September 14, 2012

Shell Review Panel Secretariat
Canadian Environmental Assessment Agency
160 Elgin Street, 22nd Floor
Place Bell Canada
Ottawa ON K1A 0H3

Attention: JRP Panel Manager

Dear Panel Chair and Members:

Re: Shell Canada Ltd. – proposed Pierre River Mine

We write in response to the Joint Review Panel’s request for submissions on the adequacy of the Shell Canada Ltd’s Environmental Impact Statement (EIS) and the Application filed for the proposed Pierre River Mine.

For the reasons set out in the attached memoranda, it is our informed view that Shell’s EIS is overwhelmingly inadequate and does not answer the Panel’s information needs. We also refer the Panel to our submissions on the deficiencies in Shell’s EIA for the Jackpine Mine Expansion Hearing: the gaps we identified in those submissions apply with equal force to Shell’s Pierre River Mine EIS and Application.¹

We are deeply concerned that the serious gaps and deficiencies in Shell’s EIS and Application that, unless corrected by Shell, will prevent the Panel from discharging its obligation to credibly assess the direct, indirect and cumulative impacts of the Project on the environment and on our ability to meaningfully exercise our Section 35 rights and our culture now and into the future.

We wish to highlight an issue of fundamental importance: Shell’s EIS and Application is based upon the expectation or assumption that we should simply “go elsewhere” to practice our rights. When we are alienated from those lands to which we have a spiritual and cultural connection, there are serious spiritual, psychological and cultural impacts. We have a connection to the lands that will be impacted by Shell’s proposed Project, but Shell’s EIS completely fails to address these impacts.

Further, there is no mitigation, and no accommodation provided in Shell’s application for all of the future generations of ACFN members who will lose the lands taken up by Shell’s proposed project. No

¹ CEAA Registry 59540 Docs. 175 and 276
thought has been given to the ability of our grandchildren and great grandchildren to live their culture and exercise their rights on our traditional lands.

In our view, the Panel is unable to discharge its mandate based on the information Shell has put forward to date.

Sincerely,

<original signed by>
Lisa King
IRC Director

Enclosure: Submission on the Adequacy of Shells EIS for the Pierre River Mine
Submission on the Adequacy of the Environmental Impact Statement for Shell’s Pierre River Mine Project

Submitted by:

Athabasca Chipewyan First Nation
Industry Relations Corporation

Dated: 9/14/2012
Introduction

The Athabasca Chipewyan First Nation (“ACFN”) possesses rights protected by Section 35 of the Constitution Act, 1982, including rights pursuant to Treaty 8. The Pierre River Mine Project (the “Project”) is located within the traditional territories of the ACFN and in an area where the ACFN have and continue to exercise their constitutionally protected rights.

The purpose of this submission is to highlight critical deficiencies, omissions and “gaps” in the information that Shell Canada Ltd has filed to date with the Joint Review Panel for the Project. There are three related reasons for this submission on the adequacy of the information filed by Shell regarding the Project:

1) ACFN wishes to ensure that the Panel has information it requires to fulfill its Terms of Reference, including the information it requires to assess Shell’s determination of effects, impacts of the Project to terrestrial and aquatic resources, the capacity of renewable resources, climate change, and other factors;

2) ACFN wishes to ensure that the Proponent has supplied the necessary information for the direct, indirect and cumulative impacts of the Project to be properly assessed against the ACFN’s ability to meaningfully exercise their constitutionally-protected rights and culture now and into the future;

3) ACFN wishes to ensure that the Crown, regulators, interested parties and the public have access to the information that is required for them to meaningfully participate in the hearing for the Project.

Respectfully, Shell has not yet provided sufficient information in any of these respects. In particular, we are deeply concerned that the serious gaps and deficiencies in the information filed by Shell regarding the Project, unless corrected by Shell, will prevent the Panel from discharging its obligation to credibly assess the direct, indirect and cumulative impacts of the Project on the environment and on our ability to meaningfully exercise our Section 35 rights and our culture and will impede the Panel from credibly assessing the Project’s socio-economic impacts on our Nation.

As set out below, upon our assessment (aided by consultants retained by the ACFN) of the materials Shell has filed with the Panel regarding the Project, there remain significant and critical gaps in the following areas:

1) Shell has failed to provide an effects assessment for pre-mitigation Project effects and has failed to provide an effects assessment for other impacts to our rights and culture;
2) Shell has failed to provide adequate information regarding how Shell determined is “significance of effects”, greatly impeding the ability of the Panel, the Crown and the ACFN to engage Shell at a hearing on this important issue;

3) Shell has failed to provide adequate information regarding Aboriginal rights and interests, including information about traditional resources necessary for the meaningful exercise of our rights, impacts to our culture and impacts to our socio-economic conditions, among others;

4) Shell has failed to provide critical cumulative effects information;

5) Shell has failed to provide adequate information about certain terrestrial resources, including protected species such as caribou, bison, and migratory birds;

6) Shell has failed to provide adequate information regarding aquatic resources;

7) Shell has failed to provide adequate information regarding the Project’s effects on renewable resources required for the sustained exercise of our rights and culture;

8) Shell has failed to provide adequate information for the Panel to determine whether established thresholds (i.e. Aboriginal Base Flow, Aboriginal Extreme Flow, those limits established in LARP, the pending Phase 2 water withdrawal rules) will be exceeded should PRM be approved;

9) Shell has failed to provide adequate information regarding hydrogeology;

10) Shell has failed to provide adequate information regarding the effects of proposed adjacent development projects on Shell’s hydrologic models and water management plan; and

11) Shell has failed to provide adequate information regarding accidents and malfunctions in Shell’s oil sands mines, and the associated risks and environmental effects.

