

# Lower Churchill Project 4 – SNC Lavalin Inc. Contract June 2018

Boundless Energy



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# Integrated LCP Team PM model

## Project delivery model considerations

### Key PM 'drivers' developed in 2007/2008

Owner control  
and capability

- Intelligently size the owner managed team to ensure strong owner influence

Financing

- Engage engineering and support companies with strong reputations to provide "name recognition"

Market  
Conditions

- Contractor capability and capacity

Market  
participation

- Contractor desires and willingness to do the project

Risk management

- Appropriately allocate risk

Front End Loading  
(FEL)

- Optimize definition and planning

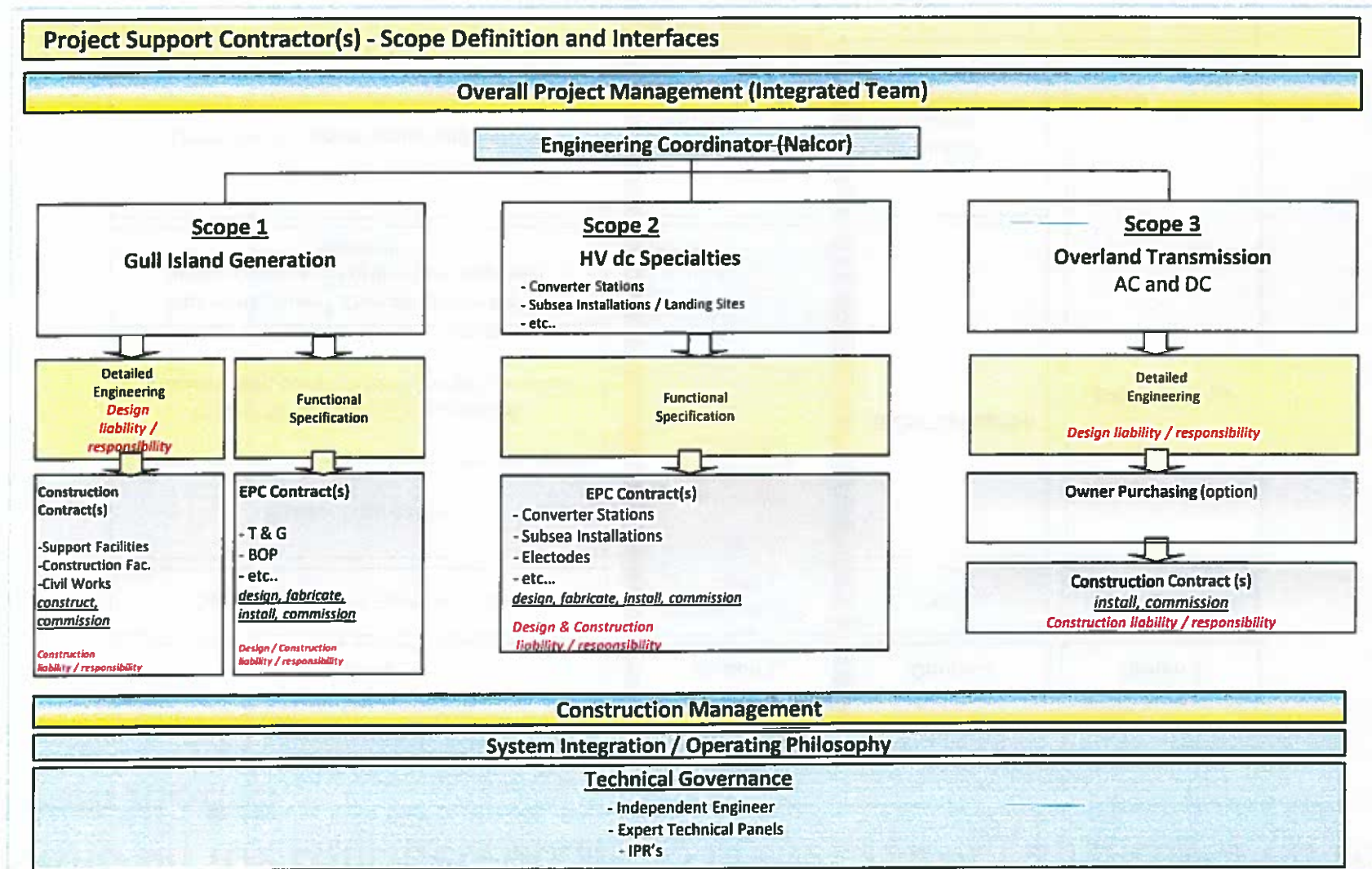
\* PM drivers shown are representative, and not exhaustive

## Based on the considerations the team to select an integrated LCP Team model


2007/2008			
Activity	Option 1	Option 2	Option 3
Oversight / Project Controls / Audit	Integrated LCP Team	LCP	LCP
Phase 3 Engineering	Engineering Contractor	EPCM Contractor	EPC Contractor
Project Management, engineering, procurement, cost/schedule, project services			
Site management, Overall Labour Set Up (work planning, co-ordination, approval, control)			
Labor issues / construction supervision	Construction Contractors	Construction Contractors	
<b>Contract Types</b> - Procure / Construct; Construct; EPC (e.g. T&G)			



## The organizational approach supported the execution plan



## The approach was documented in the “Lower Churchill Project: Project Management Approach and Contracting Strategy”

									
NEWFOUNDLAND and LABRADOR HYDRO									
System:	WBS:	Project:		Location:		Applicability Code:			
		Lower Churchill Project		All		D			
Document Title:						Total Pages (including Cover):			
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Document Number:				Management Systems Document					
MSD	—	MM	—	014	Yes	X	No		
Doc. Set		Discipline		Sequence #					
<div style="text-align: right; margin-right: 50px;"> <i>il</i>  <i>il</i> </div>									
B1	28 April 2008	Issued for Use & Implementation	P. Huxley / R. Power	B. Barnes	J. Keen	L. Clarke	P. Henington	D. Bennett	E. Martin
A1	16-Jan-08	Issued for Review and Comment	P. Huxley	C. Rowe					
Status/Revision	Date	Reason For Issue	Prepared By	Checked By	Checked By	Dept. Manager Approval	Project Manager Approval	VP Approval	CEO Approval
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## An Expression Of Interest (EOI) was issued, and signalled a preference for an EPCM model

