valard - Valard Amending Agreement Number 2 – Page 117
211 Binder provided by Chris Armstrong, Counsel for BJ Ducey, Senior VP of Operations Quanta Services, Valard Amending Agreement Number 2 – Page 117

4.7.3 Change Orders

There were a number of change orders executed during construction of this work package totaling $212 million ($25 million transmission line and $187 million ROW).

4.7.3.1 Transmission Line

We obtained a change order log from Nalcor which accounts for the $25 million in change orders for this work scope. We examined a change order totaling approximately $22 million[212] and noted that this change order related to Valard supplying additional equipment and personnel pertaining to the all season road construction.

4.7.3.2 Right of Way

There were numerous contracts involved with the ROW work. We selected contracts that were over $10 million for additional review. For each of these contracts we obtained a change order log. The total of the change order logs obtained represented $187 million in change orders for the right of way work scope. We examined four of the change orders which totaled $90 million[213&214&215&216], and noted the following reasons for the change:

- Poor onsite geotechnical conditions
- Permitting delays
- Issues dealing with the complex terrain
- Weather conditions

The DG3 base estimate for the ROW portion of CT0327 assumed that a permanent access network to support the transmission line operations and maintenance would not be required. The PMT indicated that: *"For both the HVac and HVdc transmission lines, NL Hydro advised that it did not require the establishment of a permanent access network to support line operations and maintenance…With this design and operations philosophy established, SLI's* [SNC Lavalin] *proposed construction planning strategy for the transmission lines largely relied upon the contractor determining what level of temporary construction access would be required…"*[217]

However, the PMT also indicated that as a result of the Liberty review, *"…Nalcor acknowledged that NL Hydro's operations and maintenance philosophy needed adjustment, and that a near permanent access network would be required…"*[218]

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212 NAL0021253 – Change Order CHO-CT0327001-0003 – March 11, 2015
213 NAL4108515 – Change Order CHO-CT0327011-0008 – December 9, 2015
214 NAL4114844 – Change Order CHO-CT0327015-0009 – December 18, 2015
215 NAL4114884 – Change Order CHO-CT0327015-0006 – October 1, 2015
216 NAL4109781 – Change Order CHO-CT0327013-0012 – December 18, 2015
217 Post Sanction – Briefing Note as Requested by Nalcor Legal Counsel – January 2018 – Page 41
218 Post Sanction – Briefing Note as Requested by Nalcor Legal Counsel – January 2018 – Page 42

4.7.4 Unawarded Scope

In addition to the unawarded scope of $37 million, there are also $3 million of outstanding items as of March 2018 included in the $40 million of unallocated budget. We asked Nalcor what the $37 million of unawarded scope on the Right of Way pertained to. Nalcor explained that *"The budget of ~$37.3M is the remaining budget in the CT0327 Commitment Package that has not yet been assigned to a Contract Package. Note that the current forecast is ~$32.5M with the variance of ~$4.9M to be returned to the contingency through a pending Project Change Notice (PCN)."*[219]

4.7.5 Insurance Claim

There is a $25 million credit included in the Cost Report – CT0327 with the description *"insurance claim – conductor proud stranding"*.[220] Nalcor explained that this was an insurance claim for the Conductor Proud Stranding issue; the total cost was approximately $58 million with $25 million of this recovered through the insurance claim.[221]

4.8 Observations and Findings

During our review of CT0327 we observed and found the following, which for the most part, contributed to the differences between the estimated costs of the Muskrat Falls Project at the time of sanction and the costs incurred by Nalcor during project execution:

- Scope changes and budget transfers from other work packages resulted in $139 million in additional cost.
- Original contracts in excess of budget resulting in $177 million of additional cost.
- Amending Agreement 2 for $245 million with Valard to settle issues such as geotechnical conditions, the conductor proud stranding issue and delays with the right of way work.
- Scope changes associated with developing a permanent right of way resulting in $212 million in additional cost; including but not limited to:
  - All season road construction
  - Poor onsite geotechnical conditions
  - Permitting delays
  - Terrain and weather conditions
- Nalcor performed limited geotechnical analysis. Williams Engineering noted that best practice is to attend each tower location and complete a minimum of one borehole per tower location.

219 Response to Grant Thornton Question 10.39 – November 6, 2018 – Page 2
220 Response to Grant Thornton Question 10.35 – Cost Report – CT0327 2018-09-27 to 2018-10-31 – Page 2
221 Response to Grant Thornton Question 10.39 – November 6, 2018 – Page 2

5 EPCM and Owner's Cost

5.1 Mandate

Reference 4. (b) *"Why there are significant differences between the estimated costs of the Muskrat Falls Project at the time of sanction and the costs by Nalcor during project execution, to the time of this inquiry together with reliable estimates of the costs to the conclusion of the project…"*[222]

5.2 Summary of Overrun

Included in the DG3 budget was a work package for Project Management divided across the three sub-projects; MFG, LTA and LIL.[223] This work package accounted for approximately $406 million (10%) of the total cost variance of $3.9 billion as of March 2018 as summarized below:[224]

		$ Millions
Forecast (March 2018)		1,118
Base Estimate	571	
Escalation	36	
Allocation of historical costs	105	
Revised DG3 estimate		712
Overrun		406
Reconciliation:		
Increase in staffing due to Contractor performance/schedule extension		162
Unallocated budget		244
Reconciled overrun		406

222 NEWFOUNDLAND AND LABRADOR REGULATION 101/17 - *Commission of Inquiry Respecting the Muskrat Falls Project Order* under the *Public Inquiries Act, 2006* (O.C. 2017 - 339) – Page 2
223 NAL0019634 – DG3 Capital Cost Estimate – December 11, 2012 – Page 14
224 Nalcor provided owners cost information as of April 2018. We have noted that this differs from the March 2018 information by an immaterial amount.

The $406 million overrun[225] is attributable to time extension of the project due to contractor performance issues and unallocated budget.[226]

5.3 DG3 Base Estimate

The Project Management budget included in the DG3 Capital Cost Estimate was $571 million that was subsequently allocated between two work packages; SM0714 EPCM Services ($352 million) and XX0100 Owner's Team ($219 million).[227] In January 2014, historical costs of $105 million were allocated to these two packages.[228] Escalation totaling $36 million was applied to both packages[229] bringing the total DG3 base estimate to $712 million.

We understand that Nalcor formally announced their switch from an EPCM project management approach with Owner team support to an integrated project team delivery model in March 2013.[230] A further discussion of the project management structure is included in section 11 of this report.

In a response to Grant Thornton's Question Nalcor indicated: *"A change occurred in 2014, with respect to project management, from an EPCM/Owner Team to an Integrated Project Management Team…All SNC costs from January 2014 forward were incurred under XX0100."*[231] Due to this change, the balance remaining in the EPCM services budget was transferred to the Owner's Team budget.

5.4 Cost Growth of Project Management

As of April 2018 the budget value for the total EPCM Services and Owner's Team combined scope was $1.12 billion[232] reflecting cost growth of $406 million. Included in the $406 million in cost growth, is $244 million of unallocated budget.[233] The remaining $162 million of cost growth was a result of an increase in project management staffing for the LTA and MFG portion of the project due to contractor performance issues and schedule extensions.[234]

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225 Response to Grant Thornton questions 5.8, 5.10 and 6.1 – Page 5
226 NAL0285545 – Project Cost Status – March 28, 2018
227 NAL0019634 – DG3 Capital Cost Estimate – December 11, 2012 – Page 14
228 Response to Grant Thornton questions 5.8, 5.10 and 6.1 – Page 5
229 Response to Grant Thornton questions 5.8, 5.10 and 6.1 – Page 3
230 Announcement Integration Management Team – March 12, 2013
231 Response to Grant Thornton questions 5.8, 5.10 and 6.1 – Page 4
232 Response to Grant Thornton questions 5.8, 5.10 and 6.1 – Page 4
233 Response to Grant Thornton questions 5.8, 5.10 and 6.1 – Page 5
234 Response to Grant Thornton questions 5.8, 5.10 and 6.1 – Page 5

5.5 Observations and Findings

During our review of Project Management – EPCM and Owner's Cost we observed and found the following which contributed to the differences between the estimated costs of the Muskrat Falls Project at the time of sanction and the costs incurred by Nalcor during project execution:

- The cost growth experienced in owners cost and overall project management is a result of experiencing contractor performance issues and schedule extensions requiring additional project management and other services required to execute the project.

6 CH0009 – Construction of North and South Dams

6.1 Mandate

Reference 4. (b) *"Why there are significant differences between the estimated costs of the Muskrat Falls Project at the time of sanction and the costs by Nalcor during project execution, to the time of this inquiry together with reliable estimates of the costs to the conclusion of the project…"*[235]

6.2 Summary of Overrun

Work package CH0009 – Construction of North and South Dams[236] accounts for [redacted] million [redacted] of the total cost variance of $3.9 billion as of March 2018. This variance includes transfers of [redacted] million, therefore the net overrun on this work package was [redacted] million, as summarized below:

		$ Millions
Forecast (March 2018)		[redacted]
Base Estimate	117	
Escalation	[redacted]	
Transfers from other work packages		
Revised DG3 estimate		[redacted]
Overrun		[redacted]
Reconciliation:		
Contract award amount	287	
Revised DG3 estimate	[redacted]	
Contract greater than revised estimate		[redacted]
Approved change orders & back charges		91
Unallocated budget		[redacted]
Reconciled overrun		[redacted]

The [redacted] million overrun is mostly attributable to the contract awarded in excess of the revised DG3 estimate and change orders.

[235] NEWFOUNDLAND AND LABRADOR REGULATION 101/17 - *Commission of Inquiry Respecting the Muskrat Falls Project Order* under the *Public Inquiries Act, 2006* (O.C. 2017 - 339) – Page 2
[236] NAL0266124 CH0009-001 Bid Evaluation and Award Recommendation – August 5, 2015 – Page 1

6.3 DG3 Base Estimate

The base estimate of $117 million was prepared by SNC Lavalin Inc.[237] Escalation of [redacted] million was applied to bring the base estimate including escalation to [redacted] million.[238]

6.4 RFP and Bidding

Prior to the RFP being issued for this package the budget was increased by [redacted] million to [redacted] million as a result of scope changes and transfers from other packages.[239]

The RFP was issued on October 22, 2014 to three pre-approved bidders. Bidding was scheduled to close on November 21, 2014.[240] The bids were evaluated commercially and technically using a series of pre-set criteria.[241] The package was originally scheduled to be awarded December 23, 2014 but was not awarded until August 5, 2015. There was a delay in the award of this contract due to 1) uncertainty of the completion date of other work packages it interfaced with, and 2) the estimated contract value exceeding the budget by over 50%. As a result Nalcor decided to explore a cost reduction program.[242]

6.5 Contract

The contract was executed on October 29, 2015 with Bernard Pennecon-JV[243] at a value of $287 million.[244] The difference between the contract award amount of $287 million and the revised budget [redacted] million) of [redacted] million was primarily due to indirect labour rate and hours being greater than what was indicated in the estimate.[245] Specifically, the indirect labour costs in the contract award amount was $94 million greater than what was in the estimate.[246]

In an email to Stan Marshall on May 22, 2016, Mark Turpin, former Package Lead/Area Manager for the North and South Dams, expressed concerns regarding the award of CH0009. His memo stated *"As the Area Manager, I was the lead team member responsible for the tabulation of the award recommendation to LCP Management. After a year of technically reviewing the proposals both technical and commercial scores, an award recommendation was made promoting HJOC / Dragadoss JV… After I was assigned to the North Spur in April of 2015, I was surprised to learn that the award went to Barnard Pennecon JV…"*[247]

During an interview with Mark Turpin on December 2, 2018 when asked about the award recommendation for CH0009, he stated *"We – myself and Roy* [Lewis] *did bid recommendation and we recommended the project be awarded to an alternate, not Barnard Pennecon, it was a Joint Venture*

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[237] NAL0019634 – DG3 Capital Cost Estimate – December 11, 2012 – Page 29
[238] NAL0285354 – Project Cost Status 6-20-13 to 7-24-13
[239] Response to Grant Thornton Question 10.47 – Pages 1-2
[240] NAL0266050 – CH0009 Bid Evaluation Plan – Page 4
[241] NAL0266050 – CH0009 Bid Evaluation Plan – Page 6
[242] NAL0266124 – CH0009-001 Bid Evaluation and Award Recommendation - August 5, 2015 - Page 5
[243] NAL0012521 – CH0009-001 Civil Works Agreement - August 20, 2015 – Page 83
[244] NAL0012524 – CH0009 Exhibit 2 - Compensation Page 2
[245] NAL0266124 – CH0009-001 Bid Evaluation and Award Recommendation - August 5, 2015 - Page 6
[246] NAL0266124 – CH0009-001 Bid Evaluation and Award Recommendation - August 5, 2015 - Page 23
[247] Email from Mark Turpin to Stan Marshall – Subject: Note from Mark Turpin – Attachment - SM LCP Letter.pdf – May 22, 2016 – Page 2

between Dragadoss and H.J. O'Connell."[248] We asked him whether his team's evaluation was completed and submitted and he responded *"It was. We put a nice bow on it and said here you go guys...here's the package."*[249] As of the date of this report, we were unable to locate the original bid award recommendation completed by Mark Turpin, Roy Lewis, and their team.

Further to this, we asked Mark Turpin whether it is typical to change methodology after the bids are received. He explained that *""The proposal both in bulk excavation and for CH09 we specifically had to have our proposal plan submitted and approved… prior to opening the bids… How and why it got changed, I don't know."*[250] We also asked in terms of best practice, would the process normally change after opening and he said *"it shouldn't."*[251]

The Bid Evaluation and Award Recommendation that we have reviewed was dated August 2015. This recommendation did not include Mark Turpin on the bid evaluation team, but noted the following: *"… there has been a significant delay in bringing this Package to this point. The development of the Evaluation Plan and initial assessment of the bids received was carried out by a Bid Evaluation Team (BET) that included Roy Lewis (Contract Administrator) and Mark Turpin (Package Lead/Area Manager). In May, due to project resource requirements and other circumstances, bid evaluation activities were taken over by Ken McClintock, John Mulcahy, Ed Over and Greg Snyder. This team completed all activities necessary to bring this Package to this Recommendation stage."*[252]

The delay referenced above is explained further in the Bid Evaluation and Award Recommendation when it sates: *"Although the original schedule was to award the package by Dec 23, 2014, two serious issues prevented this from occurring. Firstly, there was a great deal of uncertainty around the completion dates related to the construction of the powerhouse, spillway and gate installation. As CH0009 delivery performance is highly dependent on interfaces with the other contractors executing this scope, it would not be prudent to award CH0009 without more certainty on completion dates. The focus of this strategy was claims avoidance. Secondly, the Estimated Contract Value exceeded the budget by more than 50%. It was decided, therefore, to carry out a cost reduction program to identify areas of cost savings, which could be achieved."*[253]

The Bid Evaluation and Award Recommendation also noted that *"the BET believed that an alternative evaluation methodology would be more suited to the nature of the work. More specifically, the BET believed that the evaluation should focus more on project execution, schedule and quality of the proposed project management teams."*[254] The document recommended that *"CH0009 – Construction of the North and South Dams be awarded to BPJV* [Barnard-Pennecon JV] *… BPJV's defining factors are schedule assurance, solid execution plan and an experienced project team."*[255]

[248] Interview Summary – Mark Turpin – December 2, 2018 – Page 19
[249] Interview Summary – Mark Turpin – December 2, 2018 – Page 19
[250] Interview Summary – Mark Turpin – December 2, 2018 – Page 22
[251] Interview Summary – Mark Turpin – December 2, 2018 – Page 21
[252] NAL0266124 – Bid Evaluation and Award Recommendation CH0009-001 Construction of the North and South Dams – August 5, 2015 – Pages 3 - 4
[253] NAL0266124 – Bid Evaluation and Award Recommendation CH0009-001 Construction of the North and South Dams – August 5, 2015 – Pages 5
[254] NAL0266124 – Bid Evaluation and Award Recommendation CH0009-001 Construction of the North and South Dams – August 5, 2015 – Page 4
[255] NAL0266124 – Bid Evaluation and Award Recommendation CH0009-001 Construction of the North and South Dams – August 5, 2015 – Page 3

Nalcor's Bid Evaluation and Award Recommendation policy states that *"proposals are assessed fairly against a set a pre-established criteria which normally include the following as established in the package Bid Evaluation Plan… Commercial (including exceptions to Agreement Articles), Technical, Health & Safety, Environmental, Quality, Risk, Benefits. Bids are analyzed using the above criteria to establish conformity to the RFP requirements and to identify and evaluate exceptions, rank the bids received which may include developing a short list for further evaluation."*[256] In other words, the criteria should be established prior to completing the bid evaluation. Changing the evaluation criteria after the bids had been opened is not in accordance with their policy.

6.6 Cost Growth to March 2018

Between the contract date of August 2015 and March 2018 (the date of the updated financial forecast), the package grew [redacted] million for a total of [redacted] million.[257]

The [redacted] million increase was a result of the following:

- Change orders and back charges totaling $91 million. We reviewed the change order log[258] and noted that the change orders and back charges were the result of the following:
  - Changes in quantities and issues with the cofferdam
  - Additional labour incurred to address shortage of rock fill
  - Changes in quantities and labour as the contract is reimbursable
- The remaining [redacted] million cost overrun is due to unallocated budget.[259]

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[256] NAL0018340 – Bid Evaluation and Award Recommendation – October 23, 2013 – Page 4
[257] NAL0285545 – Project Cost Status 3-1-18 to 3-28-18
[258] CH0009001 – CHO – Change Order
[259] NAL0285545 – Project Cost Status 3-1-18 to 3-28-18

6.7 Observations and Findings

During our review of CH0009 – Construction of North and South Dams we observed and found the following which contributed to the differences between the estimated costs of the Muskrat Falls Project at the time of sanction and the costs incurred by Nalcor during project execution:

- Scope changes and budget transfers from other work packages resulting in [redacted] million in additional cost.
- Higher labour rates and hours required by the contractor in their bid than what was estimated resulting in [redacted] million of additional costs.
- Change orders and back charges of $91 million were primarily associated with reimbursements for quantity changes and issues with the cofferdam as well as [redacted] million of unallocated budget dollars, resulting in [redacted] million of additional costs.
- We have noted that the bid evaluation criteria for CH0009 were revised following the bid opening for this work package. Based on our review of Nalcor's policies we have noted that bid evaluation plans should be established prior to commencing the bid evaluation. Changing the evaluation criteria after the bids had been opened is not in accordance with Nalcor's policy.

7 CH0032 – Supply and Install Powerhouse Hydro-Mechanical Equipment

7.1 Mandate

Reference 4. (b) *"Why there are significant differences between the estimated costs of the Muskrat Falls Project at the time of sanction and the costs by Nalcor during project execution, to the time of this inquiry together with reliable estimates of the costs to the conclusion of the project…"*[260]

7.2 Summary of Overrun

CH0032 – Supply and Install Powerhouse Hydro-Mechanical Equipment is a package to design, supply and install hydro-mechanical equipment in the powerhouse, spillway, mechanical and electrical auxiliaries, draft tube hydro-mechanical and handling equipment, and trash cleaning system.[261] This work package accounts for [redacted] million ([redacted]%) of the total cost variance as of March 2018. This variance included [redacted] million in transfers from other work packages and as a result the overrun on this work scope was [redacted] million, as summarized below:

		$ Millions
Forecast (March 2018)		[redacted]
Base Estimate	102	
Escalation	[redacted]	
Transfers from other work packages	[redacted]	
Revised DG3 estimate		[redacted]
Overrun		[redacted]
Reconciliation:		
Contract award amount	205	
Revised DG3 estimate	[redacted]	
Contract greater than revised estimate		[redacted]
Approved change orders		91
Unallocated budget		[redacted]
Reconciled overrun		[redacted]

260 NEWFOUNDLAND AND LABRADOR REGULATION 101/17 - *Commission of Inquiry Respecting the Muskrat Falls Project Order* under the *Public Inquiries Act, 2006* (O.C. 2017 - 339) – Page 2

261 NAL0271687 – CH0032 Award Recommendation – October 31, 2013 – Page 3

The [redacted] million overrun is attributable to the contract awarded in excess of the revised estimate, approved change orders, and unallocated budget.

7.3 DG3 Base Estimate

The base estimate of $102 million for this work package was prepared by SNC Lavalin Inc.[262] Escalation of [redacted] million was applied to bring the base plus escalation total to [redacted] million.[263]

7.4 RFP and Bidding

On December 7, 2012 RFPs were issued to six pre-approved bidders.[264] Nalcor required the RFP responses to be received no later than April 16, 2013. After the bids were received, they were evaluated commercially and technically using a series of pre-set criteria.[265] Prior to contract award, the package budget was increased by [redacted] million to [redacted] million.[266] This increase was for scope changes and transfers of scope from other packages as follows:[267]

Package	$ Millions	Reason
CH0046 Supply and Install Spillway Hydro-Mechanical Equipment	[redacted]	Full scope transfer
CH0031 Supply and Install Mechanical and Electrical Auxiliaries	[redacted]	Transfer of spillway electrical
CH0007 Construction of Intake, Powerhouse, Spillway & Transition Dams	[redacted]	Spillway and intake secondary concrete
SM0709 Air Transport Services	[redacted]	Transfer scope from CH0032 to SM0709
Change Orders	[redacted]	Spillway LLO gates optimization
Total	[redacted]	

7.5 Contract

On December 18, 2013 the contract CH0032-001 was signed with Andritz Hydro Ltd. at a value of $205 million.[268] The variance of [redacted] million between the contract amount and the package value is due to air travel ([redacted] million), labour rate difference of [redacted] per man hour [redacted] million) and reduced by cost savings from fabrication [redacted] million).[269]

262 NAL0019634 – DG3 Capital Cost Estimate – December 11, 2012 – Page 29
263 NAL0285354 – Project Cost Status 6-20-13 to 7-24-13
264 NAL0271687 – CH0032 Award Recommendation – Page 4
265 NAL0271357 – CH0032 Bid Evaluation Plan – Page 10
266 NAL0285355 – Project Cost Status 7-25-15 to 8-21-13
267 NAL0271687 – CH0032 Award Recommendation - Page 8
268 NAL0013410 – Supply and Install Powerhouse and Spillway Hydro-Mechanical Equipment – December 18, 2013 – Page 1438
269 NAL0271687 – CH0032 Award Recommendation – Page 8

7.6 Cost Overruns December 2013 – March 2018

After signing the agreement, the package had total cost growth of $91 million through change orders which included a settlement agreement. We reviewed the following two change orders which make up $78 million of the $91 million change orders:

Change Order/Document	$ Millions	Commentary
Change Order #005[270]	20	The addition of secondary concrete work allowable in the contract
Settlement Agreement (Change Order #040)[271]	58	Settlement of delay claims by the contractor as their delivery schedule was delayed as a result of Astaldi delays[272]
Total	**78**	

In addition to the change orders, there was [redacted] million of unallocated budget which brings the value to [redacted] million.[273]

7.7 Observations and Findings

During our review of CH0032 – Supply and Install Powerhouse Hydro-Mechanical Equipment we observed and found the following which contributed to the differences between the estimated costs of the Muskrat Falls Project at the time of sanction and the costs incurred by Nalcor during project execution:

- Scope changes and budget transfers from other work packages resulting in [redacted] million in additional cost.
- The contract awarded in excess of the revised estimate, resulting in [redacted] million of additional cost.
- Change orders such as the addition of secondary concrete work and delay claims due to the effect of Astaldi delays resulting in $91 million of additional costs.
- Unallocated budget of [redacted] million.

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[270] NAL0021134 – CH0032001 Change Order #005
[271] NAL0021173 – CH0032001 Change Order #040
[272] DISCL-GNL-36965 - Information Note Cabinet Secretariat Muskrat Falls CH0032 Amending Agreement,- November 8, 2017 – Pages 1 - 2
[273] NAL0285545 – Project Cost Status 3-1-18 to 3-28-18

8 CH0031 – Supply and Install Mechanical and Electrical Auxiliaries

8.1 Mandate

Reference 4. (b) *"Why there are significant differences between the estimated costs of the Muskrat Falls Project at the time of sanction and the costs by Nalcor during project execution, to the time of this inquiry together with reliable estimates of the costs to the conclusion of the project…"*[274]

8.2 Summary of Overrun

CH0031 – Supply and Install Mechanical and Electrical Auxiliaries is a package for design, supply, installation, registration and completions of mechanical piping systems, heating ventilation and cooling (HVAC) systems, auxiliary electrical systems, assembly and installation of major electrical equipment.[275] This work package accounts for [redacted] million ([redacted]%) of the total cost variance of $3.9 billion as of March 2018. This variance includes [redacted] million of transfers from other work packages. Therefore the net overrun on this scope of work is [redacted] million, as summarized below:

		$ Millions
Forecast (March 2018)		[redacted]
Base Estimate	92	
Escalation	[redacted]	
Transfers from other work packages		
Revised DG3 estimate		[redacted]
Overrun		[redacted]
Reconciliation:		
Contract award amount	193	
Revised DG3 estimate	[redacted]	
Contract greater than revised estimate		[redacted]
Approved change orders		-
Unallocated budget		[redacted]
Reconciled overrun		[redacted]

The [redacted] million overrun is the variance in contract to budget and unallocated budget.

[274] NEWFOUNDLAND AND LABRADOR REGULATION 101/17 - *Commission of Inquiry Respecting the Muskrat Falls Project Order* under the *Public Inquiries Act, 2006* (O.C. 2017 - 339) – Page 2
[275] Project Team Document -13 CH0031 Award Recommendation - Approvedo.pdf – June 7, 2017 – Page 4

8.3 DG3 Base Estimate

The base estimate of $92 million was prepared by SNC Lavalin Inc.[276] Escalation of [redacted] million was applied to bring the work package total to [redacted] million (including escalation).[277]

8.4 RFP and Bidding

An RFP was issued on June 10, 2014 to seven pre-approved bidders with bids received January 2015.[278] Bids were evaluated commercially and technically using a series of pre-set criteria.[279] In June 2016 the work package budget was increased by [redacted] million to a new value of [redacted] million.[280] The budget increase was due to scope changes and transfers from other work packages as summarized below:[281]

Package	$ Millions	Reason
CH0032 Supply and Install Powerhouse Hydro-Mechanical Equipment	[redacted]	Transfer of electrical and fire detection scope from CH0031 to CH0032
SM0709 Air Transport Service	[redacted]	Transfer scope from CH0031 to SM0709
CH0007 Construction of Intake, Powerhouse, Spillway & Transition Dams	[redacted]	Electro-mechanical embedment scope from CH0031 to CH0007
CT0319 Construction of 315 kV HVac Transmission Line	[redacted]	Transfer in to CH0031 for HV Cable Drops
Total	[redacted]	

8.5 Contract

The contract was executed on June 16, 2017[282] with Cahill-Ganotec Joint Venture for a value of $193 million, [redacted] million less than the package estimate.[283] The contractor's estimated labour hours in the bid was approximately 693,000 labour hours,[284] 31% less than the 1 million labour hours in the estimate.[285]

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276 NAL0019634 DG3 Capital Cost Estimate – December 11, 2012 – Page 29
277 NAL0285354 – Project Cost Status 6-20-13 to 7-24-13
278 NAL0271357 – CH0031 Bid Evaluation Plan – Page 2
279 NAL0271357 – CH0031 Bid Evaluation Plan – Page 3
280 NAL0285461 – Project Cost Status 5-26-16 to 6-29-16
281 CH0031 Bid Evaluation and Award Recommendation – June 7, 2017 – Page 15
282 NAL0013395 – CH0031-001 Supply and Install Agreement – June 16, 2017 – Page 1
283 NAL0013397 – Exhibit 2 Compensation – Page 50
284 CH0031 Bid Evaluation and Award Recommendation – June 7, 2017 – Page 21
285 CH0031 Bid Evaluation and Award Recommendation – June 7, 2017 – Page 8

8.6 Cost Growth July 2017 – March 2018

Between the contract date and March 2018, the package grew by [redacted] million to [redacted] million.[286] This is due to the remaining unallocated budget.