These deficiencies must be credibly addressed before the Panel can call a hearing for the Project.

We note that each of CEAA and the ERCB recently issued substantial supplemental information requests to Teck Resources regarding a proposed mine adjacent to the Project.\(^1\) In those SIRs, the regulators recognized the need for certain types, quantity and quality of information to enable informed decision making. In our view there are many issues common to both the proposed

\(^{1}\) CEAA Frontier Oil Sands Registry Doc. No. 60, online:
Pierre River Mine and Frontier mine. It is also our view that Shell’s application for this Project does not provide the type, quantity nor the quality of information that the ERCB and CEAA have required in relation to the Frontier application. The ACFN strongly suggest that at minimum, Shell’s application for the Pierre River Mine be subjected to the level of rigour that the regulators have applied to Teck’s Frontier application.

Gaps and Deficiencies in Shell’s Information

I. Determination of Project Effects

a. JRP Requirement

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</tr>
<tr>
<td>d. community knowledge and aboriginal traditional knowledge (such as traditional use studies) received during the joint review.</td>
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**PART III – SCOPE OF THE FACTORS – ABORIGINAL RIGHTS AND INTERESTS – PROJECT EFFECTS**

The Joint Review Panel shall consider:
- Evidence concerning any potential project effects to asserted or established Aboriginal and treaty rights presented by participants, such as:
  - Any potential effects on uses of lands and resources by Aboriginal groups for traditional purposes;
  - Any effects (including the effects related to increased access and fragmentation of habitat) on hunting, fishing, trapping, cultural and other traditional uses of the land (e.g. collection of medicinal plans, use of sacred sites), as well as related effects on lifestyle, culture, health and quality of life of Aboriginal persons;
  - Any effects of alterations to access into areas used by Aboriginal persons for traditional uses;

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2 See issues raised in the joint ACFN-MCFN submission dated June 4th, CEAA Frontier Oil Sands Registry Doc. No. 30 online:
- Any adverse effects of the project on the ability of future generations to pursue traditional activities or lifestyle;
- Any effects of the project on heritage and archaeological resources in the project area that are of importance or concern to Aboriginal groups;

**JRP Terms of Reference Incorporated from the Provincial Terms of Reference**

5.5 Land, Access to Public Lands and Aggregate Resource Conservation

Describe land, access to public lands and the availability of aggregate resources in the Study Area. Explain the significance of land use changes for regional land management, aggregate resource conservation, other industrial uses in the region, the maintenance of traditional lifestyles, and recreational uses. Provide information on land uses and seasonal variations. Discuss:

c) access to fish, wildlife and vegetation resources for existing and potential domestic, traditional and recreational activities

8.0 TRADITIONAL ECOLOGICAL KNOWLEDGE AND LAND USE

Provide details on the consultation undertaken with Aboriginal communities with respect to traditional ecological knowledge and traditional land use. Determine whether there will be implications on traditional land use resulting from the Project. Discuss:

a. the extent of traditional land use and cultural use in the Study Area. Discuss the vegetation and wildlife used for nutritional, cultural and medicinal purposes and identify cabin sites, spiritual sites and graves;

b. Project and cumulative effects of development on traditional uses and mitigation strategies to prevent or minimize effects; and

c. identify how Traditional Ecological Knowledge was incorporated into the EIA report.

**Constitutional Requirements**

- Section 35(1) of the Constitution Act, 1982 is to be construed in a purposive way. A generous, liberal interpretation is demanded given that the provision is to affirm aboriginal rights: R. v. Sparrow, [1990] 1 S.C.R. 1075;

- When considering the direct and adverse environmental impacts of the Project on First Nations’ rights, the term “environment” must be construed broadly and includes the cumulative impacts of a project and other facilities to be developed in the future on those rights: Dene Tha’ First Nation v. MOE et al., 2006 FC 1354, at para. 34;

- The potential negative derivative impacts of a project must also be taken into account: Taku River Tlingit First Nation v. British Columbia (Project Assessment Director), 2004 SCC 74, [2004] 3 S.C.R. 550, at para. 32;

- The honour of the Crown requires that aboriginal rights and title be assessed when assessing environmental factors, Allan Adam v. Canada, 2011 FCC 962 at paras 35-36
The injurious affection that a project causes on the exercise of rights within the vicinity of that project must be taken into account: Mikisew Cree First Nation v. Canada, 2005 SCC 69, at paras. 15, 44, and 47;

Impacts to section 35 rights that are more than “de minimis” may be an unjustified infringement of the right, Tsilhqot’in Nation v. British Columbia, 2007 BCSC 1700 at para. 1062, R. v. Morris, 2006 SCC 59

b. Commentary

Shell’s information relating to Project effects is deficient in numerous ways. First, Shell has not provided the Panel with information containing an assessment of Project impacts separate from the Jackpine Mine Expansion Project.

Second, Shell has not provided the Panel with adequate information regarding Project effects on ACFN’s culture.