### EOI issued 25 February 2009

- An EOI for “Engineering Design and Project Support” was issued to:
  - SNC-Lavalin Inc.
  - Black and Veatch
  - Hatch
  - URS – Washington Group
  - Bechtel
  - MWH
- Scope – perform engineering design services, and provide other personnel to bolster the Nalcor-led Integrated Management Team

### Responses to EOI received 14 April 2009

- In general, respondents indicated support for the Integrated Project Management Team (PMT)
- However, the submissions did not fully align with the concept
- **Contractors were more experienced in/aligned to an EPCM model and leaned toward providing all of their own methods, systems, processes, procedures, tools, support services, and general “know-how”**
- Contractor responses indicated slackening of resource restrictions in place pre-2008 – with greater assurance that experienced teams now available
- Bechtel was not aligned – proposed Project Delivery Partner approach



# Development of the EPCM PM model

## Why we changed to the EPCM model

	Integrated LCP Team	EPCM Model
Owner control and capability	<ul style="list-style-type: none"> <li>High control – capacity to be built into organization</li> </ul>	<ul style="list-style-type: none"> <li>High degree of control maintained</li> <li>Lower risk of capacity concern &amp; Crown Corp. decision making</li> </ul>
Financing	<ul style="list-style-type: none"> <li>Owner input seen as good, but uncertain of model awareness</li> </ul>	<ul style="list-style-type: none"> <li>More awareness of model by financiers</li> </ul>
Market Conditions – capability / capacity	<ul style="list-style-type: none"> <li>Better fit to capacity in the late 2000's</li> <li>Could need multiple contractors</li> </ul>	<ul style="list-style-type: none"> <li>Concerns given size of the project</li> <li>Inserted flexibility in contract</li> <li>Market softening</li> </ul>
Market participation	<ul style="list-style-type: none"> <li>Market less inclined to participate</li> </ul>	<ul style="list-style-type: none"> <li>More desirable in the market</li> </ul>
Risk management	<ul style="list-style-type: none"> <li>Large portion of risk passed to designer &amp; construction contracts</li> <li>Owner oversight reduces risk</li> </ul>	<ul style="list-style-type: none"> <li>Same risk of design &amp; construction</li> <li>Owner input diminished but EPCM systems more proven</li> </ul>
Front End Loading (FEL)	<ul style="list-style-type: none"> <li>Allowed for early design and construction planning to reflect diverse components</li> </ul>	<ul style="list-style-type: none"> <li>Maintained early design and most flexibility around components</li> </ul>

Based on the new considerations the decision was made to change to an EPCM model

2009			
Activity	Option 1	Option 2	Option 3
Oversight / Project Controls / Audit	Integrated LCP Team	LCP	LCP
Phase 3 Engineering	Engineering Contractor	EPCM Contractor	EPC Contractor (Not practical in the market)
Project Management, engineering, procurement, cost/schedule, project services			
Site management, Overall Labour Set Up (work planning, co-ordination, approval, control)			
Labor issues / construction supervision	Construction Contractors	Construction Contractors	
<b>Contract Types</b> - Procure / Construct; Construct; EPC (e.g. T&G)			

## An RFP was issued - SNC was selected as the EPCM contractor

### RFP was issued in July 2010

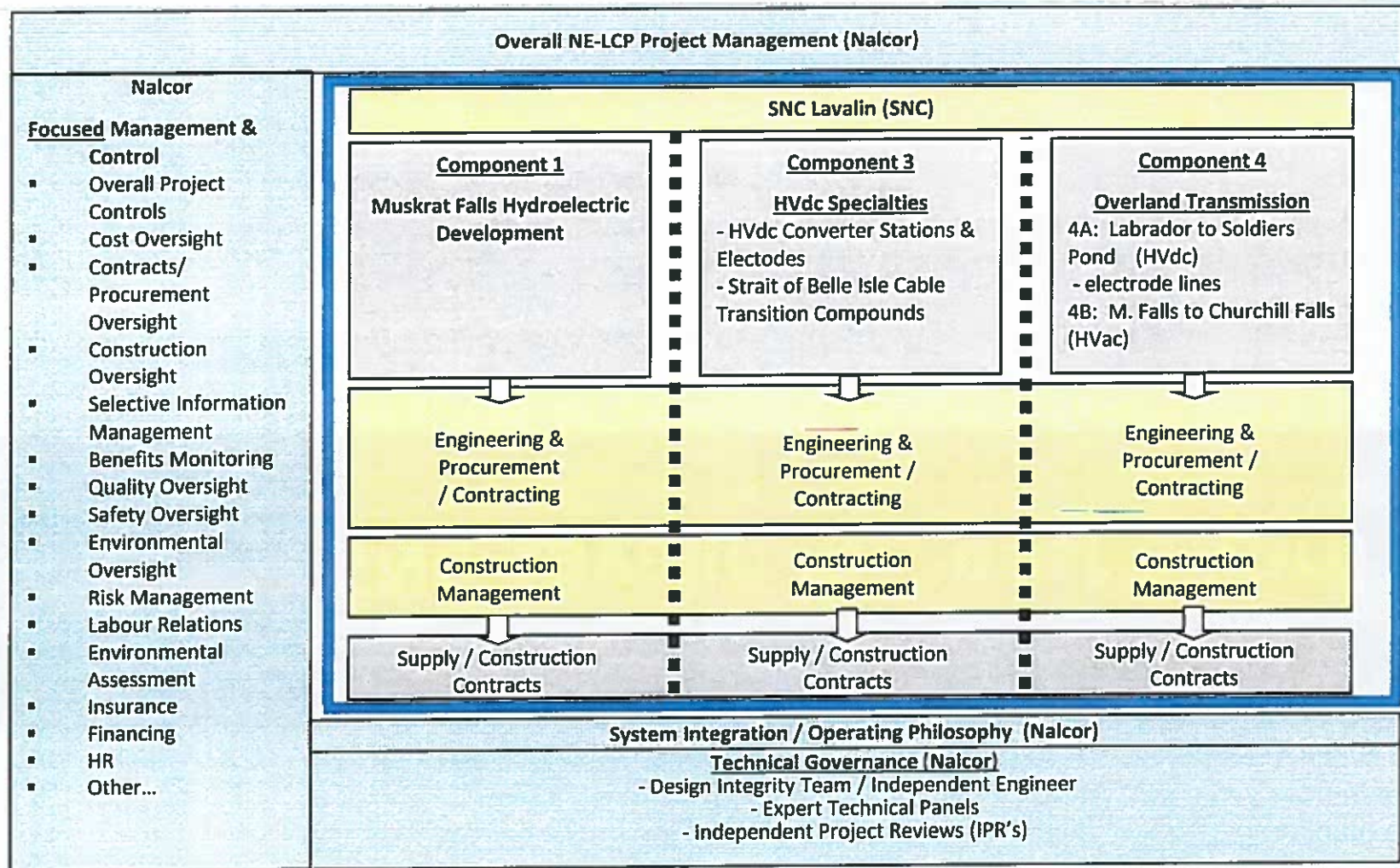
- An RFP for "Engineering, Procurement and Construction Mgt. Services " was issued to:
  - SNC-Lavalin Inc.
  - Black and Veatch
  - Hatch
- Scope – EP & CM functions provided by contractors
- Nalcor to maintain overall control of the Project by focused "management" of EP and CM entities
- EPCM takes advantage of capabilities of the bidders i.e. opportunity to avail of existing EP strengths and to potentially strengthen weak Construction Management
- Right to award:
  - full EPCM
  - EP or CM to one or more bidders (i.e. for all or separate project components)
  - EP with option to award CM later
  - EP with option to re-bid for CM later