8.7 Observations and Findings

During our review of CH0031 – Supply and Install Mechanical and Electrical Auxiliaries we observed and found the following which contributed to the differences between the estimated costs of the Muskrat Falls Project at the time of sanction and the costs incurred by Nalcor during project execution:

- Scope changes and budget transfers from other work packages resulting in [redacted] million in additional cost.
- Unallocated budget of [redacted] million.
- The overrun is partially offset by cost savings of [redacted] million arising from the contract coming in below the estimate.

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[286] NAL0285545 – Project Cost Status 3-1-18 to 3-28-18

9 Retaining and Subsequently Dealing with Contractors and Suppliers

9.1 Mandate

Reference 4. (b) (i) *"…whether (i) Nalcor's conduct in retaining and subsequently dealing with contractors and suppliers of every kind was in accordance with best practice, and, if not, whether Nalcor's supervisory oversight and conduct contributed to project cost increases and project delays…"*[287]

9.2 Background

As part of the ongoing governance and oversight process for managing the Muskrat Falls Project, Nalcor developed a number of written management plans and policies and procedures governing how the project would be executed, including how contractors are selected and managed. Several of the policies and procedures developed for the project were modified or updated throughout the sanctioning and construction phases. The key policies reviewed by Grant Thornton encompassed how the PMT would select and retain contractors, and subsequently, how those relationships were managed and monitored after a contractor was selected. The key policies and procedures selected for review by Grant Thornton included:

- Invitation for Bidder Selection[288]
- Bid Receipt and Opening[289]
- Bid Evaluation and Award Recommendation[290]
- Procedure for Post Award Contract Administration[291]
- Procedure for Site Purchases[292]
- Materials Management Plan[293]
- Material Receiving[294]
- Material Request, Issue, Return[295]
- Accounts Payable Procedure[296]
- Payment Certificate Procedure[297]

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[287] NEWFOUNDLAND AND LABRADOR REGULATION 101/17 - Commission of Inquiry Respecting the Muskrat Falls Project Order under the Public Inquiries Act, 2006 (O.C. 2017 - 339) – Page 5
[288] NAL0018331 – Invitation for Bidder Selection, Rev. B2 – October 23, 2013
[289] NAL0018337 – Bid Receipt and Opening, Rev. B2 – October 23, 2013
[290] NAL0018340 – Bid Evaluation and Award Recommendation, Rev. B2 – October 23, 2013
[291] NAL0018244 – Procedure for Post Award Contract Administration
[292] NAL1999102 – Procedure for Site Purchases – April 15, 2014
[293] NAL3455533 – Materials Management Plan – March 8, 2012
[294] NAL2712272 – Material Receiving – April 2, 2014
[295] NAL1724418 – Material Request, Issue, Return – April 7, 2014
[296] NAL0018039 – Accounts Payable Procedure, Rev. B1 – November 14, 2017
[297] NAL0017910 – Payment Certificate Procedure, Rev. B3 – March 2, 2016

9.3 Bidder Selection, Evaluation and Award Recommendation

The bidding process began with the development of a contracting strategy by the Contract Administrator ("CA") on any packages greater than $5 million in estimated value, which includes key dates, considerations, procurement method, agreement type, compensation basis and commercial strategy.[298] Once completed, the CA was to: 1) prepare bidder selection questionnaires and evaluation plans,[299] 2) once approved, post those plans on the Lower Churchill Project website and distribute them to any targeted applicants.[300] Once applications were received by Nalcor, they were distributed to the evaluation team for scoring.[301] Applicants were scored on engineering, commercial/credit worthiness, quality assurance, health & safety, environmental and risk management.[302] The result was to identify three or more approved applicants to submit proposals/bids.[303] A bid may be single sourced by preparation of the Single Source Justification form, which must be approved by someone one level higher than the required authority level for the acquisition of the goods or services requested.[304]

Bids received from the selected applicants were logged into the Bid Received Log by the CA and placed sealed into a locked storage cabinet until the RFP closing and formal bid opening.[305] For all bid opening sessions, three representatives were required to attend. In addition to the CA / Buyer, these representatives may include, Project Cost Control and/or one member of the LCP procurement department.[306] The bids were to be stamped and the unevaluated prices are logged into the Bid Opening Record.[307] Technical information was evaluated separately from financial information. The technical documents were distributed to the technical evaluation team to be evaluated and financial information was evaluated by the procurement department for commercial evaluation.[308]

The proposals were to be evaluated against criteria established in the Bid Evaluation Plan.[309] These criteria generally include commercial, technical, health & safety, environmental, quality, risk, and provincial benefits requirements designed to establish conformity across proposals.[310] Throughout the evaluation process, clarification requests were to be issued by the CA or meetings are held as needed to clarify the bidder's proposal.[311] Once evaluations were completed they were compiled in the Bid Evaluation and Recommendation for Award.[312] The CA will compile the information from the evaluation team and, if necessary,

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[298] NAL0018331 – Invitation for Bidder Selection, Rev. B2 – October 23, 2013 – Pages 5 & 6
[299] NAL0018331 – Invitation for Bidder Selection, Rev. B2 – October 23, 2013 – Page 6
[300] NAL0018331 – Invitation for Bidder Selection, Rev. B2 – October 23, 2013 – Page 6
[301] NAL0018331 – Invitation for Bidder Selection, Rev. B2 – October 23, 2013 – Page 6
[302] NAL0018331 – Invitation for Bidder Selection, Rev. B2 – October 23, 2013 – Page 7
[303] NAL0018331 – Invitation for Bidder Selection, Rev. B2 – October 23, 2013 – Page 7
[304] NAL0018331 – Invitation for Bidder Selection, Rev. B2 – October 23, 2013 – Pages 7 - 8
[305] NAL0018337 – Bid Receipt and Opening, Rev. B2 – October 23, 2013 – Pages 4 - 5
[306] NAL0018337 – Bid Receipt and Opening, Rev. B2 – October 23, 2013 – Page 5
[307] NAL0018337 – Bid Receipt and Opening, Rev. B2 – October 23, 2013 – Page 5
[308] NAL0018337 – Bid Receipt and Opening, Rev. B2 – October 23, 2013 – Page 6
[309] NAL0018340 – Bid Evaluation and Award Recommendation, Rev. B2 – October 23, 2013 – Page 4
[310] NAL0018340 – Bid Evaluation and Award Recommendation, Rev. B2 – October 23, 2013 – Page 4
[311] NAL0018340 – Bid Evaluation and Award Recommendation, Rev. B2 – October 23, 2013 – Pages 7
[312] NAL0018340 – Bid Evaluation and Award Recommendation, Rev. B2 – October 23, 2013 – Page 8

schedule a meeting to discuss and agree on the recommendation for award.[313] A Nalcor requisition form is completed and approved based on the estimated contract value before the award of the contract or purchase order.[314]

9.3.1 Internal Audit Review

Nalcor Internal Audit conducted a review of the Contract Award Process in April 2013.[315] The objectives of the audit were to assess the policies and procedures governing the decision for contract award to ensure it is fair and reasonable, and to verify compliance with stated policies and procedures.[316] The results of the audit concluded that the policies and procedures in place provided a reasonable approach for a fair and consistent assessment of potential applicants.[317] Internal Audit also concluded the procedures were followed, a consistent application of the evaluation criteria was used, and documentation existed detailing the required levels of approval. [318]

9.4 Post Award Contract Administration

Contracts are generated by the Home Office Supply Chain Team.[319] Responsibility for the contract is then transferred to the CA once a kick-off meeting with the contractor is held.[320] The CA is responsible for maintaining the official contract, in both digital and physical copies of related files.[321] The Aconex system is to be used for the official mailroom and repository for documents pertaining to the contract.[322] The contractor's duties are generally outlined in Exhibit 3 Coordination Procedures in each contract.[323] The CA verifies that the contractor is meeting their responsibilities as well as confirming all contract documentation is stored in Aconex.[324]

Once all of the required documents have been submitted by the contractor prior to commencing work as outlined in the contract, the CA drafted a notification letter to commence mobilization activities.[325] The CA hosted an initial site coordination meeting to establish a common understanding of site regulations, responsibilities, and methods of reporting progress to the Project Controls Team.[326] The CA drafts all correspondence in consultation with an individual at Nalcor who has authority to act on behalf of Nalcor.[327] The CA advises the Contractor of all deadlines for reports and confirms that all reporting

[313] NAL0018340 – Bid Evaluation and Award Recommendation, Rev. B2 – October 23, 2013 – Page 8
[314] NAL0018340 – Bid Evaluation and Award Recommendation, Rev. B2– October 23, 2013 – Page 9
[315] NAL0106555 – Audit Report 13-06, 2013 Contracts Award Process – April 29, 2013 – Page 1
[316] NAL0106555 – Audit Report 13-06, 2013 Contracts Award Process – April 29, 2013 – Page 1
[317] NAL0106555 – Audit Report 13-06, 2013 Contracts Award Process – April 29, 2013 – Page 2
[318] NAL0106555 – Audit Report 13-06, 2013 Contracts Award Process – April 29, 2013 – Page 3
[319] NAL0018244 – Procedure for Post Award Contract Administration – Page 10
[320] NAL0018244 – Procedure for Post Award Contract Administration – Page 10
[321] NAL0018244 – Procedure for Post Award Contract Administration – Page 11
[322] NAL0018244 – Procedure for Post Award Contract Administration – Pages 11 & 12
[323] NAL0018244 – Procedure for Post Award Contract Administration – Page 11
[324] NAL0018244 – Procedure for Post Award Contract Administration – Page 11
[325] NAL0018244 – Procedure for Post Award Contract Administration – Page 18
[326] NAL0018244 – Procedure for Post Award Contract Administration – Page 18
[327] NAL0018244 – Procedure for Post Award Contract Administration – Page 19

requirements identified in the contract are being met.[328] The CA advises the Company Representative of any concerns and assists the Project Controls Department with the verification of cost or schedule information provided by the contractor.[329] The CA shall interact with the contractor on issues relative to Change Requests and Payments.[330]

After receiving a request for substantial completion or release of holdback, the CA is responsible for confirming that the contractor has met the contractual requirements.[331] Finally the CA is to confirm that the requirements for final completion as outlined in the contract have been met, draft a Final Completion Certificate, and advise the Company Operations Group that work has been accepted and turned over, and provides copies of all warranty certificates and notification of any defects.[332]

9.4.1 Internal Audit Review

Nalcor Internal Audit conducted a review of the Contract Administration process in 2014.[333] The objectives of the audit were to confirm contract administration had an adequate control environment, to verify procedures aligned with best practices consistent with the Project Management Body of Knowledge ("PMBOK"), Chapter 12 Project Procurement Management/Contract Administration and the Institute of Internal Auditors Construction Audit Guide, and to review legal templates for completeness and ensure legal oversight and approval during their creation.[334] Internal Audit concluded that the Supply Chain is working within an appropriate control environment.[335] Internal Audit also concluded the post contract award activities and contract close activities are consistent with best practices.[336]

9.5 Procurement

Nalcor used two methods for supplying materials for contractors: purchasing materials directly or reimbursing the contractor supplied materials.[337] Nalcor's purchasing procedures requires that purchases are not made without a requisition which is approved by the budget holder.[338] Once approved by the Site Contracts Manager, a purchase order is generated.[339] Once received, materials are checked against the packing list and purchase order.[340] Contractors request the release of materials using a material release form at least 72 hours prior to the release of company supplied material.[341] Once approved, the Site Material Controller prepares a Material Issue Report documenting the approval to release the

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328 NAL0018244 – Procedure for Post Award Contract Administration – Page 19
329 NAL0018244 – Procedure for Post Award Contract Administration – Pages 19-20
330 NAL0018244 – Procedure for Post Award Contract Administration – Page 20
331 NAL0018244 – Procedure for Post Award Contract Administration – Page 27
332 NAL0018244 – Procedure for Post Award Contract Administration – Pages 28-29
333 NAL0106559 – Audit Report 14-34, Contract Administration – 2014 -Page 1
334 NAL0106559 – Audit Report 14-34, Contract Administration – 2014 – Page 1
335 NAL0106559 – Audit Report 14-34, Contract Administration – 2014 - Page 4
336 NAL0106559 – Audit Report 14-34, Contract Administration – 2014 - Page 4
337 NAL3455533 – Materials Management Plan – March 8, 2012 – Page 6
338 NAL1999102 – Procedure for Site Purchases – April 15, 2014 – Page 6
339 NAL1999102 – Procedure for Site Purchases – April 15, 2014 – Pages 8-9
340 NAL2712272 – Material Receiving – April 2, 2014 – Page 7
341 NAL1724418 – Material Request, Issue, Return – April 7, 2014 – Page 5

materials.[342] Any unused materials are returned to the company, inspected and re-entered into the inventory tracking system.[343]

9.5.1 Internal Audit Review

Nalcor Internal Audit conducted a Site Purchasing Review in September 2017.[344] The objectives of the audit were to review, discuss, and compliance test site purchasing, receiving, and disbursement of site supplies and tools, including a safety walk around of the maintenance facility.[345] Internal Audit concluded that generally the Site Purchasing Procedure is being followed, as demonstrated through compliance testing, it does however require an update, which the LCP Supply Chain Manager was already in the process of doing.[346]

9.6 Invoice Attest and Accounts Payable

All contractor invoices received were required to go through an attest and approval process before payment.[347] The objectives of this process is to confirm invoices are:[348]

- Compliant with the contract and includes all supporting documentation,
- Free of errors or omissions,
- Compliant with tax regulations,
- Approved in accordance with the Financial Authority Procedure, and
- Coded to the appropriate code of accounts.

Contractors are required to submit invoices in paper format to the Project Office, where they are logged into the Invoice Tracking Log.[349] A Cost Analyst is assigned and starts the attest process by completing Financial Verification.[350] The Financial Verification process includes reviewing the invoice for required information and verifying mathematical accuracy, correct treatment of taxes has been applied, accuracy of holdback amounts, agreement to supporting documentation, and compliance with contract and applicable policies.[351] If the invoice has significant errors or disputed amounts it is rejected and the contractor is notified of the rejection and reasoning in a letter.[352] Once Financial Verification is completed the Cost Analyst enters the invoice into the integrated project management software programs; PM+ (construction costs) or Prism (administrative and staff costs) as appropriate.[353]

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342 NAL1724418 – Material Request, Issue, Return – April 7, 2014 – Page 6
343 NAL1724418 – Material Request, Issue, Return – April 7, 2014 – Page 7
344 NAL4848318 – Internal Audit Memo: Site Purchasing Review – October 16, 2017 – Page 1
345 NAL4848318 – Internal Audit Memo: Site Purchasing Review – October 16, 2017– Page 1
346 NAL4848318 – Internal Audit Memo: Site Purchasing Review – October 16, 2017– Page 1
347 NAL0018039 – Accounts Payable Procedure, Rev. B1 – November 14, 2017 – Page 9
348 NAL0018039 – Accounts Payable Procedure, Rev. B1 – November 14, 2017 – Page 9
349 NAL0018039 – Accounts Payable Procedure, Rev. B1 – November 14, 2017 – Page 9
350 NAL0018039 – Accounts Payable Procedure, Rev. B1 – November 14, 2017 – Page 10
351 NAL0018039 – Accounts Payable Procedure, Rev. B1 – November 14, 2017 – Pages 10 to 15
352 NAL0018039 – Accounts Payable Procedure, Rev. B1 – November 14, 2017 – Page 16
353 NAL0018039 – Accounts Payable Procedure, Rev. B1 – November 14, 2017 – Page 9

Certain major contracts have a requirement for a payment or milestone certificate that must be submitted with the contractor's invoice for payment.[354] A contractor will prepare an application for payment certificate with all supporting documentation and send to the CA.[355] The CA validates the certificate package for commercial compliance and distributes to the Cost Controller, Technical/Construction Representative, and the Area or Construction Manager with an approval form.[356] Each must review and sign the approval form, which is then sent to the Company Representative to validate and approve.[357] Once completed, the Contract Administrator verifies the certificate package has all the required documents and approvals and issues the payment certificate to the contractor to be submitted as part of the invoice package.[358]

The next step of the attest process is Technical Verification, which is to confirm goods have been received or services delivered by the contractor are due and payable.[359] This involves reviews of approved milestone certificates, quantity survey certificates, materials receiving reports, payment certificates or other documentation.[360] After Technical Verification, Budget Verification is confirmed by the Lead Cost Controller to verify it's applied to the correct line items in the system.[361] The Budget Holder will then approve the invoice package.[362]

Prism invoices are mailed to Nalcor Corporate Accounts Payable ("C-AP") to process the invoices via the corporate accounts payable process using the JDE system.[363] PM+ invoices are electronically transmitted to JDE.[364]

9.6.1 Internal Audit Review

Internal Audit conducted a review of the invoice attest and payable process in September 2015.[365] The objectives of the audit were: 1) review the control environment, risk assessment process, communications and monitoring activities, 2) determine if adequate internal controls exist, 3) test compliance of the process with attested invoices.[366] Internal Audit concluded that internal controls for the Accounts Payable function align with the COSO Internal Control Framework principles relating to control environment, risk assessment, and monitoring processes.[367] Internal Audit also concluded that internal controls included in the invoice attest process and the data exchange process were effective in mitigating the risk of

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354 NAL0018039 – Accounts Payable Procedure, Rev. B1 – November 14, 2017 – Page 16
355 NAL0017910 – Payment Certificate Procedure, Rev. B3 – March 2, 2016 – Page 11
356 NAL0017910 – Payment Certificate Procedure, Rev. B3 – March 2, 2016 – Pages 7 & 11
357 NAL0017910 – Payment Certificate Procedure, Rev. B3 – March 2, 2016 – Page 11
358 NAL0017910 – Payment Certificate Procedure, Rev. B3 – March 2, 2016 – Pages 11
359 NAL0018039 – Accounts Payable Procedure, Rev. B1 – November 14, 2017 – Page 17
360 NAL0018039 – Accounts Payable Procedure, Rev. B1 – November 14, 2017 – Page 17
361 NAL0018039 – Accounts Payable Procedure, Rev. B1 – November 14, 2017 – Page 18
362 NAL0018039 – Accounts Payable Procedure, Rev. B1 – November 14, 2017 – Pages 18-19
363 NAL0018039 – Accounts Payable Procedure, Rev. B1 – November 14, 2017 – Pages 18-19
364 NAL0018036 – Electronic Data Exchange Procedure, Rev. B2 – July 15, 2016 – Page 3
365 NAL0106564 – Audit Report 15-07, Invoice Attest and Payable Process – September 22, 2015 – Page 1
366 NAL0106564 – Audit Report 15-07, Invoice Attest and Payable Process – September 22, 2015 – Page 3
367 NAL0106564 – Audit Report 15-07, Invoice Attest and Payable Process – September 22, 2015 – Page 6

payment for unauthorized costs.[368] Internal audit noted three medium to low risk issues overall that did not impact the project team's relationship in dealing with suppliers.[369]

Additionally, Internal Audit conducted a review of the LCP payment certificate review and compliance process in 2015.[370] The audit objectives were to review and assess the adequacy of the controls in place for the Payment Certificate Approval Process and to test compliance to these procedures with invoices that had previously been approved for payment.[371] Internal Audit concluded the controls in place adequately ensured that billings for goods/services were received, inspected, accepted and that pricing and terms are correct.[372] Internal Audit also concluded that the approvals of the payment certificates were generally in compliance with the Payment Certificate process.[373]

9.7 Observations and Findings

When considering Nalcor's conduct in retaining and subsequently dealing with contractors we reviewed Nalcor's policies and procedures. Our review was focused on considering if Nalcor's supervisory oversight and conduct contributed to project cost increases and project delays. We concluded the following:

- Nalcor had well documented policies and procedures specific to the LCP. These policies and procedures were reviewed and updated periodically. In addition, Nalcor's internal audit group, throughout the construction phase of the LCP, reviewed the policies and procedures with no material deficiencies noted. Therefore, we have concluded that the documented policies and procedures governing Nalcor's conduct in retaining and subsequently dealing with contractors were in accordance with best practice.

- Generally, with the exception of Nalcor's oversight of Astaldi's work (as described in section 4 of this report), their conduct in retaining and subsequently dealing with contractors did not contribute to project cost increases and project delays.

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368 NAL0106564 – Audit Report 15-07, Invoice Attest and Payable Process – September 22, 2015 – Page 6

369 NAL0106564 – Audit Report 15-07, Invoice Attest and Payable Process – September 22, 2015 – Pages 7 to 12

370 NAL0106566 – Audit Report 15-17, Payment Certificate Review and Compliance – January 28, 2016 – Page 1 (First 2 digits of report number indicates year)

371 NAL0106566 – Audit Report 15-17, Payment Certificate Review and Compliance – January 28, 2016 – Page 3

372 NAL0106566 – Audit Report 15-17, Payment Certificate Review and Compliance – January 28, 2016 – Page 9

373 NAL0106566 – Audit Report 15-17, Payment Certificate Review and Compliance – January 28, 2016 – Page 9

10 Contractual and Commercial Arrangements Between Nalcor and the Various Contractors

10.1 Mandate

Reference 4. (b) (ii) *"…whether (ii) the terms of the contractual arrangements between Nalcor and the various contractors retained in relation to the Muskrat Falls Project contributed to delays and cost overruns, and whether or not these terms provided sufficient risk transfer from Nalcor to the contractors…"*[374]

"…whether (vi) the commercial arrangements Nalcor negotiated were reasonable and competently negotiated…"[375]

10.2 Background

When considering this portion of our mandate, we reviewed Edward Merrow's comment on contracting. Mr. Merrow states: *"Contracting for the services needed to engineer, procure materials, and construct megaprojects is an area of intense disagreement and almost religious-like fervor among project professionals…Every approach to contracting appears to have both ardent adherents and steadfast opponents."*[376] Mr. Merrow goes on to say: *"We tend to exaggerate the importance of contracting approach to project success or failure. No contracting approach guarantees success; most contracting approaches can succeed."*[377]Mr. Merrow also says: *"Every contracting approach brings with it uncertainty and possibility. Contracting is difficult, and it is situational. Perhaps that is why so many owner project and business professionals want to believe they have found the answer. But in reality, the answer probably does not exist. There is, however, one rule that always seems to apply: if sponsors decide to engage in contracting games, by which I mean trying to get the better of contractors, they will always lose. Contractors always have been and always will be better at contracting games than owners. Their lives depend on it."*[378]

Notwithstanding the above, in order to fulfill this portion of our mandate we focused our review on the articles of the construction contracts with Astaldi (CH0007-001) and Valard (CT0327-001) which were the two largest contracts on the project and the contracts with the largest cost overruns. The Articles are the standard terms and conditions of the agreement that govern the interaction between Nalcor and each of the contractors.

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[374] NEWFOUNDLAND AND LABRADOR REGULATION 101/17 - *Commission of Inquiry Respecting the Muskrat Falls Project Order* under the *Public Inquiries Act, 2006* (O.C. 2017 - 339) – Page 5
[375] NEWFOUNDLAND AND LABRADOR REGULATION 101/17 - *Commission of Inquiry Respecting the Muskrat Falls Project Order* under the *Public Inquiries Act, 2006* (O.C. 2017 - 339) – Page 3
[376] Edward Merrow – Industrial Megaprojects Concepts, Strategies, and Practices for Success – 2011 – Page 253
[377] Edward Merrow – Industrial Megaprojects Concepts, Strategies, and Practices for Success – 2011 – Page 253
[378] Edward Merrow – Industrial Megaprojects Concepts, Strategies, and Practices for Success – 2011 – Page 254

10.3 Use of Third Party Expert Services

Our review of these contracts was supplemented with the services of Miller Thomson LLP and R.W. Block Consulting, LLC as summarized below.

10.3.1 Miller Thomson LLP

We asked Miller Thomson to answer specific questions regarding contractual terms included in the original agreements with Astaldi and Valard. We did not ask them to comment on the contractual arrangements in subsequent agreements because the subsequent agreements deal with specific issues such as productivity, geotechnical and conductor proud stranding etc. Specifically, we requested Miller Thomson to review the agreements and to provide their view as to whether the contractual terms:[379]

- contributed to delays and/or cost overruns,
- provided sufficient risk transfer from the Owners to the Contractors,
- reflected a procurement strategy appropriate for the Project, and
- were reasonably and competently negotiated.

Their conclusions have been incorporated throughout the analysis that follows.

10.3.2 R.W. Block Consulting, LLC

We asked R.W. Block to review the original agreements with Astaldi and Valard. We did not ask them to comment on the contractual arrangements in subsequent agreements because the subsequent agreements deal with specific issues such as productivity, geotechnical and conductor proud stranding, etc. Their review included the following:

- Astaldi:[380]
  - the structure of the contract,
  - the financial security provisions in the contract,
  - Nalcor's decision to negotiate a revised contract with Astaldi.

- Valard:[381]
  - the structure of the contract,
  - the financial security provisions in the contract,
  - Nalcor's claims settlement with Valard.

Their conclusions have been incorporated throughout the analysis that follows.

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379 Miller Thomson Memorandum to Grant Thornton – November 20, 2018

380 Muskrat Falls CH0007 Contract Review – R.W. Block Consulting – November 1, 2018

381 Muskrat Falls CT0327 Contract Review – R.W. Block Consulting – November 1, 2018

10.4 Astaldi – Contract CH0007-001

As noted previously, the contract with Astaldi contributed to $1.207 billion (31%) of the project overrun as of March 2018. Based on the size of the overrun we chose this contract for review.

As part of our analysis we became aware that Nalcor's investment evaluation team performed a creditworthiness evaluation on Astaldi and Salini. As already described previously in this report, Salini was the other shortlisted bidder on this work package that was being considered by Nalcor.

