

1 Q. What specific studies/analyses have been done to determine the effects of
2 developing the Muskrat Falls site before the Gull Island site? What are the specific
3 cost, risk and other factors that would affect both developments if such a
4 sequencing program was followed?

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7 A. The sequencing of Gull Island and Muskrat Falls has been flexible throughout
8 Nalcor's planning up to DG2. Nalcor's planning has been undertaken on the basis
9 that either Muskrat Falls or Gull Island could be developed first.

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11 The sequencing of Gull Island and Muskrat Falls was considered during the
12 environmental assessment process, and Exhibit 113 – IR JRP.165, discusses this
13 issue.

14

15 The sequencing does not affect:

- 16 • Location of transmission lines
- 17 • Location of generating facilities
- 18 • Dam heights
- 19 • Areas of inundation
- 20 • Power output
- 21 • Duration of construction activities
- 22 • Water management and operating regime

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24 Insofar as the Labrador-Island Transmission Link is concerned, the converter station
25 in Labrador will be located at Muskrat Falls rather than at Gull Island. This location
26 is included in the DG2 capital cost estimate for the Labrador Island Transmission
27 Link.

1 None of these items is expected to have a material impact on costs, risks, or
2 schedules.

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4 Nalcor undertook a series of studies to examine potential hydraulic and hydrologic
5 effects from developing Muskrat Falls prior to Gull Island. These reports are filed as
6 confidential exhibits CE-21, CE-23, CE-25, and CE-26.

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8 The key conclusions from these reports are:

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10 Confidential Exhibit CE-21 (Estimate Firm Generation Potential of the Muskrat Falls
11 Development):

12 There is minimal difference in firm energy and capacity at Muskrat Falls with and
13 without the Gull Island reservoir in place (CE-21, page 27).

14
15 Confidential Exhibit CE-23 (Muskrat Falls PMF and Construction Design Flood
16 Study):

17 The Muskrat Falls spillway design capacity will need to be increased to 24,800 m³/s
18 from 23,270 m³/s. This will be addressed during detailed engineering, and is not
19 expected to be material, as the maximum water level in the Muskrat Falls reservoir
20 without Gull Island does not exceed the Muskrat Falls design height (44 m). The
21 difference in construction design flood is minimal (5,890 m³/s vs. 5910 m³/s) (CE-23,
22 page 21).

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24 Confidential Exhibit CE-25 (Muskrat Falls Ice Study):

25 The analysis previously prepared with Gull Island present remains valid (CE-25,
26 page 28).

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1 Confidential Exhibit CE-26 (Hydraulic Modeling Studies – 2010 Update):
2 There are negligible differences in production at Muskrat Falls with and without
3 Gull Island for uncoordinated, partially coordinated, and coordinated operation
4 with Churchill Falls (CE-26, page 38, Table 4-2).

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6 From a risk prospective, the construction of the smaller Muskrat Falls project
7 requires a smaller capital outlay (thus a smaller equity contribution and debt
8 financing) and a smaller construction effort than the larger Gull Island project.
9 Similarly the physical layout of Muskrat Falls project does not present some of the
10 technical and execution challenges that the larger Gull Island project provides, in
11 particular the need to construct diversion tunnels for the temporary diversion of
12 the river, the need to establish a construction bridge across the river, the very large
13 excavation and materials handling volumes, and the very large structures (e.g. 11
14 million m³ CFRD main dam). These factors result in smaller execution risks for
15 Muskrat Falls than Gull Island. The experience from the construction of Muskrat
16 Falls will also serve to reduce execution risks associated with Gull Island.

1 Q. In response to PUB-Nalcor-16 regarding the potential increase of Rio Tinto's
2 production capacity in Labrador by 100 percent, Nalcor states:

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4 *"Nalcor will have 2TWh of production available from Muskrat Falls, and*
5 *approximately 1 TWh available from Churchill Falls recall to meet needs in*
6 *Labrador".*

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8 Current requirements for Rio Tinto's operations in Labrador is approximately 2.2
9 TWh. Assuming a 100 percent increase in production would require approximately
10 2 TWh, this would leave about 1 TWh available from Muskrat Falls and Churchill
11 Falls recall. From Nalcor's forecast for the Island Interconnected System, this
12 surplus energy would be required to meet Island needs within a 10-year timeframe.
13 This does not provide for any additional domestic or industrial load growth in
14 Labrador or industrial load growth on the Island. Also energy exports on the
15 potential Maritime Link to Nova Scotia would be limited to the 1TWh contracted
16 with Emera for a 35 year term.

17

18 In consideration of the above, and the fact that Nalcor's assessment of a Gull Island
19 development with 800MW HVdc lines to Soldiers Pond and Salisbury, New
20 Brunswick "did not meet Nalcor's financial targets," if Rio Tinto's planned expansion
21 proceeds, how would Nalcor propose to meet load requirements in Newfoundland
22 and Labrador beyond 2027?

