



May 22, 2009

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BY EMAIL AND BY COURIER

Subject: Lower Churchill River Hydroelectric Generation Project – Public Consultation on Environmental Impact Statement

Madam,
Sir,

Hydro-Québec is a Crown corporation engaged in the generation, transmission and distribution of electricity as well as in activities related to energy research, energy conversion and conservation.

On February 22, 2008, Hydro-Québec provided you with comments as part of the consultation pertaining to the draft guidelines for the preparation of the impact statement for the Lower Churchill River Hydroelectric Generation Project. At that time, we advised you of our concerns arising from the fact that the content of the draft guidelines did not meet the standard of quality usually found in guidelines for impact statements for projects of this kind. Since then, we have taken cognizance of the final guidelines issued by the Canadian Environmental Assessment Agency (CEAA) and the Department of Environment and Conservation of Newfoundland and Labrador. We have also analyzed the environmental impact statement for the project submitted by the proponent, Nalcor Energy.

The final guidelines, as well as the environmental impact statement filed by the proponent, clearly appear to fall short of the standard and quality of information normally required in connection with the environmental assessment of major hydroelectric projects. By way of illustration, we cite two impact statements that were recently referred by Hydro-Québec to joint environmental review panels in accordance with the provisions of the *Canadian Environmental Assessment Act*, namely for the Eastmain-1-A and Rupert Diversion Project and for the Romaine Hydroelectric Complex Project.

In this regard, we note that the information provided in the impact statement for the present project is manifestly insufficient, particularly in regard to the use of the territory by aboriginal and non-aboriginal populations, the management of the hydroelectric generating facilities on the Churchill River (including Churchill Falls), the aspects that pertain to fish populations and habitats, and the monitoring and follow-up programs and compensation measures envisioned. Consequently, Hydro-Québec perceives that the various impact statements that are submitted to the federal authorities for review receive widely varying treatment.

In light of its expertise in carrying out impact studies and its commercial activities in North American energy markets, Hydro-Québec is interested in energy generation and transmission projects in Canada. In addition, as Hydro-Québec is without a doubt the entity in Quebec, perhaps even in Canada, that has conducted the largest number of environmental assessments and participated in numerous public consultations on environmental matters, Hydro-Québec is particularly interested in the credibility of the processes for environmental assessment of energy products.

We believe it is fundamental, in the business and competitive context prevailing in North America today, that the various energy projects undertaken in Canada be subject to fair treatment and comparable analysis, at the time of the environmental assessment and when the authorizations are issued by the Canadian authorities.

For these reasons, Hydro-Québec is participating in the public consultation on the environmental impact statement for the Lower Churchill River Hydroelectric Generation Project and respectfully submits the attached questions to the joint review panel.

We are of the view that in the absence of well-documented information relating to the matters that we are bringing to your attention, the review panel should not declare the proponent's impact statement to be compliant, based on the principle of fairness in the environmental assessment of projects of the same type throughout Canada. Indeed, we would be hard pressed to understand how the Canadian authorities could see fit to issue authorizations allowing this project to proceed, so long as the questions that we are submitting to you, and which are normally mandatory for the environmental analysis of other projects, remain unanswered.

Yours truly,

Robert Landry
General Manager
Development Projects and Nuclear Power Generation

cc: Mr. Richard Cacchione, President, Hydro-Québec Production
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**Lower Churchill Hydroelectric
Generation Project**

Questions on the Environmental Impact Statement

May 2009

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Introduction

This document presents questions and comments on the *Lower Churchill Hydroelectric Generation Project – Environmental Impact Statement* produced by Nalcor Energy in February 2009 and accessible on the Canadian Environmental Assessment Agency Web site.¹

The Environmental Impact Statement (EIS) consists of an Executive Summary and three volumes in five binders (volumes IA and IB: Project Planning and Description; volumes IIA and IIB: Biophysical Assessment; Volume III: Socio-Economic Assessment). The impact statement is based mainly on a number of supporting studies listed in Appendix IB–F of Volume IB. A Table of Concordance between the EIS and the government Environmental Impact Statement Guidelines is provided in Appendix IB–E (Volume IB).

Additional Needs of the Province

■ Question 1

Insofar as one of the rationales for the projects is based, in part, on meeting provincial needs beyond those filled by the present output, can the Proponent provide detailed estimates of the province's capacity and energy requirements between 2009 and 2027? Can the Proponent provide estimates with and without the industrial development opportunities presented in Table 2.5 (p. 2-13 of Volume IA)?

Can the Proponent clearly indicate the anticipated operating scenario for the output of Holyrood generating station and incorporate it into the estimates?

■ Question 2

Energy efficiency and demand-side management can help control demand growth in order to reduce pressure on energy supply. Can the Proponent provide its annual energy savings plan, including demand reduction targets set for 2027? This is an important issue, and the various means possible should therefore undergo detailed analysis. The energy savings forecast must then be factored into Table 2.3 (p. 2-11 of Volume IA) presenting load growth forecasts.

1. The Environmental Impact Statement may be accessed at: http://www.ceaa-acee.gc.ca/050/05/documents-eng.cfm?CEAR_ID=26178&categoryID=9. Also available on this site are the government Environmental Impact Statement Guidelines and the component studies filed by the Proponent in support of the Environmental Impact Statement.

■ Question 3

To meet the additional needs forecast, the Proponent is planning to build generating stations on the lower Churchill River. However, the environmental impact statement does not in any way demonstrate that this project constitutes the most appropriate solution for meeting the province's additional needs in 2027.

- a) First, can the Proponent provide a detailed technical and economic analysis demonstrating that the Lower Churchill Project is the most advantageous, considering the development of small hydro (a quantity of energy more suited to domestic demand growth) and wind generation?
- b) Second, can the Proponent provide a technical and economic analysis taking into account the impact of reduced output at Holyrood generating station?

Electricity Exports

■ Question 4

Insofar as one of the rationales for the projects is based, in part, on additional sales outside the Province of Newfoundland and Labrador, can the Proponent supply the objectives and strategies for sales outside the Province?

■ Question 5

With respect to electricity exports, can the Proponent provide its latest market price estimates for electricity on markets targeted by the Proponent for the period from 2010 to 2035? These estimates must include monthly prices in peak and off-peak periods, as well as any indicators used by the Proponent to take price volatility into account.

■ Question 6

To demonstrate the profitability of the Lower Churchill Project for supplying export markets (Section 2.4.4 of Volume IA), can the Proponent provide the following data, for each year from 2015 to 2035:

- Volume of electricity exports from the Province to the different markets to which it has access.
- Revenue generated by energy sales during peak and off-peak periods, taking into account market prices, transmission rates, brokerage fees and transmission losses.
- Revenue generated by capacity sales, taking into account market prices, transmission rates, brokerage fees and transmission losses.

■ Question 7

With respect to electricity exports, can the Proponent provide, for each of the energy export sales scenarios, the agreements it has signed or is in the process of signing with the various transmission providers to carry the power to the major load centres, and the routes that will be taken by the power generated at the Lower Churchill facilities?

How has the Generator factored in the interconnection congestion that could arise due to the presence of other sellers on the same markets?

■ Question 8

In the analysis of revenue generated by the export of electricity from the Lower Churchill facilities, can the Proponent explain how it has factored in the effects which the various quantities of energy added by these facilities will have on market prices?

■ Question 9

Does the Generator plan to sign long-term export contracts for the electricity generated by the Lower Churchill facilities? If so, can the Proponent indicate the terms of these contracts and the sale prices specified, and state how these contracts will affect its ability to meet domestic demand growth in Newfoundland and Labrador?

■ Question 10

According to the environmental impact statement, 525 MW from the Churchill Falls power station, including 225 MW set aside for Twin Falls Corporation for its mining operations, is available for use in Labrador. The remaining 300 MW is available for export. Can the Proponent provide sales forecasts for this electricity, according to the different markets to which it has access?

Financial Aspects

■ Question 11

The total project cost is not provided in comprehensive, detailed fashion; in particular, inflation and financing during construction are not shown. These omissions limit the ability to evaluate the total project cost, and they should be corrected. Can the Proponent supply a table showing the cost breakdown by construction item, including inflation, interest during construction, injection of shareholder equity, and all other costs not directly related to construction, such as those incurred during the pre-construction and operation phases?

The cost of agreements signed with local communities must also be indicated.

The Proponent must also provide cash flows for each year of the construction phase, as well as all costs committed to date for the development of this project.

■ Question 12

In conjunction with the profitability analysis, can the Proponent provide the project cost (with benchmark year) including the transmission cost and rate of return on equity, based on the financial parameters used?

The Proponent must indicate the financial parameters used in its profitability analysis, namely:

- duration of analysis
- debt/equity ratio
- duration of long-term debt
- interest rate during construction
- interest rate on long-term debt
- guarantee fees for long-term debt
- \$US/\$C exchange rate
- indexation of electricity price on external markets (outside the province)

Can the Proponent indicate the transmission cost included in the ¢/kWh production cost?