Third, Shell has not provided the Panel with adequate information regarding Project effects on the socio-economic conditions of ACFN.

Fourth, Shell has not provided the Panel with adequate information regarding Project effects pre-mitigation. Such information is necessary here because the effectiveness of mitigation and reclamation measures is, according to Shell’s own experts in other contexts, unclear: the same authors who developed the impact assessment for the PRM, Golder Associates Ltd., also developed a report about the history of reclamation on Suncor’s leases (Golder 2007, Suncor is used as a study example due to its arguably, longest history in Oil Sands operations and reclamation). The report provides evidence that the vegetation communities which develop in reclamation sites are not comparable to pre-disturbance communities and will not be in the foreseeable future.

c. Requests

1. Gather information and assess Project effects (direct, indirect and cumulative) using KIRs and VECs relating to ACFN’s rights, providing a detailed description and justification of the thresholds, measures and criteria used to do so and a description of how the methods used would allow the potential effects of the Project on rights and culture to be adequately assessed

2. Gather information and assess Project effects on the culture of ACFN, providing a detailed description and justification of the thresholds, measures and criteria used to do so and a description of how the methods used would allow the potential effects of the Project on rights and culture to be adequately assessed. ACFN was unequivocal...
in the last sufficiency review for the Jackpine Mine Expansion Project that the cultural impact assessment submitted by Shell to the Panel for that Project is offensive and completely lacks relevant and useful information for the Panel to credibly understand and assess impacts of that Project on our culture;

3. Gather information and assess Project effects on the socio-economic conditions of ACFN, providing a detailed description and justification of the thresholds, measures and criteria used to do so and a description of how the methods used would allow the potential effects of the Project on rights and culture to be adequately assessed. ACFN was unequivocal in the last sufficiency review for the Jackpine Mine Expansion Project that the socio-economic impact assessment submitted by Shell to the Panel for that Project is offensive and completely lacks relevant and useful information for the Panel to credibly understand and assess impacts of that Project on the socio-economic conditions of our Nation;

4. Gather information and assess Project effects on ACFN’s access to lands, waters and resources for the exercise of ACFN’s rights and culture;

5. Gather information and assess Project effects on ACFN’s rights, culture, socio-economic conditions and access to lands and resources prior to mitigation measures and prior to reclamation, in light of the evidence provided by Golder (2007) that impacts to terrestrial traditional resources are likely not reversible;

II. Significance of Effects

a. JRP Requirement

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<tr>
<td>2. The assessment shall include a consideration of the factors listed in paragraphs 16(1)(a) to (d) and subsection 16(2) of the Canadian Environmental Assessment Act, namely:</td>
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<td>a. the environmental effects of the project, including the environmental effects of malfunctions or accidents that may occur in connection with the project and any cumulative environmental effects that are likely to result from the project in combination with other projects or activities that have been or will be carried out;</td>
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<td>b. the significance of the effects referred to in paragraph a.;</td>
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b. Commentary

Shell has not provided adequate information about the threshold at which, according to Shell, adverse effects on Aboriginal and treaty rights are deemed significant. Presently, it is not possible to assess

Furthermore, to allow Shell and the Panel to appropriately determine significance, Shell must provide information about the value the ACFN put on Traditional Resources, traditional activities and the role those resources and activities serve in supporting the ACFN’s rights and culture. In the international EIA practice there is “considerable unanimity of views that consultation with …the local community should assist in ensuring that all potentially significant impacts are identified” (Wood 2003, p.161). The determination of significance needs to be done collaboratively through effective public consultation (Lawrence 2007). That is, Shell must discuss with ACFN what the perceived impact might be and the significance of residual impacts would need to be rated by together with ACFN. Shell has not yet done this, as confirmed by Section 5 of the TLU Report prepared by Golder (2011a, p.5):

5.0 SIGNIFICANCE DETERMINATION

Following is a TLU significance determination to support and augment the TLU assessment in the Project’s EIA.

5.1 Approach

To determine the significance of the Project’s effects on traditional land use, consideration was given to what constitutes a significant effect to the resources used by a traditional resource user. As EIA practitioners, significance is discussed from a scientific perspective and in an ecological context. Value placed on the resources beyond a scientific or ecological context are not considered in this determination; however, agencies responsible for making public interest decisions on development applications should be aware of the value placed on these resources by local users as part of their decision-making process.

c. Requests

1. for each KIR, provide the thresholds and scale used for determining the environmental significance of the Project’s effects, including the rationale employed for selecting the scale, criteria, definitions and thresholds

2. provide a detailed description of the thresholds, measures and criteria used to determine the significance of the Project’s effects on ACFN rights, culture and socio-economic conditions.

3. assess the significance of impacts on wildlife, species at risk and aboriginal and treaty rights at the scale of the local study area, not only the regional study area.

4. taking the values of traditional land users into account, define the level at which adverse effects on Aboriginal and treaty rights are deemed significant for any Traditional Resources identified by ACFN as potentially impacted.
5. assess the significance of effects on the environment and Aboriginal rights and interests including environmental context as a criterion for determining significance.