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25 A. Nalcor's comments in response to RFI PUB-Nalcor-65 indicate that Gull Island has
26 not been "abandoned". Should Rio Tinto's requirements materialize (or other
27 changes to the load forecasts occur), Nalcor would use the period between 2017

1 and 2027 to develop additional sources of supply. These additional sources of
2 supply may include Gull Island, other hydroelectric sites, or wind development.

1 Q. Further to PUB-Nalcor-72, what would be the impact of such a scenario on the
2 Power Purchase Agreement between Nalcor and Hydro?

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5 A. Nalcor does not anticipate any impact from the scenario described in PUB-Nalcor-
6 72 on the arrangements between Nalcor and Hydro for the supply of Muskrat Falls
7 energy.

1 Q. Further to PUB-Nalcor-72, what would be the potential impact of such a scenario on
2 ratepayers of the Island Interconnected System?

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5 A. Further to the responses to PUB-Nalcor-72 and PUB-Nalcor-73, Nalcor does not
6 anticipate any impact on Island Interconnected ratepayers.

1 Q. In response to MHI-Nalcor-24, Nalcor states: *“The HVDC interconnection is designed*
2 *to obtain the required level of reliability via the HVDC link from Labrador in*
3 *conjunction with island generation facilities.”*

4

5 With the proposed shutdown of the Holyrood Thermal Generating Station in 2021,
6 how will Nalcor respond to the loss of up to 800 MW of generation during a
7 prolonged bipole outage which could potentially last for weeks or even months?

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10 A. Nalcor has considered the possibility of a prolonged bipole outage and has
11 addressed these issues in the design to date. The component of the Project with
12 the greatest probability of an extended outage is the Strait of Belle Isle Crossing.
13 Nalcor has included approaches in the design to address reliability concerns for the
14 Strait of Belle Isle Crossing, including:

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16 a. a spare HVdc cable in the basis of design to permit full capacity operation in
17 the unlikely event of a cable cut

18 b. use of horizontal drilling techniques to protect the cables out to deep water
19 where the probability of iceberg damage is low (confidential exhibit CE-41
20 Feasibility Study of HDD for the Strait of Belle Isle)

21 c. Completing models to identify a suitable depth at which to place cables on
22 the sea floor (Exhibit 35 Iceberg Risk to Subsea Cables in SOBI)

23

24 The HVdc converters are designed to a high standard of reliability with system and
25 component redundancy and diversity to avoid an extended outage. Critical spares
26 will be available for both converters.

27

1 With respect to the overhead transmission line, Hydro’s operational experience is
2 that transmission line outages can be restored within reasonable periods of time,
3 and the worst case restoration time is comparable to the restoration time on the
4 Island system today. In order to minimize restoration time, Nalcor expects to
5 maintain appropriate spares inventories and resources to expedite repairs in the
6 unlikely event of a structural failure.

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8 In Exhibit 106, “Labrador – Island HVdc Link & Island Interconnected System
9 Reliability”, Nalcor has compared the expected reliability of the existing Island
10 system to the Interconnected scenario, and the study indicates that the Island
11 system with the Labrador Island Transmission Link offers equivalent reliability over
12 the existing Island system, and that similar level of reliability is further improved
13 with the construction of the Maritime Link.

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15 With these mitigation approaches in mind, Nalcor is of the view that the probability
16 of an event that would see unserved energy for customers extending for many
17 weeks or months is extremely remote.

1 Q. What is the current anticipated date for project approval at DG3 or sanction?

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4 A. Although Project sanction (DG3) is dependent on the completion of prerequisite

5 activities that are beyond Nalcor's control, Nalcor anticipates that DG3

6 requirements will be achieved as early as possible within the first half of 2012.

1 Q. What are the current anticipated targets for First Power and Full Power from the
2 Muskrat Falls Project?

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5 A. The current anticipated targets for First Power and Full Power from the Muskrat
6 Falls Project is late in 2016 for First Power and in mid-2017 for Full Power.

1 Q. What is the schedule for contract tenders and contract awards associated with the
2 Muskrat Falls-Labrador-Island Link Project for the period September 1, 2011 to June
3 30, 2012?

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6 A. Assuming EA approval is provided by the Federal and Provincial Ministers late
7 2011/early 2012 and subject to internal Nalcor approvals and 2012 budget
8 approval, the following table lists the anticipated readiness to award dates for
9 contract packages for the Muskrat Falls and the Labrador – Island Transmission Link
10 Projects during the specified period.

