

25 October 2018

To: Angie Brown

From: Richard Westney

Re: Risk Ranges & Responsibilities for DG3 QRA

Angie

Thanks for your patience as I assembled this information. Your request of me was to provide the risk ranges used for the DG3 QRA tactical and strategic risk ranges and explain whose responsibility it was to establish those ranges.

This memo summarizes where the ranges are documented as well as our understanding of how they were developed. All page numbers refer to the pagination in P00130.

A. The Ranges

See: P00130: *Decision Gate 3 Project Cost and Schedule Risk Analysis Report*

- Attachment B.10: *Base Estimate Tactical Risk Exposure Input*

See pages 239 – 247. This shows the “Best Cost” and “Worst Cost” ranges for each cost category in the cost-risk model.

- Attachment B.12 - *Westney’s Estimate Accuracy Report*

See page 272: Tactical Risk Analysis Results for the results of the above tactical cost ranging

- Attachment B.11: *Time-Risk Exposure Input*

See pages 251 – 261. This shows the ranges used for the time-risk model.

- Attachment B.13: *Time-Risk Analysis Results*

See pages 280 – 281 for the results of the above time-risk ranging

- Attachment B.14 – *Analysis of Potential Management Reserve and Lender’s Owner Contingency*

See pages 293 - 295 for the ranges for each strategic risk

See pages 287 and 290 for the results of the above strategic cost-risk ranging

B. The Ranging Process

- Nalcor began using the Westney Risk Resolution® process in 2008, so, by 2012, the Nalcor PMT had 4 years of experience in the assessment and management of tactical and strategic risks. Similarly, SLI had a well-developed risk management capability including experience with recent hydropower projects in Canada.

- A risk assessment workshop was held in St John's on 23 – 25 May 2012. Prior to the start of this workshop, Nalcor and SLI had worked closely on developing a comprehensive risk register with associated ranges. Inputs to the workshop ranging exercise were as follows:
 - See Attachment B.1: *SNC Lavalin Risk Register* (pages 20 – 52)
 - See Attachment B.3: *ERM Risk Register*, and email dated 12 May 2012 from Jason Kean to R Henderson and other workshop participants (pages 93 – 105). This provides the Nalcor risk register that was used as a starting point for ranging.
 - See Attachment B.5: *Initial Screening of SNC Lavalin Risk Registers for Applicable Cost and Schedule Risks for Probabilistic Analysis* (pages 123 – 133). This provides an email from Yuri Raydugin (SLI Risk Manager) transmitting a risk register designed for use in the cost and schedule probabilistic analysis workshop. There are separate registers for cost and schedule risk, and risk impacts are suggested.

It should be noted that SLI had completed two recent hydro projects – Eastmain-1 and Romaine, which provided the basis for their estimate and assessment of ranges for key cost drivers such as labor costs, productivity, and concrete installation rates. (See Cost Category A.f in Attachment B.10, (page 241) and 31 May 2012 email Paul Lemay to Jason Kean (pages 235 – 237) for examples of this type of discussion.)

The workshop was led by Nalcor who had overall responsibility for the setting of ranges. Westney participants facilitated the discussions around the ranging and scenarios for specific cost elements.

The workshop did not attempt to finalize ranges, but to capture the viewpoints of all parties and develop a basis for Nalcor to finalize the tactical cost, schedule and strategic risk ranges.

- Nalcor (Paul Harrington and Jason Kean) visited Westney office for a meeting on 4- 5 June 2012. The purpose of this meeting was to follow-up on the workshop by finalizing the tactical cost-risk ranges, discussing the strategic risks and ranges, and defining the number and content of the reports.
 - The tactical cost-risks were finalized, and a preliminary cost model was run.
 - The strategic risk ranging process was done in two steps: defining each strategic risk and determining the range for that risk (i.e. the cost impact over and above the base estimate including contingency for tactical risks). Both steps involved discussion between Westney and Nalcor with, of course, Nalcor making the final determination of the risks and ranges. A preliminary strategic risk model was run.
 - Westney was also collaborating with Nalcor to finalize the time-risk model and ranges for activities. (See Attachment B.11 *Time-Risk Exposure Input*. These are the same time-risk ranges that were used in the 20 September report that published the time-risk model.) A preliminary time-risk model was run.

After the meeting, Westney finalized the risk models and shared the results with Nalcor the following week. Nalcor authorized release of the Tactical Cost Risk Report and this was done on 15 June 2012. The Strategic Risk and Time-Risk analyses were published as one report on 20 September 2012, (see *Analysis of Potential Management Reserve and Lender's Owner Contingency ...* Attachment B.14.)