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Subject: Latest Version
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Attachments: [Preliminary Findings - Draft 8June2015 - Track Changes accepted.pdf](#)

Hello Craig,

I wasn't sure if Emiliano sent this along to you or not. So, here it is for your review.

Emiliano is preparing the word version (just the tables for mgmt. response) to accompany this document.

Regards,
Dave

Preliminary Findings
Briefing for Nalcor Feedback
June 8th, 2015

Preliminary detailed observations

- I. **Schedule management, monitoring and control processes**
- II. **Schedule process compliance**
- III. **Cost management, monitoring and control processes**
- IV. **Cost process compliance**

Appendices

Appendix A – Status of control schedule baseline for a sample of contractors

Appendix B – Variances between IPS bar chart and IPS progress spreadsheet (Rosetta Stone)

Appendix C – Implementation of schedule corrective actions for a sample of contractors

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Preliminary Detailed Observations

i) Schedule Management Processes

Effective Schedule management, monitoring and control processes allow the user to maintain an effective baseline plan and compare with progress to identify variances from that plan a take corrective actions taken.

While not running a full Earned Value Management System, which would constitute leading practice, a majority of alternate conventional schedule control plans, processes and procedures have been developed and substantially deployed by Nalcor's LCP team. This includes:

- An integrated Program Schedule (IPS) document including description of the IPS structure, schedule assumptions, baseline as well as IPS progress/updating/reporting and critical path determination and IPS bar charts;
- A Project Execution Plan (PEP), where the function and structure of Project Controls are defined. The basic function of Project Controls is described as control or stewardship of scope, cost and schedule for the Program. Project control is set as a line management responsibility and not the responsibility of the Project Control team, who provides the information needed to exercise control. PEP also includes a summary of schedule estimate and basis as well schedule key assumptions, driving logic and project milestones;
- A Project Control Management Plan that has a reasonably detailed section dedicated to Planning and Scheduling including:
 - General strategies for achieving the planning and scheduling objectives set for the Program;
 - Schedule reporting and alignment requirements; and
 - Integration of the various contractors and suppliers detailed schedules.
- Planning and schedule process work flows. While the process steps remain at a fairly high level, the map is able to demonstrate functional responsibilities and handoffs. These work flows include key steps for:
 - Controlling the schedule at component level (i.e. Muskrat Falls Generation, Labrador Transmission Asset, Labrador Island Transmission Link), from contract award up to contract close out;
 - Developing components schedule baseline;
 - Updating the IPS; and
 - Reporting.
- Coordination procedures for administration, execution control and management of the contractors' schedule (and cost);
- Trend analysis and change management processes used for forecasting time (and cost);
- The focus of the IPS and management is on completion of the Physical Construction of the plant. However, management also indicated that schedules had been prepared for operational readiness and commissioning; and

- Project monthly reporting captures the key information to manage work on schedule including:
 - Planned/earned/forecast progress;
 - Variance;
 - Critical path(s);
 - Float watch; and

IPS summary and construction progress.

The following observations/gaps were identified:

i) Schedule Management Processes	
Detailed observation	Management Response
1. The process used to update the status and record progress of the project in the IPS is complex and requires a number of manual inputs and tools (i.e. LCP database, IPS progress spreadsheet "Rosetta Stone") and processing each month. This process is not yet fully documented.	
2. Variance thresholds for monitoring schedule performance are not defined. Control thresholds are typically used to indicate the predefined scale of variation permissible before a documented corrective action plan is put in place and the issues is escalated in reporting.	
3. The IPS Gantt charts does not show percent complete at the activity level which restricts the ability to cross check progress and forecasted end dates.	
4. While IPS focuses on construction, commissioning and operations start-up, it does not include information on engineering, procurement and fabrication. Logic relationships and delays of engineering, procurement or fabrication with construction are not reported; therefore it is not clear how any delays may impact construction.	

ii) Schedule Management Compliance

Nalcor LCP team has established a reasonably conventional organization structure to support the management of the Program and the execution of the processes and controls. This organization structure has been staffed with experienced resources in key roles related to the management, monitoring and control of the schedule.

EY’s observations below are based on Nalcor’s management using the IPS and a sample of 5 key projects whose aggregate value is just over \$2.3 billion. Assessment was made of the quality (accuracy and completeness) of schedule information reported and the compliance with schedule management work flows.

The sample of information reflected the state of the program on December 2014 and January 2015 noting that Nalcor has made progress since this time.

We observed that:

- Nalcor is regularly updating and maintaining the IPS as its core schedule management tool and basis of reporting. IPS updates are performed using the established tools (IPS progress spreadsheet “Rosetta Stone”, LCP database);
- Nalcor are working towards systematically integrating contractor schedule updates as a basis of the IPS updates. Contractor’s schedules are regularly (i.e. monthly) reviewed by the Project Controls team and comments made;
- The Project Controls team is well aware of the established processes as well as the planning and schedule work flows;
- The Nalcor LCP team is also making significant effort to work collaboratively with contractors to them comply with project requirements; and
- Input from a quantity surveyor on site is also used to validate contractor quantity and support progress reporting for the IPS.