11

Description	Readiness to award date
Main Access Road	Q4-2011
Construction Power Materials – Various Packages	Q1-2012
AC Transmission Materials– Various Packages	Q1-2012
Turbine and Generators Supply & Install	Q2-2012
SOBI Cable EPCI	Q2-2012
Reservoir Clearing	Q2-2012
AC Transmission Right of Way Clearing	Q2-2012
Accommodations Complex Buildings	Q2-2012
Administrative Buildings	Q2-2012
Accommodations Complex Site Utilities	Q2-2012
Rock Mass Excavation (Muskrat Falls)	Q2-2012
Construction Contract for Construction Power	Q2-2012
Catering, Housekeeping and Janitorial Services	Q2-2012
Medical Services	Q2-2012

1 Q. What is the current anticipated date for the finalization of formal agreements with
2 Emera Inc.?

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5 A. The term sheet signed by Nalcor and Emera has a target date for the finalization of
6 formal agreements of November 30, 2011. While the term sheet states that this
7 target date may be extended by mutual agreement of Nalcor and Emera, November
8 30, 2011 is the current anticipated target date.

- 1 Q. It has been announced that Navigant Consulting is completing a review for Nalcor of
2 the Muskrat Falls-Labrador-Island Link Project and the Isolated Island Options.
3 Provide the terms of reference for this review.
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6 A. The Terms of Reference are included on pages 2 and 3.



Overview

Nalcor's Decision Gate process is designed to ensure decisions are made at appropriate times, with the appropriate level of information, and at appropriate levels of expenditure. Nalcor's Decision Gate process focuses on key milestones to achieve gateway readiness and builds in "cold eyes" reviews at key decision points throughout the process.

The Lower Churchill Project Phase 1 (the "Project") recently passed through Decision Gate 2 ("DG2") which is Concept Selection. At that time, to select a preferred concept, Nalcor completed the appropriate activities and gathered the required information including field work, engineering and design, finalization of Labrador Innu Impacts and Benefits Agreement ("IBA"), environmental assessment progression, execution of water management agreement, completion of the Emera Term Sheet, financing preparation and economic analysis.

Decision Gate 3 ("DG3") which is Project Sanction requires the advancement of project activities and work streams to a level of progression which provides the certainty needed to sanction the Project (e.g. ratification of the IBA, receipt of environmental permits and approvals, completion of detailed engineering and design, market confirmation of financing strategy, finalization of definitive commercial agreements, etc.). The intent of DG3 is to validate the concept selected before committing the largest dollars.

Independent reviews are carried out in accordance with established Nalcor decision-making processes with each Decision Gate having differing requirements. For DG3, one such independent review is an independent review of the reasonableness of the Island supply decision as described below (the "Supply Decision Review") using the latest available project cost and schedule information.

Terms of Reference

The Supply Decision Review will be conducted by an external consultant (the "Consultant") with a focus on the reasonableness of the Island supply decision. For purposes of clarification, the scope of the Supply Decision Review does not extend to a review of the financing decision or the monetization of the excess power.

The Consultant will review the following:

- Reasonableness of the long-term (~60 years) Island supply options considered;
- Reasonableness of the process followed to screen and evaluate the appropriate Island supply options; and
- Assumptions used by Nalcor in assessing the Island supply options.

Based upon this review, the Consultant will provide an opinion on:

[Redacted area]



- whether the Project represents the least cost Island supply option which also fulfills the additional criteria requirements of security of supply and reliability, environmental responsibility, and risk and uncertainty; and
- the accuracy of the rate projections.

To complete the necessary work to provide their opinion, the Consultant will complete their review using the following inputs:

- necessary internal financial and engineering models, reports, and discussions with management and personnel;
- the 2007 Energy Plan (available at www.nr.gov.nl.ca/nr/energy/plan/) that forms the policy framework used by Nalcor in determining the Island supply option;
- the Island supply option evaluation criteria used by Nalcor; and
- generally accepted utility practices for the evaluation of Island supply options.

The Island supply option evaluation criteria used by Nalcor are:

- Security of supply and reliability;
- Cost to ratepayers;
- Environmental responsibility; and
- Risk and uncertainty.

The Consultant will provide a report using DG2 estimates. The Consultant will provide a second report using DG3 estimates and assumptions prior to the conclusion of the DG3 process. These reports will be made public.

As part of the comprehensive evaluation process to move the development of Muskrat Falls and the Labrador Island Link projects to final sanction, the Provincial Government has asked the Board of Commissioners of Public Utilities (PUB) to provide a supplemental review of the process used to determine that Muskrat Falls represents the least-cost option for the supply of power to Island Interconnected Customers compared to the Isolated Island development option. Please refer to: <http://www.releases.gov.nl.ca/releases/2011/nr/0617n04.htm> for the reference question. The Consultant may be required to act as a witness as part of any related PUB process.

