SITE C | CLEAN ENERGY PROJECT

RESPONSE TO WORKING GROUP AND PUBLIC COMMENTS ON THE SITE C CLEAN ENERGY PROJECT ENVIRONMENTAL IMPACT STATEMENT

Technical Memo

UNCERTAINTY AND PRECAUTION

MAY 8, 2013

Subject: Uncertainty and Precaution

Purpose of Technical Memo

The purpose of the technical memo is to address comments submitted during the comment period on the review of the EIS related to uncertainty in modelling predictions, selection of valued components, effectiveness of mitigation measures, characterization of residual effects, and in the determination of significance.

The Predictive Nature of Environmental Assessment

Environmental assessment requires prediction. Certainty is not achievable:

> "By its nature the panel's exercise is predictive and it is not surprising that the statute specifically envisages the possibility of "follow up" programmes. Indeed, given the nature of the task we suspect that finality and certainty in environmental assessment can never be achieved."[1]
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> "[G]iven the predictive function of an environmental assessment and the existence of follow-up mechanisms envisioned by the CEAA, the Panel's assessment of significance does not extend to the elimination of uncertainty surrounding project effects." [2]

Consideration of mitigation measures, the details of which are to be determined at some point in the future, is appropriate in environmental assessment:

> "The jurisprudence establishes that a Screening Report and decisions under CEAA can describe general mitigation measures which will be detailed and resolved in the future when the exact project design is determined. <u>This is consistent with the preliminary and predictive nature of an environmental assessment</u>." [3][underlining added]

The uncertainty is addressed by adopting an approach of precaution and adaptive management:

> "[32] An approach that has developed in conjunction with the precautionary principle is that of "adaptive management". In *Canadian Parks and Wilderness Society v. Canada (Minister of Canadian Heritage)*, 2003 FCA 197, [2003] F.C.J. No. 703, at para. 24, Evans J.A. stated that "[t]he concept of "adaptive management" responds to the difficulty, or impossibility, of predicting all the environmental consequences of a project on the basis of existing knowledge" and indicated that adaptive management counters the potentially paralyzing effects of the precautionary principle. Thus, in my opinion, adaptive management permits projects with uncertain, yet potentially adverse environmental impacts to proceed based on flexible management strategies capable of adjusting to new information regarding adverse environmental impacts

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1 *Alberta Wilderness Association v. Express Pipelines Ltd.*, [1996] F.C.J. No. 1016 (FCA), at para. 14.

2 *Pembina Institute for Appropriate Development v. Canada (Attorney General)*, 2008 FC 302, at para. 23.

3 *Canadian Transit Company v. Canada (Transport)*, 2011 FC 515, at para. 214.

> where sufficient information regarding those impacts and potential mitigation measures already exists.
>
> [33] Accordingly, the scope of the duties incumbent upon a panel must be viewed through the prism of these guiding tenets: the precautionary principle and adaptive management. As an early planning tool, environmental assessment is tasked with the management of future risk, thus a review panel has a duty to gather the information required to fulfill this charge.
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> [34] In sum, the CEAA represents a sophisticated legislative system for addressing the uncertainty surrounding environmental effects. To this end, it mandates early assessment of adverse environmental consequences as well as mitigation measures, coupled with the flexibility of follow-up processes capable of adapting to new information and changed circumstances. The dynamic and fluid nature of the process means that perfect certainty regarding environmental effects is not required." [4]

Precaution

The precautionary principle is defined in the *Federal Sustainable Development Act*[5] as follows:

> "precautionary principle" means the principle that where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.