6. provide a comprehensive discussion of habitat threshold scenarios based on peer-reviewed literature

III. Aboriginal Rights and Interests

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|  o Any effects of alterations to access into areas used by Aboriginal persons for traditional uses; |
|  o Any adverse effects of the project on the ability of future generations to pursue traditional activities or lifestyle; |
|  o Any effects of the project on heritage and archaeological resources in the project area that are of importance or concern to Aboriginal groups; |

JRP Terms of Reference Incorporated from the Provincial Terms of Reference

4.2 Project Components and Site Selection

Describe the nature, size, design capacity, location and duration of the components of the
Project. Include:

k) how Shell has incorporated both community information and elements of Traditional Ecological Knowledge (TEK) into Project design and mitigation.

5.5 Land, Access to Public Lands and Aggregate Resource Conservation

Describe land, access to public lands and the availability of aggregate resources in the Study Area. Explain the significance of land use changes for regional land management, aggregate resource conservation, other industrial uses in the region, the maintenance of traditional lifestyles, and recreational uses. Provide information on land uses and seasonal variations. Discuss:

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Provide details on the consultation undertaken with Aboriginal communities with respect to traditional ecological knowledge and traditional land use. Determine whether there will be implications on traditional land use resulting from the Project. Discuss:

d. the extent of traditional land use and cultural use in the Study Area. Discuss the vegetation and wildlife used for nutritional, cultural and medicinal purposes and identify cabin sites, spiritual sites and graves;

e. Project and cumulative effects of development on traditional uses and mitigation strategies to prevent or minimize effects; and

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- The honour of the Crown requires that aboriginal rights and title be assessed when assessing environmental factors, Allan Adam v. Canada, 2011 FCC 962 at paras 35-36

- The injurious affection that a project causes on the exercise of rights within the vicinity of that project must be taken into account: Mikisew Cree First Nation v. Canada, 2005 SCC 69, at paras. 15, 44, and 47;
b. Commentary

As noted above, Shell has not provided critical information regarding Project impacts on ACFN’s rights, culture, socio-economic conditions and other interests. We reiterate the need for Shell to gather this information in a credible and comprehensive way that includes engagement with our Nation.

Furthermore, to assess impacts to ACFN’s land and resource use, it is essential to have an understanding of what elements are necessary to sustain the practice of our rights and culture. For example, maintenance of our right to hunt moose or caribou must take into account the number of harvestable moose or caribou per rights-holding member (based on current and future population projections) available every year, ecological requirements for moose and caribou, the availability of preferred and accessible areas, the ability to navigate to and access those areas, cumulative effects on relied upon resources, and other aboriginal rights holders relying on resources in the same area. Put more broadly, to fulfill its mandate the JRP requires information about the underlying conditions (ecological and cultural) necessary to sustain the right. Shell has not provided such information.

Missing entirely from the EIA is an analysis of what is needed to sustain the use of Traditional resources and the exercise of our rights today and into the future. Instead of providing information regarding the ecological and cultural needs that underlie our Aboriginal and Treaty Rights, Shell’s EIA and supplemental filings assert, without justification, that these needs can be met if our members ‘go elsewhere’ in the RSA or suspend their activities until post-reclamation. Shell does not justify or back up this assertion with evidence regarding the distribution of traditional resources (such as bison, caribou, moose) in the LSA/RSA, effects on water quality and quantity that would impact travel to and use of other areas, cost of going elsewhere, the availability of opportunities elsewhere, whether other areas are accessible or preferred, and whether going elsewhere is sustainable over the long term. Indeed, resources that are either unique, rare, or in short supply elsewhere in the RSA (such as site-specific cabins, trails, cultural/spiritual areas, or harvesting areas, the Athabasca River, wood bison, or woodland caribou), including heritage resources, are not considered by Shell. The JRP must require Shell to work with us to gather that information if it is to credibly assess the impacts of the Project on our rights and culture.

In estimating that ACFN can simply “go elsewhere” Shell provided no information regarding the following:
the potential for forest fires, climate change, drought, disease, and other variable and stochastic large scale natural disturbances alongside anticipated or projected human caused disturbances
- whether the resources are in places that are useable and accessible to our members
- whether the resources are as good a quality
- the cultural and Treaty right of ACFN to access specific resources with specific habitat requirements and needs - such as wood bison, boreal caribou, or rare medicinal plants- within preferred and accessible areas of their territory
- that rights are practiced in particular places because of the quality and quantity of particular resources in the area
- that rights are practiced in particular places because of the unique cultural and historical associations of particular places
- that rights are practiced in particular places because of the ease of access to those places
- that rights are practiced in particular places because of the aesthetic and spiritual qualities of those places,
- that rights are practiced in particular places because the level of familiarity and knowledge that allows the user to navigate those places safely and comfortably

These omissions must be addressed by Shell prior to the hearing.

Even if Shell succeeded to re-establish Traditional Resources decades after closure, which in our view Shell has not demonstrated it can do, this is a duration that spans several human generations. Shell does not offer any explanation on how our members can suspend their rights and culture for that long a period without significant impacts to their culture and their rights. In Round One AENV SIR # 455b for PRM Shell asserts that: “Lack of access and local extirpation of areas resulting from the project will affect where locals can hunt, fish, and trap for between one and two human generations, i.e., about 30 years. Surrounding areas will still be available, but locals will have to travel farther to access them”. However, Shell does not relate this predicted loss to the impacts this will have on the Aboriginal and treaty rights of future generations.