Can the Proponent indicate the unit production cost for each of the Lower Churchill facilities, stating the different financial parameters used?

■ Question 13

Can the Proponent provide a sensitivity analysis for return on equity? The Proponent must state the parameters that present the greatest uncertainty, such as exchange rate, interest rates on loans and market price indexation, as well as those that pose the greatest risk to profitability. It must also specify the impact of these parameters on production cost.

Other Considerations

■ Question 14

The Proponent announced in its Notice of Commencement dated February 13, 2007 (which may be consulted in the Canadian Environmental Assessment Registry) that the two generating facilities would have a combined installed capacity of 2,800 MW. Can the Proponent justify the increase in installed capacity that is now planned, namely 3,074 MW?

■ Question 15

The Proponent must provide and explain a statement of results for 2015–2030 for the Lower Churchill Project, stating revenue (all markets), detailed expenses and net income, for each year after commissioning.

■ Question 16

How does the Proponent plan to adjust the output of the new facilities on the basis of demand? The Proponent must provide, for each reservoir (Gull Island and Muskrat Falls), the net storage capacity in m³ and the monthly output curves in energy and capacity for dry, average and wet years.

■ Question 17

Considering the time required for the construction permitting process, does the Proponent still expect to commission the Gull Island facility in 2015 and Muskrat Falls in 2018?

Proposed Project

Alternative Means of Carrying Out the Project

Section 3.7 of Volume IA of the EIS presents the project alternatives in response to the requirements stated in Section 4.3.2.2 of the government EIS Guidelines. Alternatives are described for several components of the project, but only a very brief comparative analysis of these alternatives is provided, in the form of overall conclusions and without specific data as to the indicators used for the technical, economic and environmental comparisons (for example, costs, excavation volumes, surface areas flooded, flows) and on the results of these comparisons. It is therefore rather difficult to judge the actual advantages of the selected options relative to the different possibilities described.

■ Question 18

Can the Proponent present in detail the comparative analyses of the various alternatives, in order to properly document and justify its choices?

Transmission Lines

According to the EIS Guidelines, “the proposed principal structures and related works to be described include but are not limited to ... the transmission terminal facilities and transmission lines linking the two stations and interconnecting with Churchill Falls Station” (Section 4.3.3.1 b). Prior to that, the Guidelines also specify that “the Proponent is to undertake a Route Selection Study which identifies the alignment for transmission lines proposed between Gull Island and Muskrat Falls and from Gull Island to Churchill Falls. The study shall involve the selection of a study corridor, approximately 1.0 km in width, within which various engineering, social and environmental constraints are identified. A preferred alignment and one or two alternative alignments shall be selected for evaluation, as appropriate.” (Section 4.3.2.2 b)

In responding to these requirements, in the Table of Concordance, the Proponent refers to Section 4.2.3 and Section 3.7.8 of Volume IA of the EIS. These sections state that two corridors were evaluated and that, at the conclusion of the evaluation, the corridor running along the existing 138-kV line (TL 240) between Churchill Falls and Happy Valley-Goose Bay was the one preferred. However, they do not provide either a description or a map of the final route of the transmission lines planned for the project.²

■ Question 19

The information pertaining to the lines should include precise data on the selected route (i.e., description, exact siting, analysis of affected environmental components), a detailed map of these components and an assessment of the route’s impacts on the Valued Environmental Components (VECs).

Can the Proponent supply the missing data so as to meet the government requirements and permit a full assessment of the project?

² The maps referred to in the EIS (Appendix IB–B of Volume IB) present the sensitive components of the selected corridor, in which only the existing 138-kV line is shown.

Operating Regime

In Section 4.3.5 (a), the EIS Guidelines supply a detailed list of points to be discussed in order to describe the project's operating regime. These include "water management (turbine flows, ecological flows, reservoir head, maximum and minimum operating levels, operation of structures) for different hydrological conditions (low and high flows including flows lower than the ecological flows); the time of year, frequency and amplitude (maximum and minimum levels) of water level fluctuation ranges for all water bodies; flow rates (maximum, minimum and average) and velocities in the sections of river affected, with detailed maps showing the areas affected, and seasonal and daily variations in water levels; the maximum and minimum surface areas, total volume, live storage, and bathymetry of reservoirs, with detailed maps and residence time of water masses; changes in water temperature and oxygen regimes upstream and downstream of dams; velocity of water at intake structures and outlets of spillways and tailrace canals; changes in management of lakes or reservoirs upstream and downstream of the Project area; changes in flow rates, velocities, temperature and oxygen regimes at the mouths of major tributaries to the Lower Churchill River; the control and management of sedimentation and erosion; maintenance plan for structures (dams) and facilities; and management of ice, including frazil ice."

In the Table of Concordance, the Proponent refers to sections 4.5.1.1 and 4.5.2.1 of Volume IA to respond to these requirements. These sections state essentially that the reservoirs will be operated as close as possible to their maximum level, with minimal variations in water levels (on the order of a few centimetres per day and 0.5 m to 1 m per week, depending on the reservoir). The maximum and minimum levels of the reservoirs are also indicated. Other sections of the EIS state that the Gull Island and Muskrat Falls generating stations will have installed capacities of 2,250 MW and 824 MW, respectively, and total flows of 2,950 m³/s and 2,660 m³/s (sections 4.2.1.2 and 4.2.2.2 of Volume IA).

■ Question 20

- a) In view of the need to properly factor in the different aspects of the operating regime in order to adequately assess its impacts on the environment, in particular on shallow-water fish habitat in the Churchill River and its tributaries, can the Proponent supply all the data required by the government authorities in Section 4.3.5 of the EIS Guidelines ("turbine flows, ecological flows ... operation of structures for different hydrological conditions [low and high flows including flows lower than the ecological flows]; flow rates (maximum, minimum and average) and velocities in the sections of river affected with detailed maps showing the areas affected, and seasonal and daily variations in water levels; the maximum and minimum surface areas, total volume, live storage, and bathymetry of reservoirs, with detailed maps; changes in water temperature and oxygen regimes upstream and downstream of dams; velocity of water at intake structures

- and outlets of spillways and tailrace canals; changes in management of lakes or reservoirs upstream and downstream of the Project area; changes in flow rates, velocities, temperature and oxygen regimes at the mouths of major tributaries to the Lower Churchill River; the control and management of sedimentation and erosion; management of ice, including frazil ice”)?
- b) Will the operating regime of the Lower Churchill hydroelectric facilities bring about any changes in the operating regime of the Churchill Falls power station? If so, can the Proponent specify what changes and provide an assessment of the resulting impacts on the different environmental components?

Reservoir Clearing

In Section 4.4.1.2 of Volume IA of the EIS, the Proponent refers to Sikumiut 2008, Reservoir Preparation Report,³ for further details on reservoir clearing. This component study indicates that the river will be used to transport the harvested wood wherever road construction proves problematic, namely over about 180 km between the Churchill Falls station and Slackwaters, near Beaver Brook. There, a 1,219-m (4,000-ft.) holding boom would be built across the river for removal of the floating wood while allowing free movement of small water craft on the south side. The entire clearing and removal operation would take four years and would be carried out from early June to late October of each year, with a concurrent cleanup of the shorelines to ensure that there is no accumulation of wood.

The study also indicates that, depending on market conditions, merchantable wood removed from the reservoirs (1.8 million cubic metres) would be trucked directly to Happy Valley-Goose Bay or would be stockpiled in storage sites prepared for this purpose along Highway 500 (Trans-Labrador Highway or TLH), between Churchill Falls and Happy Valley-Goose Bay. About 10 to 15 of these sites, each approximately 12 ha in size, would be developed 100 metres or so from the highway.

■ Question 21

- a) Can the Proponent detail the impacts of the wood driving on water quality and fish habitat and, more specifically, on shallow-water habitats (spawning grounds, nursery areas, aquatic grass beds) over the approximately 180 km affected by this activity? Can the Proponent also state how it intends to locate these particularly sensitive areas and what protective measures will be applied?

3 Nalcor Energy, January 2009. *Component Studies. Air Quality, Timber Resources and Other. Timber Resources. Report 1 of 3. Reservoir Preparation Report.* Sikumiut Environmental Management Ltd. March 2008. Accessible at: http://www.ceaa-acee.gc.ca/050/documents_staticpost/26178/31993/aa-tr-01.pdf.