### SNC was selected

- SNC-Lavalin Inc. selected as EPCM contractor
- Letter of Intent issued December 2010
- Formal EPCM Agreement signed February 2011



The overall NE-LCP project management structure was defined with Nalcor and SNC responsibilities and interfaces



## SNC-Lavalin Inc. post award

## There were serious SNC-Lavalin Inc. performance issues in 2011/2012

### Details of SNC's challenges

#### Resources

- During the Engineering & Procurement phase of the Project SNC struggled to provide the resources required with a succession of Project Managers & Functional Managers assigned to the Project coupled with significant senior personnel gaps.

#### Decision Gate 3 Deliverables

- Significant number of DG3 deliverables not produced by contractual date, including cost estimate inputs - Engineering for HVdc scope and transmission lines engineering lacking

#### Implementation

- A lack of implementation of the committed SNC processes, tools and systems (e.g. PM+) resulting in poor controls and the need for Lower Churchill Management Corporation (LCMC) to step-in on numerous occasions to fill critical gaps (people and processes). SNC Power Division had no experience with SNC corporate systems.

#### Interface Issues

- The lack of working interfaces between engineering deliverables and procurement, resulted in missed deadlines for the issuance of Requests for Proposals for commitment packages
- Nalcor had to recruit/assign engineering deliverables coordinators in order to bridge this interface

#### Execution Ideology

- The growing ideology gap between the bid phase to that currently being presented by SNC; huge estimated person-hour gap
- Construction management of early site works was problematic



## There were serious SNC-Lavalin Inc. performance issues in 2011/2012 (cont'd.)

### Details of SNC's challenges

#### Reputational Issues

- SNC's reputation issues on international contracts and accusations of corruption at senior SNC leadership resulted in major changes to the SNC Corporate Senior Leadership and to SNC leadership accountable for the EPCM Services Agreement resulting in significant distraction / lack of focus
- This also resulted in public and political pressure as to whether SNC should remain on the project

#### Contract Strategy

- The contract strategy ideas being put forward by new SNC PM were based upon the HQ model and were incompatible with the strategy approved by Nalcor Executive & deemed essential for financing
- SNC contractual thinking not aligned with project needs – pushed for full control despite performance issues and would not relinquish despite liability being with Nalcor – no recognition of Nalcor ownership

#### Engineering

- No standard technical specifications, or standard formats – gap filled by Nalcor
- No engineering deliverables listings / no progress measurement
- Resource gap HVdc design engineers