The following observations/gaps were identified:

ii) Schedule Management Compliance	
Detailed observation	Management Response
<p>1. The process for integrated maintenance of the IPS and contractors schedules is not yet fully deployed and consistently executed. Schedule Control Baseline Documents (SCBD) and Schedule Development and Control Plans (SDCP) are incomplete and/or fail criteria, as per Nalcor’s coordination procedures. These are key documents that describe the approach to planning and schedule</p>	

ii) Schedule Management Compliance	
Detailed observation	Management Response
control including schedule development, analysis, forecasting, reporting, progress measurement and corrective actions. Specifically:	
a. Of the sample of 5 key contractors, only 2 had complete SCBD and SDCP. The status of control schedule baselines, as per contractor's monthly progress reports of December 2014 and January 2015, is illustrated in Appendix A; and	
b. The updated schedule control baseline from the sample of contractors cannot at this time be included / rolled up in the IPS. A date has not been established for completing the plans and finalizing an integrated baseline of contractor and IPS schedules.	
2. One key contractor's [Astaldi] most recent approved schedule (dated October 2014) does not fully comply with Nalcor's coordination procedure:	
a. That schedule includes many activities (more than 500 activities) some with negative significant float. Negative float indicates the inability to meet schedule milestones/deadlines. As of May 21 2015, some schedule non-compliances have still not been rectified; and	
b. This same key contractor's monthly progress report has not been approved since July 2014 indicative of significant dispute on the quality and accuracy of their reporting.	
3. Schedule corrective actions are not always implemented in a timely manner. Appendix C captures the results of corrective action test performed on 3 contractors of the sample.	
4. Spot checks revealed instances where progress reported in the IPS	

ii) Schedule Management Compliance	
Detailed observation	Management Response
differed from the progress reported from contractors in the Rosetta Stone (refer to Appendix B for more detail). Although the gaps are not themselves material the reported progress may be viewed as subject to interpretation and so not fully objective.	
5. A target date for completion of corrective action on the schedule management and reporting challenges at the contractor level has not been established.	

iii) Cost Management Processes

Project cost management typically includes processes for planning, estimating, budgeting, financing, funding, managing and controlling costs so that the project can be completed within approved budget. Cost control processes are set to monitor and report project performance against the cost baseline and to identify variance from the plan and forecasting potential impacts.

While not running a full earned value management system (which would constitute leading practice), a majority of alternate conventional cost management and controls have been developed. Specifically we found that:

- Nalcor’s LCP cost management processes are reasonably detailed and documented in the Project Execution Plan, Project Controls Management Plan and Procedure for Cost Control. In these plans and procedures is included the description of:
 - The function and structure of Project Controls group for management of cost; and
 - The structure of the cost baseline, which includes LCP coding structure and work breakdown structure, LCP commitment packages and packages dictionaries, LCP process to establish and maintain budgets.
- A Project Control Management Plan that has a reasonably detailed section dedicated to cost management including:
 - Commitments and incurred cost monitoring process and cost/cash flow methodology;
 - Trending and forecasting processes that are used to calculate Final Forecast Cost (FFC) and assess variances. FFC is adjusted through a formal Forecast Change Notices mechanism. Early identification of potential variance is deemed necessary to allow an effective cost control system and ultimately improve the accuracy of cost forecast;
- Cost control work flows have been drafted by the LCP Project Controls team. These work flows are generally well-defined and describe the key steps at functional level for each interface involved in the cost control processes. Work flows cover the following areas:

- Commitments;
- Incurred and cost flow; and
- Forecast cost.
- Coordination procedures for administration, execution control and management of the contractors' cost (and schedule) have been established;
- Nalcor's cost monthly report captures key cost information, both at Program and component level, including:
 - Original control budget (OCB);
 - Approved project changes;
 - Current control baseline (CCB);
 - Incurred cost;
 - Committed cost;
 - Final Forecast Cost (FFC), which is the sum of original commitment, approved changes, changes in progress, trends and unallocated budget/unawarded scope;
 - Variance from CCB and Trends; and
 - Contingency with related draw down curve.
- An estimated contingency draw down curve has been developed to forecast the usage of estimate contingency over the project life.

The following observations/gaps were identified:

iii) Cost Management Processes	
Detailed observation	Management Response
1. Cost variance thresholds are not defined. These thresholds are usually used to establish a permissible variation from budget before documented corrective action must be taken. Variance thresholds are also usually used to define what constitutes a variance requiring escalation for senior management attention.	
2. Management indicated that rebaselining of the program was at their discretion and dependent on a variety of factors including forecast and rate of draw down on	

iii) Cost Management Processes	
Detailed observation	Management Response
contingency. The explicit conditions and processes for rebaselining are not defined in the program's control processes and procedures.	
3. A detailed checklist has not been prepared to be used by cost controllers to review and validate contractor costs and ensure consistency of the review.	
4. The shape of the contingency curve is conventionally defined by aggregation of the forecasted materialization of estimate uncertainties or tactical risks. It was indicated that the basis of the forecast contingency draw down curve did not include quantified material risks. This significantly limits the precision of comparison of the rate of realized cost risks versus original forecast. This in turn also limits its ability to act as a basis of assessment of the need for rebaselining.	

iv) Cost Management Compliance

Nalcor LCP team has established a reasonably conventional organization structure to support the management of the Program and the execution of the processes and controls. This organization structure has been staffed with experienced resources in key roles for related to the management, monitoring and control of the Program's cost.