The results of this evaluation are outlined in an email from Rob Hull, General Manager (Commercial, Treasury and Risk) & Chief Risk Officer to Derrick Sturge, VP Finance and CFO on August 23, 2013. Mr. Hull states *"I believe the Salini JV to be an unacceptable counterparty from a credit perspective. Salini has recently been rated as BB by Fitch, which is near the bottom end of speculative. Further, FCC* [Salini S.p.A/FCC Construction S.A. – Joint Venture] *has a bankrupt subsidiary with allegations of bankruptcy fraud, and seems to be having their own set of problems in Spain, including substantial losses in 2012."* [382]

He goes on to say: *"That leaves Astaldi. While I am not overly enthusiastic about the outlook for Italy…and hence exposure to an Italian firm for such a substantial contract, I understand there are commercial reasons as to why these two players comprise the short-list…the contract terms for Astaldi appear stronger overall versus the Salini JV…I understand the commercial team believes the performance security provided to be the maximum amount we likely could obtain....would like to have seen it higher given the risk and seeing it is below our standard ask of 15%. I also understand Treasury enquired about obtaining security over the batch plant in the event of default...I understand that was rejected and I would like to understand why...on the surface, it would provide more value and also likely to reduce time and cost if they had to be replaced…My conclusion....the Salini JV should not be considered further. Astaldi is better (less risk) but risks above should be communicated to the decision makers."*[383]

In a subsequent email from September 12, 2013 Mr. Hull states *"The proponent is credit worthy based on our established criteria and has posted an acceptable performance security package, and we will be recommending acceptance from a creditworthiness perspective. However, in reaching this decision, decision makers should be "eyes open" to any of the risks noted below in the key findings… overall credit score is 63%... Performance security consists of a $100 million letter of credit… and a $150 million performance bond… LCP has arranged a 10% hold back bond, which minimizes risk of work stoppage due to subcontractor claims… liquidated damages are also provided on a schedule and key personnel. This provides an adequate incentive to the proponent to complete the work in a timely manner… liability is unlimited if the proposed proponent walks away… the economic outlook for Italy… is not favourable."* [384]

The following is a summary of the key provisions within the contract relevant for our mandate.

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[382] NAL0127974 – Email RE: Due Diligence CH0007, from CRO and Responses – August 23 and 24, 2013 – Pages 3 & 4

[383] NAL0127974 – Email RE: Due Diligence CH0007, from CRO and Responses – August 23 and 24, 2013 – Pages 3 & 4

[384] NAL0128180 –Email RE: Credit Assessment – CH0007, from CRO – September 12, 2013 – Page 2 & 3

10.4.1 Commercial Terms

Agreement No: CH0007-001, Exhibit 2 Compensation, outlines the compensation terms of the original agreement with Astaldi. The total original contract value can be categorized as follows (this includes the LMAX of $64 million):

Contract Component	Amount ($ Millions)
Target Cost of Labour	508[385]
Maximum Labour Cost Sharing Amount	64[386]
LMAX (Subtotal)	572[387]
Labour Profit (7% of Target Labour Cost)	35[388]
Lump Sum and Unit Price Items	452[389]
Travel Allowance	29[390]
Total (Including LMAX)	**1,088**

10.4.2 Target Cost of Labour

Target cost of labour was the Contractor's estimate of the reimbursable cost of labour.[391] This includes actual wages and benefits paid by the contractor plus the associated government burdens (i.e. Canadian Pension Plan).[392] The reimbursable cost of labour was subject to an "LMAX." The LMAX was defined as the maximum value of the reimbursable cost of labour.[393] The contractor was responsible for the reimbursable cost of labour which exceeded the LMAX amount.[394] On the effective date of the contract, the estimated LMAX was $572 million, which was the target cost of labour of $508 million plus $64 million.[395]

Miller Thomson reviewed the LMAX provision and noted: "*… the cap on Reimbursable Cost of Labour (the LMAX) is still subject to fluctuation on account of any change orders approved by MFC. Ultimately, any increase to the estimate of the Reimbursable Cost of Labour …had to be approved by MFC pursuant to the change order regime included in the Astaldi Agreement.*"[396] Thus Astaldi would bear the risk of any labour costs which exceeded the LMAX that were not approved by MFC

385 NAL0011236 – CH0007-001 Exhibit 2 Compensation – November 29, 2013 – Page 6
386 NAL0011236 – CH0007-001 Exhibit 2 Compensation – November 29, 2013 – Page 7
387 NAL0011236 – CH0007-001 Exhibit 2 Compensation – November 29, 2013 – Page 7
388 NAL0011236 – CH0007-001 Exhibit 2 Compensation – November 29, 2013 – Page 7
389 NAL0011236 – CH0007-001 Exhibit 2 Compensation – November 29, 2013 – Page 36
390 NAL0011236 – CH0007-001 Exhibit 2 Compensation – November 29, 2013 – Page 36
391 NAL0011236 – Contract for CH0007-001, Exhibit 2 Compensation – Pages 4
392 NAL0011236 – Contract for CH0007-001, Exhibit 2 Compensation – Pages 4
393 NAL0011236 – Contract for CH0007-001, Exhibit 2 Compensation – Pages 5
394 NAL0011236 – Contract for CH0007-001, Exhibit 2 Compensation – Page 5
395 NAL0011236 – Contract for CH0007-001, Exhibit 2 Compensation – Pages 7
396 Miller Thomson Memorandum to Grant Thornton, November 20, 2018 – Page 3

pursuant to any change orders. Subsequently, Nalcor agreed to absorb that risk based on the analysis described in the following paragraphs.

As previously noted in this report, in October 2016 Nalcor engaged Westney Consulting to assist them with determining whether they should continue with Astaldi. This analysis found that with such a significant cost gap, other factors needed to be considered such as:[397]

- *"Cost to complete over and above Astaldi contract,*
- *Astaldi's financial strength, i.e. their ability to absorb losses of such magnitude,*
- *The cost of Alternative execution approaches given the size of the issue"*

It also became known that the guarantor, Astaldi S.p.A. (parent company of Astaldi Canada), was experiencing a deteriorating financial position[398] hence diminishing the value of the parental guarantee. This impacted Nalcor's decision on whether or not to enforce the parental guarantee as *"Astaldi's lack of liquidity and creditworthiness are likely to lead to outcomes that are very unfavorable..."*[399]

Nalcor, with the assistance of Westney, determined that negotiating a completion agreement with Astaldi provided an outcome that gave the *"…least cost-risk exposure…"* and *"…provides most certainty and controlled predictive outcome..."*[400]

10.4.3 Labour Profit

Labor profit is the compensation for profit on the reimbursable cost of labour.[401] Labour profit was 7% of the target cost of labour ($508 million) or approximately $36 million.[402] Labour profit was to be paid based on the proportion of total concrete installed to the total estimated concrete.[403]

10.4.4 Fixed Lump Sum Items

Certain items in the contract required a lump sum payment. The lump sum payments were to be paid monthly based on the progress achieved against each item from the schedule of values and accepted by the Engineer.[404]

10.4.5 Fixed Unit Price Items

Certain items in the contract required unit price payments. Unit price payments were to be paid monthly and were based on company approved quantities installed.[405]

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[397] NAL0277308 – Astaldi Completions Binder 1 – Legal Opinion Extracted – Page 5
[398] NAL1583497 – Astaldi Briefing for Government of Canada – October 12, 2016 – Page 26
[399] NAL1175676 – Muskrat Falls Generation Astaldi Analysis and Path Forward, February 2016 – Page 10
[400] NAL1175676 – Muskrat Falls Generation Astaldi Analysis and Path Forward, February 2016 – Page 9
[401] NAL0011236 – Contract for CH0007-001, Exhibit 2 Compensation – Page 5
[402] NAL0011236 – Contract for CH0007-001, Exhibit 2 Compensation – Pages 7
[403] NAL0011236 – Contract for CH0007-001, Exhibit 2 Compensation – Pages 7
[404] NAL0011236 – Contract for CH0007-001, Exhibit 2 Compensation – Page 10
[405] NAL0011236 – Contract for CH0007-001, Exhibit 2 Compensation – Page 11

10.4.6 Travel Allowance

Nalcor was required to pay the actual travel allowances /air transportation costs of the contractor's work force covered by the collective agreement and working at site.[406]

10.4.7 Performance Security

The contract outlines the various type of performance security instruments Astaldi provided to guarantee their performance. These instruments are summarized below:

Performance Security	Description	Amount ($ Millions)
Parental Guarantee	Guarantee from Astaldi S.p.A. providing the financial or other support as may be required to ensure all obligations under the agreement continue to be fulfilled. [407]	Unlimited
Letter of Credit #1	Linked to the advanced payment of 10% of the contract price to the contractor and released when Nalcor had received full credit from the Contractor[408]	102
Letter of Credit #2	$100 million until substantial completion certificate has been issued reduced to $20 million until a final completion certificate has been issued[409]	100
Letter of Credit #3	Covering the warranty period[410]	10
Performance Bond	To guarantee performance of the work, pre-paid and non-cancellable[411]	150

[406] NAL0011236 – Contract for CH0007-001, Exhibit 2 Compensation – Page 9
[407]NAL0011226 – Contract for CH0007-001, Exhibit 14 Performance Security – Page 2
[408] NAL0011221 – Civil Works Agreement: Construction of Intake and Powerhouse, Spillway and Transition Dams – November 29, 2013 – Pages 30-31
[409] NAL0011221 – Civil Works Agreement: Construction of Intake and Powerhouse, Spillway and Transition Dams – November 29, 2013 – Page 31
[410] NAL0011221 – Civil Works Agreement: Construction of Intake and Powerhouse, Spillway and Transition Dams – November 29, 2013 – Page 31
[411] NAL0011221 – Civil Works Agreement: Construction of Intake and Powerhouse, Spillway and Transition Dams – November 29, 2013 – Page 31

R.W. Block reviewed this article and noted: *"Contracts that require performance bonds, often require bonds in the amount of 100% of the project's value. However, on very large projects (such as this) we have seen lower bonding requirements (such as 50%, or less, of contract value), and other approaches such as Letters of Credit and Parent Guarantees. As such, Nalcor's approach is consistent with approaches we have seen on other large contracts, but as Astaldi S.p.A.'s reported financial deterioration has shown (which will be discussed later), Parent Guarantees are not one-for-one replacements for performance bonds."*[412]

10.4.8 Liquidated Damages

The agreement includes liquidated damages for delays at a daily rate that varies based on the missed milestone. The liquidated damages is limited to 7.5% of the contract value (approximately $77 million).[413]

Miller Thomson reviewed the liquidated damages article included in the Astaldi contract and noted: *"The inclusion of liquidated damages for delay ("Delay LDs") assists in transferring a proportion of the risk of delays from MFC to Astaldi, as it provides an incentive for Astaldi to achieve specific milestones by the applicable agreed upon dates."*[414]

10.4.9 Limitation of Liability

The agreement contained a limitation of liability provision which limited the Contractor's maximum aggregate liability to 50% of the contract price (approximately $500 million).[415]

Miller Thomson reviewed the limitation of liability article included in the Astaldi contract and noted: *"The cap being based on 50% of the Contract Price is a negotiated term, and while it could be argued that 100% of the Contract Price would have been more appropriate in the circumstances, the existing provision, as conditioned by the various exceptions, does not appear to be unreasonable."*[416]

10.4.10 Default and Termination

The agreement contained default and termination provision which allowed for the termination of the contractor for two situations: 1) for cause or 2) for convenience.

Section 24.1(a) of the agreement states the following event shall constitute a default by the Contractor: *"if Contractor does not properly prosecute the Work or fails in the performance or observance of any of its obligations under this Agreement and such failure has a material adverse effect on the Company or the Work except to the extent that the failure in performance or observance is excused by reason of Force Majeure or is caused by Company or any Person under its control."*[417]

Miller Thomson reviewed this article and noted: *"…the Astaldi Agreement included the necessary tools that would have allowed MFC to terminate the Agreement due to Astaldi's poor performance. MFC had the ability to terminate the Astaldi Agreement "for cause" based on Astaldi's poor performance assuming that such poor performance had a "material adverse effect" on MFC or the Project*

[412] Muskrat Falls CH0007 Contract Review – R.W. Block Consulting – November 1, 2018 – Page 3
[413] NAL0011221 – Civil Works Agreement: Construction of Intake and Powerhouse, Spillway and Transition Dams – November 29, 2013 – Page 75
[414] Miller Thomson Memorandum to Grant Thornton – November 20, 2018 – Page 3
[415] NAL0011221 – Civil Works Agreement: Construction of Intake and Powerhouse, Spillway and Transition Dams – November 29, 2013 – Page 80
[416] Miller Thomson Memorandum to Grant Thornton – November 20, 2018 – Page 13
[417] NAL0011221 – Civil Works Agreement: Construction of Intake and Powerhouse, Spillway and Transition Dams – November 29, 2013 – Page 63

itself…Assuming that Astaldi's poor performance: (a) caused a material adverse effect on MFC or the Project, (b) such poor performance is not excused by reason of Force Majeure, and (c) such poor performance was not caused by MFC or any Person under MFC's control, then, the Astaldi Agreement allows MFC to begin the process to terminate the Astaldi Agreement "for cause".[418]

Section 24.11(b) of the agreement indicated that notwithstanding any other provision in the agreement: *"…at any time during the Term, Company may, in its sole and absolute discretion and for any reason, including convenience of Company and without any fault or default on the part of Contractor, terminate this Agreement effective immediately…"*[419]

Miller Thomson reviewed this article and noted: *"Therefore, in the event Astaldi's poor performance did not rise to the level of a "material adverse effect" on MFC or the Project or otherwise did not meet the minimum requirements to allow MFC to terminate the Astaldi Agreement "for cause"…MFC had the ability to terminate the Astaldi Agreement at any time…provided MFC paid the applicable termination fee to Astaldi."*[420]

The termination for convenience fee would have included the following:[421]

- unpaid labour profit owed to Astaldi
- work that has been satisfactorily performed to date of termination
- expenses of the Contractor that are directly related to the termination
- cost of plant and materials ordered for the work which have been delivered to the Contractor
- cost of removal of any temporary works and of Contractor's items from the Site
- cost of repatriation of Contractor's staff and labour employed wholly in connection with the work at the date of termination

10.4.11 Construction Schedule

Section 8.5 of the agreement indicated: *"To the extent a Change impacts a Milestone Date or an Interface Date such date or dates shall be extended to reflect additional time required for the Work occasioned by the Change. Such extension of time shall require a Change Order and be treated in accordance with the provisions of Article 14."*[422]

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[418] Miller Thomson Memorandum to Grant Thornton – November 20, 2018 – Page 5
[419] NAL0011221 – Civil Works Agreement: Construction of Intake and Powerhouse, Spillway and Transition Dams – November 29, 2013 – Page 67
[420] Miller Thomson Memorandum to Grant Thornton – November 20, 2018 – Page 6
[421] NAL0011221 – Civil Works Agreement: Construction of Intake and Powerhouse, Spillway and Transition Dams – November 29, 2013 – Pages 67-70
[422] NAL0011221 – Civil Works Agreement: Construction of Intake and Powerhouse, Spillway and Transition Dams – November 29, 2013 – Page 32

10.4.12 Miller Thomson Conclusion

Miller Thomson commented: *"As demonstrated by the examples of MFC's Approval Rights above, Astaldi was largely unable to increase the Project cost/price or extend the construction schedules without the prior approval of MFC in the form of a change order or similar approval. MFC's Approval Rights included in the Astaldi Agreement provided an effective risk transfer "tool" as they limited the ability of Astaldi to unilaterally increase the cost of the Project or extend the construction schedule. Therefore, it is our view that the Astaldi Agreement largely included the necessary and typical tools found in an agreement of this type to allow MFC to limit cost overruns and delays by withholding any requested approvals and seeking alternative solutions at that time."*[423]

10.5 Valard – Contract CT0327-001

As noted previously, the contract with Valard has contributed to $788 million (20%) of the project overrun as of March 2018. Based on the size of the overrun we chose this contract for review.

10.5.1 Commercial Terms

Agreement No: CT0327-001 Exhibit 2 Compensation outlines the compensation terms of the original agreement with Valard. The contract was primarily structured as a lump sum and unit price[424] contract which effectively transferred the cost risk due to labour productivity to Valard:

Contract Component	Amount ($ Millions)
Segments 1 & 2	318[425]
Segment 3	178[426]
Segments 4 & 5	313[427]
Sub-total	**809[428]**

10.5.2 Fixed Lump Sum

Payment for work completed on a lump sum basis is based on fixed prices and the aggregate total shall form the fixed lump sum price of this agreement. This includes all elements necessary to complete the work. Measurement of items paid on a lump sum basis shall be completed on a monthly basis subdivided into the payment milestones. Progress against the payment milestones accepted by the engineer form the basis of the invoices.[429]

423 Miller Thomson Memorandum to Grant Thornton – November 20, 2018 – Page 4
424 NAL0014341 – Civil Works Agreement: Construction of 350 kV HVdc Transmission Line, Exhibit 2 Compensation – August 8, 2014 – Page 175-176
425 NAL0014341 – CT0327-001 Civil Works Agreement – August 8, 2014 – Page 194
426 NAL0014341 – CT0327-001 Civil Works Agreement – August 8, 2014 – Page 194
427 NAL0014341 – CT0327-001 Civil Works Agreement – August 8, 2014 – Page 194
428 NAL0014341 – CT0327-001 Civil Works Agreement – August 8, 2014 – Page 194
429 NAL0014341 – CT0327-001 Civil Works Agreement – August 8, 2014 – Page 175 to 176

10.5.3 Unit Price Items

Unit price items include all elements necessary to achieve completion of each item.[430] Payments on unit price items are made monthly and are based on company approved quantities installed.[431] Estimated quantities of unit price items are not guaranteed and payments are only made on quantities installed.[432]

10.5.4 Reimbursable Work (Time and Material)

The Contractor had to obtain prior approval from Nalcor or the Engineer before commencing any reimbursable work. Cost reimbursable work is identified as follows: 1) the Contractor's Labour Rates multiplied by Accepted hours of Work; 2) Contractor's Equipment Rates multiplied by Accepted hours of use 3) Pre-Accepted material expenses, travel and mileage expenses and third party expenses. [433]

10.5.5 Performance Security

The contract outlines the various type of performance security instruments Valard provided to guarantee their performance. These instruments are summarized below:

Performance Security	Description	Amount ($ Millions)
Parental Guarantee	Guarantee from Quanta Services, Inc. ("Quanta"), guaranteeing *"the full performance, payment and observance by the Contractor of each and every acknowledgement, covenant, agreement, undertaking, indemnity, waiver, release and obligation of the Contractor contained in the Agreement."*[434]	Unlimited

[430] NAL0014341 – Civil Works Agreement: Construction of 350 kV HVdc Transmission Line, Exhibit 2 Compensation – August 8, 2014 – Page 176
[431] NAL0014341 – Civil Works Agreement: Construction of 350 kV HVdc Transmission Line – August 8, 2014, Exhibit 2 Compensation – Page 176
[432] NAL0014341 – Civil Works Agreement: Construction of 350 kV HVdc Transmission Line – August 8, 2014, Exhibit 2 Compensation – Page 176
[433] NAL0014341 – Civil Works Agreement: Construction of 350 kV HVdc Transmission Line – August 8, 2014, Exhibit 2 Compensation – Pages 177
[434] NAL0014341 – Civil Works Agreement: Construction of 350 kV HVdc Transmission Line – August 8, 2014 – Page 1453

Performance Security	Description	Amount ($ Millions)
Letter of Credit #1	Equal to eight percent (8%) of the total contract price until a Final Completion Certificate has been issued, and thereafter[435]	65
	Equal to four percent (4%) of the total contract price during the warranty period[436]	32
Performance Bond	None	-

R.W. Block stated: *"Contracts that require performance bonds, often require bonds in the amount of 100% of the project's value. However, on very large projects (such as this) we have seen lower bonding requirements (such as 50% of contract value – which was the amount identified in the RFP), and other approaches such as Letters of Credit and Parent Guarantees. As such, Nalcor's approach is consistent with approaches we have seen on other large contracts."*[437] In a clarification memo, R.W. Block clarified this comment and stated *"In our experience we do not typically see requirements for both Parent Guarantees and Performance Bonds for 50% or more of the contract value on large contracts. We generally see one or the other. Including the Parent Guarantee in the contract is why we stated Nalcor's approach was consistent with approaches we have seen on other large contracts."*[438]

10.5.6 Liquidated Damages

The agreement includes liquidated damages for delays at a daily rate that varies based on the missed milestone.[439] The liquidated damages is limited to 10% of the contract value (approximately $81 million).[440]

Miller Thomson reviewed the liquidated damages article included in the Valard contract and noted: *"The inclusion of Delay LDs assists in transferring a proportion of the risk from LIL LP to Valard, as it provides an incentive for Valard to achieve specific milestones by the applicable agreed upon dates. Assuming the quantum of the Delay LDs was appropriate, it also streamlined the mechanism for LIL LP to collect its reasonable estimated costs as a result of such delay. However, the Delay LDs are limited to 10% of the Contract Price by Section 26.1 of the Valard Agreement."*[441]

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435 NAL0014341 – Civil Works Agreement: Construction of 350 kV HVdc Transmission Line – August 8, 2014 – Page 30

436 NAL0014341 – Civil Works Agreement: Construction of 350 kV HVdc Transmission Line – August 8, 2014 – Page 30

437 Muskrat Falls – CT0327-001 Contract Review – R.W. Block Consulting – November 1, 2018 – Page 3

438 Muskrat Falls – Clarifications to RWBC CT0327-001 – R.W. Block Consulting – November 26, 2018 – Page 2

439 NAL0014341 – Civil Works Agreement: Construction of 350 kV HVdc Transmission Line – August 8, 2014 – Page 73

440 NAL0014341 – Civil Works Agreement: Construction of 350 kV HVdc Transmission Line – August 8, 2014 – Pages 73

441 Miller Thomson Memorandum to Grant Thornton – November 20, 2018 – Page 7

10.5.7 Limitation of Liability

Article 21.15 of the contract discusses damages and provided some limits to Valard liability.

Miller Thomson reviewed article 21.15 they noted: *"… it is not unusual for a limitation of liability provision to be included in agreements of this type. This provision caps the liability of the Valard to LIL LP at 100% of the Contract Price, but this limitation does not apply to any indemnification for claims for personal injury or property damage suffered by third parties, Valard's wilful breach, taxes, fines, or penalties imposed for which Valard is liable, claims for infringement of intellectual property, claims for environmental damage or loss, and any other indemnity claims arising from third party claims. While the level of the cap is a negotiated term, a cap of 100% of the applicable Contract Price is generally reasonable, depending on the potential liability that could be caused by Valard while completing its obligations under the Valard Agreement."*[442]

10.5.8 Default and Termination

Article 24 of the agreement outlines events of default and conditions that would result in termination with cause. Article 24.11 dictates that Nalcor had the ability to terminate the agreement for convenience.[443]

10.5.9 Construction Schedule

Section 8.3 of the agreement indicated: *"The Construction Schedule shall be updated as necessary and in any event shall be updated by Contractor at least monthly and delivered to Engineer not more than seven (7) days after the end of the preceding month. Update to the Construction Schedule shall comply with the requirements of this Article 8."*[444]

Article 1 interpretation of the agreement defines "Change" as including a variation to the schedule for the completion of a Milestone.[445] We reviewed Article 14 of the Contract titled "Changes in the Work". Article 14.2 indicates *"the contractor shall not perform and shall not be entitled to any compensation for a change without a change order issued by the company* [Nalcor] *to the contractor for the change."*[446]

10.5.10 Subsurface Conditions

Miller Thomson, *"Article 23 of the Valard Agreement provides that in the event Valard encounters unforeseen geological or geotechnical conditions which it believes may impact upon its ability to complete the Works specified in Exhibit 9, Valard shall immediately notify LIL LP's engineer… To the extent that any unforeseen geological or geotechnical conditions constituted a "Change", Article 14 of the Valard Agreement applied which required the approval of a change order by LIL LP."*[447] This term in the contract placed the risk for unforeseen geotechnical conditions on Nalcor however Miller

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[442] Miller Thomson Memorandum to Grant Thornton – November 20, 2018 – Page 15

[443] NAL0014341 – Civil Works Agreement: Construction of 350 kV HVdc Transmission Line – August 8, 2014 – Page 68

[444] NAL0014341 – Civil Works Agreement: Construction of 350 kV HVdc Transmission Line – August 8, 2014 – Page 31

[445] NAL0014341 – Civil Works Agreement: Construction of 350 kV HVdc Transmission Line – August 8, 2014 – Page 7

[446] NAL0014341 – Civil Works Agreement: Construction of 350 kV HVdc Transmission Line – August 8, 2014 – Page 43

[447] Miller Thomson Memorandum to Grant Thornton – November 20, 2018 – Page 7

Thomson noted that "*…Although this provision allowed Valard relief for unforeseen geological conditions, this is not an unusual provision and it was part of the original template agreement.*"[448]

10.5.11 Miller Thomson Conclusion

Miller Thomson commented: *"As demonstrated by the examples of the LIL LP Approval Rights above, Valard was largely unable to increase the Project cost/price or extend the applicable schedules without the prior approval of LIL LP in the form of a change order or similar approval. The LIL LP Approval Rights included in the Valard Agreement provided an effective risk transfer "tool" as they did not allow Valard to unilaterally increase the cost of the Project or extend the schedule in most circumstances. Therefore, it is our view that the Valard Agreement included the necessary and typical tools found in an agreement of this type to allow LIL LP to limit cost overruns and delays by withholding any requested approvals and seeking alternative solutions at that time."*[449]

10.6 Overall Comments

As noted above, both the Astaldi and Valard Contracts did allocate a certain portion of the risk to Nalcor. Examples of this are as follows:

- Letters of credit not covering 100% of the contract price
- Limitation of liability of the contractors limited to a certain percentage of the contract price (50% for Astaldi, 100% for Valard)
- Performance bonds not for the full amount of the contract price ($150 million for Astaldi and none for Valard)

Miller Thomson concluded that: *"In conclusion, while certain contractual terms included in the Agreements were negotiated to be more favourable to the Contractors than as originally included in the Owners' template, we did not locate any contractual terms included in the Agreements that were clearly unsuitable for an agreement of this type. Included in the Agreements were contract terms providing the Owners with the ability to approve additional costs and time extensions, and to terminate the Agreements for convenience or for poor performance on the part of the Contractors. Therefore, delays and cost overruns that occurred cannot be attributed directly to the contractual terms of the Agreements themselves. The contractual terms of the Agreements reflect a procurement/contractual strategy employed by the Owners to limit the aggregate cost of the Project, and in so doing, allocated a higher proportion of risk to the Owners."*[450]

[448] Miller Thomson Memorandum to Grant Thornton – November 20, 2018 – Page 7
[449] Miller Thomson Memorandum to Grant Thornton – November 20, 2018 – Page 8
[450] Miller Thomson Memorandum to Grant Thornton – November 20, 2018 – Page 8

10.7 Observations and Findings

When considering whether the terms of the contractual arrangements between Nalcor and its contractors contributed to delays and cost overruns, and whether or not these terms provided sufficient risk transfer from Nalcor to the contractors we have concluded the following:

- Nalcor had the control to approve additional cost and time extensions. However, as noted previously in the Valard contract, Nalcor accepted the risk of geotechnical conditions being worse than what was anticipated in the base estimate. Geotechnical conditions encountered during construction contributed to the cost overruns on this work package. However, Miller Thomson reviewed this article and noted that this is not an unusual provision.