#### Change Management

- No working change management processes – gap filled by Nalcor

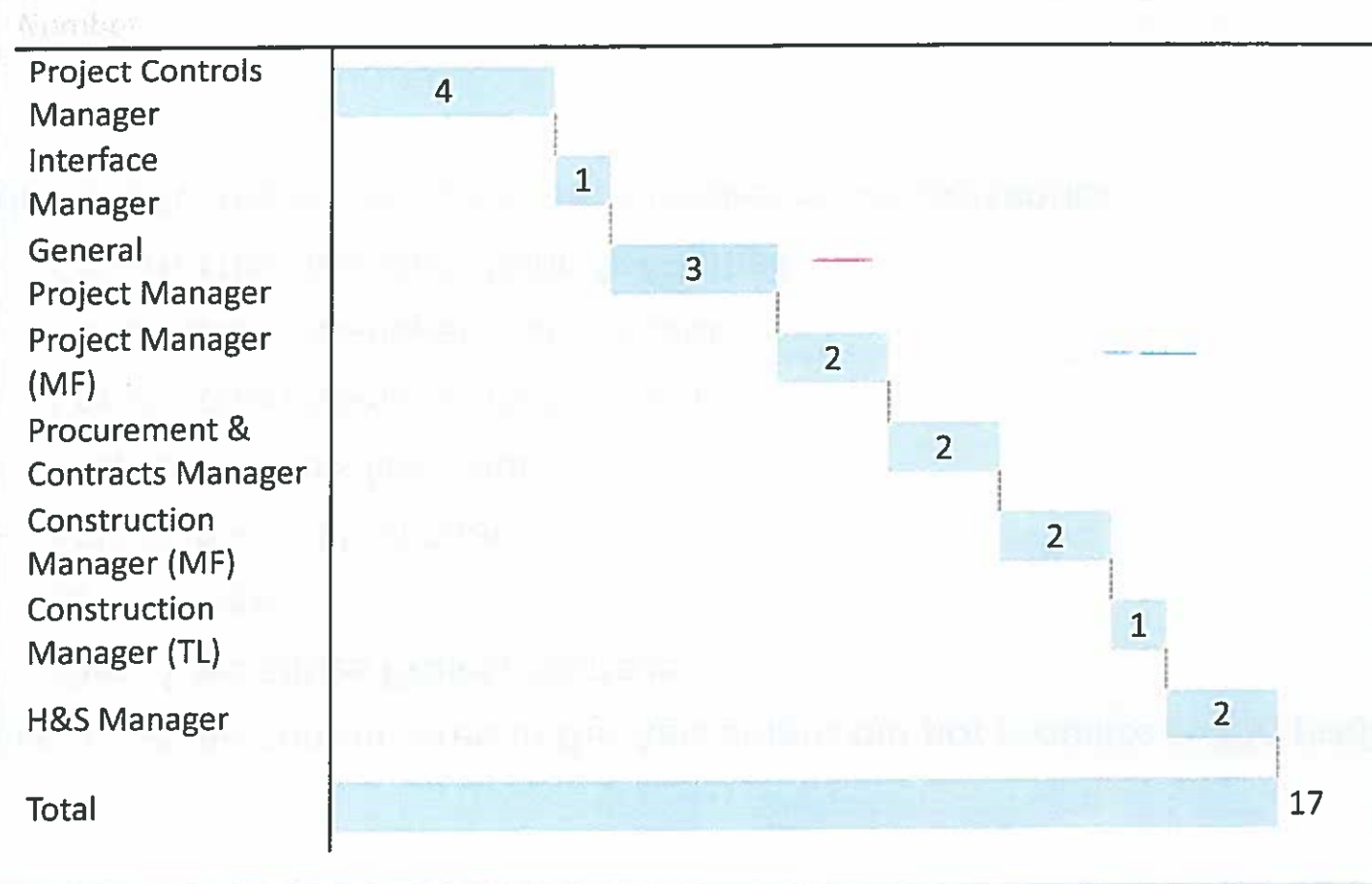


## Key personnel gaps

- Several Key personnel listed in the Agreement did not mobilize to the project
  - HVdc Specialities Project Manager
  - QA Manager
  - Environmental Manager
  - Project Controls Manager
  - Construction Manager Hydro Plants
  - Construction Manager Transmission
  - Construction Manager Hvdc Specialties
- Additionally, there was significant turnover of key personnel

## Turnover of key SNC positions (first 18 months post contract award: January 2011 to June 2012)

Turnover of key SNC-Lavalin positions (First 18 months - Jan 2011 to Jun 2012)



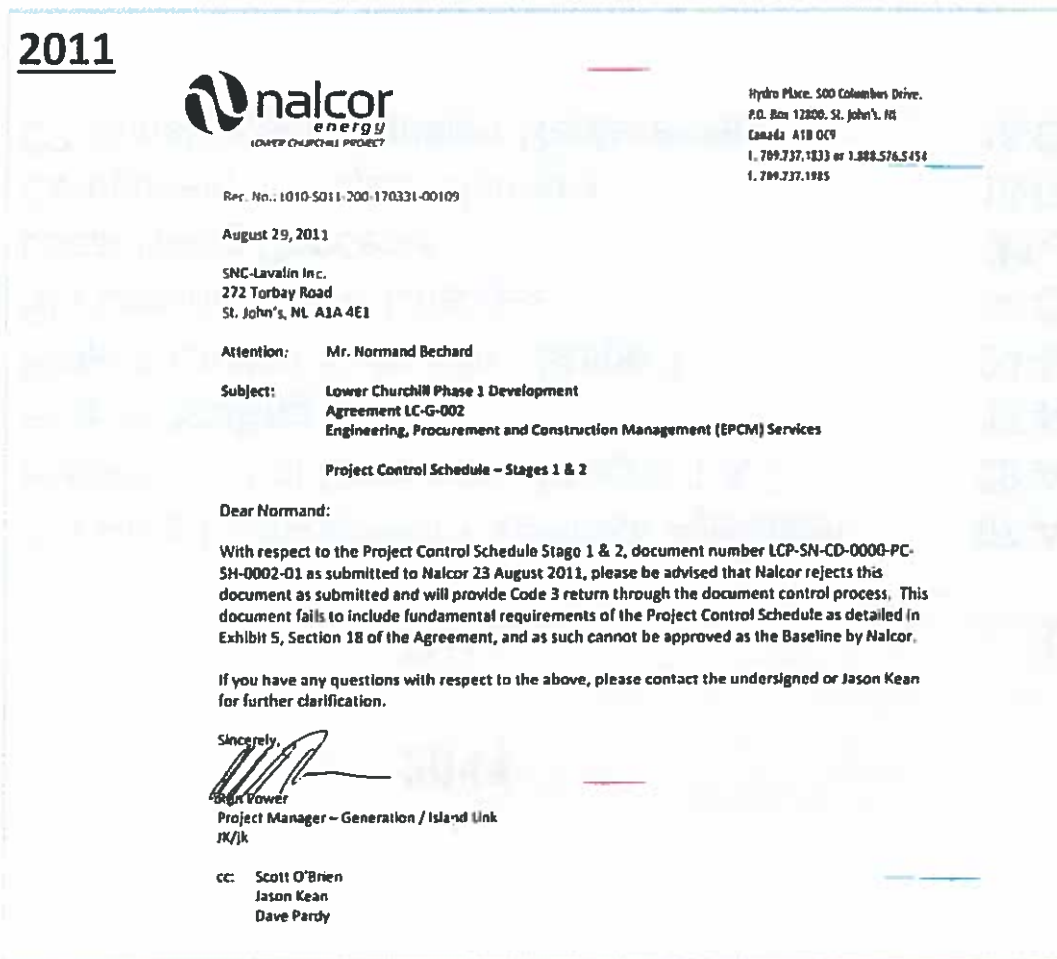
## Sampling of key letters documenting performance issues

2011

**2011**

NO.	TITLE	DATE
95	SLI Area Management Execution Approach	07-Aug-2011
109	Project Control Schedule - Stages 1 & 2	29-Aug-2011
127	Project Staffing	17-Nov-2011
128	Project Control Schedule - Stage 3	24-Nov-2011
140	SLI Organizational Changes	14-Dec-2011
90	Local Hiring Concerns	31-Jul-2011
142	Component 1 Project Manager	16-Dec-2011
144	C3 Construction Manager Replacement	16-Dec-2011