- b) Can the Proponent specify how it plans to ensure the safety and ongoing activities of boaters and land users (river corridor and shorelines) on this stretch of the river, given that there will be floating wood there throughout the summer for four consecutive boating seasons?
- c) The EIS (Section 4.4.5 of Volume IA [Traffic] and Section 4.5.5.1 of Volume III [Construction/Roads] makes no mention of the increase in truck traffic associated with the transportation of merchantable wood. Since this transportation does not seem to have been considered in estimating the increased volume of traffic associated with the construction, it is legitimate to suppose that this transportation was not taken into account in the estimate of greenhouse gas emissions given in Section 3.9.1.1 of Volume IIA. Can the Proponent therefore provide a comprehensive assessment of all impacts associated with the transportation of merchantable wood from Churchill Falls to the storage sites and to Happy Valley-Goose Bay?
- d) Can the Proponent indicate the locations of the potential sites it plans to develop in case the harvested wood has to be stockpiled along the TLH?
 - i) Can the Proponent detail the impacts of these stockpiling areas on the affected environmental components, specifically land animals, semi-aquatic wildlife, birds, vegetation, land use (for example, by the Innu Nation who, over the years, seem to have relocated their activities, which they now practise in the area of the highway) and infrastructures, where applicable?
 - ii) Can the Proponent also specify the various mitigation measures proposed to minimize these impacts on the various environmental components?
- e) Shouldn't the Proponent plan an environmental follow-up program for woody debris, to ensure that reservoir boating conditions remain safe, for example, and specify the main terms of that follow-up (objectives, frequency, method, etc.)?
- f) Shouldn't the Proponent also plan a follow-up program for floating peatlands and describe the cleanup methods for the years following reservoir impoundment?
- g) Shouldn't the Proponent plan for Aboriginal involvement in these follow-up activities and specify what form this involvement will take?

Reservoir Impoundment and Transitional Operating Period

In the EIS, the Proponent indicates that reservoir impoundment will take place from August to October. No flow can be released downstream of the dams during this stage of construction—33 to 37 days for Gull Island and 10 to 12 days for Muskrat Falls (Section 4.11.1.3 of Volume IIA)—when the downstream flow would consist solely

of inflows from the tributaries. The Proponent states that this filling, timed to take place prior to fall spawning, would minimize dewatering of spawning grounds and eggs, and that there would consequently be no measurable overall impact in terms of the affected fish populations.

In the component study referred to by the Proponent in this section,⁴ a different scenario is given to model the saltwater intrusion, with the Gull Island Reservoir scheduled to be filled in May (Section 5, Hydrology). The latter section mentions that the flow at Muskrat Falls would be reduced from 1,521 m³/s to 23 m³/s after the closure at Gull Island and that a compensation flow (518 m³/s) would then be released over the spillway once the water reaches a sufficient level, after seven to nine days. An estimated 17 to 20 days would then be necessary to complete impoundment of the Gull Island Reservoir.

A similar scenario to that provided in the impact statement is also presented in an addendum to the study modeling the saltwater intrusion.⁵ In it, filling of the Gull Island Reservoir would take 37 days, starting September 1, and there would be no compensation flow release. This study states that the flow at the southern end of Lake Melville (downstream boundary of the model area) would consequently be reduced from 1,457 m³/s to 59 m³/s during the filling of the Gull Island Reservoir.

In addition, for the filling of the Muskrat Falls Reservoir, while the Proponent describes a period of 10 to 12 days without any flow, it also mentions that a compensation flow of 550 m³/s could be released over the spillway, if needed (Section 4.11.1.3 of Volume IIA and Section 4.4.2.2 of Volume IA).

■ Question 22

- a) At this stage, can the Proponent indicate which of these scenarios it will prefer for the impoundment of the Gull Island and Muskrat Falls reservoirs, and specify the impoundment conditions in terms of compensation flow (if any) and flows downstream of the facilities?
- b) Can the Proponent document the differences in impact of the various scenarios considered?

4 Nalcor Energy. January 2009. *Component Studies Aquatic Environment (2). Hydrology. Report 2 of 8. Salt Water Intrusion 3D Model Study*. Hatch, October 2008. Accessible at: http://www.ceaa-acee.gc.ca/050/documents_staticpost/26178/31993/ae2-hy-02.pdf.

5 Nalcor Energy. January 2009. *Component Studies Aquatic Environment (2). Hydrology. Report 8 of 8. Salt Water Intrusion 3D Model Study. Addendum No.1*. Hatch, December 2008. Accessible at: http://www.ceaa-acee.gc.ca/050/documents_staticpost/26178/31993/ae2-hy-08.pdf.

- c) If the Proponent has abandoned the scenario providing for the release of a compensation flow downstream of Gull Island during the filling of this reservoir, why has it done so?
- d) In Section 4.11.1.3 of Volume IIA, the Proponent anticipates that fish habitat will be disrupted by the major changes in flow downstream of the facilities during reservoir filling. These closures would result in substantial reductions in flow and, consequently, in water level and wetted perimeter, over nearly 100 km of the Lower Churchill River. However, apart from an allusion to the potential dewatering of spawning grounds, no impact assessment is provided in this regard.

These impacts could include dewatering of spawning grounds and nursery areas causing mortality of eggs and young-of-the-year, mortality of fish—especially smaller individuals and species—due to the sudden increase in fish density in the remaining habitats (and, consequently, in competition and in predation by piscivorous fish and birds), a reduction in habitat availability for all species, incision as a result of headward erosion in the riverbed at the tributary mouths (making them inaccessible to fish), an increase in water turbidity due to the increase in suspended solids as the waters rise, etc.

Can the Proponent provide a comprehensive assessment of the impacts on fish and fish habitat according to the scenario selected for reservoir filling?

- e) In Section 4.3 of Volume 1A, the Proponent calls for a gradual commissioning from Year 6⁶ to Year 8 at Gull Island and from Year 9 to Year 10 at Muskrat Falls. Can the Proponent explain in detail the modes of operation during the different stages in this transitional period (from partial to full operation at Gull Island, then from partial to full operation at Muskrat Falls)?
- f) Can the Proponent also assess the impacts specifically associated with the different stages in this transitional period, since the modes of operation will be different from those that will prevail after Year 10? This analysis should include the effects of the different operating regimes on the river below Muskrat Falls.

Fish and Fish Habitat

Fish Population Dynamics

Section 4.4.4.2 of the governments' EIS Guidelines provides a detailed list of components to be included in the description of the aquatic environment: the Proponent must describe the relevant components of the aquatic environment in the

6. Year 1 corresponds to the year construction begins (2010 in the EIS).

study areas for the VECs, including “(g) biological diversity, composition, abundance, distribution, population dynamics and habitat utilization of aquatic species, including fish....”

In addition, Section 4.4.4 of the Guidelines specifies that, in the EIS, “where appropriate and possible to do so, the Proponent shall present a time series of data and sufficient information to establish the averages, trends and extremes of the data that are necessary for the evaluation of potential environmental and cumulative effects of the Project.”

The EIS (Volume IIA) notes that the baseline data on fish and fish habitat were compiled from a variety of studies carried out over the last 35 years. However, temporal changes in fish populations in the lower Churchill River merit only a single mention in the EIS, to the effect that a comparison of population data (e.g., growth and habitat use) over a 30-year period indicates that fish populations in the lower Churchill watershed are relatively stable (Section 2.3.6 of Volume IIA). Moreover, the EIS provides none of the biometric data (length, weight, age, growth, instantaneous mortality, sex, fertility, age at sexual maturity) needed to evaluate fish population dynamics and monitor changes.

■ Question 23

The Proponent should supply recent and historical data (anatomical measurements, growth curves, instantaneous mortality, fertility, year class, etc.) on fish populations in the lower Churchill River and its tributaries to fulfill the requirements of the government guidelines and to support its assertion regarding the stability of fish populations in the study area.

Habitat Assessment Method

In Section 4.8.2.1 of Volume IIA, the Proponent states that it has developed a scientifically defensible method for quantifying fish habitat and its utilization before and after reservoir impoundment, in order to be able to predict changes. The Proponent states that this method was recently presented at a Department of Fisheries and Oceans workshop, “Methods of Assessing Productive Capacity in Canada” (Smokorowski and Derbowka, 2007). The Proponent mentions that its method was reviewed and evaluated at this workshop, whose participants concluded that it is valid, has no fatal flaws or limitations and is suitable for its described purpose.

The report cited by the Proponent presents a summary of 27 methods proposed to measure productive capacity in Canada, without any scientific examination of these methods. It also states, however, that the methods were the subject of a national workshop in Calgary, on October 15 and 16, 2007. The report of this workshop notes that: “The methods were eventually grouped according to use and applicability for

assessment and monitoring, and the only development scenario considered to be missing an appropriate method was how to assess the creation of reservoirs. However, no method handled connectivity of habitats or the impacts on estuaries, and all methods lacked adequate scientific validation of predictions.”

During this workshop, only the Proponent’s method underwent an evaluation based on the evaluation criteria selected for this purpose. Moreover, the report’s authors state: “It is important to note that this evaluation was conducted as a test of the criteria, not as a specific evaluation of the method itself.”

■ Question 24

In view of the preceding, how can the Proponent assert that its method has been evaluated and that it is suitable for assessing and predicting the project’s effects on fish productivity? Such an assertion does not reflect reality. The review authorities should be made aware of this, and it would be wise to check the validity of other claims of this nature in the EIS.

Spawning Habitat

The methodology used in the EIS to quantify the productivity of existing fish habitat and predict productive capacity in future reservoirs is based on a quantification of the different fish habitats in the main stem of the Churchill River as well as in its tributaries upstream of Muskrat Falls and in Winokapau Lake. It is also based on the utilization of these habitats by the different fish species in four life-cycle stages: spawning, young-of-the-year, juvenile and adult.