- The contractual terms reflect a procurement strategy employed by Nalcor to limit the aggregate cost of the Project, and in so doing, allocated a higher proportion of risk to Nalcor as described in Section 10.6 above.

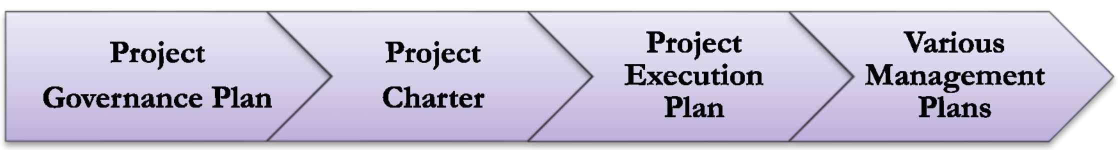
11 Overall Project Management Structure Nalcor Developed and Followed

11.1 Mandate

Reference 4. (b) (iii) *"…whether (iii) the overall project management structure Nalcor developed and followed was in accordance with best practice, and whether it contributed to cost increases and project delays…"*[451]

11.2 Background

Prior to Sanction, Nalcor developed a Project Governance Plan[452], Project Charter[453] and a Project Execution Plan[454] to guide the execution of the LCP project. The Project Execution Plan outlined the following project management plan structure:[455]



The Project Governance Plan we reviewed was a draft document. In response to Grant Thornton request S.35, Nalcor noted that LCP Information Management was unable to find an approved copy of revision B1 of the Project Governance Plan or the Project Steering Committee Charter which was referenced in the Governance Plan.[456]

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[451] NEWFOUNDLAND AND LABRADOR REGULATION 101/17 – *Commission of Inquiry Respecting the Muskrat Falls Project Order* under the *Public Inquiries Act, 2006* (O.C. 2017 - 339) – Page 5
[452] NAL0017689 Project Governance Plan – March 16, 2011
[453] NAL0019446 Project Charter – December 12, 2011
[454] NAL0427444 Project Execution Plan (Scope and Approach) – September 22, 2011
[455] NAL0427444 Project Execution Plan (Scope and Approach) – September 22, 2011 – Page 14
[456] Grant Thornton Request S.35 – May 23, 2018

11.3 Project Charter

The Project Charter stated "*This Project Charter is applicable during the planning and execution of the Muskrat Falls Hydroelectric Generation Facility, Labrador Transmission Assets (i.e. transmission between Muskrat Falls and Churchill Falls) and the Labrador-Island Link Transmission Project during Gateway Phases 3 and 4...*"[457] The charter clarified key responsibilities and objectives to be followed through the life of the project, including but not limited to the following:

- Responsibilities of the Gatekeeper, NE-LCP Vice President, and NE-LCP Project Director[458]
- Business objectives for the project included[459]:
  - *"Develop the Project as the least-cost long-term supply of electricity for Newfoundland and Labrador;"*
  - *"Export production from the Project that is not used within Newfoundland and Labrador to neighbouring markets; and"*
  - *"Develop markets and market access strategies that position Newfoundland and Labrador for realizing the value of the Upper Churchill development when the Churchill Falls power contract expires in 2014"*
- Nalcor's goals, core values[460], and code of conduct[461]
- Nalcor's responsibility to the Shareholders[462] which states *"Nalcor is responsible to develop the Lower Churchill Project on behalf and in the best interest of the people of Newfoundland and Labrador"*[463]
- Nalcor's goals and outcome measures[464]
- Project Mission Statement: *"To develop Phase I of the Lower Churchill Project, respecting shareholder and stakeholder requirements and commitments, using best-in-class planning and execution practices in order to ensure the safe and environmentally sound delivery of an economically-viable source of clean, renewable energy to the marketplace in accordance with the Project Master Schedule."*[465]

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457 NAL0019446 – Project Charter – December 12, 2011 – Page 4
458 NAL0019446 – Project Charter – December 12, 2011 – Page 6
459 NAL0019446 – Project Charter – December 12, 2011 – Page 8
460 NAL0019446 – Project Charter – December 12, 2011 – Page 11
461 NAL0019446 – Project Charter – December 12, 2011 – Page 12
462 NAL0019446 – Project Charter – December 12, 2011 – Page 14
463 NAL0019446 – Project Charter – December 12, 2011 – Page 14
464 NAL0019446 – Project Charter – December 12, 2011 – Pages 16 & 17
465 NAL0019446 – Project Charter – December 12, 2011 – Page 18

11.4 Project Execution Plan (Scope and Approach)

The Project Execution Plan was approved for use in September 2011 (prior to sanction).[466] The purpose of this plan was to *"set out guidelines to ensure a consistent execution strategy and approach to the planning, organizing, directing and controlling of the Lower Churchill Project (LCP), provide a basis to develop detailed procedures for the execution of the work, provide a communication tool for the Nalcor Energy Lower Churchill Project (NE-LCP) Project Team and other project stakeholders, and provide a high level overview of the LCP scope, facilities and execution strategy."*[467] The plan is applicable to the Project during phase 3 covering the engineering, procurement, construction and project management.[468] The plan outlined the following:

- Roles and Responsibilities for the Project Director, Project Managers, Quality Manager, Functional Managers and Team Members[469]
- The original control budget for the capital cost estimate which includes the base estimate, contingency, and escalation. The document demonstrates that the management reserve is excluded.[470]
- Project execution and delivery strategy[471] including the delivery strategy for EPCM services[472]
- Nalcor's Project Management Organization including the objectives of the organizational plan[473] and the project organization matrix[474]
- Risk Management[475] including key risks and management strategies[476]
- Key Performance Indicators[477]
- NE-LCP / EPCM Consultant Responsibility Matrix which outlines Nalcor's responsibilities compared to SNC's responsibilities as the EPCM[478]

In March 2014, the Project Execution Plan was updated to reflect the change in management structure from an EPCM to an integrated project team. This change has been discussed in more detailed later in this report. However, the change led to an *"Integrated Project Team, or Project Delivery Organization, consist of Nalcor and SNC resources as well as various third party consultants, including Hatch, AMEC, Stantec, and independent consultants."*[479]

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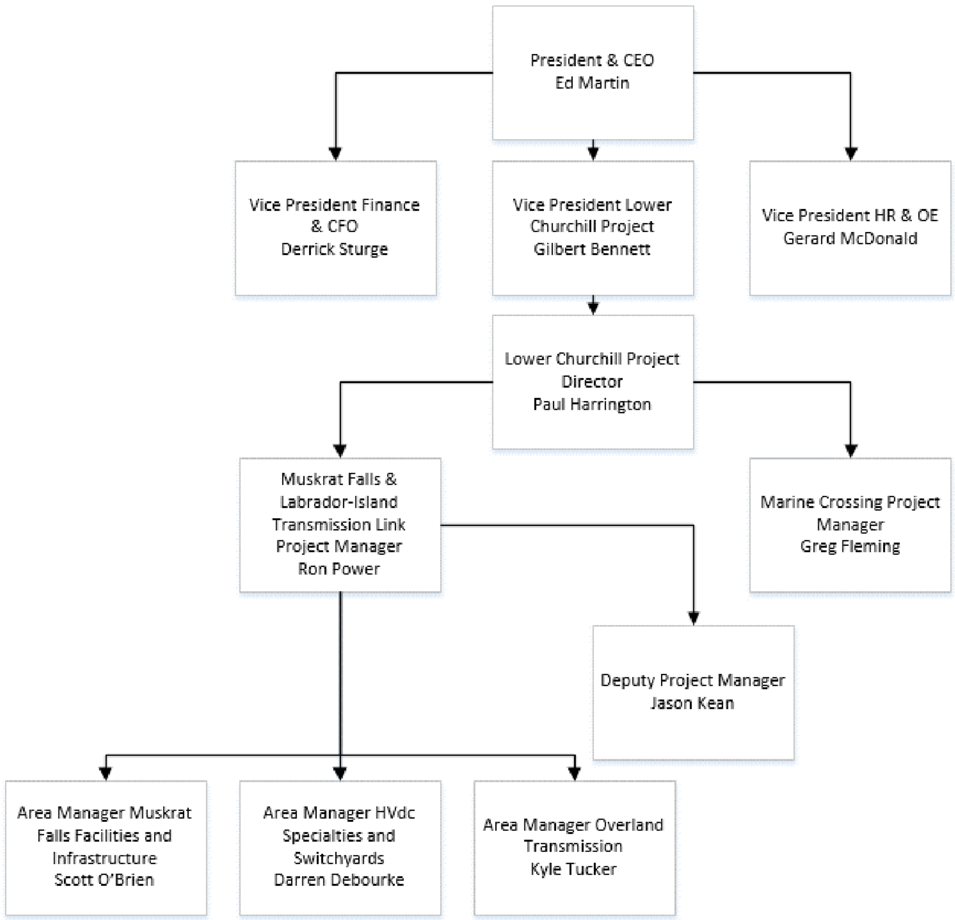
466 NAL0427444 – Project Execution Plan (Scope and Approach) – September 22, 2011 – Page 1
467 NAL0427444 – Project Execution Plan (Scope and Approach) – September 22, 2011 – Page 5
468 NAL0427444 – Project Execution Plan (Scope and Approach) – September 22, 2011 – Page 6
469 NAL0427444 – Project Execution Plan (Scope and Approach) – September 22, 2011 – Page 7
470 NAL0427444 – Project Execution Plan (Scope and Approach) – September 22, 2011 – Page 33
471 NAL0427444 – Project Execution Plan (Scope and Approach) – September 22, 2011 – Page 34
472 NAL0427444 – Project Execution Plan (Scope and Approach) – September 22, 2011 – Page 39
473 NAL0427444 – Project Execution Plan (Scope and Approach) – September 22, 2011 – Page 56
474 NAL0427444 – Project Execution Plan (Scope and Approach) – September 22, 2011 – Page 57
475 NAL0427444 – Project Execution Plan (Scope and Approach) – September 22, 2011 – Page 67
476 NAL0427444 – Project Execution Plan (Scope and Approach) – September 22, 2011 – Pages 68 to 70
477 NAL0427444 – Project Execution Plan (Scope and Approach) – September 22, 2011 – Page 78
478 NAL0427444 – Project Execution Plan (Scope and Approach) – September 22, 2011 – Page 81
479 NAL0130478 – Project Execution Plan (Scope and Approach) – March 11, 2014 – Page 35

Prior to the change to an integrated model, the Project Execution Plan included a matrix which clearly outlined the responsibilities for SNC team members and Nalcor team members. After the change to the integrated team, the updated Project Execution Plan did not include this matrix. We asked Nalcor to *"…provide an updated matrix or explain what SNC responsibilities were and which of the responsibilities were transferred to Nalcor after the switch to an integrated team."*[480] In response to our request, Nalcor stated: *"After the Owner/EPCM model evolved to an Integrated Team model, SNC-Lavalin retained responsibility as Engineer of Record for all engineering and design. For all other responsibilities, they were allocated to the appropriate members of the Integrated Project Delivery team."*[481] Based on this response, we assume that the only responsibility retained by SNC team members after the switch to an integrated team was the engineering and design of the project. While we acknowledge that SNC employees were members of the integrated project team, based on the organizational chart[482] it appears that the ultimate responsibility and decision making authority rested with the Nalcor PMT.

[480] Response to Grant Thornton Question 10.28 – November 5, 2018
[481] Response to Grant Thornton Question 10.28 – November 5, 2018
[482] NAL0130478 – Project Execution Plan (Scope and Approach) – March 11, 2014 – Page 39

11.5 Project Management Team Experience

SNC Lavalin was selected as the EPCM contractor in part due to their hydroelectric experience.[483] However, as noted above, once the change over to the integrated project team occurred it appears that many of the responsibilities that were assigned to SNC were reallocated to Nalcor. The overall project leadership prior to the change to an integrated team was structured as follows:[484]



We compared the organization chart above to the organization chart included in the Project Execution Plan after the change to an integrated project team. We noted that the only SNC employee that was added to the revised organization chart was Normand Bechard, Construction Advisor. He reported to Ron Power, General Project Manager and was responsible for *"SLI Engineering Functional Reporting Relationship, SLI Corporate Interfaces, SLI HR, IT, Office and Administration Services."*[485] In an interview with Normand Bechard, he noted that he left the LCP and commented: "*I have been a guy with very high responsibility and*

[483] NAL0018452 – Overarching Contracting Strategy – February 29, 2012 – Page 56
[484] NAL0019070 – LCP Organizational Charts – January 24, 2012 – Pages 4, 9, 10
[485] NAL0130478 – Project Execution Plan (Scope and Approach) – March 11, 2014 – Page 39

accountability. I'm there and I've got no accountability and no responsibility. Not even managing the SNC employees, they were managed by other people. As an advisor, no one was coming in my office. I was useless… Even though they weren't using me I was perceived as someone with a lot of experience.'[486]

We considered whether the core project team members included in the organizational chart above had the requisite experience to manage the LCP construction.

Paul Harrington provided us with a list of the core key personnel whom he and Gilbert Bennett VP LCP considered to be individuals that would have been consulted with on key decisions, such as contract award recommendations, project changes, technical matters and project/cost related matters.[487]

This list indicated that there were certain individuals with prior hydro experience. However Mr. Harrington's list included the individuals experience working on the LCP when indicating the number of years of hydro experience. Thus when LCP is not included Mr. Harrington and Mr. Kean have no years of hydro experience. Six of the individuals included in the above organization chart were included in the list provided by Mr. Harrington. They are as follows:

Name	Position	Hydro Experience including LCP	Transmission experience	Megaproject experience	Total years of experience
Darren Debourke	Project Manager - HVdc Specialties			13	23
Paul Harrington	Project Director	6	6	35	35
Jason Kean	Deputy General Project Manager	3	3		17
Scott O'Brien	Project Manager - Muskrat Falls Generation			9	16
Ron Power	General Project Manager	11		20	30
Kyle Tucker	Project Manager - Transmission Lines/LILCo Manager		16	7	16

[486] Interview summary – Normand Bechard – May 8, 2018 – Pages 20
[487] Response to Inquiry Counsel request in Interview with P Harrington dated 12th September 2018

We compared the years of experience in the summary provided by Mr. Harrington to resumes and other support provided to determine the number of years of hydro experience for these individuals. The only project management team member who had hydro experience prior to LCP was Ron Power. Mr. Power's hydro experience consists of the following positions:[488]

- 1986 to 1997 – Shawmont Newfoundland Ltd. – Various Projects
- 1982 to 1986 – Monenco Nigeria Ltd. – Area Construction Manager for Jebba Hydroelectric Project (540 MW)
- 1977 to 1982 – Shawmont Newfoundland Ltd. – Project / Design Engineer for several hydroelectric projects.

We noted that Ed Martin[489], Gilbert Bennett[490] and Greg Fleming[491] were not included in the list provided by Mr. Harrington. As such we reviewed their resumes and noted that none of these individuals had hydro experience prior to LCP.

In addition to the individuals indicated above, the list provided by Mr. Harrington included a number of other individuals who did have hydro experience. Individuals with 30 years or more of hydro experience are summarized below:

Name	Position	Term on LCP[492]	Hydro Experience including LCP	Megaproject experience	Total years of experience
Barnes, Bob	Ready for Operations Manager	2006 – Retired *(Note 1)*	31	7	38
Mulcahy, John	Hydroelectric Construction Specialist	2011-2017	36	3	41
Dolen, Timothy	Senior RCC Construction Engineer	2017 to Present	34	1	35
Mallam, John	Operations/ Engineering Interface	Not provided	5	0	35
Snyder, Greg	Engineering Manager Hydro	2012 - Present	40	0	40
Besaw, David	Senior Engineering Geologist	Not provided	32	10	38
Bouchard, Regis	Lead Engineer Geotech	2011 - present	36	2	36

488 R. Power – resume Aug. 2013.doc
489 CV for Ed Martin, provided by Stewart McKelvey on September 10, 2018
490 NAL1285251 Gilbert CV email – April 23, 2011
491 Response to GT Question 10.2 – Resume of Greg Fleming – September 5, 2018
492 Response to Grant Thornton Question 10.46 – November 8, 2018

Stanton, Lee	Hydro Construction Planner	2011 - present	37	10	40
Kaushik, Rai	Electrical Lead	2006 - present	35	0	35

Note 1 – Nalcor did not provide the date of retirement.

We compared the table above to resumes and other supporting documentation to determine 1) their years of experience and 2) the timeframe that the individual was involved with LCP.

The supporting documentation which indicated the years of experience was provided by Nalcor as was the timeframe that the individuals were involved in the LCP. Based on the information provided, it appears that there were a number of individuals on the integrated project team who had significant hydro experience.

Professor Bent Flyvbjerg demonstrated in his Report for the Commission of Inquiry Respecting the Muskrat Falls Project that on average, cost overruns for hydro-electric dams are significantly higher than oil and gas related projects. His report explained that the mean cost overrun for hydro-electric dams is significantly higher than the mean cost overrun for mining, oil & gas projects, as shown in the following table:[493]

	Cost overrun (mean)	Frequency of cost overrun	Sample size
Hydro-electric dams	96%	77%	274
Mining, oil & gas	17%	60%	531

During his testimony on September 17, 2018, Professor Flyvbjerg was asked whether the skills and experience of project management in the oil and gas sector can be transferred to a hydroelectric dam and transmission project. Prof Flyvbjerg stated *"I would say, yes, a lot of skills can be transferred and it would be a huge advantage that if you are working on any megaproject that you worked on another megaproject before. That being said, however, I would say that there also need to be people on the team who have specific domain experience from the – from dams, if you're building a dam."*[494]

As shown above, the core project management team, with the exception of Ron Power, did not have any hydro experience prior to LCP. On average they did have 14 years of mega-project experience, primarily oil and gas related. There were other individuals on the integrated team that had significant hydro experience. However, on average they had less than 4 years mega-project experience.

[493] Report for the Commission of the Inquiry Respecting the Muskrat Falls Project - Professor Bent Flyvbjerg – August 2018 – Page 10

[494] Muskrat Falls Inquiry Transcript – Dr. Flyvbjerg – September 17, 2018 – Page 21

11.6 Schedule Management

As previously noted, it was known at the time of sanction that the schedule was aggressive. According to Edward Merrow, *"Schedule pressure dooms more megaprojects than any other single factor. When there is pressure to move a project along quickly from the outset, corners get cut and opportunists have a field day."*[495] He goes on to say, *"No project should be deliberately slow…But taking risks with megaproject schedules is a fools game…If the economics of the project require an accelerated schedule, then the appropriate conclusion is that the project is uneconomic and should not be done."*[496]

Project milestones were tracked and included in the monthly construction reports that were submitted to the Collateral Agent, Toronto Dominion bank and the Independent Engineer. There was no indication of schedule slippage contained in these reports until the reports for the period ending July 31, 2015. At this time, the project milestone dates still remained unchanged but were listed as "under review"[497 &498] and they remained under review for a full year until June 2016 (after the resignation of Ed Martin) when the category titled *"Full Power from Muskrat Falls"* shifted ahead 2 years from June 2018 to June 2020.[499] The report explains that *"…a Quantitative Cost and Schedule Risk Analysis was completed for Muskrat Falls Generation based upon an assessment of risks to project completion and an analysis of the associated impact on cost and schedule"*[500] and that the revised dates *"…reflect the high end (P75) of the probabilistic range of most likely outcomes resulting from this Risk Analysis."*[501]

During the period from November 2013 to June 2016 when the schedule milestones remained unchanged, the following events occurred that should have triggered the project team to consider whether the schedule had been impacted (and additional costs that would have been incurred because of schedule slippage):

- Astaldi's late start in 2013 resulted in slow mobilization[502] and delays throughout 2014;[503]
- Astaldi's production rate for concrete placement was behind schedule essentially from the beginning to at least the middle of 2015; and
- In December 2014 into the winter, the Integrated Cover System was only half completed which impacted the ability to work through the winter[504] and thus would impact productivity negatively.

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[495] Edward Merrow – Industrial Megaprojects Concepts, Strategies, and Practices for Success – 2011 – Page 2
[496] Edward Merrow – Industrial Megaprojects Concepts, Strategies, and Practices for Success – 2011 – Page 3
[497] NAL0018468 – Construction Report Muskrat/LTA Project Finance Agreement – August 20, 2015 – Pages 13 to 15
[498] NAL0020740 – Construction Report LIL Project Finance Agreement – August 20, 2015 – Page 9
[499] NAL0020795 – Construction Report Muskrat/LTA Project Finance Agreement – July 20, 2016 – Pages 14 & 15
[500] NAL0020795 – Construction Report Muskrat/LTA Project Finance Agreement – July 20, 2016 – Page 15
[501] NAL0020795 – Construction Report Muskrat/LTA Project Finance Agreement – July 20, 2016 – Page 15
[502] NAL0019112 - Lower Churchill Project Monthly Progress Report – January 31, 2014 – Page 7
[503] NAL0019122 - Lower Churchill Project Monthly Progress Report – November 30, 2014 – Page 8
[504] CBC News – Muskrat Falls: Astaldi adapting following dispute over 'dome' – February 13, 2015 *https://www.cbc.ca/news/canada/newfoundland-labrador/muskrat-falls-astaldi-adapting-following-dispute-over-dome-1.2955492*

In response to Grant Thornton's question 10.41, where we requested a copy of the schedule analysis recently prepared, Nalcor provided a document titled *"Reasonableness of the Attainability of 2017 First Power"*[505] prepared on October 18, 2018. We reviewed this document which notes it was prepared in order to address questions and statements raised during the Muskrat Falls Inquiry related to attainability of first power in 2017. We gave no weight to this document for the following reasons:

- Westney's analysis from 2012 noted that there was an extremely low probability of achieving the schedule.
- To the best of our knowledge, Nalcor did not perform an analysis at the time of Westney's report to conclude why they felt the schedule was attainable in light of Westney's conclusion. If such an analysis was prepared, it was not provided to us.
- The analysis that was provided, was prepared in 2018 (approximately 6 years after the project was sanctioned) with the benefit of hindsight.

[505] Muskrat Falls Project – Reasonableness of the Attainability of 2017 First Power – October 18, 2018

11.7 Project Management Structure

When considering how to structure the project management team for the Lower Churchill Project, Nalcor considered the following three project structures:

- **Integrated LCP team** – both the engineering contractor and Nalcor's LCP team jointly contribute to the project.[506] This would be a unified Nalcor-led team.[507]
- **Engineering, Procurement, and Construction Management ("EPCM") contractor who hires sub-contractors** – *"…involves an owner contracting with an Engineering, Procurement, and Construction Management contractor who is responsible for the engineering, design and technical specifications for the project (either through itself or through its sub-consultants), for the procurement on behalf of the owner of multiple contracts between the owner and contractors and suppliers for construction, equipment, materials and supplies, and for the administration and management of those contracts."*[508]
- **Engineer, Procure and Construct ("EPC") contractor without sub-contractors** – *"…involves an owner contracting all work (engineering, construction, supply and installation activities) for implementation of an entire project, or of a specific part of that project to an EPC Contractor. Owner provides only a conceptual layout of the project and a statement of the minimum requirements, typically in the form of an extensive functional specification, leaving the optimization and subsequent details design to the EPC Contractor."*[509]

The following table summarizes project activities assigned to each role under the three structure options[510]:

<table>
<tr><th>Activity</th><th>Option 1</th><th>Option 2</th><th>Option 3</th></tr>
<tr><td>Oversight/controls/audit</td><td rowspan="4">Integrated LCP Team

Engineering contractor</td><td>LCP</td><td>LCP</td></tr>
<tr><td>Phase 3 Engineering</td><td rowspan="3">EPCM Contractor</td><td rowspan="4">EPC Contractor</td></tr>
<tr><td>Project management, engineering, procurement, cost/schedule, project services</td></tr>
<tr><td>Site management, Overall labour set up</td></tr>
<tr><td>Labour issues/ construction supervision</td><td>Construction contractors</td><td>Construction contractors</td></tr>
</table>

506 Pre-Sanction – Briefing Note as Requested by Nalcor Legal Counsel – January 2018 – Page 38
507 PMT Presentation – Lower Churchill Project 4 – SNC Lavalin Contract – May 2018 – Slide 35
508 NAL0018452 - Overarching Contracting Strategy – February 29, 2012 – Page 11
509 NAL0018452 - Overarching Contracting Strategy – February 29, 2012 – Page 11
510 PMT Presentation – Lower Churchill Project 4 – SNC Lavalin Contract – May 2018 – Slide 5

11.8 Selection of EPCM

When considering the three project management structure alternatives, Nalcor performed screening through international contractors during 2008 and 2009 and also engaged Hatch Energy to undertake a study with the objective to determine the amount of additional Front End Engineering Design (FEED) engineering that would be required in order to produce the required performance and functional specifications and drawings required for an EPC-type arrangement.[511] Based on these two studies, Nalcor concluded that an EPC option would increase the overall project duration and therefore the first power date, and would also attract significant risk premiums. Therefore, Nalcor focused their efforts on the Integrated LCP Team and the EPCM contractor options.[512]

In February 2009 Nalcor released an Expression of Interest ("EOI") to six contractors.[513] The EOI indicated that Nalcor planned to utilize a fully integrated project management team. However, it stated *"While Company contemplates using a Company led integrated project management team model, Consultant may include, as an alternative, other proposed project delivery models for consideration by Company."*[514] The responses received from these contractors indicated support for the Integrated Project Management Team, but in general the contractors were more experienced in and showed a preference for the EPCM model. As a result, Nalcor ultimately selected the EPCM contractor model for the project management structure.[515]

In July 2010, a Request for Proposal ("RFP") for *"Engineering, Procurement and Construction Mgt. Services"* was issued to three contractors.[516] In December 2010,[517] SNC-Lavalin Inc. was issued a letter of intent and in February 2011 they were awarded the contract for this work package.[518]

According to the Project Team, SNC was selected because they had the most contemporary knowledge in hydro.[519] It was also noted in the Overarching Contracting Strategy that *"SNC Lavalin Inc. offers the world-class engineering, procurement and construction management experience required for a project of this magnitude. Their specialization in hydroelectric developments, transmission, HVdc and civil works will be critical to the successful construction of the Lower Churchill Project."*[520] As the EPCM Contractor, SNC was responsible *"for the completion of all project engineering and detailed design, construction execution planning, procurement of permanent plant equipment, issue and management of all supply and construction contracts, and overall construction management for the Project, including custodian for*

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[511] NAL0018452 – Overarching Contracting Strategy – February 29, 2012 – Pages 36 & 37
[512] NAL0018452 – Overarching Contracting Strategy – February 29, 2012 – Page 37
[513] NAL0018452 – Overarching Contracting Strategy – February 29, 2012 – Page 25
[514] Expression of Interest No. G-002 – October 7, 2008 – Page 42
[515] PMT Presentation – Lower Churchill Project 3 - Project Delivery Model and Organization – May 27, 2018 – Slides 8 & 11
[516] NAL0018452 – Overarching Contracting Strategy – February 29, 2012 – Page 25
[517] NAL0018452 – Overarching Contracting Strategy – February 29, 2012 – Page 56
[518] NAL0018452 – Overarching Contracting Strategy – February 29, 2012 – Page 25
[519] Interview Summary – Presentation from PMT – May 30, 2018 – Page 12
[520] NAL0018452 – Overarching Contracting Strategy – February 29, 2012 – Page 56

the Project work sites, and Project Completions" with the exception of the Strait of Bell Isle (SOBI) crossing.[521]