## Sampling of key letters documenting performance issues





## Sampling of key letters documenting performance issues

**2012**

**2012**

NO.	TITLE	DATE
147	Component 1 - Interim Project Manager	04-Jan-2012
148	Component 1 - Engineering Execution	11-Jan-2012
149	Estimate for EPCM Services	16-Jan-2012
158	Implementation of PM+	23-Jan-2012
	Nonconformance No. OFI-0013 — Gate 3	
160	Deliverables	16-Feb-2012
	Nonconformance No. NC-0022 — Transmittal	
161	of SLI Deliverables	03-Feb-2012
	Component 3 Construction Manager -	
165	Taqueer Ahmad	16-Feb-2012
172	Proposed Labrador Assignment Conditions	29-Mar-2012
175	Format of Technical Specifications	31-Mar-2012
180	Early Works Construction Management	22-Jun-2012
183	Early Works Construction Management	17-Jul-2012
199	Component 1 Engineering Execution	15-Oct-2012
	AC Switchyards - Change in Contract	
202	Strategy	07-Nov-2012
205	Muskrat Falls Site Team	19-Nov-2012
	Access Road SLI Management Issues - E-	
	mail from Paul Harrington to Joe Salim 19-	
N/A	Jun-2012	
	MOM SLI-Nalcor Steering Mtg. 08-Jun-2012 -	
	Addresses Contracting Strategy Alignment	08-Jun-2012
	SLI letter 170 - Addresses Integrated Team	27-Jun-2012

# Sampling of key letters documenting performance issues

**2012**



Hydro Place, 500 Coluccabus Drive,  
P.O. Box 12200, St. John's, NL  
Canada A1B 0C9  
t. 709.737.1833 or 1.888.576.3454  
f. 709.737.1985

Ref. No.: LD10-SG11-200-170331-00149

January 16, 2012

SNC-Lavalin Inc.  
272 Torbay Road  
St. John's, NL A1A 4E1

Attention: Mr. Normand Bechard

Subject: Lower Churchill Phase 1 Development  
Agreement LC-G-002  
Engineering, Procurement and Construction Management (EPCM) Services

Estimate for EPCM Services

Dear Normand:

We refer to SLJ submittal "Lower Churchill Project - Gate 3 Deliverables - EPCM Services - Stage 3 - December 2011" issued to Nalcor via transmittal 0000-CL-0417 dated 21 December 2011.

The information contained in the noted submission contains the estimated Reimbursable Labour Cost Hours for Stage 3 and the associated Milestone Payment Schedule for Stage 3. These deliverables are being provided in accordance with Agreement Exhibit 4, paragraph 4.2.3.

Notwithstanding that several Gate 3 - Key Deliverables have not been fully completed to date and are in the process of being completed, approval of which is a prerequisite to transitioning to Stage 3, we offer the following commentary:

The table below provides the EPCM reimbursable hours contained in SLJ's "Proposal for EPCM Services for the Lower Churchill Project" compared with SLJ's current estimate for the Services per the referenced submittal.

EPCM Services Person-Hours		
	NEW ESTIMATE	PROPOSAL
EPCM Hrs. expended to 31 Dec. 2011 (approx.)	215,823	
STAGE 3 Estimate		
Office St. John's	2,221,281	
Site (All Locations)	1,071,861	
Total	3,438,940	2,498,940
Increase		2,972,006

# Sampling of key letters documenting performance issues

**2012**



Hydro Place, 580 Columbus Drive,  
P.O. Box 12880, St. John's, NL  
Canada A1B 0C9  
T. 709.737.1833 or 1.888.576.5454  
F. 709.737.1985

Rec. No.: L010-S011-200-170331-00158

January 23, 2012

SNC-Lavalin Inc.  
272 Torbay Road  
St. John's, NL A1A 4E1

Attention: Mr. Normand Bechard

Subject: Lower Churchill Phase 1 Development  
Agreement LC-G-002  
Engineering, Procurement and Construction Management (EPCM) Services

Implementation of PM+

Dear Normand:

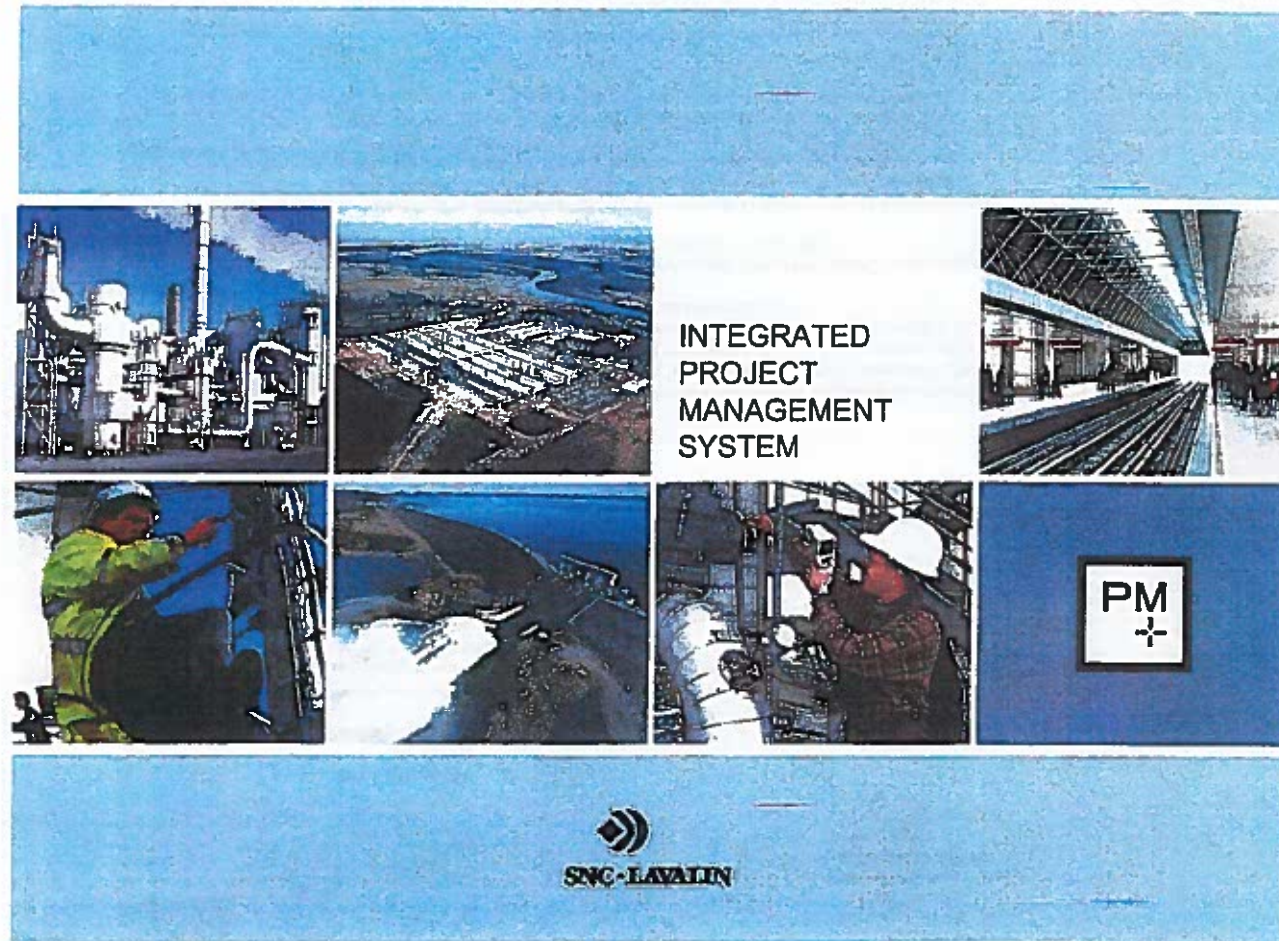
SLI's proposal stated that "SNC-Lavalin's PM+ Project Management System will be utilized to monitor and control the work." To that effect, an overview presentation (Attachment 1) of the tool was provided and presented, highlighting its capabilities and project experience, including that PM+ "allows users to access critical information rapidly and effectively, resulting in a highly responsive and practical project management and reporting tool."

Several of Nalcor's core team members have extensively utilized PM+, as SNC Lavalin project staff, on previous projects, and understand and espouse this capability.

We refer to our correspondence no. L010-S011-200-170331-00127, dated 17 November 2011, where we indicated the need to evaluate the functional "Processes, Systems/Tools, People" required to deliver the Project; a core aspect of this review is the usage of PM+. To-date there has been limited implementation of PM+ or the supporting SLI project control procedures (e.g. 3242-E Progress Measurement and 3435-E Earned Value Management). In addition, it is apparent that at the working level the SLI Project organization has limited awareness / experience in either. **In short, the utilization of PM+ to any meaningful degree has not occurred to date.**

We acknowledge and support SLI's current efforts to implement stronger project controls within the Project organization, coinciding with arrival of Mr. Mahmoud Berjaoui as Project Controls Manager. We are confident that under his leadership, PM+ will be utilized with full awareness, support and engagement of the entire Project Management Team. Mr. Berjaoui

# No substantive implementation of PM+ Project Management System





## Sampling of key letters documenting performance issues

**2012**

From: Paul Harrington/NLHydro  
To: "Salim, Joseph" <Joseph.Salim@snclavalin.com>, "Fanning, William" <bill.fanning@snclavalin.com>  
Cc: Gilbert Bennett/NLHydro@NLHydro  
Date: 06/19/2012 09:26 AM  
Subject: Performance issue

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In our last meeting we talked about the importance to Nalcor to get the early works carried out on time and without issue.

Consequently we are providing you with feedback on a matter of serious concern to Nalcor regarding SLI management performance.

It has been made clear to all that the faultless execution of the early works is of critical importance to Nalcor at the very highest levels. Senior SLI personnel were assigned to make this happen, their roles and responsibilities were clearly communicated, so it is deeply concerning to discover at this late stage that there has been a mishandling of this important task by SLI. This came to light during a recent meeting with the road construction contractor when issues of incomplete planning, lack of proper communication and inadequate management were identified. The work was supposed to have started already but it was clear that without intervention by Nalcor this would not be the case.

Given the importance of this work to us, the time already lost to us and the need to get this back on track without further delay, Nalcor management were obliged to intervene and take control.

This is a serious SLI performance issue and requires attention and corrective action at the leadership level within SLI, we recommend that you assign a senior Corporate person to handle this. Please advise by 22nd June at the latest, how you intend to address this serious

## Independent review February 2012

- In Feb. 2012 Nalcor commissioned a cold-eyes assurance review to assess:
  - readiness of SNC's people, processes and systems for DG3 (i.e. Project Sanction).
  - production of requisite DG3 deliverables
- Senior SNC Project Manager from SNC's Mines and Metallurgy division participated
- Major deficiencies identified:
  - SNC's performance
  - Lack of adequate systems/tools
  - significant organizational gaps

## Key findings - independent review February 2012

### RESOURCES

- *"SNC 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."*
- *"The following positions should be filled as a matter of extreme urgency. Component #1 Project Manager, Component #1 Construction manager, Overall Construction Manager. The five vacant positions in Procurement, an individual to oversee the estimating group who has a Project Management approach as well as estimating back ground."*
- *"In several senior positions SNC have not provided personnel who have both SNC knowledge and experience and "Hydro" experience."*

## Key findings - independent review February 2012

### SYSTEMS AND TOOLS

- *"The PM+ and M&M procedures 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 SNC extensive experience it is a very serious deficiency in their performance."*
- *"There would appear to be no Project Controls systems in place that accurately measures and reports progress."*
- *"Document Control process is a major bottleneck ...."*

## Key findings - independent review February 2012

### GENERAL

- *"The monthly report needs a major work over to make it a useful document."*
- *"The challenge of setting up a "new" office to execute this project was underestimated by the contractor and a considerable effort is now required to improve the performance of the team...."*