Baseline data on habitat utilization were obtained from fishing activities in 1998, 2000 and 2006, a habitat characterization and a review of the literature. The fishing data collected did not allow a survey of potential spawning habitats. Consequently, the spawning habitat utilization indices for the different species surveyed were calculated from the substrate characterization data, the results of radio-tracking of seven fish species conducted in 1998–1999 (spawning activity not confirmed) and information drawn from the literature on fish preferences in terms of spawning substrate. It should be noted that this was pointed out as a weakness in the methodology at the national workshop on compared methods of quantifying the productive capacity of fish habitat impacted by hydroelectric projects.

Spawning habitat is a critical factor in the biological cycle and in population survival. For a number of species, this habitat is located in shallow water and hence in areas sensitive to variations in water level and vulnerable to exposure.

■ Question 25

- a) The Proponent should locate the confirmed and potential spawning grounds in the Churchill River and its tributaries, including the section downstream of Muskrat Falls, and characterize these spawning grounds. To clearly indicate this information, it should use a large-scale map.
- b) The Proponent should also determine which species use these spawning grounds, as well as the current and future productive capacity of this habitat, and then establish an estimate of habitat productivity losses and gains.
- c) Fish habitat will undergo major changes after reservoir impoundment, which will lead, in turn, to substantial alterations in the fish community in the lower Churchill River. The Proponent should specify, in its impact analysis, which species will derive either advantages or disadvantages from the new conditions and assess the impacts of these conditions on the fish community structure, namely species distribution (abundance and productivity). This assessment should take the species' diet, trophic level and social value into account.
- d) Finally, for species of interest, the Proponent should develop specific compensation measures to offset breeding habitat losses and set productivity objectives, by species, even if the losses are temporary and new aquatic habitat will emerge in future conditions once the environment has reached a new equilibrium, likely within a few decades.

Fishing Effort

The assessment of the project's impacts on fish and fish habitat seems to be simply a quantification of overall areas of aquatic habitat (Composite Habitat Equivalent Units) created or lost. This quantification includes fish biomass per habitat, estimated from fishing yields over several years (1998, 2000 and 2006), and, where necessary, data drawn from the literature when fishing data are insufficient, as in the case of spawning habitat.

■ Question 26

- a) Considering the gaps in the study in terms of locating spawning grounds, and since the Proponent drew on data available in the literature, can the Proponent make use of the study of traditional knowledge carried out in cooperation with the Innu Nation to supplement its information?
- b) With the data collected, the Proponent seems to be in a position to predict the relative abundance in the future reservoirs of the different species now present in

the lower Churchill River. Can the Proponent also predict these species' future utilization of the reservoir habitats?

- c) Is the Proponent able to establish the confidence level of these predictions?
- d) Why did the Proponent not make an effort to study fish breeding habitat in the lower Churchill River and its tributaries, since it demonstrated that this stretch of the river and its tributaries will be affected by the project?
- e) Can the Proponent better define these impacts, namely: quantify them, locate them, identify the resulting mitigation or compensation measures and, finally, present the necessary follow-up program?

Estimate of Fish Habitat Gains and Losses

For the two reservoirs combined, , the Proponent predicts an increase of approximately 60% in aquatic habitat (+ 11,865 ha), a 40% increase in habitat utilization (+ 4,812 ha, Composite HEUs), a substantial decrease in fast-velocity habitat and a significant increase in slow-velocity habitat. Added to this is a 1°C to 4°C drop in water temperature in the Churchill River during the fish growing period (Table 4-14 of Volume IIA). In its summary of residual effects, the Proponent concludes that the construction and operation phases will not have a significant effect on fish and fish habitat. This conclusion is all the more surprising given that the Proponent mentions that present conditions in the lower Churchill River are not optimal in terms of the needs of resident fish and that future conditions there will be more suitable.

■ Question 27

- a) In view of the preceding, can the Proponent explain the reasoning that leads it to conclude that the project will have no significant impacts on fish (by species) and fish habitat (with reference to losses and gains and particular attention to valued species)?
- b) The use of indices to describe the extent of the project's effects on fish and fish habitat yields a very simplistic overview of the impacts on fish. The Proponent should, at least for the main species, assess productivity (kg/ha/a) under present and future conditions.

Large Piscivorous Fish

The EIS (Volume IIA, Table 4-15) presents the anticipated changes in habitat utilization (HEU: Habitat Equivalent Units) for the different species caught upstream

of Muskrat Falls. This table indicates that available habitat will increase for all species, except lake chub. An analysis of the results presented shows that the increase in habitat of large piscivorous fish (northern pike, lake trout and burbot) represents, on its own, over 30% of the total anticipated increase.

■ Question 28

Can the Proponent assess the impacts of this increased habitat availability for large predators on the dynamics of their respective populations and on those of other species?

Fish Movement

In the EIS, the Proponent predicts an approximately 800-ha increase in fish habitat in the reservoirs' tributaries (Table 4-13 of Volume IIA) as a result of the increase in water levels which, for fish in the Churchill River, will push the boundary of tributary access farther upstream. An analysis of the figures presented in the EIS shows that several of the tributaries are fed by lakes, some of them large.

■ Question 29

Is the Proponent able to say whether the increase in tributary water levels will lead to the introduction of fish from the Churchill River into these lakes, which could have an impact on resident fish populations (competition, predation, etc.)? If the lakes become accessible, the Proponent must define what measures it plans to implement, and where, to keep undesirable species from moving beyond the tributaries.

The Churchill River Below Muskrat Falls

In the EIS, the Proponent indicates that the classification of fish habitat in the lower Churchill below Muskrat Falls will not be altered by project construction or facility operation, and that there will be no change in the quantity of aquatic habitat. In this regard, the Proponent estimates that fish habitat from Muskrat Falls to Goose Bay totals 6,376 ha, and that more than 99% of it is slow-velocity in type (tables 2-8 and 4-10 of Volume IIA).

The Proponent adds, however, that the facilities planned at Muskrat Falls will intercept sediment from upstream, resulting in a sediment deficit condition downstream, scouring of the riverbed and a decrease in water level. The quantity of sediment from upstream of Muskrat Falls is estimated at 1 million m³/year. An additional 0.67 million m³/year will come from bank erosion downstream of Muskrat Falls (Section 4.12.2.2 of Volume IIA). The Proponent also notes that these new

conditions will lead to a new equilibrium between erosion and deposition, which will alter fish habitat below Muskrat Falls.

■ Question 30

- a) Given that all these changes will affect the most important part of the river for the fish, namely the shallow-water area, can the Proponent characterize the aquatic environment in the lower Churchill below Muskrat Falls and in its tributaries in order to adequately describe the various fish habitats that may be altered (specifically, breeding and rearing habitats)? The characterization of fish populations should go beyond a species inventory and describe fish population dynamics in this area.
- b) Can the Proponent explain in detail how it reached the conclusion that there would be no impacts on fish and fish habitat below Muskrat Falls?
- c) The predicted reduction in sediment input downstream of the facilities will lead to a reduction in the influx of nutrients. The Proponent should assess the effects on production (primary, secondary and tertiary) downstream of Muskrat Falls and discuss these effects in detail.
- d) In the EIS, the Proponent states that the progression of ice cover from Goose Bay to Muskrat Falls currently takes an average of two weeks and that, after reservoir impoundment, this progression may take up to five months—in other words, until the end of winter (Section 4.12.2.1 of Volume IIA). The Proponent must assess the effects, on fish and fish habitat, of this several-month delay in the progression of the ice cover below Muskrat Falls after reservoir impoundment.
- e) The Proponent should plan a follow-up of sediment dynamics, water quality, ice regime, fish habitat and fish populations below Muskrat Falls, given the potential significant alterations predicted in this area and the imprecise nature of the related impact assessments. It should also identify the activities and studies that will ensue from these conclusions.
- f) The estuarine biological and physical inventories (Goose Bay and Lake Melville), which seem to have been limited to the intertidal zone, showed that the aquatic environment there consists of a thin freshwater layer on the surface and a saline layer at depth. The saltwater areas of Goose Bay and Lake Melville could probably prove favorable for the development of eelgrass beds (*Zostera marina*).

In view of the ecological importance of eelgrass beds, their effect on sedimentation processes, and the predicted substantial reduction in sediment deposited by the Churchill River in the estuary zone, is the Proponent able to document the possible presence of eelgrass beds in the Churchill River estuary and, if there are any, the project's potential impacts on this habitat?

Public Consultation

Consultation with Aboriginal Groups and Traditional Knowledge

In Section 4.8, the government EIS Guidelines state that “the EIS shall demonstrate the Proponent’s understanding of the interests, values, concerns, contemporary and historic activities, Aboriginal traditional knowledge and important issues facing Aboriginal groups, and indicate how these will be considered in planning and carrying out the Project. The Aboriginal groups and communities to be considered include, in Newfoundland and Labrador, the Innu Nation, the Labrador Métis Nation and the Nunatsiavut Government and, in Quebec, the Innu communities of Uashat Mak Mani-Utenam, Ekuanitshit, Nutaskuan, Unamen Shipu, Pakua Shipi and Matimekush-Lake John.”