11.9 EPCM Performance

Nalcor has indicated that they experienced performance issues with SNC shortly after the contract was awarded, including turnover of key project resources, the failure to complete key project deliverables, lack of adequate systems and tools, and significant organization and alignment gaps.[522]

11.9.1 Turnover and Lack of Resources

During the Engineering and Procurement phase of the Project, SNC struggled to provide the required resources. Several key personnel listed in the Agreement did not mobilize to the project and there was significant turnover of key positions.[523] In particular, the PMT noted that from January 2011 to January 2012, the Project Controls Manager position turned over four times, the General Project Manager position turned over three times, and the Project Manager position turned over twice.[524] This was confirmed during an interview with Paul Lemay the Lead Estimator from SNC. Mr. Lemay indicated that the SNC Project Manager whom he reported to, changed four times between May 2011 and September 2013. [525] Subsequent to September 2013, the SNC person was replaced by a Nalcor employee.[526] When asked why there were so many changes, Mr., Lemay explained "*That's not something I can answer. I don't know why these people left… It was uncomfortable I can tell you that, to go through all people and get used to them. For me it was tough, but why exactly these guys are gone, I don't know. It was tough for me to change from one to another.*"[527] Since September of 2013, Nalcor has replaced this position on three separate occasions. [528]

In an interview with Normand Bechard, the former Director General Project Lower Churchill, SNC, Grant Thornton asked whether the reason for the change to an integrated team was due to the staff that SNC had provided. Mr. Bechard responded *"I brought senior men and women and they didn't want any of them."*[529]

The lack of resources and turnover was also identified in the Lower Churchill Project Review Report completed in March 2012. [530] This report was an assurance review commissioned by Nalcor to assess the readiness of SNC's people, processes and systems for

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521 NAL0018452 – Overarching Contracting Strategy – February 29, 2012 – Page 57
522 SNC Lavalin Contract – May 2018 – Slide 15 & 16
523 SNC Lavalin Contract – May 2018 – Slide 16 & 17
524 Pre-Sanction- Briefing Note as Requested by Nalcor Legal Counsel McInnes-Cooper – January 2018 – Page 43
525 Interview Summary – Paul Lemay – April 10 2018 – Pages 1 & 2
526 Interview Summary – Paul Lemay – April 10 2018 – Pages 1 & 2
527 Interview Summary – Paul Lemay – April 10, 2018 – Pages 6 & 7
528 Interview Summary – Paul Lemay – April 10 2018 – Pages 1 & 2
529 Interview Summary – Normand Bechard – May 8, 2018, Page 7
530 Lower Churchill Project Review Report – March 9, 2012

DG3 deliverables.[531] The purpose of the review was to identify any potential gaps in DG3 deliverables.[532]

In relation to lack of resources, the Lower Churchill Project Review Report noted that *"SLI have several senior positions open, which at this stage of the project is a very serious concern. Furthermore, several positions are on the third incumbent which, severely impacts team performance."*[533] In addition to this, the report noted that *"in several senior positions SLI* [SNC] *have not provided personnel who have both SLI knowledge and experience and "Hydro" experience. Many have excellent "Hydro" experience and need to be supported in the SLI systems and procedures to deliver the desired level of performance."*[534]

11.9.2 Completion of key deliverables

During the Engineering & Procurement phase of the Project, SNC failed to complete a significant number of Decision Gate 3 Deliverables by the contractual date (December 2011).[535]

Nalcor sent a letter in February 2012 to SNC explaining that due to inconsistencies between the information transmitted by SNC, the gate 3 deliverables list, and the information located on the DVD that SNC had provided, Nalcor was not able to process the information that they had received. The letter explained that *"Nalcor is attaching for SLI action Opportunity for Improvement No. OFI-0013, which documents this issue. The intent of the Opportunity for Improvement is to document a significant issue that requires SLI to determine the root causes, evaluate the need for actions and the planned action to correct the issue in order to prevent its reoccurrence."*[536]

As noted above, in March 2012, a "cold eyes review" was performed at the request of Nalcor for the purpose of identifying potential gaps in Gate 3 deliverables. The resulting report titled "The Lower Churchill Project Review Report" noted, *"the project is not ready to proceed to Gate 3"* and while the contract deliverables were tracked using a checklist format, the checklist was missing target dates. The report recommended, *"a detailed plan for achieving Gate 3 goals be developed and rolled out to the groups to ensure full alignment."*[537]

When asked about the timeline of the DG3 deliverables including the estimate, Paul Lemay, SNC's Lead Estimator explained that they "*had to turn that estimate for December 15, 2011.*"[538] He also noted that it was very rushed and explained, "*We are rushing to get this thing real quick and we have tried to do our best but it's tough. $5 billion in six months was quite a challenge. But we did finish in time for December 15th and we turn in what we call cost of project to the best of our knowledge. All the quotation we got, we produced 13 binders that we turned into Nalcor in December 2011 and by May 2012 we had 43 binders.*"[539]

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531 PMT Presentation – Lower Churchill Project 4 – SNC Lavalin Contract – May 2018 – Slide 26
532 Lower Churchill Project Review Report – March 9, 2012
533 Lower Churchill Project Review Report – March 9, 2012 – Page 2
534 Lower Churchill Project Review Report – March 9, 2012 – Page 2
535 Lower Churchill Project Review Report – March 9, 2012 – Page 1
536 Letter 160 Nonconformance No. OFI-0013 – Gate 3 Deliverables, Attachment 1 – February 16, 2012 – Page 1
537 Lower Churchill Project Review Report – March 9, 2012 – Page 1
538 Interview Summary – Lead Estimator – April 10, 2018 – Page 1
539 Interview Summary – Lead Estimator – April 10, 2018 – Page 7

11.9.3 Lack of Adequate Systems and Tools

The Lower Churchill Project Review Report noted that some of the required systems and tools *"have recently been brought into the project, which is very late, and cannot be considered a best practice. This is the cause of great frustration in both teams and considering SLI extensive experience it is a very serious deficiency in their performance"*[540] It also noted that *"it was frequently mentioned that improvements in quality were not evident. Document Control process is a major bottleneck and needs to be reviewed to improve the timely flow of documents between the groups."*[541]

11.9.4 Significant Organizational and Alignment Gaps

The Lower Churchill Project Review Report identified that *"for the focus areas that were reviewed the two project teams* [Nalcor and SNC] *are not aligned. There was no demonstrated collective accountability also, there was no feeling of a collaborative working relationship."*[542] The report noted *"in the opinion of the review team this needs to be addressed with a comprehensive plan over the life of the project to ensure Project Effectiveness and Alignment is achieved and sustained as the project changes phases and new major contractors are brought on."*[543]

11.9.5 Nalcor Intervened

In response to the challenges experienced with SNC's performance, Nalcor intervened in the following ways:

- Implemented Deloitte "Organizational Effectiveness" program[544]
- Sent various letters to SNC regarding their performance and particular issues[545]
- Implemented Mitigation Efforts[546]
- Engaged PowerAdvocate to evaluate the project's contracting and packaging strategy[547]
- Lower Churchill Project Review[548] (discussed throughout the various examples)

11.9.6 Deloitte Lower Churchill Project Team Effectiveness Programme

In May 2012, Nalcor engaged Deloitte to run a team effectiveness program.[549] As part of this engagement, Deloitte conducted a number of working sessions, surveys and interviews, feedback sessions and group exercises. The results of these exercises and surveys were used to assess the various teams and rated them on a number of competencies in comparison to

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540 Lower Churchill Project Review Report – March 9, 2012 – Page 1
541 Lower Churchill Project Review Report – March 9, 2012 – Page 2
542 Lower Churchill Project Review Report – March 9, 2012 – Page 2
543 Lower Churchill Project Review Report – March 9, 2012 – Page 3
544 PMT Presentation – Lower Churchill Project 4 – SNC Lavalin Contract – May 2018 – Slide 31
545 PMT Presentation – Lower Churchill Project 4 – SNC Lavalin Contract – May 2018 – Slide 21
546 PMT Presentation – Lower Churchill Project 4 – SNC Lavalin Contract – May 2018 – Slide 32
547 NAL3524074 – Transmission Project Contracting and Packaging Strategy Risk Assessment – PowerAdvocate - June 20, 2012 – Page 3
548 Lower Churchill Project Review Report – March 9, 2012 – Page 1
549 NAL0706067 – Deloitte Lower Churchill Project Team Effectiveness Programme – July-Sept 2012 – Page 4

high performing teams.[550] The Project Team noted that *"While Deloitte's roadmap to team effectiveness proved to have good value, it did not change the broader issue with SLI's performance gap."*[551]

Deloitte noted some common comments from interviews and surveys that were related to the SNC team members. Overall, there was an uncertainty of working relationship between Nalcor and SLI in the future. It was also noted in the Deloitte review that there was a broad consensus in the early stages that SNC was not performing well and did not execute on their agreement.[552]

11.9.7 Sent Various Letters to SNC

Various letters were sent by Nalcor to SNC expressing concerns in a number of areas including the transmittal of SNC deliverables, turnover of various positions, and contracting strategy alignment.[553] For example, on August 29, 2011 Nalcor Project Manager wrote a letter to the SNC Project Manager which stated, *"please be advised that Nalcor rejects this document as submitted… This document fails to include fundamental requirements of the Project Control Schedule as detailed in Exhibit 5, Section 18 of the Agreement, and as such cannot be approved as the Baseline by Nalcor."*[554]

11.9.8 Implemented Mitigation Efforts

The following migration efforts were implemented by Nalcor[555]:

– Arranged for engineering work to be performed in SNC's Montreal offices. Originally, SNC team members had worked from the St. John's office on Torbay Road[556] as the government required all engineering work to be completed in the province.[557]

11.9.9 Engaged PowerAdvocate to Evaluate Project Contracting and Packaging

In June 2012, PowerAdvocate completed an assessment with the purpose *"…to deliver strategic insights (both risks and opportunities) to the Lower Churchill project team based on a "fresh" look at Nalcor's contracting and bid packaging strategies…"*[558]

This review noted that the *"…EPCM model is well supported and is consistent with the most common contracting approach that we have seen used on Transmission projects..."*[559] It also explained that there are some risks related to the model but concluded that *"There is no "silver bullet" when it comes to contracting approaches and the best an owner can do is to make sure it is set up with appropriate resources and risk focus to obtain the benefits and to manage the drawbacks of the selected approach. Based on our review of the documents referenced earlier and our understanding of Nalcor and EPCM resourcing and*

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550 NAL0706067 – Deloitte Lower Churchill Project Team Effectiveness Programme – July-Sept 2012
551 Pre-Sanction- Briefing Note as Requested by Nalcor Legal Counsel McInnes-Cooper – January 2018 – Page 39
552 Deloitte Team Effectiveness Phase 2 – July - September 2012 – Slide 27
553 PMT Presentation – Lower Churchill Project 4 - SNC Lavalin Contract – May 2018 – Slide 22
554 Project Control Schedule – Stages 1 & 2 Letter, August 29, 2011 – Page 1 (Rec. No: L010-S011-200-170331-00109)
555 PMT Presentation – Lower Churchill Project 4 - SNC Lavalin Contract – May 2018 – Slide 32
556 Interview Summary – Paul Lemay – SNC Lead Estimator – April 10, 2018
557 Pre-Sanction- Briefing Note as Requested by Nalcor Legal Counsel McInnes-Cooper - January 2018 – Page 24
558 Transmission Project Contracting and Packaging Strategy Risk Assessment – June 20, 2012 – Page 3
559 Transmission Project Contracting and Packaging Strategy Risk Assessment – June 20, 2012 – Page 5

compared with our other project experiences, we believe that the project team has sufficient resources, expertise and focus to manage these risks."[560]

11.10 Integrated Team

In response to SNC's performance issues outlined above, Nalcor understood that the risk exposure was unacceptable and that post-sanction the risk would only increase.[561] This resulted in a renewed drive to integrate and it became clear that the only viable way to reduce the exposure of risk and a lack of project management capability was to switch from an EPCM to an integrated delivery model.[562] On March 12, 2013 Gilbert Bennett, the VP LCP sent an email to the Lower Churchill Project staff announcing that *"…the organization structure for the Integrated Management Team responsible for execution for engineering, procurement and construction management for the Lower Churchill Project has been finalized"*.[563]

We asked Williams Engineering to review the project management structure and they noted the following: "*Once a contract format is selected, planning and project organization processes are set in motion that align with the contract methodology. Therefore changing project management strategies after a project begins is not best practice."*[564]

In this integrated model, SNC and Nalcor were to jointly contribute resources to the project team.[565] SNC would retain responsibility for engineering. [566] The PMT indicated that: *"While this risk reduction measure was successful and has been acknowledged by external stakeholders and reviewers, its implementation occupied significant management resources during a critical period of the Project."*[567]

As previously noted, the IE was engaged to review the Project prior to financial close. With regards to the change from an EPCM model to an Integrated Project Team, the IE report indicated that the EPCM Agreement *"…is a well prepared and comprehensive contract that places the responsibility for design of a successful project on SNC-L, in MWH's opinion."*[568] The IE report also acknowledged the change to integrate in 2013 and stated that *"The organizational model shift is viewed as a key enabler of team effectiveness, which is considered imperative for delivery of this megaproject"*[569] and *"…in our opinion, and based on their past experience, the Integrated Project Team consisting of SNC-*

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560 Transmission Project Contracting and Packaging Strategy Risk Assessment – June 20, 2012 – Page 8
561 Pre-Sanction- Briefing Note as Requested by Nalcor Legal Counsel McInnes-Cooper - January 2018 – Page 42
562 Pre-Sanction- Briefing Note as Requested by Nalcor Legal Counsel McInnes-Cooper - January 2018 – Pages 42 & 36
563 Announcement Integration Management Team – March 12, 2013
564 Williams Engineering Canada – Forensic Review in Support of Commission of Inquiry Respecting the Muskrat Falls Project – November 30, 2018 – Page 19
565 Pre-Sanction- Briefing Note as Requested by Nalcor Legal Counsel McInnes-Cooper - January 2018 – Page 38
566 Pre-Sanction- Briefing Note as Requested by Nalcor Legal Counsel McInnes-Cooper - January 2018 – Page 24
567 Pre-Sanction- Briefing Note as Requested by Nalcor Legal Counsel McInnes-Cooper - January 2018 – Page 43
568 NAL0706068, Independent Engineer's Report – Lower Churchill Project – December 30, 2013 – Page 62
569 NAL0706068, Independent Engineer's Report – Lower Churchill Project – December 30, 2013 – Page 62

L…and Nalcor…are qualified to design, contract, manage, commission, operate and maintain the three projects currently under design and construction for the LCP."[570]

Independent Project Analysis Inc. also completed a Mid-Execution Assessment of the Nalcor Lower Churchill Project in December 2015.[571] This review noted that the *"Project team is fully integrated with all functions that have influence on project success"* and rated the LCP project as "good" which is above the Megaproject average rating of "fair".[572]

With regards to whether an integrated team structure is best practice, Merrow indicates that integrated teams generate better projects. However, *"for a project of average complexity, the integrated core team was twice as large on average as the nonintegrated team."*[573]

We also asked R.W. Block to provide their view on the project management structure. They noted that *"The project management structure used by owners depends on their internal level of staffing and the skill sets that an owner's internal staff possess."*[574] They also noted that an EPCM model is a *"common approach in the utility sector… especially if the engineering is also being performed by the same firm selected to perform the construction management functions."*[575]

Therefore, both the integrated and EPCM project management structures are common models and there does not appear to be one single best practice for selecting a model.

11.11 Key Performance Indicators

Edward Merrow explains in his book that *"The role of the owner team is to generate comparative advantage for the sponsors. The team is where all of the owner functions come together to take the business opportunity and generate a project that is fashioned to the particular strengths and talents of the sponsor organization(s)."*[576] He also explains that *"the clarity of the business objectives to the project team correlates with key measures of project results: cost competitiveness… cost overruns… execution schedule competitiveness… schedule slippage… operability… success… The key to the formation and development of effective teams is developing project objectives."*[577]

With regards to the Key Performance Indicators (KPIs) on the Lower Churchill Project, we asked Nalcor to provide an explanation of how these KPI's were monitored throughout construction, who tracked this performance, the frequency of reporting KPI results, and

570 Lower Churchill Project Independent Engineers Report – Interim Final – December 30, 2013 – Page 213
571 Independent Project Analysis Mid-Execution Assessment Nalcor Lower Churchill Project – December 2015 – Page 21
572 Independent Project Analysis Mid-Execution Assessment Nalcor Lower Churchill Project – December 2015 – Page 21
573 Edward Merrow – Industrial Megaprojects Concepts, Strategies, and Practices for Success – 2011 – Page 168
574 Muskrat Falls – Additional Areas for RWBC Comment – R.W. Block Consulting – November 1, 2018 – Page 5
575 Muskrat Falls – Additional Areas for RWBC Comment – R.W. Block Consulting – November 1, 2018 – Page 6
576 Edward Merrow – Industrial Megaprojects Concepts, Strategies, and Practices for Success – 2011 – Page 160
577 Edward Merrow – Industrial Megaprojects Concepts, Strategies, and Practices for Success – 2011 – Page 162-163

who the results were reported to.[578] In particular, we were concerned with the KPIs related to the cost and schedule performance as these were key measures outlined by Edward Merrow. The following responses were provided by Nalcor:

"Cost Performance Index (CPI) is not tracked at the Project level… Many of the Contracts on LCP are either lump sum or lump sum/unit rate… Nalcor would have no visibility with respect to actual costs, only invoiced/paid costs."[579]

"Budget vs. Final Forecast Cost (FFC) on the LCP has been monitored extensively throughout construction… the latest approved AFE budget remains constant from one reporting period to the next. The FFC… also remains constant from one reporting cycle to the next…however, the forecast is regularly adjusted at the package/contract level to align with the latest available information within the period. The LCP Monthly Progress Report… and the Construction Reports prepared in alignment with the Financial Loan Guarantee… report Budget vs. FFC data at a category and asset level, along with a detailed analysis of the FFC changes within the respective contracts."[580] However, as previously noted in our report the FFC did not include potential costs. For example, in March 2014, as noted in the Cost section of this report, a briefing provided by Paul Harrington for a budget update of $7.5B noted that *"…there was no allowance for any cost increase in the Astaldi Contract because of delays and performance."*[581] The March 2014 construction reports for MF/LTA and LIL show a total budget and final forecast cost of $6.53 billion.[582&583]

With regards to the Schedule Performance Index (SPI), Nalcor responded *"The LCP Monthly Progress Report… and Integrated Progress Schedule (IPS) Monthly Schedule and Progress Analysis… are the primary monthly reporting deliverables that outline earned vs. planned progress."*[584]

We have reviewed the schedule milestones included in the LCP Monthly Progress Reports and IPS and noted that there were instances where the schedule remained under review. As an example, in July 2015, the LCP Monthly Progress Report noted that the first power date for MFG was under assessment.[585] This milestone remained under assessment until the June 2016 LCP Monthly Progress Report, when the first power date was updated to August 2019.[586]

In an interview with Paul Harrington, we asked why it would have taken so long to update the schedule. He stated *"During that period, that's when we were negotiating deal with Astaldi. Until such time that we negotiated a settlement, which was the settlement of $50 million that was added on, they wouldn't tell you when it was going to be finished. You can't guess it. It has to be based on a contracted schedule."*[587] We understand that this means that the scheduled milestone dates were not updated until contracted schedules had been negotiated.

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578 Response to Grant Thornton Question 10.32 – November 7, 2018
579 Response to Grant Thornton Question 10.32 – November 7, 2018 – Page 3
580 Response to Grant Thornton Question 10.32 – November 7, 2018 – Page 3
581 DISCL-MFPMT-30 – Mar 2014 $7.5B – Page 1
582 NAL0020799 – Construction Report Muskrat/LTA Project Finance Agreement – September 20, 2016 – Pages 7 & 8
583 NAL0020778 – Construction Report LIL Project Finance Agreement – April 20, 2014 – Page 5
584 Response to Grant Thornton Question 10.32 – November 7, 2018 – Page 3-4
585 NAL0019130 – Lower Churchill Project Monthly Progress Report – July 31, 2015 – Page 30
586 NAL0019141 – Lower Churchill Project Monthly Progress Report – June 30, 2016 – Page 37
587 Interview Summary – Paul Harrington – Lower Churchill Project Director – October 24, 2018 – Page 15

11.12 Transmission vs. Generation

In June 2016[588], after Stan Marshall became CEO, the project was separated into two distinct work streams, Generation and Transmission, with individual leadership and project resources.[589] Some of the project team members did not agree with this change and felt that it led to cost increases. For example, Paul Harrington, the Project Director LC Management and Support wrote a memo to Stan Marshall explaining his concerns with this change. The letter states, *"I fully understand and support your desire to focus work in a different way. I do have concerns with the timing of implementing the organizational changes and suggest we do so in a more gradual manner."*[590] He explains that his primary concerns are as follows:

- **Impact on organization** – *"…a number of key leaders in the Transmission and HVDC project management team will feel that this organization change will have a disruptive effect on the remaining work. I am concerned about loss of Project institutional knowledge and overall demoralization of the remaining team."*[591]
- **Increased risk LIL** – *"In my opinion and based on my experiences in mega project execution, the LIL cost QRA P75 of $300M will be increased and the current QRA P75 schedule of 7 months will be similarly increased by disruptions and distractions to the Project teams."* [592]
- **Increased risk generation** – *"…for example the negotiation with Astaldi in an effort to seek a negotiated settlement could be severely compromised. If no negotiated settlement is achieved then the change-out and legal action will require all our project knowledge and resources."*[593]

However, he also states, *"I fully agree with the Transmission/Generation split post project and feel that the emphasis needs to be placed on the readiness of the operating entity to take over the LIL assets…."*[594]

Other members of the PMT also expressed concern with the bifurcation of the project. During an interview with Jason Kean, the former Deputy General Project Manager he explained that the fifth budget increase to $10.1 billion was a result of new leadership and bifurcation.[595] He also noted that: *"…bifurcation was probably beneficial strengthening of focus, the approach taken by and the ideologies of those that led the bifurcation is not the best for the project in my personal opinion."*[596]

During an interview with Stan Marshall, Nalcor CEO, we asked whether the idea to split the transmission and generation had impacted the cost overruns at all. Stan Marshall responded:

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588 Assessment of Implementation of EY Interim Report Recommendations – August 31, 2017 – Page 7
589 Assessment of Implementation of EY Interim Report Recommendations – August 31, 2017 – Page 7
590 DISCL-NAL-1729058-Memo to CEO from Project Director LC Management and Support – June 6, 2016 – Page 2
591 DISCL-NAL-1729058-Memo to CEO from Project Director LC Management and Support – June 6, 2016 – Page 3
592 DISCL-NAL-1729058-Memo to CEO from Project Director LC Management and Support – June 6, 2016 – Page 3
593 DISCL-NAL-1729058-Memo to CEO from Project Director LC Management and Support – June 6, 2016 – Page 3
594 DISCL-NAL-1729058-Memo to CEO from Project Director LC Management and Support – June 6, 2016 – Page 3
595 Interview Summary – Jason Kean – Former Deputy Project Manager – May 11, 2018 – Page 15
596 Interview Summary – Jason Kean - Former Deputy Project Manager – May 11, 2018 – Page 29

"No, I think it was the key to our success."[597] Further to this, when asked whether the mandate changed from being cost driven to just get it done, Stan Marshall explained that: *"…people are looking at the actual out of pocket capital cost and not worried about time, and I said time is money."*[598] He continued to explain *"I tried to simplify it for everybody and said look you have a $10B project roughly 6.3%, that means that financing costs for interest is a million dollars a day… if I'm going to save $1-2 million dollars a day and it's going to cost $100,000 more, it's money well spent."*[599]

11.13 Observations and Findings

We reviewed the overall project management structure Nalcor developed and considered whether this structure was in accordance with best practice. We conclude the following:

- Nalcor has detailed and well documented policies and procedures governing their project management process.
- The core project management team, with the exception of Ron Power, did not have any hydro experience. On average they did have 14 years of mega-project experience, primarily oil and gas related. There were other individuals on the integrated team that had significant hydro experience, however these individuals had on average less than 4 years mega-project experience.
- Nalcor selected SNC as the EPCM contractor but expressed issues with SNC's performance in 2012 and ultimately decided to switch to an integrated project team approach in 2013. Both the EPCM and Integrated project team models are acceptable management frameworks.
- In 2016 Stan Marshall, Nalcor CEO split the project into two separate work streams (Generation and Transmission). Paul Harrington and other team members expressed concerns with the decision to bifurcate the project, as he felt it would contribute to cost increases. Mr. Marshall indicated that the bifurcation was to accelerate the completion and that his decision was an effort to save money overall in financing charges.