EY's observations below are based on Nalcor's management using Program Level cost reporting and a sample of 5 key projects whose aggregate value is just over \$2.3 billion. Assessment was made of the quality (accuracy and completeness) of cost information reported and the compliance with cost management work flows.

The sample of information reflected the state of the program on December 2014 and January 2015 noting that Nalcor has made progress since this time.

We observed that:

- A Cost Control team has been established with the mandate to provide the LCP Project Management Delivery Team with timely updated information on the project cost status for analysis and control to deliver the LCP project within budget;
- Major activities performed under this mandate include: budgeting, reporting commitments and actual status, trending and forecasting final cost (FFC);
- In line with the project budgeting and cost control processes and objectives, the LCP project has been divided into manageable sub-projects with their own budget code of accounts, funding authority and funding release mechanism.
- A cost baseline has been established and maintained;
- The Final Forecast Cost FFC is calculated using data from Nalcor’s cost management systems (including PM+, LCP tracker and PRISM);
- Contractor’s cost are regularly reviewed by Cost Control teams and comments made and fed back to the contractors;
- Sanity checks and variance analysis are performed by cost controllers to validate contractor’s cost figures;
- Deviation Alert Notices and Trends are generally implemented and reported; and
- The Project Cost Control team is well aware of the established processes and cost related work flows (although some are still in draft version) are generally implemented.

The following observations/gaps were identified:

iv) Cost Management Compliance	
Detailed observation	Management Response
1. A trend, quantified risk and/or early identification of potential variance have not been raised for the challenges on one key contractor, specially related to progress delays [Astaldi]. It is also not clear how the quantification of the related cost risk has been communicated in reporting, limiting the understanding of the scale of the risk or issue.	
2. While cost risks are somewhat mitigated by the structure of the contract and the use of a quantity surveyor, the contractor’s forecast are not fully used as a basis of the FFC.	
3. FFC does not include trends for another contractor [Nexans] as a different system is used to track costs.	

Appendix A - Status of control schedule baseline for a sample of contractors

Package / Contractor	Package Title	Contract Award Date	Status of control schedule baseline
CH0007 Astaldi	Construction of Intake & Powerhouse, Spillway and Transition Dams	29-Nov-13	Rebaselining of control schedule required and underway. Contractor's monthly progress report not approved since July 2014.
CH0032 Andritz Hydro	Supply and Install of Powerhouse Hydro-Mechanical Equipment	19-Dec-13	Rebaselining of control schedule required. Waiting for revised Astaldi schedule, as Andritz activities on site are directly linked to Astaldi schedule.
CD0502 Alstom	Construction of AC Substations	07-Nov-14	Schedule control baseline under review.
CT0327 Valard	Construction of 350 kV HVdc Transmission Line - Section 1 (MF to SOBI to Deer Lake 610 km)	14-Nov-14	Rebaselining of control schedule required and underway.
LC-SB-003 Nexans	Submarine Cable Design, Supply and Install	29-Nov-13	Rebaselining of control schedule required and underway.

Appendix B - Variances between IPS bar chart and IPS progress spreadsheet (Rosetta Stone)

Code	Description	IPS bar chart of MFGen and LTA (data date end of Feb 2015)	% complete as per IPS progress spreadsheet (Rosetta Stone) at the end of Feb 2015
MFG-3-1320	Construction Power - Muskrat Falls	Complete	90.8% complete
MFG-3-2330	MF South Dam	Not started	3% complete
LTA-6-6180	735kV AC Intercon CF	Construction started and ROW completed	0% progress

Appendix C - Implementation of schedule corrective actions for a sample of contractors

Package / Contractor	Corrective action test	Comment
CD0502 Alstom	For both contractors, most recent available schedule is the baseline with data date August 2014. No updated contractor's schedule with progress to date is available. Corrective action check could not be performed.	Our spot check on both schedules revealed a number of constraints (over 20) affecting the backward pass calculation of the network ("Finish on or before"). These constraints are strictly to be avoided, as per Nalcor's coordination procedures, unless approved by Engineer. However, no engineer's approval was found.
CT0327 Valard		
LC-SB-003 Nexans	Corrective actions were identified in the contractor's Control Schedule Baseline issued February 6, 2015. However, corrective actions have not been implemented yet.	Nalcor advised that corrective actions will be implemented in the next schedule re-baseline expected at the end of May.