Shell’s assessment of lichen-jack pine communities formed erroneous conclusions about the distribution of traditional resources in the EIA. Lichen-jack pine communities were ranked as low traditional use plant potential when they should have been classified as high traditional use potential. Such misclassifications mean that the calculations for the area within low, moderate, and high potential for traditional use plants are inaccurate.
c. Requests

1. Gather and provide information regarding the Project’s effects on our rights and cultures, assessing those effects using a rights-based methodology, prior to reclamation.

2. Gather and present information about the types of vessels and timing utilized by our members for transportation and exercise of our rights and culture and include that information in the effects assessment.

3. Gather and present information about Project effects on our members’ access to areas for the exercise of their rights and culture.

4. Address the gaps in information relating to traditional resources identified this section and in the following sections of this submission.

5. Provide pre-industrial baseline information and a needs assessment for Aboriginal and Treaty rights.

6. Provide information respecting the availability of traditional resources required to sustain the exercise of our rights and culture, taking into account

   a. impacts to our access to the LSA and effects on access in the RSA,
   b. preferred species and locations,
   c. habitat fragmentation and amounts and rate of disturbance,
   d. intangible cultural elements,
   e. financial costs of going elsewhere,
   f. other conditions that favour or impede rights-based activities,
   g. quality of resources.

7. Determine the action thresholds which will be used to assure Aboriginal land users that if environmental performance would be below an acceptable level, adaptive management action would be implemented.

8. Given that re-establishing Traditional Resources would not be achieved until decades after closure (a duration spanning several human generations), if at all, please provide an assessment regarding what the impacts will be on the First Nations while they suspend their Treaty Rights until Traditional Resources are re-established.
IV. Cumulative Effects

a. JRP Requirement

The JRP’s Terms of Reference


The Joint Review Panel should focus its consideration of cumulative effects on key valued components. Without limiting itself thereto, the following components should be considered:

- water quality and quantity, including any potential effects on navigable waters or navigation;
- air quality and greenhouse gas emissions;
- asserted or established Aboriginal and treaty rights and interests;
- wildlife and wildlife habitat for valued species including: federally and provincially listed species at risk, and migratory birds; and
- valued vegetation communities and wetlands.

The cumulative effects assessment should provide a justification and description of the temporal boundaries and include, but not be limited to, the following:

- a pre-industrial case to allow the Joint Review Panel to take into account the effects that may have already been experienced prior to the project; and
- future foreseeable projects or activities as of the issuance of the Joint Review Panel’s Terms of Reference.

JRP Terms of Reference Incorporated from the Provincial Terms of Reference

5.3 Cumulative Environmental Effects Assessment

a) Assess and discuss the cumulative environmental effects that are likely to result from the Project in combination with other existing, approved and planned projects in the region that could reasonably be considered to have a combined effect. Include industrial projects, as well as activities associated with land use and infrastructure.

b) Explain the approach and methods used to identify and assess cumulative effects, including cooperative opportunities and initiatives undertaken to further the collective understanding of cumulative effects.

c) Provide a record of relevant assumptions. Discuss the confidence in the assessment and the basis for this confidence level. Describe deficiencies or limitations in the existing database on environmental components.

8.0 TRADITIONAL ECOLOGICAL KNOWLEDGE AND LAND USE

Provide details on the consultation undertaken with Aboriginal communities with respect to traditional ecological knowledge and traditional land use. Determine whether there will be implications on traditional land use resulting from the Project. Discuss:

b) Project and cumulative effects of development on traditional uses and mitigation
strategies to prevent or minimize effects; and

**CEAA’s Practitioner’s Guide**

*Other actions that have occurred, exist, or may yet occur which may also affect those same VECs are identified. Future actions that are approved within the study area must be considered; officially announced and reasonably foreseeable actions should be considered if they may affect those VECs and there is enough information about them to assess their effects* [pg. 2, emphasis added]

b. Commentary

Shell’s cumulative impact assessment and mitigation measures that are required at a regional scale lack substance in any of the disciplines listed in the TOR section quoted above. Rather than provide the detailed and relevant information required by the Panel, for water and air resources, Shell relies on its membership in regional, multi-stakeholder groups and on approval conditions to be set out in regulatory approvals. Shell does not provide any information on how its own data will add to and improve the knowledge of regional cumulative effects.

Furthermore, Shell’s conclusions that there will be no significant cumulative effects are based on little or no information about past, present, and future regional effects. Moreover, Shell uses the erroneous assumption that impacts to traditional resources will be reversed. Shell’s own consultants found that this is not likely the case (Golder 2007, see our discussion above). Both are unacceptable and must be corrected if the Panel is to fulfill its terms of reference.

Numerous independent review panels have identified the need for rigorous scientific methods in the regional cumulative effects management of the oilsands. In the report by the Office of the Auditor General of Canada (2011), the author stated:

> “*despite repeated warnings of gaps in environmental information, little was done for almost a decade to close many of those key information gaps. …, uncertainty persists about other environmental trends, because of insufficient or inadequate environmental monitoring systems. … As a consequence, decisions about oil sands projects have been based on incomplete, poor, or non-existent environmental information that has, in turn, led to poorly informed decisions.*”

In that report, the Commissioner noted that deficiencies in baseline information and data gaps caused major deficiencies in oil sands hearings by limiting the assessment of cumulative effects on water quantity, water quality, fish and fish habitat, land, wildlife, and air.