[597] Interview Summary – Stan Marshall – Nalcor CEO – September 13, 2018 – Page 8
[598] Interview Summary – Stan Marshall – Nalcor CEO – September 13, 2018 – Page 18
[599] Interview Summary – Stan Marshall – Nalcor CEO – September 13, 2018 – Page 18

12 Overall Procurement Strategy Developed by Nalcor

12.1 Mandate

Reference 4. (b) (iv) *"…whether (iv) the overall procurement strategy developed by Nalcor for the project to subdivide the Muskrat Falls Project into multiple construction packages followed industry best practices, and whether or not there was fair and competent consideration of risk transfer and retention in this strategy relative to other procurement models…"*[600]

12.2 Background

Nalcor's overall procurement strategy is outlined in their Overarching Contracting Strategy.[601] This document considers factors such as risk, skills, resources and capabilities, contract type, obligations and interfaces.[602] In preparing this strategy Nalcor conducted an analysis of the contracting environment to determine lessons learned and best practices.[603] This was done by compiling data on multiple projects and other sources including hydro, transmission, and other mega projects.[604] The information considered included the following:[605]

- Newfoundland and Labrador (and Atlantic Canada) megaproject execution lessons learned (i.e. Hibernia, Terra Nova, White Rose, Sable Energy, Voisey's Bay, etc.).
- Lessons learned from the highly successful development of Churchill Falls Generating Facility lead by Brinco under an EPCM arrangement with Acres Canada Bechtel.
- Hydro development project lessons learned from across Canada sourced from BC Hydro, Manitoba Hydro, Hydro Quebec, and Ontario Power Generation.
- Recent international hydro megaproject lessons learned from Iceland.
- Hydro industry trends in Canada through participation in the Canadian Electrical Utilities Project Management Network Group.
- Mega-project industry trends through the involvement of Independent Project Analysis Inc. and Westney Consulting Group.
- Lessons learned from various industry associations including AACE International and PMI.
- Insights from Nalcor's financial advisors for the Project, Pricewaterhouse Coopers ("PWC") and strategic legal advisor, Fasken Martineau DuMoulin

[600] NEWFOUNDLAND AND LABRADOR REGULATION 101/17 - *Commission of Inquiry Respecting the Muskrat Falls Project Order* under the *Public Inquiries Act, 2006* (O.C. 2017 - 339) – Page 5
[601] NAL0018451 – Overarching Contracting Strategy – October 25, 2011
[602] NAL0018451 – Overarching Contracting Strategy – October 25, 2011 – Page 6
[603] NAL0018451 – Overarching Contracting Strategy – October 25, 2011 – Page 27
[604] NAL0018451 – Overarching Contracting Strategy – October 25, 2011 – Page 27
[605] NAL0018451 – Overarching Contracting Strategy – October 25, 2011 – Pages 27-28

Based on the above analysis Nalcor identified the following considerations for the contracting strategy:[606]

- Ensure contract size is manageable and does not exceed contractor capability, put interface risk in correct place
- Contractors need to stay within their expertise
- Avoid one strategy fits all for the contracting packages as the contracting environment varies between the different scopes of work
- Smaller packages work better
- Commercial terms and conditions strongly in favour of the Owner will limit bidder competition and drive costs up
- Megaprojects with large EPC lump sum contracting schemes fail more often than non-lump sum schemes
- Risk premiums tend to increase with onerous local content requirements (e.g. man-hour targets, harsh environments/climate, concurrent large projects in the region, high potential for labour shortages
- Risk premiums can be significantly reduced by the Owner assuming some of the risk; in particular those risks outside the contractor's control (i.e. strategic risk)

Nalcor's Contracting Strategy notes that the main objectives of the contracting strategy were:[607]

- Achieve the required project quality
- Optimize the project schedule
- Minimize overall cost and schedule risk
- Achieve optimum and appropriate risk allocation
- Meeting benefits and First Nations obligations

[606] NAL0018451 – Overarching Contracting Strategy – October 25, 2011 – Pages 27-29
[607] NAL2241839 – Construction Management Taskforce Workshop #1 – March 26, 2012 – Page 6

12.3 Work Package Size

Nalcor subdivided the LCP into multiple work packages. We reviewed guidance from the Project Management Institute ("PMI") as published in the A Guide to the Project Management Body of Knowledge ("PMBOK"). PMBOK states *"...the process of subdividing project deliverables and project work into smaller, more manageable components. The key benefit of this process is that it provides a framework of what has to be delivered."*[608]

The size of the work packages used by Nalcor required further analysis. Nalcor's research indicated that "*Smaller packages work better*"[609] however, in executing the LCP Nalcor selected a larger work package structure. We reviewed this decision and have noted the following:

Nalcor received input from SNC regarding the size of the work packages. The PMT indicated that SNC *"…maintained the view that the construction packages should be smaller (as was the case within Hydro Quebec)."*[610]

We reviewed SNC's April 2013 Risk Review for Lower Churchill Project. It states: "*The project must come to the realization that the market response to these large bid packages is limited to a few major players. The pricing tendency is showing signs of being well above their original set budget…"*[611] The report goes on to say: *"Restricted pool of major contractors capable of bidding on the very large packages developed for the LCP (already out for bids allowing for limited possibility to re-scope or develop new packages). Fewer bids could be submitted and at higher than original budgeted cost."*[612]

During an interview with Paul Lemay the Lead Estimator for SNC we discussed work package sizes and noted the following: *"…normally we have 2, 3 contractor but they have decided to give that to one contractor of course, you know…it drives the price up but you have less interference... when you have 3 contractor in the powerhouse and the intake, and you have to, if one is late, then the other one sue the other one because he is late and you never see the end…so that is why when you go with one contractor the advantage of doing that there is some disadvantage too, is you are taking a bigger risk. With one guy, if this guy fails everything fails, you have to start all over again..."*[613]

We discussed work package sizes with Normand Bechard, the former Director General Project Lower Churchill, SNC in an interview. He explained: "…*They were told by the lenders to reduce the number of risks they were taking…I was having discussion with Jason* [Kean] *but also with Lance* [Clarke] *at the time…these guys are there to make money with interest, but you should be careful because if you go their direction you are going to pay a premium to transfer risk to contractor and that premium can be very high…"*[614]

Additionally, Nalcor's financial advisors PWC provided advice pertaining to package sizing and transfer of risk. PWC suggested that *"…the owner should design packages for tender to achieve*

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608 A Guide to the Project Management Body of Knowledge – PMBOK Sixth Edition – Page 156
609 NAL0018451 – Overarching Contracting Strategy – October 25, 2011 – Page 27-29
610 The Sanction Decision – Briefing Note as Requested by Nalcor Legal Counsel – January 2018 – Page 12
611 Risk Review for Lower Churchill Project – April 2013 – Page 4
612 Risk Review for Lower Churchill Project – April 2013 – Page 6
613 Interview Summary – Paul LeMay – SNC Lead Estimator – May 8, 2018 – Page 4
614 Interview Summary – Normand Bechard – Project Manager SNC – May 8, 2018 – Page 4

appropriate risk transfer within a sensible scope that minimizes interfaces. The package scope and risk transfer should aim to be attractive to the relevant contracting market…"[615]

The PMT noted that: *"…Nalcor carefully assessed this packaging approach…an increase in the number of contracting packages and construction interfaces would have to be supported by…the necessary management resources…"*[616] The PMT also indicated that *"…contrary to SLI's* [SNC] *view, the financiers wished to see the opposite with a specific desire for larger packages, less interfaces and more risk transfer to credit-worthy contractors…"*[617]

Derek Hennessey from R.W. Block reviewed Nalcor's work package size. He concluded that:

"Nalcor also indicated the large contracts strategy was stipulated as a preference of the three rating agencies that assessed the project. Assuming Nalcor's indication the ratings agencies preferred a large contracts strategy [meaning the rating agencies required large packages], *given the project needed to be financeable, and there are other benefits to using larger construction packages, the decision to structure the project using larger construction packages seems reasonable."*[618]

Williams Engineering also reviewed the work package sizes and concluded: "*Best practice on large projects in remote locations is to provide large work packages in order to limit risks associated with delays in contract completion, particularly scope on the critical path."*[619] Williams goes on to say: *"Larger work package sizes attract large-scale contractors and the expertise to complete complex projects."*[620]

12.4 Nalcor's Procurement Model

As previously discussed in the Overall Project Management section of this report. Nalcor considered three project delivery options. Their financial consultant PWC reported on Procurement Issues in 2008 and noted that: *"…the adoption of a highly conservative, lowest-common-denominator approach, namely the use of a single fixed-price turnkey lump sum EPC contract…would render the project uneconomic. The number of companies willing to bid for such a project is clearly limited, and the number who would be credible in such a role even lower."*[621] At the time of sanction Nalcor had selected an EPCM model. As noted earlier in this report this scope of work was awarded to SNC. This contract contained a cost reimbursable portion and a fixed fee component tied to the completion of defined stages of service.[622]

[615] NAL0039249 – Financial Close Requirements: Procurement Issues – February 2008 – Page 8
[616] The Sanction Decision – Briefing Note as Requested by Nalcor Legal Counsel – January 2018 – Page 12
[617] The Sanction Decision – Briefing Note as Requested by Nalcor Legal Counsel – January 2018 – Page 13
[618] Follow Up Areas Memo – R.W. Block Consulting – November 1, 2018 – Page 5
[619] Williams Engineering Canada – Forensic Review in Support of Commission of Inquiry Respecting the Muskrat Falls Project – November 30, 2018 – Page 6
[620] Williams Engineering Canada – Forensic Review in Support of Commission of Inquiry Respecting the Muskrat Falls Project – November 30, 2018 – Page 7
[621] NAL0039249 – Financial Close Requirements: Procurement Issues – February 2008 – Page 8
[622] NAL0020698 – EPCM Services for the Muskrat Falls Hydroelectric Development – February 1, 2011 – Page 152-153

12.5 Observations and Findings

We reviewed the overall procurement strategy developed by Nalcor to subdivide the project into multiple construction packages followed industry best practices, and whether or not there was fair and competent consideration of risk transfer and retention in this strategy relative to other procurement models and have concluded the following:

- Nalcor subdivided the LCP into multiple work packages. We reviewed guidance from the Project Management Institute ("PMI") as published in the A Guide to the Project Management Body of Knowledge ("PMBOK"). PMBOK states *"...the process of subdividing project deliverables and project work into smaller, more manageable components. The key benefit of this process is that it provides a framework of what has to be delivered."*[623] Therefore, it is our conclusion that Nalcor's decision to subdivide the Project into multiple construction packages followed industry best practices.

- Nalcor selected a procurement strategy to use large packages, less interfaces and more risk transfer to contractors. This decision was contrary to their research which indicated that smaller work packages work better and also contrary to SNC's opinion that the construction packages should be smaller. While this decision was not in accordance with the information Nalcor had available to them, Nalcor has indicated that financiers preferred larger work packages. Accordingly, Nalcor structured larger work packages.

[623] A Guide to the Project Management Body of Knowledge – PMBOK Sixth Edition - Page 156

13 Risk Assessments

13.1 Mandate

Reference 4. (b) (v) *"…whether (v) any risk assessments, financial or otherwise, were conducted in respect of the Muskrat Falls Project, including any assessments prepared externally and whether:*

(A) the assessments were conducted in accordance with best practice,

(B) Nalcor took possession of the reports, including the method by which Nalcor took possession,

(C) Nalcor took appropriate measures to mitigate the risks identified, and

(D) Nalcor made the government aware of the reports and assessments…"[624]

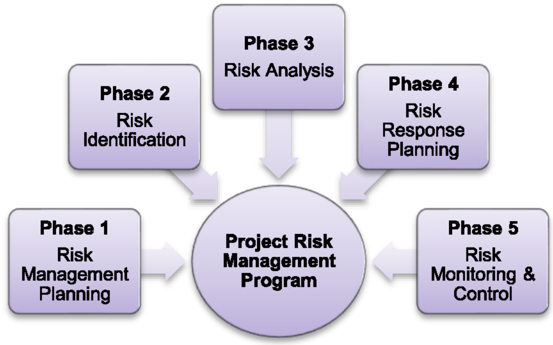
13.2 Background

Nalcor began considering the impact of risk on the Lower Churchill Project early in their gateway process through the LCP – Project Execution Risk & Uncertainty Management Guidelines. This document defines Nalcor's project risk management goal as *"…identify project risks … and develop strategies which either significantly reduce them of take steps to avoid them altogether…"*[625] Furthermore, Nalcor describes the project risk management program as *"…a mechanism by which the Project Management Team can:*[626]

- *Realistically set reasonable cost and schedule contingencies,*
- *Estimate the probability of cost overruns and schedule delays,*
- *Estimate the probability that the projected cost and schedule targets will be achieved,*
- *Understand the accuracy of the targeted cost estimate or schedule, and*
- *Ensure that the project team identifies both project risks and opportunities, and implements a plan to mitigate risks and realize opportunities."*

[624] NEWFOUNDLAND AND LABRADOR REGULATION 101/17 - *Commission of Inquiry Respecting the Muskrat Falls Project Order* under the *Public Inquiries Act, 2006* (O.C. 2017 - 339) – Page 3
[625] NAL0020665 – LCP – Project Execution Risk & Uncertainty Management Guidelines - Page 9
[626] NAL0020665 – LCP – Project Execution Risk & Uncertainty Management Guidelines - Page 10

Nalcor lays out a five phase project risk management program. This phased approach is summarized below. Note that Phases 1-3 occurred prior to sanction, while Phases 4 and 5 relate to the Construction Phase of the project. Some background information on Phases 1-3 has been included in this report as it is necessary to consider prior to Phases 4 and 5.



13.2.1 Phase 1 – Risk Management Planning

The first phase in their Project Risk Management Program involved developing the risk management philosophy, policy, staffing the function, defining risk types, defining the risk management approach, and defining reporting requirements.[627]

The risk management planning defines a risk management philosophy[628] outlining the objectives of Nalcor's risk management program. The philosophy was supported in Nalcor's project risk policy which outlines a commitment to *"…planning and executing the Lower Churchill Project in such a way as to minimize the potential negative effects of risks and to maximize opportunities…"*[629]

13.3.2 Phase 2 – Risk Identification

Nalcor discusses their risk management process as determining which risks might affect the project's desired outcome. [630] Their guidelines also address risk identification as an on-going and iterative process which should be updated throughout the life of the project.[631] To identify and quantify project risks, Nalcor held risk workshops.[632]

13.2.3 Phase 3 - Risk Analysis

Nalcor indicated that, *"The purpose of this phase of the Project Risk Management Program is to evaluate the risks and opportunities identified in terms of both their potential likelihood of occurrence (probability) and their severity level or impact/consequence…"*[633]

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627 NAL0020665 – LCP – Project Execution Risk & Uncertainty Management Guidelines - Page 13
628 NAL0020667 – Lower Churchill Project – Risk Management Philosophy – June 8, 2012
629 NAL0020666 – LCP – Project Risk Management Policy – Page 3
630 NAL0020665 – LCP – Project Execution Risk & Uncertainty Management Guidelines – October 1, 2012, Page 13
631 NAL0020665 – LCP – Project Execution Risk & Uncertainty Management Guidelines – October 1, 2012, Page 13
632 NAL0020665 – LCP – Project Execution Risk & Uncertainty Management Guidelines- October 1, 2012, Page 13
633 NAL0020665 – LCP – Project Execution Risk & Uncertainty Management Guidelines- October 1, 2012 – Page 17

Risk workshops for the DG3 risk analysis were held on May 23rd and 24th of 2012.[634] Day one of the workshops focused on tactical risks and day two of the workshops discussed key risks.[635] We reviewed the list of attendees for the workshops and noted that attendees from Nalcor, SNC and Westney attended day one of the workshop but SNC did not attend day two of the workshop. [636] We also noted that of the six individuals with over 30 years of hydro experience who worked on the LCP during 2012, the following attended the workshops:[637]

- Bob Barnes, Ready for Operations Manager attended the MFG portion on Day 1
- John Mulcahy, Hydroelectric Construction Specialist attended the MFG and transmission portions on Day 1
- Raj Kaushik, Electrical Lead attended the transmission portion on Day 1

None of the individuals with significant hydro experience attended Day 2 of the workshops when the key strategic risks were discussed. To our knowledge, Ron Power, was the only team member with hydro experience who attended Day 2 of the workshop, and he was not present on Day 1.

We were told by Mr. Richard Westney, founding partner of Westney Consulting Group,[638] that on June 4 - 5, 2012, Jason Kean, the former Deputy General Project Manager and Paul Harrington, the Project Director met with Keith Dodson at Westney Consulting's office in Houston to review and finalize the risk ranges for both the tactical and strategic risks that went into the Monte Carlo simulation performed by Westney.[639] We interviewed Keith Dodson from Westney Consulting on November 16, 2018. During that interview he highlighted the following:

- *"Our recommendation on P-value is always at least 75%, and in this case I was saying P90 because it was likely to end up like where this one has, with some type of change in government and government investigation later down the road. I've been in a lot of these public projects and it almost always happens."*[640]
- *"They wanted us to say picking P50 was a good thing, and we never would say it."*[641]
- When asked about the benchmarking used in developing the risk ranges, Mr. Dodson explained, *"Basically the benchmarks were the two Hydro Quebec projects* [Eastmain

[634] NAL0020664 - Decision Gate 3 Project Cost and Schedule Risk Analysis Report – October 1, 2012 - Page 134

[635] NAL0020664 - Decision Gate 3 Project Cost and Schedule Risk Analysis Report – October 1, 2012 – Page 137

[636] NAL0020664 - Decision Gate 3 Project Cost and Schedule Risk Analysis Report – October 1, 2012 – Page 134-144

[637] NAL0020664 – Decision Gate 3 Project Cost and Schedule Risk Analysis Report – October 1, 2012 – Pages 134 to 144

[638] http://www.westney.com/about-us/firm-leadership

[639] Richard Westney - Oct 25 memo to Angie Brown re ranging rev1.pdf

[640] Interview Summary – Keith Dodson – Westney Consulting – November 16, 2018 - Page 2

[641] Interview Summary – Keith Dodson – Westney Consulting - November 16, 2018 - Page 7

1 and Eastmain 1A located in James Bay], *but they were quite different dams, they weren't structural concrete dams"*[642]

- *"No one wanted to move the estimate. I'm sure Nalcor wanted to believe it, based on discussions and SLI was very firm that they could do it, so they didn't range as much… and that same confidence carried over into the strategic risk discussion where we would have a political risk and we would have had a much higher productivity risk, and they were $2 billion higher. But we don't make decisions, we just make our view of the world"*[643]
- When asked when mitigation would come out of contingency, Mr. Dodson explained, *"Totally up to the client… I would recommend to the client… don't count it until you've done it. But it's all over the map in terms of what they do, particularly private clients. Now, this client had more exposure because it was semi-public."*[644]

13.2.4 Phase 4 – Risk Response Planning

Nalcor's documentation indicates that their process in planning a response to risk contained four strategies; avoidance, mitigation, transference and acceptance.[645]

The risk registers populated by the project team were updated dependent on the risk strategy chosen and an action plan was developed and assigned to a risk owner. The risk owner developed risk response plans based on the risk mitigation strategy chosen.

We asked Williams to review the forecasting and budget used on the LCP. They noted the following: *"Best practice budget reporting includes contingency costs. It appears from documents reviewed that contingency costs were not included in the reported budget when a mitigation strategy was identified to address the risk. Contingency costs are included in budgets until the scope of work associated with the contingency amount is completed and the risk is eliminated."*[646]

We reviewed the Key Risk Status Report[647] that was updated during the May 2012 workshop that was held with Westney Consulting, as well as the Strategic Risk Frames[648] that coincide with the strategic risks that were included in the management reserve. Each of these strategic risk frames outline the mitigation, avoidance, acceptance or transference plan. Therefore, Nalcor did have mitigation plans in place for the identified strategic risks.

In addition to the strategic risks, we reviewed the Base Estimate Tactical-Risk Exposure Input.[649] This document contains a summary of the risk ranges in dollars (i.e. best and worst

[642] Interview Summary – Keith Dodson – Westney Consulting – November 16, 2018 - Page 2-3
[643] Interview Summary – Keith Dodson – Westney Consulting - November 16, 2018 - Page 2
[644] Interview Summary – Keith Dodson – Westney Consulting - November 16, 2018 - Page 6
[645] NAL0020665 – LCP – Project Execution Risk & Uncertainty Management Guidelines- October 1, 2012 – Page 21
[646] Williams Engineering Canada – Forensic Review in Support of Commission of Inquiry Respecting the Muskrat Falls Project – November 30, 2018 – Page 4
[647] NAL0020664 – Decision Gate 3 Project Cost and Schedule Risk Analysis Report, October 1, 2012 – Pages 146-171
[648] Pre-Sanction – Briefing Note as Requested by Nalcor Legal Counsel – January 2018 – Pages 55 to 145
[649] NAL0020664 – Decision Gate 3 Project Cost and Schedule Risk Analysis Report – October 1, 2012 – Page 238-247

case scenarios) for each of the tactical risks. These ranges were the inputs into the Monte Carlo simulation that was performed by Westney Consulting.

One of the key risks that materialized throughout the project was the risk of schedule delay. Prior to sanction, the Decision Gate 3 Project Risk and Schedule Risk Analysis Report noted that, *"the current schedule is aggressive, given the northern location and the sustained concrete placement production rates required"*[650] and *"… potential for an 11 to 24 month delay to full power…"*[651] We asked Nalcor to provide a summary of the mitigation measures put in plan to address this risk at sanction and how the cost associated was factored into the sanction budget for the project. In response, Nalcor stated:

"NAL0020664 [DG3 Project Risk and Schedule Risk Analysis Report] *outlines and discusses numerous activities that were identified and mitigation measures that were actioned to address various risks. With specific reference to the concrete placement production rates required, the assumptions included in the DG3 estimate were confirmed by SNC-Lavalin as achievable; however, SNC-Lavalin reinforced the project team's concern regarding the risk of sustaining the required production levels (reference p.235-236 of the PDF). This risk was included in the management reserve time-risk analysis and contributed to the potential 11-21 month delay."*[652]

While it is noted that SNC confirmed that the assumptions were achievable, the risk was outlined in the SNC Risk Assessment Report (discussed in more detail later in this report) as *"Concrete works slippage from baseline schedule"*[653] with a maximum consequence of $350 million and a probable consequence of $126 million.[654] Westney's report which was prepared in December 2017 in response to the SNC Risk Assessment Report, compared the risks identified by SNC to Nalcor's risks and noted that this risk was addressed through Nalcor's risk titled *"Availability of experienced hydro contractors"*[655] which is included in Nalcor's Key Risk Status Report.[656]

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[650] NAL0020664 – Decision Gate 3 Project Cost and Schedule Risk Analysis Report – October 1, 2012 – Page 286
[651] NAL0020664 – Decision Gate 3 Project Cost and Schedule Risk Analysis Report – October 1, 2012 – Page 296
[652] Response to Grant Thornton Question 8.9 – July 6, 2018
[653] An Analysis of SNC-Lavalin's Risk Assessment Report – Westney Consulting – December 2017 – Page 11
[654] SNC-Lavalin Risk Assessment Lower Churchill Project – April 23, 2013 – Page 14
[655] An Analysis of SNC-Lavalin's Risk Assessment Report – Westney Consulting - December 2017
[656] NAL0020664 – Decision Gate 3 Project Cost and Schedule Risk Analysis Report – October 1, 2012, Attachment B.7 – Key Risk Status Report, Page 159

The strategic risk frame for this risk indicated that it was a low risk, and outlined the following management strategy, action plan and status as of September 2012:

Risk Title	Management Strategy	Action Plan	Status
Availability of experienced hydro contractors	***"Avoid Risk by:*** *Engaging worldwide market and "sell the project" to stimulate interest"* *Developing an innovative contracting strategy to make project attractive to contractors with risk/benefit balance* ***Accept that this risk is not entirely avoidable and cover additional contingency to mitigate it."***[657]	*"Obtain market intelligence* *Early engagement of qualified contractors.* *Evaluate and make decision on contract package configuration* *Convey to contractors that the Project is "real"* *Provide sufficient on-site oversight* *Obtain completion guarantee."*[658]	*"RISK EXPSOSURE IS CONSIDERED LOW, DUE TO THE FOLLOWING:* *We have significant interest in firms to pre-qualify for CH0007 – at the end end 4 bidders were pre-qualified – 3 are international/global firms* ***Our key exposure remains construction labour productivity*** *Our contract terms and conditions and performance security requirements are considered too heavy handed – we will have to manage this our risk that we will not have bidders or very high prices* *Suggest that we still have \$40 to \$50 million of exposure for CH0006, 7 & 8."*[659]

[657] NAL0020664 – Decision Gate 3 Project Cost and Schedule Risk Analysis Report – October 1, 2012
[658] NAL0020664 – Decision Gate 3 Project Cost and Schedule Risk Analysis Report – October 1, 2012
[659] NAL0020664 – Decision Gate 3 Project Cost and Schedule Risk Analysis Report – October 1, 2012

As indicated in the table above, Nalcor felt that the key exposure remained with the construction labour productivity risk. This risk was indicated as high in the Strategic Risk Frames[660] and the mitigation plan, action plan and status as of September 2012 are as follows.[661]

Risk Title	Management Strategy	Action Plan	Status
Availability and retention of skilled construction labour	***"Avoid risk by:*** *Recognize competition threat for labour and proactively manage* *Making the work and work site appealing to Newfoundlanders…* *Actively recruit workforce currently commuting…* ***Mitigate the exposure by:*** ***Developing a construction schedule based upon achievable labour productivities*** *Negotiating a labour agreement that supports trade flexibility…"*[662]	*"Make work location/employment attractive…* *Develop a construction schedule based upon achievable labour productivities…* *Labour strategy that considers lessons learn for other projects incl. demarkation and composite crewing."*[663]	*"THIS REMAINS THE KEY RISK FOR THE PROJECT. MITIGATION STATUS;* *DG3 labour strategy considered this risk and baked mitigation measures into plans…* *If we Sanction in fall 2012, we should good for the next 12 months given a slowing of activity in Western Canada, however our current schedule puts is aligned with Hebron hence large competition for workers…* *EPCM Services Agmt with SLI includes a strong focus on construction planning prior to Project Sanction"*[664]

Nalcor's mitigation plan for this risk stated that they would develop a construction schedule based upon achievable labour productivities. However, at this time Nalcor was aware that

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660 Pre-Sanction – Briefing Note as Requested by Nalcor Legal Counsel – January 2018 – Page 101

661 NAL0020664 – Decision Gate 3 Project Cost and Schedule Risk Analysis Report – October 1, 2012 – Page 162

662 NAL0020664 – Decision Gate 3 Project Cost and Schedule Risk Analysis Report – October 1, 2012 – Page 162

663 NAL0020664 – Decision Gate 3 Project Cost and Schedule Risk Analysis Report – October 1, 2012 – Page 162

664 NAL0020664 – Decision Gate 3 Project Cost and Schedule Risk Analysis Report – October 1, 2012 – Page 162

there was a 3% chance of achieving first power,[665] meaning there was a 97% chance that the construction schedule would not be achievable. Therefore, Nalcor's mitigation plan to offset this risk was not supported by the information they had available at the time. Furthermore, this risk immediately began to materialize with Astaldi's slow mobilization in early 2014.

13.2.5 Phase 5 – Risk Monitoring and Control

As noted above, Phase 2 of the Project Execution Risk & Uncertainty Management Guidelines addresses risk identification as an on-going and iterative process which should be updated throughout the life of the project.[666] To our knowledge, once the risks began to materialize, there were no further steps taken to quantify the impact and adjust the contingency or revise the mitigation plans.

In 2007 Nalcor engaged Westney Consulting to provide subject matter expertise with regards to risk management for the LCP project.[667] Westney was involved in a number of engagements to support the Nalcor team in their project risk management approach including multiple Quantitative Risk Assessments ("QRA"). The QRAs that Westney completed from 2007 to financial close are summarized in the timeline below:

[665] NAL0020664 – Decision Gate 3 Project Cost and Schedule Risk Analysis Report – October 1, 2012 – Page 162

[666] NAL0020665 – LCP – Project Execution Risk & Uncertainty Management Guidelines – October 1, 2012, Page 321 & 322

[667] NAL0309329 - Agreement 15365-OB for Project Execution Risk Management Advisory Services for the Lower Churchill Project between Energy Corporation of Newfoundland and Labrador and Westney Consulting Group Canada, November 26, 2007

As shown in the above timeline, there was no QRA completed between the DG3 QRA in 2012[668] and the 2016 QRA.[669] During the period from 2012 to 2016, a number of risks materialized including but not limited to:

1. A delay in mobilization due to the delayed environmental assessment release;
2. Bids exceeding the base estimate;
3. Astaldi's slow mobilization; and
4. Astaldi's less than expected productivity rates of concrete placement.