Chapter 8 of Volume IA of the EIS reports on consultations with Aboriginal groups. While information is given on the results of discussions with the Innu Nation (table of issues raised in Section 8.3.5.1), none is provided for the other groups—for example, the Innu communities of Uashat Mak Mani-Utenam, Ekuanitshit, Nutaskuan, Unamen Shipu, Pakua Shipi and Matimekush–Lake John.

Section 8.3.4 mentions that discussions with six Québec Innu communities were initiated in May 2008 and that the project team offered to meet with the chiefs and other band representatives, who were invited to provide any relevant information for project planning and the environmental assessment, were asked how they would like to be consulted on the project and were provided with information on the project. It adds that, as of the EIS filing, meetings had been held with most communities, and schedules had been established for the remainder. Finally, it notes that in November 2008, the Naskapi Nation of Kawawachikamach received information on the project, as requested.

■ Question 31

- a) At this stage, the Proponent must identify which Québec Innu communities it has already met with and describe, as it did for the Innu Nation, what issues and concerns these communities raised with respect to the Lower Churchill Hydroelectric Generation Project.
- b) The Proponent must also specify the issues and concerns raised by the representatives of the Nunatsiavut Government and the Labrador Métis Nation.
- c) The Proponent presents a component study on Innu traditional knowledge in Appendix IB-H of Volume IB of its EIS. However, no study on traditional knowledge seems to have been carried out with other Aboriginal groups, as

required by Section 4.8 of the government EIS Guidelines. Can the Proponent fulfill this requirement so that the EIS may be considered adequate?

- d) The Proponent notes various limitations—essentially due to time constraints—on the study of traditional knowledge conducted with Innu of the Innu Nation, in addition to the fact that the advanced age of the members of the Innu Traditional Knowledge Committee meant that they do not have a contemporary knowledge of the Churchill River environment (see Question 15). The Proponent observes, for example, that: “To varying degrees, Innu knowledge of animal habitats, anatomy, behaviour, sounds, senses, locomotion, alimentation, and reproduction has been recorded from Innu Elders resident in Mingan (Clément, 1995) and the former Davis Inlet (Clément 1998). Innu botanical knowledge was documented by Clément (1990) for a sample of Mingan Elders. Like his work on Innu zoology, Clément’s ethnobotanical study was a major study entailing many months of fieldwork among the Innu and subsequent analysis. Documenting or validating this same knowledge with Sheshatshiu Innu Elders could not be undertaken in any systematic way given time constraints. Therefore, it is assumed that general knowledge related to animal, plant and fish species possessed by Sheshatshiu Innu is more or less similar to the knowledge of their neighbours to the north and south” (Section 4 of the report provided in Appendix IB-H of Volume IB).

Shouldn’t the Proponent take the necessary time to produce a comprehensive study of the traditional knowledge of Aboriginal peoples in the study area, in order to properly understand the specific issues related to the traditional activities and culture of its fellow citizens and fulfill the requirements of the government EIS Guidelines so that the EIS may be considered adequate?

Land Use

Innu Nation Land Use

Innu Nation declined to participate in the collection of information on their land use (Section 2.1.2 of Volume III). In addition, the advanced age of the members of the Innu Traditional Knowledge Committee (average age 73) meant that data on contemporary land use could not be gathered, since these individuals’ experience on the land ended nearly 40 years ago, in the early 1970s (Section 4 of the report provided in Appendix IB-H of Volume IB).

The analysis of Innu land use is therefore based essentially on a review of the literature, and the information presented dates from the early 1980s to early 2000s, with some emphasis on the 1980s (see, for example, figures 2-21 to 2-25 and 2-29 of Volume III presenting various maps that show wildlife resource harvesting for 1979–1987). The component study *Current Land and Resource Use in the Lower Churchill*

*River Area*⁷ also notes that, in the study, the word “current” generally refers to the period following construction of Phase 1 of the TLH, namely the 1980s (Section 3 – Methodology).

Moreover, the Proponent points out several times that discussions are under way with the Innu with a view to correcting the gaps in the EIS on this issue.

■ Question 32

- a) Since the EIS Guidelines state, with respect to consultation with Aboriginal groups and communities (Section 4.8), that “if the Proponent is not able or should not address any particular issue(s), the EIS should include supporting reasons,” can the Proponent state why the Innu Nation representatives declined to take part in the studies on their land use (including the telephone survey on fishing and fish consumption patterns), a decision that is all the more surprising given that the EIS reports extensive discussions, consultations and collaborations between the project team and the Innu? The reports of these meetings would have to be available for consultation for us to gain a better understanding of the concerns expressed.
- b) Following the discussions with the Innu Nation representatives, what measures does the Proponent now plan to take to fulfill the EIS Guidelines requirement regarding current land use (“the Proponent shall describe relevant land and resource use within the study area of the VECs, including the following: ... Current use of land and resources (including aquatic resources) by Aboriginal persons for traditional purposes, including location of camps, harvested species and transportation routes”), so that the EIS may be considered adequate?

Québec Innu Land Use

While we cannot, at present, find out the concerns and issues with respect to the project that were raised by the Québec Innu in consultations held by the Proponent, it is legitimate to suppose that they want to know the assessment of the project’s impacts on their pursuit of traditional activities (in view of these communities’ comments on the draft EIS Guidelines regarding the project study area, and recent events related to the caribou hunt).

The EIS does not discuss land use by Québec Innu in the study area, nor the project’s impacts on their pursuit of traditional activities.

7. Nalcor Energy. January 2009. *Component Studies. Socio-Economic Environment. Socio-Economic. Report 6 of 6. Current Land and Resource Use in the Lower Churchill River Area*. Minaskuat Inc., January 2009. Accessible at: http://www.ceaa-acce.gc.ca/050/documents_staticpost/26178/31993/se-se-06.pdf.

■ Question 33

- a) Can the Proponent provide the necessary information on Québec Innu land use in the study area and an assessment of the impacts on their pursuit of traditional activities and on resource harvesting, as required by the government EIS Guidelines (Section 4.8)?
- b) If the Proponent does not have this information, what steps does it plan to take in order to fulfill these requirements so that the EIS may be considered adequate?

Non-Innu Land Use

With respect to non-Innu people, the component study cited earlier (*Current Land and Resource Use in the Lower Churchill Area*) indicates that interviews with residents of Happy Valley-Goose Bay, North West River, Mud Lake, Churchill Falls, Labrador City and Wabush were carried out in summer 2007. Around 100 people were contacted, and about 45 agreed to be interviewed in person about their land use, while another 20 or so agreed only to a telephone interview either because they did not want to be interviewed in person or because they thought they did not have much to say on the subject (Section 3.2.2 – Interviews).⁸

As reported in another component study,⁹ about 400 residents of Happy Valley-Goose Bay, North West River, Mud Lake and Churchill Falls were also surveyed by telephone in October 2007 on their fish consumption and fishing patterns. Section 4.5 (Data Analysis) of this component study accurately points out the methodological limitations, most notably the lack of a response rate that would allow the representativeness of the sample to be verified (no details are provided on the initial sample, refusal rate, non-response rate, etc.), as well as the low number of respondents in certain communities. Added to this is the fact that several questions elicited high non-response rates.

All in all, the description of current land use is mostly vague, and it is generally impossible to form a precise idea of the frequency of use of the study area, the rate of practice of the different activities or the success rate of the harvesting of the various wildlife species in this area.

8. Nalcor Energy, January 2009. *Component Studies. Socio-Economic Environment. Socio-Economic. Report 6 of 6. Current Land and Resource Use in the Lower Churchill River Area*. Minaskuat Inc., January 2009. Accessible at: http://www.ceaa-acee.gc.ca/050/documents_staticpost/26178/31993/se-se-06.pdf.

9. Nalcor Energy, January 2009. *Component Studies. Aquatic Environment (1). Fish and Fish Habitat. Report 11 of 11. Lower Churchill River Fish Consumption and Angling Survey*. Minaskuat Inc., January 2009. Accessible at: http://www.ceaa-acee.gc.ca/050/documents_staticpost/26178/31993/ae1-fh-11.pdf.

■ Question 34

- a) The Proponent does not give any details of the land use interviews conducted with 45 to 65 individuals. We do not know the administrative results of the survey, and the compilations of results obtained from the different responses to the questionnaire are not provided. With respect to the 20 or so other individuals who opted for telephone interviews, we do not know what they responded to and how the content of their interviews differed from that of the interviews conducted in person (Appendix A of the component study presents only a questionnaire drafted in extremely general terms, i.e.: Where do you go? What do you do? etc.).

Can the Proponent provide the administrative results of the survey, the questionnaire used for the telephone interview (with about 20 respondents) and a compilation of the study results for both types of respondents?