Additionally, in a March 2011 Report, the federal government concluded that monitoring activities in the oil sands region “did not deliver data of sufficient quantity or quality to detect or quantify the effects of oil sands development” and that this lack of information inhibited
environmental protection (including water quality) and industry sustainability. The new joint Canada-Alberta Oil Sands Monitoring system it will not be fully implemented until 2015, we are several years away from having comprehensive and credible data.

To assist the Panel, we provide a few concrete examples of this larger problem with Shell’s cumulative effects assessment:

a) Shell provides no mitigation measures that would ensure that impacts to federally and provincially listed Species At Risk (SAR) and migratory birds will be avoided. A good example of this are species that inhabit fens and bogs. Shell’s own recent surveys of SAR found that Shell’s leases contain fens and bogs and that SAR inhabit these habitats (Golder 2011b). Despite this finding, Shell has virtually no plans to re-establish fens and bogs on its leases or elsewhere in the region to mitigate for this loss of habitat. Of the 12,226 ha of fens and bogs to be disturbed, only 60 ha of fens will be re-established; within the re-established fens only a limited number of species will be reintroduced. Consequently, the regional cumulative effect on SAR and other species inhabiting wetlands is a serious matter that must be addressed using adequate environmental information.

b) Water quality guidelines have been exceeded in the past and the exceedances have been measured, repeatedly by Shell’s own monitoring programs. Such exceedances are cumulative in the region and appear to be evident in the changing water quality of the Athabasca River and its tributaries (Kelly et al. 2010). In its response to the Nations’ questions about exceedances in water quality, Shell simply quotes from guidelines, which do little to protect Traditional Resource use. Shell has not demonstrated how it intends to improve on the scientific rigour of monitoring water quality in receiving streams and how exceedances in water quality parameters are protecting Traditional Resource use.

c) Shell states that endocrine disruption, as a form of the potential sub-lethal effects that arise from exposure to oil sands effluent, is not expected in fishes exposed to constituent components of the effluent. This may be the case for adult fish. However, research into the development of eggs and embryos exposed to oil sand process effluent at low concentrations have shown developmental challenges when exposed in a lab setting (Kelly et al. 2009). Shell has not discussed the issue of exposure of fish eggs and embryos to oil sands effluent.

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d) The Athabasca River has the most significant negative streamflow trends of all rivers in Alberta. The analysis of Shell’s future impacts and regional cumulative impacts on the Athabasca River are inadequate for the following reasons:

a. Shell has not incorporated into their predictions of project-specific and cumulative impacts statistically significant trends detected in certain flow conditions in the Athabasca River and other rivers in the area. Shell has not used evidence to demonstrate that they are using current information for these analyses.

b. Shell has not explained how the trends in air temperature and precipitation were used to estimate the expected range of future streamflows in the Athabasca River downstream of Fort McMurray.

c. Shell has not clarified what the impacts of climate change might be on the PRM. Shell defers to RAMP for analyzing annual trends in aquatic systems but does not discuss how any detected trends compare with predicted climate change trends (PRM Round 1 AENV SIR #301).

Finally, there has been a growing awareness, which is now codified in the JRP Terms of Reference, that the assessment of cumulative effects on Aboriginal and Treaty Rights is a fundamental part of any cumulative effects assessment. Indeed, our First Nations have been raising concerns about cumulative effects on our rights for years and the failure of governments to assess or manage the cumulative effects of oil sands development on our rights. Massive and accelerating development in the Athabasca region has driven our traditional lands to a state of crisis. Much of our traditional land base no longer supports the exercise of our Aboriginal and Treaty Rights. Oil sands development in particular presents a very real threat to our ability to maintain our traditional practices and our distinctive cultures into the future. Unfortunately, Shell has not provided information about the cultural and resource baseline conditions of our Nations or the current and future conditions required for the sustained exercise of our rights and cultures. Shell provides no cumulative effects assessment on our culture or socio-economic conditions.

c. Requests

1. Provide pre-industrial baseline information with respect to Aboriginal and Treaty rights and interests, including pre-industrial baseline information for VECs relevant to our rights and cultures.

2. Please provide evidence of research efforts and research successes in the following:

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5 See e.g. Joint Response of Athabasca Chipewyan First Nation & Mikisew Cree First Nation to the Report of the Joint Review Panel for the Joslyn North Mine Project. See also, CEAA Registry Doc. #413 in the Total Joslyn North Hearing [Oct. 8, 2010 Transcript].
a. reducing the environmental long-term effects of tailings ponds,
b. alternative approaches that would result in the reduction of the tailings footprint,
c. the elimination of tailings pond seepage, and
d. the reduction and/or elimination of uncertainties associated with the reclamation of tailings ponds.

3. Provide information for how successful proposed mitigation was in any similar projects, including an annotated bibliography of water-related research projects to evaluate the cumulative effects of current, approved, and planned oil sands projects in northern Alberta. At a minimum, the bibliography should list the title, objectives, and results achieved to date for research on the following:
   a. cumulative effects on groundwater with associated effects on local wetlands, lakes, streams, and rivers;
   b. an oil spill dispersion analysis for the Athabasca River;
   c. cumulative effects of oil spills and leakages on the Athabasca River and water bodies downstream of the Embarras; and
   d. water balance analyses for each specific landscape unit with a unique land cover-soil-climate characteristic, with particular focus on reconstructed landscape units so as to optimize conditions for successful reclamation.