Throughout 2014, Astaldi's slow mobilization began to impact the schedule and the incompletion of the integrated cover system affected productivity during the winter of 2015. In July 2015, the construction reports indicated that the majority of the project milestones were under review.[670]

We asked Nalcor whether there were any risk assessments completed internally between the 2012 and 2016 QRAs, they responded *"During that time frame* [2012 to 2016] *LCP did not complete any quantitative modelling of risk (like that completed by Westney); however, as per the Project Risk Management Plan LCP identified, quantified and monitored tactical and strategic risks on an on-going basis. This is documented in the LCP Monthly Progress Reports."*[671]

As previously noted, while risk registers were maintained, the overall final forecast cost and schedule did not reflect costs or schedule changes until they were committed. EY commented on the risk assessment process in their 2016 report and recommended that *"the project should revise it's planning and forecasting process to explicitly includes the regular reporting of a fully risk-adjusted final forecast of cost and schedule."*[672]

We are noting that during the course of the project Nalcor increased the contingency several times for an approximate total of $540 million.

13.3 Observations and Findings

When considering whether any risk assessments, financial or otherwise, conducted in respect of the Muskrat Falls Project, including any assessments prepared externally awe observed and found the following:

- Nalcor's project risk management policies and procedures were well defined and documented. The risk philosophy was communicated throughout the project to the project management team and to Nalcor Executives.
- From Sanction in 2012 to 2016, when project risks were materializing, there was no formal QRA process completed.

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668 Response to Grant Thornton Question 10.21 – October 18, 2018
669 NAL0019195 – Muskrat Falls Generation Quantitative Cost and Schedule Risk Analysis (Q1-2016), June 29, 2016
670 NAL0018468 – Construction Report Musrkat/LTA Project Finance Agreement – August 20, 2015 – Page 13
671 Response to Grant Thornton Question 10.21 – October 18, 2018 – Page 2
672 EY Report: Muskrat Falls Project Review of project cost, schedule and related risks – Interim report – April 8, 2016 – Page 18

- We have noted that Nalcor did increase the contingency several times during the project for an approximate amount of $540 million.
- Nalcor assumed mitigation would occur to reduce the exposure of a specific risk prior to actual mitigation of that risk.
- Nalcor's strategy to mitigate the risk of "Availability and retention of skilled construction labour" was to develop a construction schedule based upon "achievable labour productivity." According to Westney, Nalcor's own risk advisor, there was a 3% chance of Nalcor achieving that schedule.

14 SNC Lavalin Risk Assessment Report

14.1 Mandate

Reference 4. (b) (v) (B) *"…whether (v) any risk assessments, financial or otherwise, were conducted in respect of the Muskrat Falls Project, including any assessments prepared externally and whether…*

(B) Nalcor took possession of the reports, including the method by which Nalcor took possession…"[673]

14.2 Background

In June 2017 a Risk Assessment Report on Muskrat Falls that SNC Lavalin Inc. ("SNC") had dated April 2013 ("SNC Risk Report") was publically released that predicted a potential project risk exposure of $2.4 billion.[674]At the time the report was released it was unclear whether anyone from Nalcor, including Ed Martin, Nalcor's CEO had received or was aware of the contents of the SNC Risk Report in 2013 and if the risks identified by SNC were considered by Nalcor.

14.3 Results of Interviews

During interviews with SNC employees, we concluded that the SNC Risk Report was an internal SNC document prepared to address concerns brought forward by SNC employees. The report was titled "*Confidential for SNC-Lavalin Internal Use Only.*"[675] During our review we did not identify any evidence which would conclude that Nalcor received the SNC Risk Report. However, we have concluded that Nalcor was aware the report existed in 2013 and chose not to receive it.

Several members of SNC's management team noted that a meeting occurred between SNC's CEO and Nalcor's CEO in St. John's, NL during April 2013. The Former SNC CEO noted that while he does not recall physically giving the report to Nalcor CEO, the risks outlined in the report were discussed.[676]

In addition to the meeting in April 2013, the Director of Risk Engineering Services, SNC recalls a meeting with Paul Harrington, Nalcor's Project Director in May 2013. Notes from this meeting indicated that they had discussed the SNC Risk Report.[677]

The following is a summary of responses received from interviewees in chronological order. Note that the responses from the interviewees are direct quotes which have been indented and italicized. Questions and/or topics asked by Grant Thornton ("GT") have been added in where necessary to provide context.

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673 NEWFOUNDLAND AND LABRADOR REGULATION 101/17 - *Commission of Inquiry Respecting the Muskrat Falls Project Order* under the *Public Inquiries Act, 2006* (O.C. 2017 - 339) – Page 3
674 http://www.thetelegram.com/news/local/snc-lavalin-report-revealed-muskrat-falls-risks-premier-25434/
675 NA0428133 – SNC-Lavalin Risk Assessment Lower Churchill Project – April 23, 2013 – Page 1
676 Interview Summary – Bob Card – May 17, 2018 – Page 4
677 Jean-Daniel Tremblay Journal – Meeting with Harrington – May 28, 2013

14.3.1 Jean-Daniel Tremblay – Risk Coordinator and Interface Manager SNC (June 2012 – November 2013), April 10, 2018[678]

Q: When was the first time you've seen this [SNC Risk Report]?

A: *"About that time, about April 2013"*

How did you see it, who showed it to you, how did it come about that you saw it?

A: *"History of this with respect to my knowledge of it, is Normand Bechard came to see me at – I don't remember when, but prior to this, and told me that we had risk assessment, there was going to be a risk assessment report that would be prepared by SNC alone. I was involved in a workshop that I participated in, was in Newfoundland. There were some SNC personnel in Montreal and we did a Skype workshop."*

Q: Do you know indirectly or directly whether or not Bob Card met with Ed Martin, the CEO of Nalcor about it?

A: *"There was a meeting later at the end of May where Normand Bechard and myself were called into Paul Harrington's office and from my recollection is that Bob Card met with Ed Martin and I'm not sure about this, but what seems to have happened is that Bob Card mentioned that we did a risk report on the project, I don't know what was discussed and Paul Harrington asked us (Normand and myself) what's the deal with this report? And there was some concern that it was sensitive information and we don't want to, we shouldn't do anything with this report. It's sensitive and we have other people looking into the risk, and where did you get your information to do this report?"*

Q: Did Paul Harrington tell you that directly?

A: "Yes, he was concerned that we had done this report.

Q: Did he say why he was concerned that it was done without his knowledge?

A: "Because it was sensitive"

Q: In what way?

"Because it could be available and because this is a public project."

"Would be a concern that this would become public."

Q: There was no report in hand?

A: "I don't know, I don't remember if Paul Harrington had the report. Maybe he had, I don't know, I don't remember. But topic was this report, I think that's clear."

Q: So it's not a very nice meeting, it's pretty unpleasant. What transpired regarding report or conversation after that meeting? What did you do next?

A: *"…Nothing really. I mean I tried to carry on business as usual and carry on with what I was doing on a day to day basis but it may have had something to do with the fact I was demobilized in November, I don't know."*

[678] Interview Summary – Jean-Daniel Tremblay – April 10, 2018

14.3.2 Normand Bechard – Project Manager SNC, May 8, 2018[679]

Q: Why did you request the memo to be written?

A: "Long before the exercise of doing the risk review there was a lot of things going on and one of those main things going on is SNC was pushed aside of any decision on any strategy. So in fact, we're still having an EPCM Contract because they were refusing to amend it. But, we were a body shop and with an SNC manager like me got the obligation to do a corporate risk review. So I was looking at what was going on and said, jeeze, some day for some reason if this project starts slipping, there is a big risk for SNC to get its reputation damaged. So I discussed with my boss at the time, Bernard Garner..."

"So we did the risk review and Michel issued a report with the conclusion. I handed the report to my boss, Bernard Garner at the time, Scott Thon, and Bob Card (SNC CEO)."

Q: Did you hand it to Bob Card?

A: *"Personally, yes myself..."*

Q: You were there with him?

"Yeah, I had been driving him all across St. John's."

Q: Why was he there?

A: "Because the Lower Churchill was one of the most important projects for SNC. Bob was himself someone which was involved in big projects and he was liking being involved in big projects so he came to St. John's. I did him a briefing of the project, the scope, the contract, what was going on. The issue that we were having with the client. I hand the risk report, he look at it, he was having a planned meeting with Ed Martin when he was in St. John's… to discuss CEO to CEO which is normal, like CEO to CEO the organized meeting to discuss. Bob brought the document with him", [SNC Risk Report] *"to meet Ed. I brought myself, Bob to the Columbus Drive office* [Nalcor] *with my car… I don't know what as the agenda of the meeting, the only thing I know is Bob's intent was to offer Ed Martin the copy that I hand to him... I got back there, Bob got in the car and the only thing he told me, he say Ed refused to have the document."*

Q: What happened after that?

A: "Nothing. After that, we were having a team meeting. Bob was meeting all SNC employees in a room we rent in St. John's so we spent most of the afternoon with the Lower Churchill SNC team and then flew back to Montreal. Then a few days later I knew that I was having to come back about that report. For sure Ed Martin will have talked to his direct report that we did that. I was not remembering that meeting with Paul Harrington but I had a meeting with Paul Harrington where probably asked me why we did that. I told him, first of all you didn't pay for that report, we did that on our own money and I did that because corporately, I got the obligation to warn my organization about anything that may affect them – this was my duty."

Q: Was anyone in the meeting with you and Paul Harrington?

A: "JD [Jean Daniel Tremblay]*"*

[679] Interview Summary – Normand Bechard – May 8, 2018

Q: Did Paul Harrington say other people at Nalcor were aware?

A: "Jason Kean was aware. I offered Jason to give him a copy. Because Jason was the risk manager. He said no, I don't want it."

14.3.3 Bob Card – Prior CEO of SNC, May 17, 2018[680]

Q: Maybe you can tell us about your involvement with LCP

A: "Project was a highlight for SNC Lavalin at the time… Scott Thon had, shortly after the first year, become interim president of Power and this became a major focus for him. Somewhere in the January-ish time frame we set up a meeting in April with Nalcor executives to have a face to face discussion about our concerns about the project which then occurred."

Q: That meeting took place in April 2013?

A: "Yes"

Q: Can you tell us who attended that meeting?

A: "Ed Martin was my counterpart focus there. So Gilbert Bennett was there, what I'm reading off of, I don't have access to my former SNC archives but I do have my contacts and put in my contacts I kept track of who was at that meeting. Gilbert Bennett was there, Lance Clarke was there, and Paul Harrington was there. I can't, I can't say that all three were there with Ed at every part of it. The meeting involved a dinner, I believe the night before. I'm not sure if all three were there and there was a meeting at Ed's office the next day."

Q: Gilbert Bennett, Paul Harrington, Lance Clarke?

A: "Yeah"

Q: Who from SNC besides yourself?

A: "well there was Scott Thon there and Normand was, could have been there for some of it. I know one of the things that Scott and I were trying to make sure is how they felt about our project manager Normand. They said things were good, they liked him. But I can't specifically recall what parts of the meeting he was, Normand Bechard, he was included in and what parts he wasn't."

Q: What else was discussed?

A: "Our principal concern was over the success of the project… our key client was really upset, so the last thing we wanted was both an upset client and a failed project at the same time. It became clear to us that Nalcor's approach was rapidly evolving… into a self-perform mode. In my experience in many multi-billion dollar projects that - while it's not always successful to have a contractor be the program manager, it is rarely successful for an owner to be the program manager – that was red light number one for me. The way they were approaching… their contracting in general and oversight on the project was a concern for us…We discussed our concern over the risk posture with Ed and the team…. Ed and his team left the impression of strong comfort in their approach and capability to deliver the project as then advertised I think at $6 billion... They were quite confident they could pull that off."

680 Interview Summary – Bob Card – May 17, 2018

Q: In terms of the April 2013 SNC Risk Report – when would that have been discussed?

A:"The contents, there was not a time in my recollection where a report was laid on the table and we said now, chapter one, chapter two, chapter three. The discussion was the general perception of risk around the project, the approach to managing the contractors, the labour issues. The issues in the risk report would have been reviewed throughout that whole process."

Q: In terms of the issues that were discussed did you indicate in that meeting that you had a report?

A: "I can't recall exactly the written materials that were discussed in the meeting. But I can recall various subjects in the risk report having been discussed"

Q: And that was discussed with the four from Nalcor?

A: "Yes, most likely. I mean, again, one may have stepped out or something – but yes that would have been the plan"

Q: With the exception of stepping out of the room they would have been there and you would have been talking about what was contained in the report?

A: "Yes – but my goal was not to make sure I went down every point of the report because I had my own views. See the report didn't really feel as I recall and the management, what I call the 50,000ft level management of the project – it dealt more with specific risk. I was also concerned about the overall management approach of the project. The role of the owner verses the role of project managers verses the role of contractors. I had in my own mind what I thought were the key risks which dovetailed with the other risks. But it would not have limited my conversation to that report. Or wouldn't be my style in the meeting to whip out a report and go down here's point 1, point 2, point 3"

Q: Did you ever say there was another 2.4B in cost in here?

A: "I can't for sure say that I said that. At the minimum we would have said we think it would be extraordinarily difficult to deliver this with the promised budget and schedule with the current approach. In fact, it would be difficult even if the approach was changed to something that I would be more comfortable with in my experience with large project management"

Q: They have indicated that they never received that report?

A: "Yeah and I don't know if there is a specific transmittal that clarifies they got it. But to me, it's somewhat irrelevant whether they saw it or not because the issues were clearly discussed at that meeting and by the impression I got from my ongoing dialog with Scott Thon and others is that the issues were being discussed frequently"

Q: In April for the dinner and meeting was this report already written?

A: "I believe so. For sure the issues in the report were already understood and were part of our discussion framework at the meeting."

Q: So you don't remember handing Ed the report and him refusing to take it from you?

A: "No, I couldn't imagine Ed having refused to take it. We weren't having – the relationship while we disagreed, I would classify as cordial and adult-like. It would be hard for me to conceive me handing Ed anything and him saying I don't want that."

Q: Was the report given to Ed or anyone either electronically or via courier?

A: "You know, I don't know – the most likely person who would have delivered it would been Normand or Scott in my view. It would be rare for the CEO to send this report to the CEO of a client unless there was something horribly missed in the organization somewhere. So I don't recall doing that."

14.3.4 Scott Thon, Executive Vice-President of Global Power, June 20, 2018[681]

Q: Can we speak about the April 2013 – SNC Risk Report – can you tell me why that was written?

A: "I would have attended one CEO meeting between Bob Card and Ed Martin and others that we had in St. John's, near the end of April 2013…. A number of concerns were being raised by my team (SNC) as I entered. So I had heard customers perspective and now I was hearing from my team about their inability to get information to properly assess the risks. And of course there was going to be less and less data available to SNC-Lavalin as it moved into a services contract. In that moment we decided to do, with what information SNC-Lavalin had, to do a review of risks because the view that I was getting from the team was the risk was more qualitative in nature and less quantitative in nature."

Q: Was the report ever given to Nalcor?

A: "I just cannot remember. I remember reviewing it a number of times, I remember signing it off. I don't recall that I gave it directly to them. It may have been given by my team to them. It was certainly our intention to communicate with them those risks. I can't definitively remember whether we gave it to them directly or not. But certainly in the quarterly meetings we were having, we spoke to the risks and our concerns around getting controls on those risks.

In the CEO meeting between Bob Card, myself, Ed Martin and a few other folks, we certainly did express the concerns of the risks that are in that report "

Q: Was the content of the report shared with Nalcor?

A: "I can't remember whether we gave it to them or not. We certainly did on a number of occasions, walk through the key areas of the report and our concerns around the risk, yes. We did go through that in a number of meetings. As I recall, In the CEO meeting we talked about those risks and I think both the teams shared the concerns around the risk. I think it was more about what actions were being taken upon it or not."

Q: The public SNC report – you didn't actually sign that report?

A: "Right, and I'm not sure. That's why it is a question for me about whether we gave it or not. I definitely reviewed the report. I believe I signed it at the end of the day. I don't know why there wasn't a signature on it. That's what makes me wonder whether we actually finalized it and gave it to them or not. Regardless of whether or not I signed it, I did review it."

Q: Would that report had been revised subsequent to the meeting with Ed Martin?

A: "My recollection is that we were working on the report when we had that April meeting. It was not complete and it was not completed until after that meeting. So there would have been some revisions. I don't believe that there was anything that Nalcor provided us that changed the contents of that report."

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[681] Interview Summary – Scott Thon – June 20, 2018

Q: Normand said the report was given to Ed and he refused. Bob Card said he didn't do that. Do you know anything about that?

A: "No I don't – I would be pretty in touch with Bob. And I obviously would have been the one who would have given it to Bob to give to Ed. So I don't have that recollection that it was given to Bob Card so if Bob said he didn't give it to him, I would believe that."

Q: So if someone delivered it, it would have been you or Bob?

A: "That's right, and I just can't remember that I delivered it. My recollection would have been that it would have been delivered by Normand, so if he didn't deliver it then – I know it was our intention to give it to them, but I really just can't recollect. And I thought it was given to them because that was our intention. I can tell you what our intention was. Our intention was to first of all, to really understand where it was with the information that we had, and we didn't have all the information because it was not provided to us…We owed it to Nalcor to tell them where this is at. That is really why we started the committee and why we were going to provide the report. Normand would have provided it, and if it didn't get provided I am not sure why that is."

14.3.5 Meetings and Email Traffic

On May 28, 2013, Jean-Daniel Tremblay and Normand Bechard met with Paul Harrington. The meeting was requested by Paul Harrington. According to Mr. Tremblay's notes at the meeting, three main issues were discussed:[682]

- *"PH* [Paul Harrington] *met with Ed Martin (who'd met with Bob Card)"*
- *"Risk work performed by SLI - What's the deal?"*
- *"Sensitivity of data. Could be subject to an ATTIP – access to information protocol."*

Also on May 28, 2013, Paul Harrington sent a meeting invitation via email to Jason Kean and says *"I would like to know if there are any risks identified by SLI that are not already on the LCP Risk register and to understand the recent work carried out by SLI regarding LCP Risks".*[683] Jason Kean responds and says *"I have no insight of any risk work done by SLI. My only knowledge is what you have indicated. I can't attend the meeting but can take a call on the subject".*[684] Mr. Harrington replied to that Mr. Kean's response that day saying *"I want to know what they have been doing – Ed raised it with me and I would like to get ahead of this one and not be caught out".*[685]

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[682] J.D. Tremblay Journal – May 28, 2013 – Meeting with Harrington – Page 1-2
[683] Meeting Inv_Harrington to Tremblay and Bechard_May 28, 2013.pdf
[684] Re Declined Risk discussion (May 28 2013 43000 PM my office).msg
[685] Re Declined Risk discussion (May 28 2013 43000 PM my office).msg

The following day, on May 29, 2013, Mr. Harrington sends an email to Gilbert Bennett regarding his (Harrington) meeting with J.D. Tremblay and Normand Bechard (both of SNC) and the SNC Risk Report. Mr. Harrington stated the following:

Gilbert
I met with Normand and JD Tremblay (the SLI Risk person) yesterday and asked for clarification on the SLI risk analysis that was carried out on the project.
It appears that M&M division VP asked for this and the M&M division performed the analysis - it was based on the data from the LCP Risk Workshops that Jason had chaired mid last year .
The status is that a draft is with B Gagne and Scott Thon and they may be thinking about providing it to us . I would respectfully decline that offer because of a number of very important factors:-
1 Because the work was based on the same source data that Westney used there is nothing new here- Risk wise.
2 The risk analysis shows the unmitigated risk and cost result and is not a probabilistic analysis using Monte Carlo sampling techniques - so the results will be subjective in interpretation and will not reflect the mitigations we have implemented or the cost result of the mitigations- i.e the results will be misleading and inaccurate
3 We have had no opportunity to challenge the assumptions or factual accuracy of the input data and we really do not have the time or inclination to do so - we need to focus our efforts and resources on the risks going forward not spend time on some dated, incomplete analysis using techniques which are inferior to those used by Westney

So I recommend we talk to Scott and reassure him that we realize there was no mal intent here however given the above we would prefer if this remained as a draft internal document and not presented to us.

However there is something that we need to work on together and that is to revitalize the risk identification and mitigation efforts within the LCP team. It is now time to assess our current state regarding Risk Management and identify an action plan to get us to the desired state. I have asked JD Tremblay to provide me with that. I know that the LCP team has been very much focussed on dealing with other significant priorities and may not have been able to formally maintain the Risk register however I am also confident that the significant priority work the team is focussed on are indeed the biggest risks facing us and that we are in good shape here and with a little extra effort can catch up without major issue. I will support the Risk effort and lend my authority to Jason and JD Tremblay to help move this forward.
Regards Paul

14.3.6 Paul Harrington – Lower Churchill Project Director, October 24, 2018[686]

Q: What we do have are some notes from a meeting with Jean-Daniel Tremblay from May 28, 2013 with yourself, Normand, and Jean-Daniel Tremblay.

A: "Do you also have my email?"

Q: Yes, we're going to talk about that.

A: "Do you also have my recollections?

Q: What are you referring to?

A: "A note I gave to inquiry counsel"

Q: Ed came to you and told you about this analysis that they [SNC] did?

A: "I don't know, it was six years ago. Ed came to me and said something about check out the risk."

Q: So Ed didn't contact you and say SNC did this analysis?

A: "Not that I can recollect. I think he just said find out what is going on with risk"

686 Interview Summary – Paul Harrington – October 24, 2018

Q: You called a meeting?

A: "Yes because I was concerned about risk"

Q: You didn't call it to find out what this is about because Ed told you that?

A: "No he did not"

Q: So you're telling me that Normand and JD are lying to me?

A: "I would never say that. I would never dream of that."

Paul Harrington provided a memo titled "Recollections regarding the SNC Risk Analysis Report." The following two excerpts are from this memo:

"Late May 2013 issue was raised – I asked for clarification regarding an SNC internal risk analysis. I met with Normand Bechard and JD Tremblay and was told… that a draft of the report is with Bernard Gagne and Scott Thon and that they may be considering offering it to us. I was not offered a copy of the draft report at that time neither did I ask for a copy."[687]

"The SNC Report surfaced after a meeting between SNC and the Nalcor CEO Stan Marshall in 2016. The report was analysed by the Project Risk expert advisors – Westney in 2017 and they issued a report which confirmed that there were no new risks, Westney carried out a detailed cross check between the SNC report and the risks identified in the 2102 [2012] *QRA used in the Sanction decision."*[688]

The nagging question for us was trying to understand the reason Mr. Harrington did not want to see the SNC Risk Report. During the interview, Mr. Harrington noted *"It's not that we don't want to see it. I just didn't see the value in it because there were no new risks. I only want to know the new risks. They calculated by a different method. We already had Westney to do it for us. So if they wanted to send it to us, they could have sent it to us under a letter. It was up to Scott Thon to approve it, but I don't think he ever did".*[689] During the interview, we offered to accept a written response from Mr. Harrington regarding why he did not want to see the SNC Risk Report.

On October 24, 2018 we submitted a formal request in PTQ 1.22 and sent the following questions to Mr. Harrington's legal counsel for him to respond: [690]

"Please review the documents regarding the SNC risk analysis that were provided during Paul Harrington's interview and provide a response to the following:

- *Why did you prefer to have the SNC report held in draft and not presented to you?*

- *Why didn't you want to review the analysis / report when you became aware that it existed in May of 2013?*

- *What were your concerns specifically with it becoming a public document?*

- *In an email to Jason Kean on May 28, 2012 it notes that you "would like to know if there are any risks identified by SLI that are not already on the LCP risk register". Later in the email chain you*

[687] Recollections regarding the SNC Risk Analysis Report, Provided by Paul Harrington – Page 1
[688] Recollections regarding the SNC Risk Analysis Report, Provided by Paul Harrington – Page 2
[689] Interview Summary – Paul Harrington – October 24, 2018 – Page 35
[690] Grant Thornton Request PTQ 1.22 – October 24, 2018

respond "Ed raised it with me and I would like to get ahead of this one and not be caught out." Please explain what specifically Ed raised with you regarding the "recent work carried out by SLI regarding LCP risks". What did you mean when you said "not be caught out"?"

On November 30, 2018 (five weeks after our formal request dated October 24, 2018), Mr. Harrington responded follows (his answers are paraphrased):

Q: Why did you prefer to have the SNC report held in draft and not presented to you?

He cannot recall at any time during the meeting with Mr. Bechard and Mr. Tremblay on May 28, 2013 if the SNC Risk Report was offered to him either during or after the meeting. The report was discussed with Mr. Harrington but he indicated the first time he saw it was when it was made public.

Mr. Harrington indicated that the reasons for making a recommendation to Mr. Bennett that they [Mr. Harrington and Mr. Bennett] speak with Mr. Thon to tell Mr. Thon that they prefer the SNC Risk Report remain a draft were stated in his email to Mr. Bennett (which is the May 29, 2013 email shown above).

Q: Why didn't you want to review the analysis / report when you became aware that it existed in May of 2013?

Mr. Harrington responded to this question as follows:

- He referred us to the three reasons he stated in the May 29, 2013 email to Mr.Bennett.

- He considered the SNC Risk Report 1) as a draft confidential document for SNC's internal use only; 2) did not have anyone from Nalcor participating or involved in its preparation which could render the document inaccurate or misleading; and 3) does not add any value to Nalcor's risk management effort.

Q: What were your concerns specifically with it becoming a public document?

Mr. Harrington's concerns were that:

- The SNC Risk Report was a draft and not approved by Scott Thon and was an SNC internal document and marked "Confidential for SNC-Lavalin Use Only".

- The SNC Risk Report was an unsolicited piece of worked carried out by SNC for SNC corporate purposes and management.

- Nobody from Nalcor participated on any aspect of its work.

- The risk method used by SNC was not a probabilistic analysis.

- The SNC Risk Report was potentially inaccurate and misleading and would not be adding any value to Nalcor's risk management efforts.

Q: In an email to Jason Kean on May 28, 2012 it notes that you "would like to know if there are any risks identified by SLI that are not already on the LCP risk register". Later in the email chain you respond "Ed raised it with me and I would like to get ahead of this one and not be caught out". Please explain what specifically Ed raised with you regarding the "recent work carried out by SLI regarding LCP risks". What did you mean when you said "not be caught out"?"

Mr. Harrington did not recall the conversation with Mr. Martin that led to the emails Mr. Harrington wrote and that he wanted to meet with Mr. Tremblay and Mr. Bechard to find out the status of the LCP risk work.

14.3.7 Gilbert Bennett – Vice President Lower Churchill Project, April 19, 2018[691]

Q: We now have an understanding that various folks saw that SNC report in 2013 and had discussions over it in 2013?

A: "You saw that report – I'm not aware of that…Specifically about the report?"

Q: Tell me about it?

A: "I saw the report when Stan Marshall showed it to me."

Q: Were there any discussions?

A: "If you look at the items discussed in this report many of them are on our risk register… I'm unaware of having a discussion on this report, no. If you look at the items discussed in this report many of them are on our risk register."

Q: As far as that report – you did not have a discussion or any emails about that particular report?

A: "No"

Q: No emails about the discussion of the report?

A: "Couldn't find them"

Q: So the first time you learned about this report was in 2016?