- b) Given that the survey conducted on the largest sample covers only one aspect of land use by a subgroup of the population of the study area (fishing by non-Innu people) and that most of the other primary data on non-Innu land use is based, as regards the general public, on only 45 to 65 interviews with residents of the study area, can the Proponent state how it can claim to have drawn up a representative picture of current land use in the study area and, consequently, to have made a proper assessment of the project's impacts on land use?
- c) Can the Proponent provide precise data on the rates of practice of the different activities and the rates of harvesting for each wildlife species in the study area?
- d) If not, what does the Proponent plan to do to supplement its study and fulfill the government requirements in terms of information on current land use?
- e) The Proponent must indicate how practice and harvesting rates will be affected during the construction and operation phases.

Navigation

Navigation on the Churchill River is one of the activities for which the information given is particularly vague. Section 2.8.7 of Volume III indicates that boating is a common recreational activity (with no further details), that the majority of boating occurs below Muskrat Falls and between Churchill Falls and the lower end of Winokapau Lake, and that an estimated 12 groups per year boat down the length of the lower Churchill River.

With respect to the impacts of construction, Section 5.5.5.1 of Volume III notes that barge traffic could interfere with boat activity intermittently and for brief periods (with no mention of the impacts related to wood driving over 180 km of the river),

while reservoir impoundment could have the same effect by reducing flows below the facilities to a minimum level. Existing access points would be replaced, and portage routes maintained with brief exceptions (two weeks). While mention is made of the lack of exact statistics on guided activities (information that should nonetheless have been fairly easy to obtain), the Proponent undertakes to consult with guides to identify ways of minimizing disruptions. During the operation phase, the Proponent indicates that navigability should improve as a result of the reduced currents and deepening of the water.

■ Question 35

- a) Can the Proponent define the present use of the river for navigation (rate of practice and type of navigation, by section, proportion of the population—Innu and non-Innu—engaged in boating, presence of canoe brigades, determination of constraints, etc.) to allow a full assessment of the project’s impacts on this activity?
- b) Can the Proponent detail the impacts related to construction: exact number of boating seasons and river sections affected by barge traffic and by wood driving during reservoir clearing, exact flows and water depths anticipated during reservoir filling in different sections below the dams, planned safety measures and expected effects on regional ecotourism, since the construction seems bound to impact more than one boating season?
- c) As regards wood driving more specifically, can it be fully demonstrated that this activity does not constitute a constraint on boating? How can it be maintained that the presence of logs over 180 km does not constitute an obstacle and an alteration of access to the river and to boating there?
- d) More specifically, what impacts are anticipated (flows, depths, etc.) below Muskrat Falls during reservoir filling periods and what will the consequences be for residents of Mud Lake who use the river to travel to Happy Valley-Goose Bay?
- e) In the operation phase, what will navigation conditions be on the river during the spring, summer and fall seasons (flows and depths, by section and season), and what measures will be applied to ensure safe use of the river?

Follow-up of Land Use

The Proponent considers that follow-up of Innu and non-Innu land use is the responsibility of the government departments and agencies that manage these activities, and plans only to monitor ice conditions at select locations, while regularly

providing the government authorities with information related to the project, its planning and its progress (Section 5.7 of Volume III).

■ Question 36

In view of the points previously discussed (lack of precise data on Innu and non-Innu land use), shouldn't the Proponent undertake to consult with local populations in order to precisely identify trends in terms of frequency of use, pursuit of activities, accessibility, resource harvesting, and perceptions of the project and its impacts on the land and natural resources?

Socioeconomic Environment

Economic Spinoffs in Upper Lake Melville and the Innu Communities

The \$6.5-billion (in 2008 dollars) project is expected to generate construction expenditures of \$4.8 billion (in 2006 dollars). In Section 3.5.5.1 of Volume III of the EIS, the Proponent states that project construction will generate spinoffs totaling \$1.5 billion for the province, including \$924 million in Labrador. Annual spinoffs during the operation phase are estimated at \$16 million for the province, including \$4 million in Labrador.

The EIS does not provide any information on potential economic spinoffs in the project's host community, namely the Upper Lake Melville area, nor in the Innu communities.

■ Question 37

- a) Can the Proponent clearly define, or at the very least estimate, the anticipated economic spinoffs in the Upper Lake Melville area during the construction and operation phases?
- b) What is the economic capacity of the host community?
- c) Can the Proponent also define the anticipated economic spinoffs in the Innu communities for each of the two phases?
- d) What measures will be implemented to promote participation by Innu businesses in facility construction?

- e) What will the direct, indirect and induced economic spinoffs be for the province, Labrador and the Upper Lake Melville area?

Local Employment Prospects in Upper Lake Melville and the Innu Communities

In Section 3.6.5.1 of Volume III of the EIS, the Proponent mentions that the construction will create direct employment estimated at 9,178 person-years, 65% of which is expected to come from the province's labor force. It is further estimated that 81% of this direct Newfoundland and Labrador employment—or 53% of the total—will involve workers from Labrador. The operation phase should generate direct employment corresponding to 78 person-years in the province, including 31 in Labrador.

The EIS does not provide any information on potential employment prospects in the project's host community, namely the Upper Lake Melville area, nor in the Innu communities.

■ Question 38

- a) Can the Proponent define or estimate the number of direct jobs expected in the Upper Lake Melville area during the construction and operation phases?
- b) Can the Proponent also define the number of direct jobs expected in the Innu communities for each of the two phases?
- c) Considering the available labor pool, can the Proponent explain in detail:
 - i) the expected origin of the 53% of workers from Labrador;
 - ii) the expected origin of the 47% of workers from outside Labrador?
- d) Can the Proponent define the expected work schedules (in particular, with respect to departures from construction camps and holidays) during the construction phase?

Impacts of Labor Needs on Local Businesses

At the end of Section 3.7.5.2 of Volume III, the Proponent refers to certain potential adverse effects of the project on local businesses whose workers could be attracted by the jobs involved in building the lower Churchill River facilities and consequently leave their present jobs.

■ Question 39

- a) What measures does the Proponent plan to adopt to minimize these adverse effects for local businesses?
- b) What measures does the Proponent plan to adopt to prevent the phenomenon of boom and bust in the region's communities?

Cumulative Effects on the Labor Force

Sections 3.5.6, 3.6.6 and 3.7.6 of Volume III discuss the cumulative effects on the socioeconomic environment. The Proponent generally predicts positive effects on the economy, employment and business, while also anticipating qualitative and quantitative changes in the business community and the labor force. The expected changes are not defined, however.

■ Question 40

- a) Can the Proponent define the qualitative and quantitative changes expected in terms of the labor force and the business community?
- b) Since the Proponent seems to anticipate recruitment difficulties in the region and province during the construction phase, can it provide a detailed analysis of the cumulative effects of its project and projects in the mining and logging industries, TLH construction work, work related to other transmission lines and any other relevant project on the skilled and unskilled labor force?
- c) Can the Proponent also define the measures it plans to implement to optimize employment in the local, regional and provincial labor force, and the measures planned to prevent labor shortages?

Road Traffic

The data used to evaluate the increase in road traffic during construction are not consistent and seem incomplete. In Section 4.5.5.1 of Volume III, for example, the analysis of construction-related impacts on traffic refers to the addition of 16 truck trips per day in the peak period to transport materials, fuel and camp supplies. The 25 to 40 trips per day required to transport granular materials and the estimated 5 trips per day to transport personnel, as per Section 4.4.5 of Volume IA, are not mentioned,

however. In addition, only the component report on reservoir clearing¹⁰ notes the truck traffic involved in transporting merchantable wood from the reservoirs to the storage sites and Happy Valley-Goose Bay, which the Proponent seems not to have factored into its assessment of traffic-related impacts. Nor is there any discussion of the traffic associated with the movements of workers outside working hours (even though the Proponent states that the workers will always stay in the camps, it is conceivable that some of them will want to travel to the nearest communities in their spare time).

In addition, the Section dealing with the project's impacts on caribou notes a potential 50% increase in traffic on the TLH during construction, resulting from the addition of 120 vehicles per day compared with present conditions (Section 5.11.1.4 of Volume IIB). This differs substantially from the above figures taken from Section 4.5.5.1 of Volume III and Section 4.4.5 of Volume IA.

Finally, the Proponent notes that there are currently some problems with traffic congestion in some parts of the Happy Valley-Goose Bay area and mentions that it will provide local authorities with the information they need to take increased volumes into account in their planning and management of traffic and accesses (Section 4.5.5.1 of Volume III).

■ Question 41

- a) Can the Proponent specify the expected increases in traffic volume during the construction phase, by year, section and activity, considering the foregoing factors, among others?
- b) Taking these data into account, can the Proponent specify the anticipated effects of this increase on existing infrastructure, the alterations and measures that would be required, and the dates involved?
- c) As project Proponent, and in view of the increased traffic associated with the construction, what specific measures does Nalcor plan to take to ensure public safety, in particular on the TLH and in Happy Valley-Goose Bay?
- d) In the analysis of cumulative effects, it is difficult to understand how the projects presented in Table 4-3 of Volume III—specifically, the mining and forestry projects—and the project planned for the lower Churchill River could fail to have a substantial cumulative effect on the existing road system. Can the Proponent explain in greater detail how it reached this conclusion?