4. Please provide flow parameters for characterizing changes and effects on the Athabasca streamflow due to the proposed project for the peak flow and the 7Q10 low flow for at least the 100-year return period.

5. Please provide an assessment of the cumulative effect on sediment and water quality of the proposed project in addition to existing and approved oil sands projects upon the Athabasca River.

6. Please demonstrate that the results of local-scale transport modeling for the PRM are for an additional 2,000 years beyond the far-future snapshot described. The information in the EIA Appendix 4-1 does not appear to include any description of modeling conducted beyond 100 years of post-closure.

7. Please discuss the possible future use of shallow groundwater resources for Traditional Resource use in light of the likely scenario that the groundwater systems in the project area will all be affected by projects in the region and cannot be assumed to attenuate contaminated seepage (as Shell assumed in the EIA) from the Project before the groundwater discharges to surface water systems.

8. Using data from existing monitoring programs, please demonstrate whether traditional resource use will be protected from exceedances in water quality parameters in Shell’s projects and any other past, present, and future projects in the RSA.

9. Please provide supporting evidence from Shell’s other projects that would indicate that compensation lakes are meeting target compensation ratios. In order to
understand what is being compensated, pre-development baseline data must be collected. For the regional study area, quantify how much fish habitat (for any given valued ecosystem component) has been lost and how much has been compensated to date.

10. Shell’s monitoring program does not include a component to monitor fish health so that concrete measurements of fish health could be related to the diet of traditional land users. Please demonstrate how Shell would do the following:
   a. measure sub-lethal effects as endocrine disruption that may arise as a consequence of exposure to oil sands effluent;
   b. document the development of eggs and embryos exposed to oil sand process effluent at low concentrations; and
   c. conduct bile analysis and measure and monitor for sub-lethal effects.

11. It is acknowledged by Shell that there may be exceedances of the Alberta Ambient Air Quality Objectives (AAAQO) for benzene (PRM Round 2 ERCB SIR# 42 and AENV SIR #6). Please fully present the impacts from air emissions that could be experienced by the FNs and provide supporting documents to show predicted contaminant concentrations and impacts on land that the FNs will access. Provide information on how Shell intends to reduce the predicted emission exceedances.

12. Provide maps that include all visible anthropogenic disturbances, based on 2011 data, or 2012 data if it is available.

V. **Terrestrial Resources**

   a. JRP Requirement

   See pages 7-9 above.

   b. Commentary

Bison have been identified by ACFN as an important traditional resource. Shell argues that wood bison are not protected by legislation outside the designated management area unless they are owned as livestock (Shell 2007 EIA Volume 5; AENV SIR # 468a-b in PRM Round 1 SIR). Shell found several incidental sightings of suspected bulls and a group of 10 to 12 suspected cows in the LSA. Despite this finding, no specific mitigation for bison is proposed because Shell asserts that most of the general mitigation measures for wildlife are common to all wildlife species, including bison. This belief is problematic because bison are the only grass land species in the region. Shell has not provided any information on how the general wildlife mitigation will address the impacts on bison and how the effectiveness of mitigation will be tested.

The lack of information also applies to mitigation for impacts on caribou, which is an important traditional resource species that occurs in the LSA.
There are also information deficiencies in Shell’s materials for terrestrial resources beyond caribou and bison. For example, Shell has provided inadequate information regarding the destruction of the narrow, but critical, wildlife corridor that runs parallel to the Athabasca River and the pre-mitigation effects that will have on the environment, including ACFN’s rights and culture.

As a related point, in its assessment of impacts from the Project, Shell does not appear to adequately consider the re-establishment of the distribution and abundance of wildlife populations to the conditions which existed prior to industrial disturbance. To identify disturbances that have occurred or exist today, current resource conditions must be compared to pre-industrial conditions. Pre-industrial conditions need to be described and quantified for all disciplines, whether biophysical or socio-economic. When asked how Shell plans to re-establish pre-industrial (or pre-disturbance) conditions, Shell responded that “The goal of reclamation is not pre-disturbance conditions, but “equivalent land capability” (Shell’s Response to MCFN Technical Review August 2010, Wildlife Question 17). This statement is contradictory to the assumption that impacts will be reversed. More information is required to understand Shell’s position and the rating of the environmental consequences, both for the project specific as well as the cumulative impacts needs to be re-assessed.

In addition, Shell argues that an ecological threshold of landscape scale disturbance exists at about 70% of habitat removed resulting in a decline of persistence of wildlife populations in the landscape. Moreover, in a report prepared by the same consultants (Golder Associates Ltd. for De Beers Canada Inc. 2011), the proponent states: “For both seasonal periods, landscape disturbance is well below the 40% threshold value for habitat loss associated with anticipated declines in bird and mammal species (Andrèn 1994, 1999; Fahrig 1997; Mönkkönen and Reunanen 1999; Swift and Hannon 2010)” (p.11.11-91). Thus the authors of the report by DeBeers Canada Inc. (2011) use only 40% of habitat removed as a threshold for landscape scale disturbance. In Shell’s response to the JRP IRs relating to the Jackpine Mine Expansion, Shell calculated that 36% of the RSA was disturbed. While it is unclear how Shell arrived at that result given a lack of detail provided to explain the methods chosen in this calculation, and while Shell’s calculations may well substantially underestimate the actual disturbance, Shell’s calculated value of 36% disturbance appears to be rather close to the potential threshold of 40% estimated by Golder Associates Ltd. for DeBeers Canada Inc. (2011). This means that the RSA may have already reached a threshold at which wildlife populations may cease to persist. As such, it is absolutely critical that Shell provide further information about this cumulative effect.