In its publication, "*A Framework for the Application of Precaution in Science-Based Decision Making About Risk,*"[6] the Government of Canada sets out its guiding principles for the application of precaution to science-based, federal decision making. An assessment of the Project under CEAA 2012 ensures that the precautionary principle is applied in accordance with those principles:

- In administering CEAA 2012, the Government of Canada, the Minister, the CEA Agency, federal authorities and responsible authorities must exercise their powers in a manner that protects the environment and applies the precautionary principle[7]
- In determining the scope of an assessment,[8] the responsible authority must ensure that the project is considered in a careful and precautionary manner[9]
- In conducting an assessment in accordance with section 19(1) of CEAA 2012 and the scope of assessment determined by the responsible authority, a sound scientific basis for applying precaution is developed[10]

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4 *Pembina Institute for Appropriate Development v. Canada (Attorney General)*, 2008 FC 302, at paras. 32-34.

5 *Federal Sustainable Development Act*, SC 2008, c 33, at section 2; it is described in the *Canadian Environmental Protection Act 1999*, SC 1999, c 33, in the preamble and in section 2(1)(a), in the same terms.

6 *A Framework for the Application of Precaution in Science-Based Decision Making About Risk* ("*Framework*"), Government of Canada, 2003, found at *http://www.pco-bcp.gc.ca/docs/information/publications/precaution/Precaution-eng.pdf*.

7 CEAA 2012, section 4(2).

8 CEAA 2012, section 19(2)(a).

9 CEAA 2012, section 4(2).

10 *Framework*, page 7.

- The relevant scientific data is evaluated in a transparent process mechanism that leads to conclusions about the possibility and magnitude of harm:[11]
- Participation by the public[12] and by Aboriginal groups[13] is provided for
- Any "threats of of serious or irreversible damage" are identified
- Cost effective measures to prevent environmental degradation are identified [14,15]
- The level of risk that may be acceptable is considered[16]

Uncertainty

The environmental assessment, which must be conducted in advance of the Project,[17] is a prediction and, consequently, is subject to some uncertainty. Consistent with this, Section 8.5.2.3 and Table 8.3 of the EIS Guidelines require potential residual effects of the Project to be characterized in terms of the "Probability" that an adverse effect will occur and the "Level of Confidence" in the objective assessment of direction, magnitude, extent, duration, frequency, and reversibility of a potential effect.[18]

The environmental assessment set out in the EIS is a prediction focused on *likely* outcomes. The EIS presents the predictions of the residual effects that are likely to arise from the Project, based on available information, investigations and analyses undertaken by qualified professionals drawing on their expertise and experience.

The degree of uncertainty associated with each prediction of the potential residual effects of the Project is reflected in the EIS in the characterization of "Level of Confidence." In the EIS, uncertainty has been addressed using methodological tools including the calibration of models and weight-of-evidence analysis, and by adopting conservative assumptions about the nature of the potential effect, consistent with existing guidance (Hegmann *et al.* 1999) (*e.g.,* EIS, Volume 2, Section 12, page 12-62, lines 5-10). The residual effects described in the EIS represent the best prediction of what is likely to occur, taking any uncertainty into account. Generally speaking, as uncertainty associated with a residual effect prediction increases, the level of confidence in the prediction becomes lower (Horvath 2013).

Limitations in available information can reduce the level of confidence in the characterization of some potential residual effects. For example, information about the conditions or sensitivity of a valued component or about the nature of the interaction between a project and a VC may be incomplete. Also or alternatively, a project may involve new technology, the effects of which are not fully understood, or mitigation measures that have not yet been proven to be effective. Where such data gaps exist, the residual effect prediction may be *less certain* and, consequently, the level of confidence in that prediction lower. That is, there is a greater possibility that the outcome – the residual effect – may be

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11 *Framework*, page 7.

12 CEAA 2012, section 19(1)(c).

13 CEAA 2012, section 19(1)(c), 19(3).

14 CEAA 2012, section 19(1)(d), (e).

15 *Framework*, page 5.

16 *Framework*, page 7; CEAA 2012, section 19(1)(b), section 52(2).

