Comments from NRCan related to comments from the public on the Lower Churchill EIS Guidelines

Experts from NRCan's Geological Survey of Canada have reviewed the public comments on the draft EIS Guidelines for the Lower Churchill Project. This review focused on those topics/issues that NRCan's had reviewed and commented on in late February 2008, specifically seismicity, fluvial geomorphology, baseline characterization of HG in soils/sediments, and hydrogeology.

The following documents were examined:

"For *Distribution_key Points_Public_Submissions_on Draft_Guidelines_LC.DOC*"

"*For Distribution_Table_Public_Submissions_Draft_Directive_LC.DOC*"

"*35_Grand_Riverkeeper_Inc.pdf*"
"*Letter-08-03-12-IN-EIS-Comments-Clarfication.pdf*"
"*For Distribution_Table_of_ Innu_ Nation_Submission_Draft Guidelines_LC.DOC*"
"36_Atlantic_Canada_Sustainable_Development_Coaltion.pdf" "39_Sierra_Club_Canada.pdf"
"*For Distribution_Tables_of_Aboriginal-Submissions_on_Draft_Guidelines_LC.DOC*"
"*For Distribution_Table_of_Government_Submission_on_Draft_Guidelines_LC.DOC*"

In looking at the public comments, NRCan also focused on:

i) identifying whether any of the public comments (in NRCan's areas of expertise) were incorrect/inappropriate,
ii) whether there were additional points/suggestions raised –within the area of NRCan expertise – that were pertinent and warranted new or modified text in the guidelines
iii) whether the comments/revised text that NRCan had provided itself in Feb were sufficient to address concerns raised by the public,
iv) or whether NRCan's earlier comments could be modified to address additional public concerns/issues raised

Note that NRCan had earlier noted, like Hydro-Québec, that the guidelines for Lower Churchill were more general and lacked the detail of those for La Romaine EIS.

Based on the above approach, NRCan is suggesting the following additions or modifications (red text in table and text below) to the Guidelines, building on NRCan's earlier comments.

Please correct the acronym for Natural Resources Canada to NRCan, as NRC is the acronym commonly used and recognized for the National Research Council.

Guideline Section	NRCan Comment #	Original NRCan suggestions/text	Proposed Revision (if any)	Comments
	NRCan-1	Item (a) on reservoir preparation should maintain its reference to mercury uptake		
	NRCan-2	(6th bullet on reservoir preparation) should add Methods of soil and vegetation preparation employed to mitigate the release of mercury and methyl-mercury from flooded soils and vegetation		
3.4.2	**NRCan-new**		(1st bullet) could be changed to "…flood zones, lake and river ice formation, dynamics and melt patterns."	This new change would address comments by the Innu on river ice
	NRCan-new		(2nd bullet) reword to "water quality and quantity from both surface and groundwater sources, including any saltwater intrusion into aquifers"	This is suggested in response to public comments (from ACSEC and Grand Riverkeeper) who both refer to salt water intrusion in water wells.
	NRCan-3	(1st bullet): should move "groundwater movement and aquifer recharge zone" to the Terrestrial Environment section to respect local context (in moist climate such as Labrador, groundwater moves from terrestrial areas (where recharge takes place) towards streams and lakes		
	NRCan-4	(5th bullet): should be reworded to Mercury and methymercury concentrations in water and in fish at representative levels of the food chain		

		in streams that will become reservoirs as a result of the project		
	NRCan-5	(6th bullet): replace existing text with Geomorphological processes, such as (but not restricted to) erosion, sedimentation, channel dynamics, and sediment supply, including those along the river reach below Muskrat Fall		
3.4.3	**NRCan-6**	(2nd bullet) should be reworded to add "…an effect on the Project, including mercury concentrations in various soil types and soil horizons and their relationships with vegetation cover and past forest fire activity, this is order to properly characterize terrestrial areas that will contribute to the release of mercury and methylmercury in future reservoirs"		
	NRCan-7	(3rd bullet): be reworded to "area of potential reservoir shoreline erosion and potential ground instability such as slumping and landslides"	underlining to highlight rewording should be as follows: (3rd bullet): be reworded to "area of potential reservoir shoreline erosion and potential ground instability such as slumping and landslides"	
	NRCan-new		Add a new bullet: • Coastal /marine geology, sediments, and processes	This has been added to ensure the description of the biophysical environment includes the relevant aspects at the mouth of the Churchill River and the interactions between the river and coastal/marine systems
	NRCan-8	Add the following bullets: • regional seismicity (natural and reservoir-induced) • reservoir-induced seismic activity of the neighbooring regions (Churchill Falls, Quebec North Shore) • need for seismic monitoring before and after the filling of	Add the following bullets**:** • regional seismicity (natural and reservoir-induced) and documentation of the relevant geological structures (lineaments, faults, joints) • reservoir-induced seismic activity of the neighbooring regions (Churchill Falls,	The third bullet has been removed and transferred to Guideline section 5.4 , as it refers to monitoring