A: "First time I learned about this report was in 16 when Stan showed it to me. Like I said, the various risks in here and the subject matter in the report are not unique. Some of these are not new, there are ones that had been discussed throughout the evolution of the project and the risks we were mitigating…Man power availability, DC converter, performance – these are risks that we talked about, these are risks that had active mitigation plans."

691 Interview Summary – Gilbert Bennett – April 19, 2018

14.3.8 Ed Martin – CEO, June 27, 2018[692]

At the beginning of the interview, Ed Martin provided some background. The following was mentioned regarding the SNC report:

A: "One quick aside, that brings me to this SNC Lavalin, you know, foolishness that's been out there and that report business that I was dragged out of retirement for about a year ago, something like that. But, you know, I don't know the genesis of that. You know, there was some suggestion I was offered the report, and you know, didn't accept it which is not on. I have actually no recollection of anything like that happening. But I did take the report after I was invited to comment on it publically, had a look at it and, I spoke, I went through it, and I remember those, all of those risks had been covered, I called a couple of the guys and where are we on this thing, I mean you know it never happened but I remember all these risks being covered."

Q: SNC, why do you think they prepared the risk report?

A: "I don't have anything to say about that. I didn't know it was prepared. No recollection of getting it. SNC-Lavalin were in the middle of the risk analysis in any event. I have nothing to say really."

Q: Have you heard anything like this before?

A: No. The project team, SNC-Lavalin and Nalcor produced a report. I saw the report after it was announced because I got a copy. It is what it is."

Q: Meeting with Bob Card April 2013 – do you remember?

A: "I remember meeting with Bob Card but I don't remember the date."

Q: What was on the agenda?

A: "He had just come into the role and I was travelling to Montreal so I wanted to meet him CEO to CEO."

Q: Did you go with someone?

A: "Just myself"

Q: Did Bob bring up the investigation or the report?

A: "I don't have a recollection of that, no."

14.3.9 Comparison of SNC Risk Report to Nalcor Risk Analysis

In 2017, after the report was publically released, Westney Consulting was engaged by Nalcor to complete a review of the SNC Risk Report. The results of their analysis are outlined in "*An Analysis of SNC-Lavalin's Risk Assessment Report*" ("Westney SNC Analysis") dated December 2017. This report noted the following:

- *"The SNC-Lavalin Risk Assessment for the LCP developed in 2013 was never submitted to Nalcor."*[693] However, this conclusion was based on their review of Aconex, Nalcor's document control system and not a review of all potential delivery options (i.e. email, hand delivered etc.).

[692] Interview Summary – Ed Martin – June 27, 2018
[693] WIT005 – Westney Consulting - An Analysis of SNC-Lavalin's Risk Assessment Report, December 2017 – Page 3

- *"No copy exists in LCMC's comprehensive document control system"*[694]
- *"The review was not requested by LCMC management"*[695]
- *"The document is identified as "Confidential for SNC-Lavalin Internal Use Only" and was not approved (signed) by Executive VP Scott Thon, who was a sitting member of the Steering Committee for SNC-Lavalin's EPCM services agreement"*[696] As noted above, we interviewed Scott Thon and he told us the following: *"…I definitely reviewed the report. I believe that I signed it at the end of the day. I don't know why there wasn't a signature on it. That's what makes me wonder whether we actually finalized it and gave it to them or not. Regardless of whether or not I signed it I did review it."*[697]
- Nalcor's total cost risk results in 2012 dollars was $5.8 billion - $8.2 billion. For this analysis, Westney used a P5 to P95 range in updating the 2012 cost risk exposure.[698]
- SNC's 2013 total cost risk results was $8.2 billion[699]
- At DG3 Nalcor's total cost risk exposure was $5.6 billion to $7.2 billion. For this analysis, Westney used a P10 to P90 range.[700]

In response to SNC's assertion that the existing LCP risk register did not provide a realistic portrait of actual project risk, Westney noted that "*all risks identified by SNC-Lavalin were included in the LCP risk register and considered in Westney's analysis.*"[701] We compared the risks identified in the SNC Risk Report to Nalcor's risk registers from the DG 3 Project Costs and Schedule Risk Analysis Report.[702]

We noted some risks included in Westney's analysis may not directly compare to the risks included in the SNC Risk Report. These have been summarized in the following table and include responses from Lower Churchill Management Corporation ("LCMC") to our questions pertaining to these risks. (Note: The LCMC did not address all of SNC's risk concerns as noted in the below table):

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694 WIT005 – Westney Consulting - An Analysis of SNC-Lavalin's Risk Assessment Report, December 2017 – Page 3

695 WIT005 – Westney Consulting - An Analysis of SNC-Lavalin's Risk Assessment Report, December 2017 – Page 3

696 WIT005 – Westney Consulting - An Analysis of SNC-Lavalin's Risk Assessment Report, December 2017 – Page 3

697 Interview Summary – Scott Thon – June 20, 2018

698 WIT005 – Westney Consulting - An Analysis of SNC-Lavalin's Risk Assessment Report, December 2017 – Page 8

699 WIT005 – Westney Consulting - An Analysis of SNC-Lavalin's Risk Assessment Report, December 2017 – Page 8

700 NAL0020664 – Decision Gate 3 Project Cost and Schedule Risk Analysis Report – October 1, 2012 – Page 292

701 WIT005 – Westney Consulting - An Analysis of SNC-Lavalin's Risk Assessment Report – December 2017 – Page 4

702NAL0020664 – Decision Gate 3 Project Cost and Schedule Risk Analysis Report – October 1, 2012

SNC Risk Title[703]	Nalcor Risk Title[704]	LCMC Response[705]
Concrete works slippage from baseline schedule	Availability of experienced hydro contractors	The aggressive schedule for powerhouse and spillway was acknowledged by LCMC in 2012 and was part of the 2012 DG3 QRA. As discussed within this document, the Project schedule at Sanction was recognized as a target schedule with aggressive milestones.
River closure slippage from baseline schedule	Availability of experienced hydro contractors	The critical path activities of spillway completion, river closure and diversion were acknowledged by LCMC and were included in the 2012 DG3 QRA. The active mitigations work implemented by LCMC to ensure that the key milestones were met were successful with river closure, diversion and spillway operation being achieved on schedule.
Claims arising from contractors or suppliers	Contractors coordination/powerhouse	NO RESPONSE FROM LCMC
Scope of packages not aligned with suppliers' core business	Supplier availability	NO RESPONSE FROM LCMC
Limited camp accommodations capacity at Upper Churchill Falls site	Risk premium for obtaining lump sum contracts –	NO RESPONSE FROM LCMC
Insufficient air travel to LCP sites	Availability and retention of skilled construction labour	NO RESPONSE FROM LCMC

[703] WIT005 – Westney Consulting - An Analysis of SNC-Lavalin's Risk Assessment Report, December 2017- Page 6/7

[704] NAL0020664 – Decision Gate 3 Project Cost and Schedule Risk Analysis Report – October 1, 2012

[705] Post Sanction – Briefing Note as Requested by Nalcor Legal Counsel McInnes-Cooper, Pages 51 to 53

14.3.10 Comparison of SNC Risk to Nalcor DG3 Risk Ranges

We compared the inputs of the Monte Carlo simulation from the DG3 cost and schedule risk analysis (worst case scenario)[706] to the risk exposure calculated by SNC. The results have been summarized below:

	Worst Case ($ Millions)	
	Tactical	**Tactical + Strategic**
DG3 Monte Carlo inputs [707&708]	6,206	7,226
Less: base estimate[709]	5,473	5,473
Calculated exposure	733	1,753
SNC risk report[710]	2,400	2,400
Difference	**(1,667)**	**(647)**

14.4 Observations and Findings

During our review, we observed the following:

- According to Bob Card, former CEO of SNC Lavalin, a meeting took place in April 2013 where the SNC Risk Report was discussed. The Nalcor attendees at that meeting was Ed Martin, Gilbert Bennett, Paul Harrington and Lance Clark. The meeting took place over two (2) days with a dinner and then the following day in Ed Martin's office. Mr. Card could not remember if all three (3) Messrs' Bennett, Harrington and Clark were at every part of the meeting with Mr. Martin.

- Mr. Card indicated that the issues in the SNC Risk Report would have been reviewed throughout the process.

- The May 2013 email from Paul Harrington to Gilbert Bennett provides evidence that both Messrs. Harrington and Bennett knew about the risk analysis performed by SNC in 2013.

- The May 2013 email from Paul Harrington to Gilbert Bennett suggest that not only did Messrs. Harrington and Bennett know about the existence of SNC Risk Report, Mr. Harrington made a conscious decision to not accept it if SNC wanted to provide it to them. He also did not ask to see it.

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[706] NAL0020664 – Decision Gate 3 Project Cost and Schedule Risk Analysis Report – October 1, 2012
[707] NAL0020664 – Decision Gate 3 Project Cost and Schedule Risk Analysis Report – October 1, 2012 – Page 238 - 247
[708] NAL0020664 – Decision Gate 3 Project Cost and Schedule Risk Analysis Report – October 1, 2012 – Page 293-295
[709] NAL0019634 – Decision Gate 3 Capital Cost Estimate – December 2012 – Page 13
[710] NA0428133 – SNC-Lavalin Risk Assessment Lower Churchill Project – April 23, 2013 – Page 6

- Mr. Bennett told Grant Thornton that the first time he learned of the report was in 2016 even though there is an email from Mr. Harrington to Mr. Bennett dated May 2013 that contradicts Mr. Bennett's statement to us.

- Mr. Martin has no recollection of Bob Card bringing up the SNC Risk Report when they met in 2013 even though Mr. Card remembered discussing it.

- The calculated risk exposure from the SNC Risk Report exceeded Nalcor's calculated exposure by an approximate range of $600 million to $1.7 billion.

- Based on the above, we conclude the following:

    1. That it was possible nobody from Nalcor saw the draft SNC Risk Report in 2013;

    2. Messrs. Bennett and Harrington (and possibly more people from Nalcor) knew the SNC Risk Report existed;

    3. Messrs. Bennett and Harrington knew the contents of the report pertained to LCP project risks;

    4. Mr. Harrington made a decision not to ask for the report and recommended to Mr. Bennett that SNC keep it as an internal document in draft form and not provide it to Nalcor;

    5. Mr. Card remembered discussing the SNC Risk Report with Mr. Martin, however Mr. Martin has no recollection of it;

    6. SNC's calculated risk exposure materially exceeded Nalcor's calculated risk exposure.

Appendix A - Qualifications

GrantThornton
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Scott I. Shaffer
CPA, MBA, CFE, CCA

Forensic Advisory Services, Wisconsin Practice Leader

Scott I. Shaffer is the leader of Grant Thornton's Wisconsin's Forensic Advisory Services Practice. Mr. Shaffer conducts forensic accounting investigations working on behalf of audit committees; senior management and legal counsel for both privately held and publicly traded companies. His work has included investigations pertaining to alleged FCPA violations, bribery, corruption, fraudulent financial statements and asset misappropriations.

In addition to performing investigations, Mr. Shaffer's case work includes projects related to litigation matters requiring damage computations. He has provided expert testimony on numerous occasions for both arbitrations and trials. His past litigation assignments have included tasks requiring reconstruction of financial records, loss profits analysis, damage claims and supply chain disputes across an array of industries.

Mr. Shaffer has led multifaceted teams consisting of forensic accountants, computer forensic professionals and data analytic professionals to solve complex problems for clients.

Selected Case Experience

Forensic Accounting. Scott and his team performed a forensic accounting examination of $35 million worth of allegedly excessive pass-through charges incurred on behalf of a $500 million international disposable products manufacturer. The suspect charges analyzed related to the Company's "cost plus" agreement with its outsourced logistics provider. It was revealed that various pass-through charges were inappropriately levied against the company

FCPA Investigation. Scott led an FCPA investigation pertaining to allegations related to a US based company's Chinese subsidiary. Procedures included electronic data capture, data analytics, document review, interviews, and interacting with the general counsel and outside counsel.

Fraud Investigation. Scott led an investigation for an oleo chemical manufacturer. The allegations investigated focused on the divisional controller making unsupported journal entries to meet financial targets on a quarterly basis. Investigative procedures included electronic data capture, background investigations, document review, fact finding interviews, and journal entry analysis. Our investigation revealed that the controller was getting pressure from the Malaysian's parent company's controller to meet the budget in order to smooth earnings for a pending IPO.

Professional qualifications and memberships

- American Institute of Certified Public Accountants
- Association of Certified Fraud Examiners
- Illinois CPA Society
- Certified Public Accountant (CPA)
- Certified Fraud Examiner (CFE)
- Certified Construction Auditor (CCA)

Education

Scott earned his Bachelors of Science degree in Accounting from the University of Illinois – Chicago and his MBA from the Lake Forest Graduate School of Management.

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Appendix B – Documents relied upon

Throughout this engagement we have had access to a large volume of documents. The following represents the documents that have been referenced throughout the body of this report. :

Title of Reference	Ref# / Author
13-06 Contracts Award Process	NAL0106555
14-34 Contract Administration	NAL0106559
14-37 Contracts & Compliance	NAL0106561
15-02 – Emera Conclusion Memo - Nalcor Internal Audit Reliance Review	NAL0106563
15-07 Invoice Attest and Payable Audit	NAL0106564
15-17 Payment Certificate Review and Compliance	NAL0106566
20131129 Intergovernmental Agreement Regarding Federal Loan Guarantee for MF between NL and Canada (Signed by Min Kent) – 2013 OCR.pdf	DISCL-GNL-76398
2111 (01) Appendix A2.1 505573-CH0007-51AF-I-2111_01	-
A Guide to the Project Management Body of Knowledge – PMBOK Sixth Edition	PMI - PMBOK
Accounts Payable Procedure, Rev. B1 –	NAL0018039
Agreement 15365-OB for Project Execution Risk Management Advisory Services for the Lower Churchill Project between Energy Corporation of Newfoundland and Labrador and Westney Consulting Group Canada	NAL0309329
Announcement Integration Management Team	-
Assessment of Implementation of EY Interim Report Recommendations	EY
Astaldi Briefing for Government of Canada	NAL1583497
Astaldi Completions Binder 1 – Legal Opinion Extracted	NAL0277308
Astaldi Cost Control and Productivity Analysis Reports: Observations and Recommendations by Dr. William Ibbs	Astaldi
Astaldi Notes P. Harrington	PMT Documents
Audit & Resource Plan 2015-2019	NAL0685623
Aug 2013 $6.9B	DISCL-MFPT-32
Bid Evaluation and Award Recommendation	NAL0018340
Bid Receipt and Opening, Rev. B2	NAL0018337
Binder provided by Quanta Services / Valard - Valard Amending Agreement Number 2	Quanta
Bridge Agreement made and executed on 27 July 2016	NAL1931411

Title of Reference	Ref# / Author
CBC News – Muskrat Falls: Astaldi adapting following dispute over 'dome' *https://www.cbc.ca/news/canada/newfoundland-labrador/muskrat-falls-astaldi-adapting-following-dispute-over-dome-1.2955492*	URL
CH0007 – Recommendation for Award Summary	NAL0436468
CH0007 Completion Contract	NAL0285273
CH0009 Bid Evaluation Plan	NAL0266050
CH0009 Exhibit 2 - Compensation	NAL0012524
CH0009001 – CHO – Change Order	-
CH0009-001 Bid Evaluation and Award Recommendation	NAL0266124
CH0009-001 Civil Works Agreement	NAL0012521
CH0031 Award Recommendation - Approvedo.pdf	PMT Documents
CH0031 Bid Evaluation and Award Recommendation	PMT Documents
CH0031 Bid Evaluation Plan	NAL0271357
CH0031-001 Supply and Install Agreement	NAL0013395
CH0032 Award Recommendation	NAL0271687
CH0032001 Change Order #005	NAL0021134
CH0032001 Change Order #040	NAL0021173
Change Management Plan	NAL0017739
Change Order CHO-CT0327001-0003	NAL0021253
Change Order CHO-CT0327011-0008	NAL4108515
Change Order CHO-CT0327013-0012	NAL4109781
Change Order CHO-CT0327015-0009	NAL4114844
CHO-CH0007001-0064	-
CHO-CH0007001-0065	-
CHO-CH0007001-0066	-
Civil Works Agreement: Construction of 350 kV HVdc Transmission Line	NAL0014341
Civil Works Agreement: Construction of Intake and Powerhouse, Spillway and Transition Dams	NAL0011221
Construction Management Taskforce Workshop #1	NAL2241839
Construction Report LIL Project Finance Agreement	NAL0020740
Construction Report LIL Project Finance Agreement	NAL0020754
Construction Report LIL Project Finance Agreement	NAL0020767
Construction Report LIL Project Finance Agreement	NAL0020778
Construction Report Muskrat/LTA Project Finance Agreement	NAL0020757
Construction Report Muskrat/LTA Project Finance Agreement	NAL0020789
Construction Report Muskrat/LTA Project Finance Agreement	NAL0020795
Construction Report Muskrat/LTA Project Finance Agreement	NAL0020799

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Construction Report Musrkat/LTA Project Finance Agreement	NAL0018468
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CV for Ed Martin, provided by Stewart McKelvey	Ed Martin
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Edward Merrow – Industrial Megaprojects Concepts, Strategies, and Practices for Success – 2011	Edward Merrow
Electronic Data Exchange Procedure, Rev. B2	NAL0018036
Email – FW: IE Contract – Agreement No. LC-PM-082 For Independent Engineer and Operating and Maintenance Services for The Lower Churchill Project	DISCL-GNL-490966
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Email from Mark Turpin to Stan Marshall – Subject: Note from Mark Turpin – Attachment - SM LCP Letter.pdf	-
Email from Paul Lemay to Grant Thornton through SNC's internal counsel Melanie Proulx	SNC
Email RE: Credit Assessment – CH0007, from CRO	NAL0128180
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Internal Audit Memo – Site Purchasing Review	NAL4848318
Interview Summary – BJ Ducey – October 16, 2018	GT Interview
Interview Summary – Bob Card – May 17, 2018	GT Interview
Interview Summary – Derrick Sturge – Nalcor CFO	GT Interview
Interview Summary – Don Delarosbil - Astaldi Project Manager	GT Interview
Interview Summary – Ed Martin – June 27, 2018	GT Interview
Interview Summary - Georges Bader - Astaldi	GT Interview
Interview Summary – Gilbert Bennett – April 19, 2018	GT Interview
Interview Summary – Jason Kean – Former Deputy Project Manager	GT Interview
Interview Summary – Jean-Daniel Tremblay – April 10, 2018	GT Interview
Interview Summary – Keith Dodson – Westney Consulting	GT Interview
Interview Summary – Lead Estimator	GT Interview
Interview Summary – Mark Turpin	GT Interview
Interview Summary – Nik Argirov	GT Interview
Interview Summary – Normand Bechard – Project Manager SNC	GT Interview

Title of Reference	Ref# / Author
Interview Summary – Paul Harrington – Lower Churchill Project Director	GT Interview
Interview Summary – Paul LeMay – SNC Lead Estimator	GT Interview
Interview Summary – Paul Lemay – SNC Lead Estimator – April 10, 2018	GT Interview
Interview Summary – Presentation from PMT – May 30, 2018	GT Interview
Interview Summary – Scott Thon – June 20, 2018	GT Interview
Interview Summary – Stan Marshall – Nalcor CEO	GT Interview
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Invitation for Bidder Selection, Rev. B2 – October 23, 2013	NAL0018331
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Letter to Ed Martin From Kathy Dunderdale	NAL2716594
Lower Churchill Project – Risk Management Philosophy	NAL0020667
Lower Churchill Project 2 CT0327 Contract Strategy - Sole Source	PMT Documents
Lower Churchill Project 6 – Astaldi Contract	PMT Documents
Lower Churchill Project 9 – Financial close / Completion Guarantees/ COREA	PMT Presentation
Lower Churchill Project Independent Engineers Report – Interim Final	Independent Engineer
Lower Churchill Project Independent Engineer's Report Draft Nov 15 2013.pdf	Independent Engineer
Lower Churchill Project Monthly Progress Report	NAL0019112
Lower Churchill Project Monthly Progress Report	NAL0019122
Lower Churchill Project Monthly Progress Report	NAL0019130
Lower Churchill Project Monthly Progress Report	NAL0019141
Lower Churchill Project Review Report	PMT Documents
Mar 2014 $7.5B	DISCL-MFPT-30
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Material Receiving	NAL2712272
Material Request, Issue, Return	NAL1724418
Materials Management Plan	NAL3455533
May 2014 $7.5B	DISCL-MFPT-29

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May 2017 MF $5.5B	DISCL-MFPT-23
May 2018 MF $5.67B to $5.87B	DISCL-MFPT-22
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Memo to CEO from Project Director LC Management and Support	DISCL-NAL-1729058
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Overarching Contracting Strategy	NAL0018451
Overarching Contracting Strategy	NAL0018452
Payment Certificate Procedure, Rev. B3	NAL0017910
PMT Presentation – Lower Churchill Project 3 - Project Delivery Model and Organization	PMT Documents
PMT Presentation – Lower Churchill Project 4 – SNC Lavalin Contract	PMT Documents
Post Sanction – Briefing Note as Requested by Nalcor Legal Counsel	PMT Documents
Post Sanction – Briefing Note as Requested by Nalcor Legal Counsel	PMT Documents
Pre-Sanction – Briefing Note as Requested by Nalcor Legal Counsel	PMT Documents
Procedure for Post Award Contract Administration	NAL0018244
Procedure for Site Purchases	NAL1999102
Project Change Notice PCN-0705	NAL0016769
Project Charter	NAL0019446

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Project Cost Status 5-26-16 to 6-29-16	NAL0285461
Project Cost Status 6-20-13 to 7-24-13	NAL0285354
Project Cost Status 7-25-15 to 8-21-13	NAL0285355
Project Execution Plan (Scope and Approach)	NAL0130478
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Request for Proposal: CH0007	-
Response to Grant Thornton Question – PTQ1.10	GT Request
Response to Grant Thornton Question – PTQ1.10 – Attachment - MF/LTA 2016 Cost Overrun Certificate	GT Request
Response to Grant Thornton Question 10.2 – Resume of Greg Fleming	GT Request
Response to Grant Thornton Question 10.21	GT Request
Response to Grant Thornton Question 10.28	GT Request
Response to Grant Thornton Question 10.29	GT Request
Response to Grant Thornton Question 10.32	GT Request
Response to Grant Thornton Question 10.35 – Cost Report – CT0327 2018-09-27 to 2018-10-31	GT Request
Response to Grant Thornton Question 10.39	GT Request
Response to Grant Thornton Question 10.46	GT Request
Response to Grant Thornton Question 10.47	GT Request
Response to Grant Thornton Question 6.7	GT Request
Response to Grant Thornton Question 8.9	GT Request
Response to Grant Thornton Questions 10.39 – Attachment 1 Project Cost Status Report	GT Request
Response to Grant Thornton questions 5.8, 5.10 and 6.1	GT Request
Response to Inquiry Counsel request in Interview with P Harrington dated 12th September 2018	PMT Documents

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Richard Westney - Oct 25 memo to Angie Brown re ranging rev1.pdf	Westney
Risk Review for Lower Churchill Project	-
Sept 2013 $6.95B	DISCL-MFPT-31
SNC Lavalin Contract	-
SNC-Lavalin Risk Assessment Lower Churchill Project	NAL0428133
Statement of Claim Between Constructions Proco, Inc. and Astaldi Canada Inc.	NAL0214861
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The Sanction Decision – Briefing Note as Requested by Nalcor Legal Counsel	PMT Documents
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Transmission Project Contracting and Packaging Strategy Risk Assessment – PowerAdvocate	NAL3524074
Westney Consulting - An Analysis of SNC-Lavalin's Risk Assessment Report	WIT005
Westney Consulting Group –Lower Churchill Project – Muskrat Falls Generation (MFG) Astaldi Analysis and Path Forward	NAL2296518
Williams Engineering Canada – Forensic Review in Support of Commission of Inquiry Respecting the Muskrat Falls Project	Williams

Appendix C – List of interviews

Throughout this engagement we performed a number of interviews. The following is a list of the individuals we interviewed.

Individual	Role	Date of interview
Jim Meaney	Nalcor	March 26, 2018
Rob Hull	Nalcor	March 26, 2018
Gerald Cahill	Nalcor	March 26, 2018
John Skinner	Nalcor	March 27, 2018
Laura Walsh	Nalcor	March 27, 2018
Deann Penney	Nalcor	March 27, 2018
Mark Bradbury	Nalcor	March 28, 2018
Paul Lemay	SNC	April 10, 2018 May 8, 2018
Michel MacKay	SNC	April 10, 2018
Jean-Daniel Tremblay	SNC	April 10, 2018
Stan Wynne	SNC	April 10, 2018
Paul Stratton	Nalcor	April 11, 2018
Steve Goudie	Nalcor	April 11, 2018
Gilbert Bennett	Nalcor	April 12, 2018 April 19, 2018
Paul Humphries	Nalcor	April 12, 2018
Pat Hussey	Nalcor	April 12, 2018
Stephen Pellerin	Nalcor	April 13, 2018
Charles Bown	Oversight committee	April 13, 2018
Julia Mullaley	Oversight committee	April 13, 2018
Dave Pardy	Nalcor	April 19, 2018
John MacIsaac	Nalcor	April 20, 2018
Normand Bechard	SNC	May 8, 2018
Richard Westney	Westney	May 9, 2018 October 18, 2018 October 26, 2018
Jason Kean	Nalcor	May 11, 2018
Bob Card	SNC	May 17, 2018
Jack Evans	Westney	May 22, 2018
John Hollmann	Validation Estimating	May 23, 2018

Individual	Role	Date of interview
PMT Presentation including: -Paul Harrington -Lance Clarke -Jason Kean* -Pat Hussey -Scott O'Brien -Ron Power **Note - Mr. Kean was not present for the entire two day meeting.* ***Note – this meeting was not recorded at the request of the interviewees*	Nalcor	May 30, 2018 May 31, 2018
Concerned Citizens Coalition including: -Des Sullivan -Ron Penney -Dave Vardy	Concerned Citizens Coalition	May 31, 2018 June 1, 2018
Derrick Sturge	Nalcor	June 20, 2018
Ed Martin	Former Nalcor	June 27, 2018
Scott Thon	SNC	June 20, 2018
Nik Argirov	Independent Engineer	June 22, 2018
Terry Styles	Former Nalcor Board	July 6, 2018
Jason Kean & Paul Harrington	Nalcor	July 5, 2018
Paul Harrington	Nalcor	July 6, 2018
Ken Marshall	Former Nalcor Board	August 30, 2018
Brendan Paddick	Nalcor Board	August 29, 2018
Stan Marshall	Nalcor	September 13, 2018
Don Delarosbil	Astaldi	September 14, 2018
Georges Bader	Astaldi	September 14, 2018
BJ Ducey	Valard	October 16, 2018
Scott O'Brien	Nalcor	October 23, 2018
Paul Harrington	Nalcor	October 24,2018
Keith Dodson	Westney Consulting	November 16, 2018
Mark Turpin	Former Nalcor	December 2, 2018