17 BCEAA, sections 8, 9; CEAA 2012, sections 6, 7.

18 The level of confidence is defined as an evaluation of the scientific certainty one has in the review of project-specific data, relevant literature, and professional opinion: see EIS Guidelines, Section 8.5.2.3, Table 8.3.

different from what is predicted. This difference typically manifests as a change in the characteristics of the residual effect (such as magnitude, extent, reversibility, duration, or frequency). The difference may or may not be sufficient to change the significance of the effect and/or the likelihood that the residual effect would occur (Horvath 2013). The residual effects described in the EIS represent the best prediction of what is likely to occur, taking any uncertainty into account. For each residual effect prediction, the level of confidence in the residual effect prediction is articulated in the EIS.

Uncertainty associated with a residual effect prediction is addressed through monitoring or other follow-up programs. Such programs include:

- Monitoring to confirm actual residual effects are as predicted
- Monitoring to confirm mitigation measures are effective
- Adaptive management programs to facilitate action when unforeseen effects occur or when ongoing monitoring identifies a need for new or modified mitigation

The EIS describes follow-up when the likelihood, nature, or extent of a predicted adverse residual effect on a VC or the effectiveness of a recommended mitigation measure is uncertain, whether such uncertainty is due to gaps in information regarding the response of a VC to a particular project influence, or if the effect prediction is sensitive to a fact or an assumption that is itself uncertain or variable.

Three different approaches to follow-up are considered in the EIS. Where uncertainty is associated with the residual effect prediction, but available mitigation is considered certain, the proposed follow-up measure focuses on monitoring to confirm the residual effect, followed by implementation of appropriate mitigation. Where the residual effect prediction is certain, but there is uncertainty associated with mitigation, the proposed follow-up measure focuses on monitoring of mitigation effectiveness, followed by implementation of additional or alternative mitigation, possibly including compensation, as required. Where there is uncertainty in both the residual effect prediction and mitigation, the proposed follow-up measure comprises a management program that involves a planned sequence of monitoring or research leading to the development and implementation of mitigation. A process for monitoring and adjustment of the mitigation program, as well as rules to guide decisions for termination of mitigation efforts and/or establishment of compensatory measures to address any remaining significant adverse residual effect(s) is proposed. Follow-up programs for each VC are described in the EIS.

References

Horvath, C.L. 2013. Confidence, Uncertainty, and Risk in Environmental Assessment. *Draft* paper to be presented at the International Association for Impact Assessment annual conference, Calgary, Alberta, May 2013*. in draft*

Related Comments / Information Requests:

This technical memo provides information related to the following Information Requests:

gov_0005-015	gov_0009-009	gov_0009-023	gov_0010-054	gov_0010-057
gov_0010-066	gov_0010-070	gov_0010-071	gov_0010-244	gov_0010-248
gov_0010-249	gov_0010-252a	gov_0010-255	gov_0010-257	gov_0010-269
gov_0010-262	gov_0010-273	gov_0010-264	gov_0010-265	gov_0010-278
gov_0010-272	gov_0010-415	gov_0010-274	gov_0010-277	gov_0010-500
gov_0010-386	gov_0011-031	gov_0010-416	gov_0010-474	gov_0013-056
gov_0010-733	gov_0015-001	gov_0012-003	gov_0013-037	pub_0291-001
gov_0013-078	pub_0474-001	gov_0018_016	gov_0018_154	pub_0633-002
pub_0448-004	pub_0476-010	pub_0474-003	pub_0474-006	ab_0001-714
ab_0001-293	ab_0003-157	ab_0001-320	ab_0001-302	ab_0003-251
ab_0001-288	ab_0001-325	ab_0001-298	ab_0001-376	ab_0004-048
ab_0001-321	ab_0001-730	ab_0001-354	ab_0003-056	ab_0012-032
ab_0001-716	ab_0003-190	ab_0003-012	ab_0003-250	ab_0006-049
ab_0003-189	ab_0004-025	ab_0003-196	ab_0004-042	ab_0001-717
ab_0003-303	ab_0006-045	ab_0004-026	ab_0010-044	ab_0004-080
ab_0003-195	ab_0009-012			