		the reservoir	Quebec North Shore)	
4.0 Env. Effects				This section is written very generically, and should be improved by being more specific as to the areas of anticipated effects that will require assessment. The guidelines for La Romaine where much more detailed and specific in this regard, and addressed the biophysical environment, as well as the human.
4.2	**NRCan-9**	Proponent should assess the likelihood of occurrence of the accidents and malfunctions; how an earthquake might affect many elements of the project at the same time and discuss the mitigative measures planned		
4.4	**NRCan-10**	Because of its potential impact on local populations, the Proponent should define quantitatively and qualitatively how it will assess the expected increase of mercury and methyl mercury concentrations in reservoir waters and biota, particularly fish.		
4.5	**NRCan-11**	Earthquakes should be listed a potential hazards (both natural or triggered (induced) by reservoir)		
5.1	**NRCan-12**	(between items (e) and (f)): should add Measures taken to mitigate the expected increase of mercury and methylmercury concentrations in reservoir waters and biota, particularly fish		
5.4	**NRCan-new**		The section should explicitly include a discussion of the need for seismic monitoring before and after the filling of the reservoir	This was previously the third bullet of NRC-8. We note that section 5.4 is rather generic, and if specifics are not to be included then perhaps this NRCan addition should remain iunder 3.4.3 rather than be omitted.

One area raised in the public review relevant to NRCan expertise is the potential for acid rock drainage (ARD) to affect water quality where potential. The first bullet of guideline Section 3.4.3 would cover a discussion of rock types and their acid generating potential. Section 4.0 guidelines should allow for a discussion of the impact of quarrying/excavating/ using potentially acid generating rock. Neither section 3.4.3 or 4.0 is explicit on this ARD topic. If section 4.0 is to be expanded and become more explicit then it could include the following:
…provide an assessment of potential for and impacts of metal leaching and acid rock drainage (ML/ARD) if quarrying /excavating/using rock with the potential for acid generation.

A detailed NRCan/GSC review, providing the rationale for several of the NRCan revisions suggested above is attached for background.

Detailed Comments from NRCan related to comments from the public on the Lower Churchill EIS Guidelines

1. Topic: seismic hazards/earthquakes/faults

1.A. Public Comments submitted – but not directly embedded in the draft guidelines (Word document "For *Distribution_key Points_Public_Submissions_on Draft_Guidelines_LC.DOC*")

(10) *The number of fault lines in the valley is neglected mention*. [25]

A section on the structural geology of the area is not mentioned as such. However, one would think that the seismicity descriptions would include this and the search for recent activity along some of these structures. It is not so much the number of faults that matter as much as their seismic potential. We suggest we modify NRC-8 to:

- regional seismicity (natural and reservoir-induced) and documentation of the relevant geological structures (lineaments, faults, joints).

(37) Eldred Davis

- *Past studies show little support for a 99 meter high dam (loose material) and very weak rock quality, poor core recovery and the presence of a major lineament. Also, the whole area has been shaken by tremors in the not to distant past*.

No additional comments are needed. The earthquakes will be covered with our NRC-8.

1. B. Grand Riverkeeper Labrador Inc Comments (document "*35_Grand_Riverkeeper_Inc.pdf)*

P. 56-57/85 Section 3.4.3 – *Elaborated comments on reservoir induced seismicity*

There are some valid points on induced seismicity but the tone is somewhat catastrophist.
The reservoir-induced seismicity potential needs to be addressed by the proponent as suggested in our NRC-8.
Specifying earthquakes greater than magnitude 4.0 is not necessary.

P. 67/85 Section 4.2 – *dam failure/seismic issues*

Covered with our NRC-9 (dam failure) and NRC-8 (seismic issues).