10. Nalcor Energy. January 2009. *Component Studies. Air Quality, Timber Resources and Other. Timber Resources. Report 1 of 3. Reservoir Preparation Report*. Sikumiut Environmental Management Ltd. March 2008. Accessible at: http://www.ceaa-acee.gc.ca/050/documents_staticpost/26178/31993/aa-tr-01.pdf.

River Section Below Muskrat Falls

One of the component studies filed in support of the EIS covers the hydro-sedimentary regime and morphodynamics.¹¹ It assesses the Muskrat Falls facility's impacts on the section of river below the dam. With respect to potential impacts, the summary of this study offers the following conclusions: "The changed sediment transport conditions due to Muskrat Falls Dam may induce a shift in channel pattern from the present mildly braided form to a more meandering form. This change would be associated with increased rates of bank erosion. Increased bank erosion rates could occur even without increased meandering, due to the slope de-stabilizing effect of undercutting of banks by bed degradation. Increased rates of bank erosion would tend to reduce the extent of bed degradation by increasing the rate of sediment supply. Some of the potential impacts of the predicted bed degradation, lowered water levels, and increase lateral shifting could include the following:

- Need for increased erosion protection and/or stabilization measures at the Blackrock Bridge.
- Progressive lowering of tailwater at the proposed Muskrat Falls Dam.
- Impacts on infrastructure such as water intakes, sewer outfalls, and developments on or near river banks where erosion may develop.
- Various impacts of lowered river water level on the local groundwater table, adjacent riparian vegetation and possibly other environmental components."

■ Question 42

- a) No analysis of these potential impacts on infrastructures below the Muskrat Falls generating station is provided in the EIS. Can the Proponent assess these impacts and describe any mitigation measures proposed?
- b) Shouldn't the Proponent plan a program to follow up on the project's effects on public and private infrastructures below Muskrat Falls, including water intakes and drinking water quality?
- c) The Proponent must also analyze the land use impacts of alterations in the environment below Muskrat Falls, including, as noted in the section on fish, the effects of the anticipated changes in the progression of the ice cover (which could last up to five months) between Goose Bay and Muskrat Falls. Can the Proponent also describe the measures required to mitigate these impacts?

11. Nalcor Energy. January 2009. *Component Studies. Aquatic Environment (2). Water Quality and Quantity. Report 3 of 5. Sedimentation and Morphodynamics Study*. AMEC Earth & Environmental, July 2008. Accessible at: http://www.ceaa-acee.gc.ca/050/documents_staticpost/26178/31993/ae2-wq-03.pdf.

Follow-up of Socioeconomic Parameters

The Proponent considers that the follow-up of community aspects (physical infrastructure and services, social infrastructure and services, health) is up to the agencies responsible for managing these goods and services (Section 4.9 of Volume III). It therefore plans essentially to maintain close relations with these agencies and provide them with information on the project to help them plan their evaluations and actions. Employment follow-up is also planned in the form of exit surveys of workers leaving the project, and data on project-related employment and expenditures will be provided to the interested government departments on a quarterly basis.

■ **Question 43**

- a) What mechanisms does the Proponent plan to establish to ensure that it reaches all persons concerned, such as any residents who do not use the official channels of government and community services (which are already overloaded in certain areas, according to the picture provided in the component study¹²), in order to accurately define perceptions and concerns about the project and the progress of the construction? The Proponent should present, in detail, the mechanisms and methods it plans to adopt, and describe the experiences it has used to demonstrate the effectiveness of its approaches.
- b) In the same vein, the Proponent should define its communication plan for the construction period. How, for example, does the Proponent plan to inform area residents about the progress of the project, considering that they will not all go to its information centre in Happy Valley-Goose Bay?
- c) Since the responsible agencies are not the project's proponents, in the event they are unable to conduct the necessary follow-up, does the Proponent plan to carry out this follow-up and, if so, can it specify what the follow-up would entail?
- d) In Section 4.7.5.2 of Volume III, the Proponent mentions that primary health care, including first response emergency services, will be provided at the construction camps and that the Happy Valley-Goose Bay health services should therefore not experience undue pressure. If workers should nevertheless have to be transferred to the Happy Valley-Goose Bay facilities for emergency treatment unavailable on site, this would have to follow a set protocol, yet to be defined.

12. Nalcor Energy. January 2009. *Component Studies. Socio-Economic Environment. Socio-Economic. Report 2 of 6. Community Health Study*. Aura Environmental Research and Consulting Ltd. for Minaskuat Inc., December 2008. Accessible at: http://www.ceaa-acee.gc.ca/050/documents_staticpost/26178/31993/se-se-02.pdf.

Considering that, according to the study, the health services are already operating at or near full capacity, the Proponent should indicate exactly which health services will be provided in the construction camps and which will be the responsibility of the public system. It would also be important for the Proponent to follow up this matter closely to avoid situations that could endanger public and worker health and safety.

Public Health and Mercury

Innu Fish Consumption

The survey of fishing practices cited earlier yielded information on fish consumption—for example, the number of fish meals per week and the species consumed.¹³ As part of the studies on mercury and public health, these data were used to analyze the anticipated fish consumption advisories (*Calculations of Anticipated Consumption Advisory Levels of Fish in the Lower Churchill Area*, Section 6.1.)¹⁴

However, as previously noted, the component study on fish consumption specifies that the Innu did not participate in this survey, although Hydro and the Innu Nation are discussing other potential means of obtaining information on this subject. According to Section 4.7.5.6 of Volume III of the EIS, the Proponent seems to have used data from Health Canada (2004) and Richardson (1997) to produce extrapolations for the case of the Innu.

But in a letter to Hydro-Québec concerning the Romaine hydroelectric project,¹⁵ Health Canada stated that “the lack of initial mercury exposure data for the local communities and the lack of data on present dietary patterns and the pre-impoundment perception of the risk related to mercury would lead to significant gaps in the impact assessment, mitigation measures and subsequent follow-up measures, in particular as regards measures for communicating the risks and benefits of fish consumption. Such data would make it possible to develop communication strategies suited to the context and would also allow an evaluation of the effectiveness of the messages and tools used to communicate these risks and benefits. Regarding the use of substitute data for the exposure of local communities, based on other data

13. Nalcor Energy. January 2009. *Component Studies. Aquatic Environment (1). Fish and Fish Habitat. Report 11 of 11. Lower Churchill River Fish Consumption and Angling Survey*. Minaskuat Inc., January 2009. Accessible at: http://www.ceaa-acee.gc.ca/050/documents_staticpost/26178/31993/ae1-fh-11.pdf.

14. Nalcor Energy. January 2009. *Component Studies. Aquatic Environment (2). Mercury. Report 2 of 5. Calculations of Anticipated Consumption Advisory Levels of Fish in the Lower Churchill Area*. Minaskuat Inc., June 2008. Accessible at: http://www.ceaa-acee.gc.ca/050/documents_staticpost/26178/31993/ae2-mc-02.pdf.

15. Translation of a letter from Chantale Côté, Regional Coordinator, Environmental Assessments – Health Canada, Quebec Region to Maryse Pineau, Panel Manager, Federal Review Panel, Romaine Hydroelectric Complex, dated August 8, 2005. Reference No.: AXS.V1 OF6-1-19.

generated elsewhere in Quebec, these data do not appear to us to be transferable from one community to another, for both cultural and sociodemographic reasons....”

■ Question 44

- a) Following their discussions, did the Proponent and Innu Nation representatives establish a new approach or method for obtaining the information required to properly evaluate fishing and fish consumption patterns among the Sheshatshiu Innu, in order to adequately evaluate the risks inherent in future exposure to mercury in this community?

If so, can the Proponent describe the chosen method in detail and provide examples of past experiences demonstrating its effectiveness? If the planned method is the same as that used with non-Innu people (telephone survey), the Proponent should specify the measures planned to avoid the shortcomings noted earlier (lack of administrative results of the survey, quotas not reached, high rates of non-response to several questions, etc.) and thereby ensure greater reliability of results.

- b) If no agreement has been yet reached between the Proponent and the Innu, what does the Proponent intend to do to ensure it properly evaluates the risks related to future mercury exposure of Innu in the area and so meet the requirements of the government EIS Guidelines?

Public Opinion and Mercury

According to the government EIS Guidelines, the Proponent shall “discuss the views of local human populations regarding mercury and its influence on the changes observed in their diet and consequently on their health in general” (Section 4.4.4.6 d – 2nd series).

In the Table of Concordance, the Proponent refers to Appendix IB-1-8 of Volume IB and Section 4.7.5.6 of Volume III to respond to these requirements. The first reference presents certain questions on mercury raised by the public at meetings, and the second provides an assessment of the anticipated effects of methylmercury on residents’ health and the related fish consumption advisories. The local populations’ opinion on mercury is not presented.