## Formation of the integrated ‘Project Delivery Team’

## Nalcor intervened...

- ✓ Developed and implemented organizational task forces
- ✓ Implemented Deloitte 'Organizational Effectiveness' program
- ✓ Facilitated Functional Teams' integration throughout 2011/2012 to enable project delivery requirements to be met – 'seconded' personnel into SNC teams
- ✓ Developed and Implemented processes, tools and systems

### Team Effectiveness feedback in 2012:

- ✓ Role clarity / removal of duplication paramount
- ✓ Appropriate level of integration desired

## Team integration initiatives were setup, and mitigation efforts were put in place

### Team integration initiatives

- Supply Chain team integrated – formally announced in October 2012
- Planning Team integrated in 2011
- Quality Assurance integrated in 2012
- Document Management team integrated in 2012

### Mitigation efforts were put in place

- Implemented arrangement for all Muskrat Falls structures' engineering work to be performed in SNC's Montreal offices
- Agreement executed with Hatch for provision of personnel

## Example organizational effectiveness initiatives

### **Functional Organizational 'task forces'**

Deliverables to be produced for each functional discipline included:

- Management Plan
- All required processes, procedures, and tools agreed and in place
- Updated Responsibility Assignment Matrix
- Fully developed organization charts by phase
- Fully developed Manpower Plans
- Other deliverables related specifically to the function (see table herein)
- Table of risks, issues, potential for improvement, all with accompanying mitigating or supporting actions
- Any Gate 3 Deliverables not covered above

## Example organizational effectiveness initiatives from 2012

**2012**

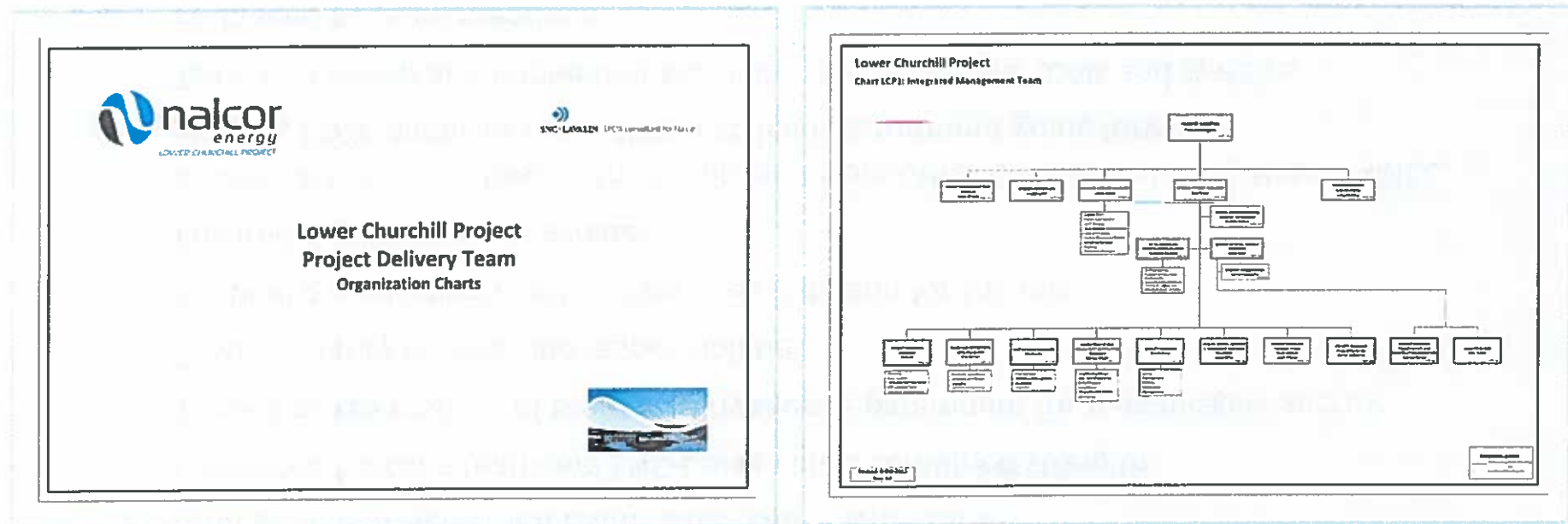
EPCM Services			
Post - Gate 3 Execution Planning : Team Charter <b>QA/QC</b>			
Introduction	<ol style="list-style-type: none"> <li>1. It is recognized that the deliverables, defined for completion during Phase 3, have not been sufficiently developed to support a project readiness review (IPR) for DG3.</li> <li>2. In an effort to expedite the completion of these deliverables and anything else required to enter a state of construction readiness, awaiting EA approval, NE and SLI agree to a cooperative effort to complete all such requirements, using a task force approach.</li> </ol>		
Date Issued	10 - Apr. - 2012		
Functional Areas	<p>Priority 1</p> <ul style="list-style-type: none"> <li>• Project Management</li> </ul> <p>Priority 2</p> <ul style="list-style-type: none"> <li>• Project Controls</li> <li>• Engineering (Components 1, 3 &amp; 4)</li> <li>• <b>QA/QC</b></li> <li>• Supply Chain</li> <li>• Construction Management &amp; Completions</li> </ul> <p>Priority 3</p> <ul style="list-style-type: none"> <li>• Health &amp; Safety</li> <li>• Environment</li> <li>• Document Control</li> <li>• Risk Management</li> <li>• Interface Management</li> <li>• Management of Change</li> <li>• Labor Relations</li> <li>• Office Services &amp; Administration</li> <li>• Commissioning</li> <li>• IS/IT</li> </ul>		
NE-LCP Sponsor	Ron Power – General Project Manager	SLI Sponsor	Normand Bechard – General Project Manager
Stakeholders	<ul style="list-style-type: none"> <li>• Nalcor Executive Leadership team: Paul Harrington, Lance Clarke</li> <li>• SLI Executive Leadership team: Joe Salim, Marie-Claude Dumas</li> </ul>		