P. /85 Section 5.2 – *comment on emergency preparedness for seismic activity*
Covered with our NRC-9.

1.C. Government of Canada comments – as Tabulated by Agency

NRC 8, 9, 11 (Note: NRC-8 has been entered under section 3.4.3 of the guidelines, but the last bullet of the comment which states "need for seismic monitoring before and during the filing of the reservoir" should actually be an addition to guideline section 5.4 which addresses monitoring and follow-up)

Typo at NRC 8: during the filing of the reservoir **-- filling**

2. Topic – fluvial geomorphology

2.A. Public Comments submitted – but not directly embedded in the draft guidelines

Comments by NRCan on public submissions in Word document "For *Distribution_key Points_Public_Submissions_on Draft_Guidelines_LC.DOC*"

- # 23 - bullet # 5,6 (*Sedimentation / erosion concerns*);

Comment about "Impacts of flooding on river banks and sedimentation of river bottom" is covered by NRCan's earlier recommended text.

Comment about "Rate of sedimentation accumulation behind dam and estimate how long the dam will be viable for" is covered off by NRCan's earlier comments at least partially. NRCan did not mention viability of the dam and couldn't find specific wording in the EIS guidelines about this. However, given that the water for the lower Churchill development is coming from the immediately upstream upper Churchill Falls reservoir, the sedimentation rate in all likelihood will be low. Is this really an issue?

- # 30 – *comments from Hydro-Québec*, asking that the Lower Churchill guidelines be of a similar level of detail as those of La Romaine and Eastmain!

A very reasonable request.

- # 37 see bullets # 5 & 6 (Hg*, riverbank slumping/erosion, siltation*) & #9 (*mentions faulting and tremors, slumps/landslides*)

This submission contains mention of potential slope problems along "high sandbanks at the water's edge upstream of the Gull island site would become major slumps or landsides if they were subjected to abnormally high water levels". This is covered off by NRCan's earlier comments/recommendations.

2. B Grand Riverkeeper Labrador Inc

Comments by NRCan on the submission "*35_Grand_Riverkeeper_Inc.pdf*".

P.46/85 Section 2.6 - Reservoir preparation: *Comment on shoreline/bank stability*: This concern is covered by NRCan's earlier recommended text.

P. 47/85 Section 2.7 - *comments on flow*

Much of these comments on flow are covered off in the EIS guidelines document.

The following comment seems inappropriate (the recent historical operations of the Upper Churchill Project are not relevant *per se*):

Recommend adding: Present historic flow data from the Upper Churchill project for at least 10 years

1. explain variations of flow on varying time scales (daily, monthly, annually)
2. indicate ramp rates (rates of increasing or decreasing flow)

The following comment also seems inappropriate at this time– questions about proposed flow regime and alternatives can be asked when we see the EIS. The guidelines already asks for this flow regime information.

Recommend adding:

Flow Regimes:

- *require Proponent to describe recent evolution of standards applied elsewhere, and especially by FERC in US re-licensing proceedings, with respect to ecological flow requirements, making particular reference to concept of emulation of the natural hydrograph and incorporating both minimum and higher peak flows while providing project operational constraints to avoid sudden flow fluctuations.*

P.55/85 Section 3.4.2 - *comment on geomorphology*

Comments on sedimentation and slumping are covered off by NRCan's earlier recommendations.

2. C Innu Nation

Comments by NRCan on the submission: Innu Nation: PDF document "*Letter-08-03-12-IN-EIS-Comments-Clarfication.pdf*" – Cover Letter + ***guidelines with embedded suggested changes*** – 67 pages total . .

- on PDF document pages 39-43, there are *comments on guideline sections 3.4.1 to 3.4.3* – see additional text/edits related to fluvial geomorphology

We feel that most of the fluvial geomorphology aspects are covered in the original wording, although it is worded much more generally than this submission. Our recommended wording covers off the submission wording: "*Geomorphology of the River and tributaries, including erosion zones, sediment transport, bank stability, and accumulation zones*".

To better capture the material on river ice that this submission breaks down in some detail, perhaps the first point of section 3.4.2 Aquatic Environment in the EI Guidelines could be changed to "…flood zones, lake and river ice formation, dynamics and melt patterns."

2. D Government of Canada comments – as Tabulated by Agency

Comments on **NRC 5, 7 in** the submission: "*For Distribution_Table_of_Government_Submission_on_Draft_Guidelines_LC.DOC*".

NRC-7 – underlining to highlight rewording should be as follows: (3rd bullet): be reworded to "area of potential reservoir shoreline erosion and potential ground instability such as slumping and landslides"