Moreover, as was seen in the letter cited in the preceding point, Health Canada also emphasizes the importance of properly evaluating perceptions of mercury-related risk, in particular so as to develop communication strategies suited to the local context.

■ Question 45

- a) Does the Proponent plan to carry out a specific consultation on this issue in order to satisfy the requirements and concerns of the government authorities so that the EIS can be considered adequate?
- b) What tools and measures does the Proponent plan to implement to reach all of the Innu and non-Innu populations? It must present the detailed program and past experiences demonstrating the effectiveness of the chosen approach.

Environmental Follow-up of Mercury

In Section 4.9.3 of Volume III on the follow-up of community health, the Proponent states that it will collect data from local residents (without further details) in order to establish a mercury exposure baseline for local residents. This study will be carried out prior to project commencement.

Table 4-18 presents an outline of the mercury monitoring and follow-up program, which calls for mercury levels to be verified only in fish, on an annual basis for the first 10 years following reservoir impoundment and thereafter at a frequency to be determined pending results.

■ Question 46

- a) Can the Proponent define the detailed program and the methodology of the study it must carry out prior to project commencement to establish the mercury exposure baseline for local residents? Among other things, can the Proponent indicate exactly which communities will undergo this study and, in the case of the Innu, whether agreements have already been reached on the conducting of these studies within the timeframes set?
- b) The EIS does not call for any monitoring of mercury exposure within the local population. Shouldn't the Proponent plan such monitoring to follow up the establishment of a baseline for residents of the study area and to measure changes in community health related to mercury exposure?

Greenhouse Gas Emissions

■ Question 47

In Section 2.2.3 of Volume IIA, the Proponent cites the results of a component study on greenhouse gas fluxes in the Smallwood Reservoir and future reservoir areas.¹⁶ The results presented are based on measurements made in 2006, but it seems that new data are now available. The Proponent should take these data into account to supplement the knowledge available.

Can the Proponent make this new study public and include the necessary updates in its analysis of the present situation in terms of greenhouse gas emissions and its assessment of the project's impacts on this component, in order to provide an up-to-date picture of this issue?

Mitigation Measures

■ Question 48

Section 4.6.1 of the government EIS Guidelines specifies certain requirements concerning mitigation measures. Among things, it notes that “the rationale for and effectiveness of the proposed mitigation and enhancement measures should be discussed and evaluated. The Proponent, where possible, should refer to similar situations where the proposed mitigation has proven to be successful. Mitigation failure should be discussed with respect to risk and severity of consequence. The discussion should include failure of dam/control structures.”

The EIS sections dealing with mitigation measures (see the Table of Concordance, Section 4.6.1, in Appendix IB-E1 of Volume IB) present some standard mitigation measures and certain specific measures, and refer to the Environmental Protection Plan (EPP), yet to come. The effectiveness and limitations of the measures are not discussed.

- a) Can the Proponent evaluate each of the mitigation measures proposed in the EIS, in particular by describing similar situations through environmental follow-up studies it has conducted for other projects, so that the EIS can be considered adequate?
- b) With respect to the EPP, the EIS Guidelines note, in Section 4.10: “The Proponent shall prepare an Environmental Protection Plan (EPP) for each main construction

16. Nalcor Energy. January 2009. *Component Studies. Air Quality, Timber Resources and Other. Air Quality. Report 2 of 2. Greenhouse Gas Fluxes.* Bastien J., A.-M. Blais and A. Tremblay, 2007.

site and have them approved by the regulatory authorities before starting construction.” They add that “proposed Table of Contents and an annotated outline for the EPP is to be presented in the EIS which shall address the major construction and operational activities, permit requirements, mitigation measures and contingency planning.”

And yet, Section 4.8.2 of Volume IA and Appendix IB-G of Volume IB present the main objectives of the EPP and a brief table of contents (as well as a list of permits, approvals and authorizations required), but no annotated outline of this plan, as required.

Can the Proponent supply the current version of its EPP and an annotated outline of the updates it plans to add, in order to provide a better understanding of the assessment of the project’s residual impacts and to meet government requirements?

Compensation Measures

■ Question 49

No specific, formal commitment in terms of compensation is provided by the Proponent in the EIS. Considering that the EIS must allow conclusions to be drawn on the project’s residual effects—an impossibility without knowing what compensation measures are planned—what does the Proponent intend to do by the end of the process, in order to supplement the EIS so that it can be considered adequate?

Cumulative Effects Assessment

■ Question 50

- a) The cumulative effects assessment takes little account of past events for most of the VECs and, as a result, does not benefit from a suitable historical perspective on the state of these components. Such a perspective would provide an understanding of the factors that have had the greatest impact on each component to date and allow the combined effects of future projects or activities to be better predicted. How can the Proponent conclude that its project will have no cumulative effects on the environment in the absence of such information?
- b) The spatial boundaries considered in the cumulative effects assessment are the same as those used in the impact assessment for the Project. However, according to the *Cumulative Effects Assessment Practitioners Guide*, “CEA, by definition,

expands those spatial horizons,”¹⁷ and the Guidelines state that the boundaries for the cumulative effects assessment “will also generally be different from (larger than) the boundaries for the corresponding Project effects” (Section 4.5.3, point b). The assessment is consequently limited, and affected as well by the lack of a historical perspective, as noted in the preceding point.

How can the Proponent present a cumulative effects assessment without a broader spatial scoping? The Proponent should review and justify the spatial boundaries used in the cumulative effects assessment for each component.

- c) Given the screening criteria the Proponent has set (Section 9.9 of Volume IA), spatial and temporal scoping are determining factors in the screening of other projects and activities to be included in the assessment. The number of other projects included is all the more limited given that actions or events likely to have an effect on the environmental components (natural disruptions, legislation, protective regulations or measures, park projects, etc.) do not seem to have been taken into account. And the list of inclusions is further reduced due to the following surprising considerations:
- The Voisey’s Bay mine project and Labrador West mining developments are immediately excluded, in terms of effects on the biophysical environment, due to their physical distance (Table 9-7 of Volume IA), even though the study area for atmospheric GHG emissions is supposed to extend to the province and even the country (Section 2.2.1.1 of Volume IIA).
 - Infrastructure development projects are immediately excluded from the assessment of effects on the biophysical environment (“due to limited physical nature of this activity,” Table 9-7 of Volume IA), whereas an argument could be made for taking road construction or work on sewage treatment facilities into account.
 - Only the effects of work on the TLH and boating and fishing activities are considered in the assessment of cumulative effects on the aquatic environment (Table 4-23 of Volume IIA). Keeping strictly to the Proponent’s initial list, at least logging and infrastructure construction should have been included.
 - Mining and infrastructure construction should also have been included in the assessment of cumulative effects on wildlife, if only with respect to habitat disruptions, division and losses.

Finally, the EIS Guidelines state that the Proponent shall “describe and justify the choice of projects and selected activities for the cumulative effects assessment.

¹⁷ CEAA. Cumulative Effects Assessment Practitioners Guide, Section 3.2.3.1. Accessible at:
http://www.ceaa.gc.ca/013/0001/0004/3_e.htm#2-3-1.

These shall include past activities and projects, those being carried out and future projects or activities likely to be carried out” (Section 4.5.3, point c).

Considering the preceding, the Proponent should

- i) review and supplement its selection of other projects, actions and events likely to have had, to have at present or to have at a later date effects on components of the environment; and
 - ii) supplement its assessment accordingly.
- d) The Proponent divides its cumulative effects assessment by component or key indicator, following the assessment of the Project’s impacts on each of these components. In addition, in the presentation of study areas for each component or key indicator, the reader is referred back to the start of the description of present conditions, since the spatial boundaries presented are the same as those in the EIS. It is consequently difficult to form an overall idea of the assessment of cumulative environmental effects.

The Proponent should supply

- i) a summary table presenting, for each component or key indicator, the spatial boundaries (with justification), temporal boundaries (with justification) and indicators used for the assessment;
- ii) a summary table showing the relationship between past, present and future projects, actions and events and the components and key indicators; and
- iii) a summary of the cumulative effects assessment, revised on the basis of the preceding points.

Environmental Follow-up Program

■ Question 51

Generally speaking, the environmental follow-up program for the Lower Churchill Hydroelectric Generation Project is presented very briefly, and little detail is given in the description of the Proponent’s commitments.

With respect, more specifically, to follow-up of components associated with the human environment, it is surprising to note that the Proponent nearly systematically transfers responsibility for follow-up to the authorities responsible for managing these components, generally undertaking only to remain in close contact with these authorities and provide them with factual data on the project progress.

- a) Can the Proponent define more clearly its commitments in terms of environmental follow-up of the different components, in order to provide a better understanding of the division of responsibilities between the project initiator and stakeholders in the host community?

- b) Among the data to be added, it seems important to specify the temporal boundaries for each of the follow-up studies, which should, in principle, continue until each component returns to normal conditions (i.e., generally around 20 years).