## The integrated 'Project Delivery Team' was created

- Fully integrated 'Project Delivery Team' announced 12 March 2013
  - Strong, unified Nalcor-led team "One Team – One Vision"
  - Leveraged Nalcor's team and SNC-Lavalin Inc.'s combined strength
  - Viewed as key enabler of team effectiveness – paramount for megaproject success
  - Ensured clarity of roles and responsibilities
  - Enabled organizational efficiencies – 'Best person for the job'
  - Ensured duplication was avoided
  - Broadened resource base with recruitment from other entities including Hatch, AMEC, Stantec, PMX, agencies etc. – Nalcor to lead recruitment going forward
  - Team to develop and implement the necessary processes, tools and systems
  - Embraced by team members
  - Supported by Independent Engineer, Independent Project Analysis (IPA), Westney & KPMG
  - Did not materially change SNC liability – SNC remained 'Engineer of Record'
  - Flexibility in the contract allowed for this change

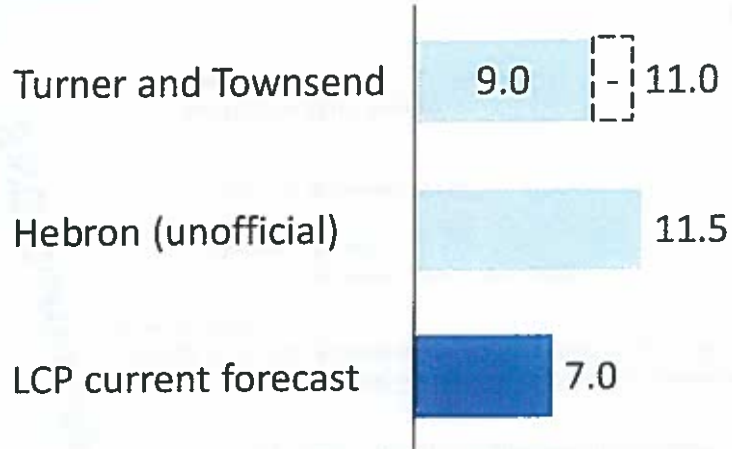
## Project Delivery Team organizational charts - 2013



## Several external sources validate the LCP integrated project management team's value and effectiveness

**LCP total project mgmt. team costs (excl. engineering) are forecasted below benchmarks**

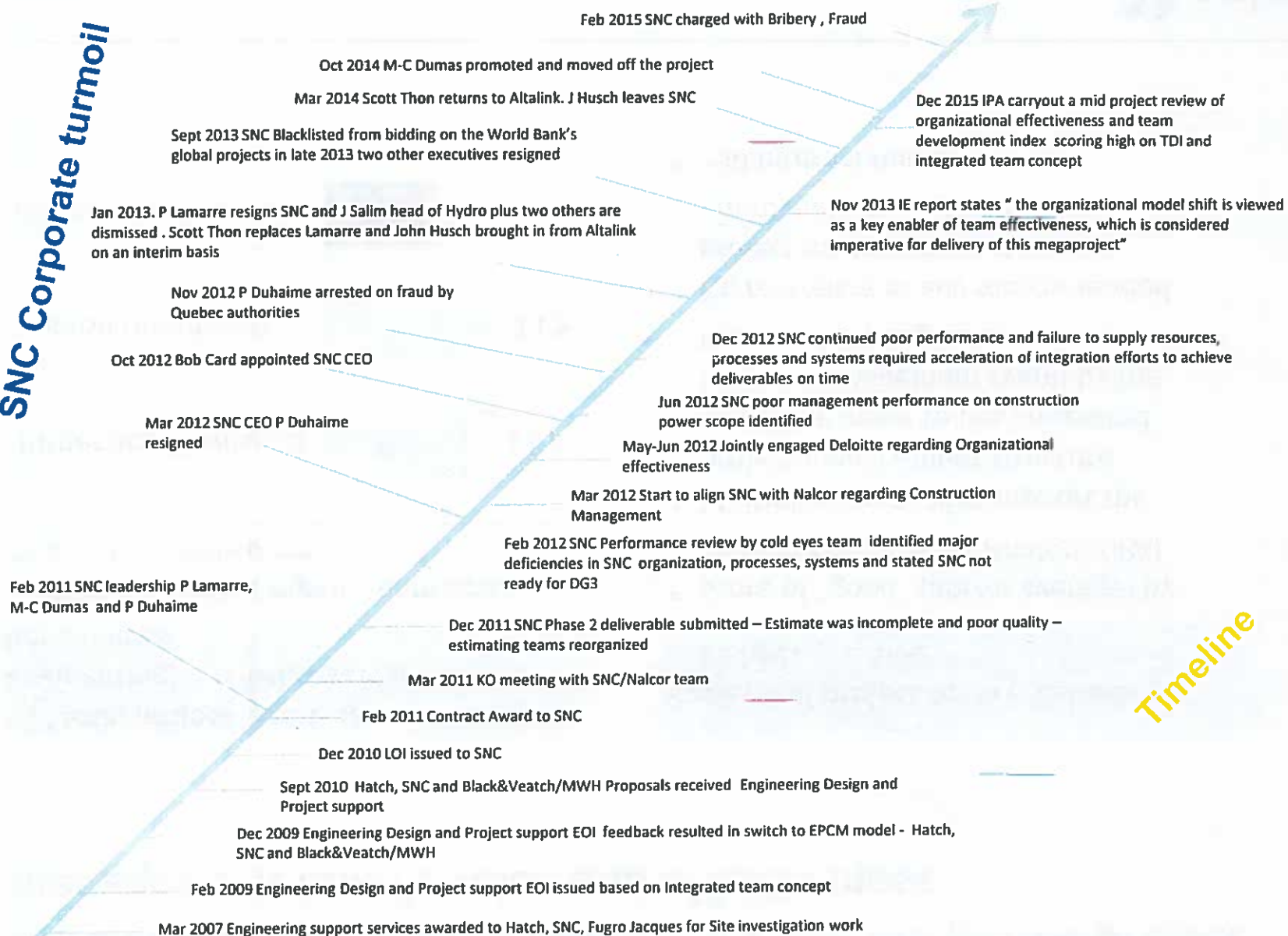
**Integrated project mgmt. team costs**  
% of total installed cost



**Reviews of project team effectiveness have been positive**

- Score of "good" (above average) by Independent Project Analysis (IPA)
- Multiple reports that support the project management structure (including move to the integrated project management team) by the Independent Engineer
- No reference to any recommended project management structure improvements by EY reviews
- ~30 Internal Audits

# SNC Corporate turmoil



Timeline