ACFN also has concerns regarding the limitations in Shell’s information about the footprint and effect of the compensation lakes. Specifically, the lakes will remove wildlife habitat but Shell appear to have failed to include information about this habitat removal into its impact assessment (Draft Meeting Minutes July 12, 2011, from a No-Net-Loss Plan meeting between Shell, DFO, and the FNs). In addition, Shell states that the 250m setback along the Athabasca River provides a balance between minimizing impacts to the wildlife corridor and recovery of bitumen. Shell
asserts that the setback is sufficient to allow the movement of wildlife along the Athabasca River, but provides no substantive rationale (PRM Round 2 AENV SIR #49a). Furthermore, it goes without saying that without information on pre-industrial resources and how resource conditions have been altered to date, any incremental effects of landscape fragmentation and the resultant increase in human access cannot be understood. Without information on how wildlife movements through the landscape will be restored and human access reduced in the future, the adverse effects on the ability of future generations to pursue traditional lifestyles cannot be determined. Shell must provide this information.

c. Requests

1. Provide sufficient information regarding bison and caribou, including
   a. quantify the significance of impacts on Traditional Resource availability, prior to specific reclamation of bison and caribou habitat.
   b. Please quantify the significance of impacts on Traditional Resource availability, after specific reclamation of bison and caribou habitat.
   c. Please quantify the impacts on Traditional Resource use and culture relating to bison and caribou comparing the application case to the pre-industrial case.
   d. Please quantify the impacts on Traditional Resource use and culture relating to bison and caribou comparing the planned development case to the pre-industrial case.
   e. Please discuss the implications for future generations using Traditional Resource in light of the evidence that pre-disturbance habitat will not be restored and thus the impact not being reversed.

2. Please describe where wildlife from the Project area will go during Project construction and operations and where re-colonizing wildlife will originate from after closure and reclamation.

3. Please assess the ability of future generations to continue hunting and fishing and accessing traditional resources in light of reaching a landscape scale threshold at which wildlife populations may cease to persist in the LSA and RSA.

4. Please provide quantitative evidence of how fragmentation
   a. has affected the use of Traditional Resources to date,
   b. will continue to alter the landscape in the future, and
   c. will be mitigated to alleviate the impacts on Traditional Resource use in the future.

5. Please provide evidence that the various corridor options (widths and lengths) will work to maintain regional wildlife movements.

6. Please provide targets for the re-establishment of traditional wildlife resources (i.e., harvested species such as moose, bison, black bear, waterfowl, beaver, muskrat, etc.).
7. Please conduct detailed vegetation plots within uncommon ecosites and wetland types and in cut-blocks to increase the accuracy of the preliminary vegetation map.

8. Please provide evidence, either from supporting data or peer-reviewed literature, for Shell’s claims that reclaimed shrubland may provide habitat that will mitigate the loss of fens inhabited by yellow rail (an avian species listed as of Special Concern and in Schedule 1 under SARA; Shell has indicated that the effects of the project on this species and its habitat will be high).

9. Please use statistical analysis to validate the HSI models and model assumptions. For example,
   a. describe the accuracy associated with the AVI data used in the various LSA Models;
   b. describe how the accuracy of the HSI models and impact predictions affect Shell’s ability to validate its predictions in the future; and
   c. provide data or supporting literature for Shell’s claims that moose, lynx, fisher/marten, and black bear are the species most sensitive to habitat fragmentation and that the other KIR species as well as bison and caribou will show similar or lesser effects.

VI. Aquatic Resources

   a. JRP Requirement
   See pages 7-9 above.

   b. Commentary

Shell still has not provided an analysis of the implications of water withdrawal and pollution on traditional societal development, lifestyle, culture, and health and the ability of future generations of traditional land users to pursue traditional lifestyles.

A significant hydrogeologic impact involves relatively widespread degradation of groundwater quality due to tailings disposal. In PRM Round 2 ERCB SIR #57c, it appears that groundwater quality will continue to degrade surface water quality beyond the temporal boundaries of 100 years after completion of mining established for the EIA. For example, in Shell’s solute transport model, peak concentrations of several Project contaminant indicator parameters were not determined at several nodes which represent points of groundwater discharge to surface water in the Project Area because they occurred beyond the timeframe of the model (100 years beyond Project closure). In addition, no regional solute transport modeling was carried out. As a result, the basis for Shell’s assessment of negligible effects of Project-based groundwater seepage on the Athabasca River with respect to human and ecological health is unclear. Groundwater solute transport modeling of the external tailings disposal area (ETDA)-sourced contaminant seepage should be carried out over a sufficient time scale to allow peak contaminant loadings to be
quantified in terms of cumulative impacts from all oil sands projects, operating and planned, within the Athabasca basin over the next 100 years and beyond.

Although Shell states that they will monitor for groundwater quality and install mitigation measures around the perimeter of the tailings pond (PRM Round 1 ERCB SIR #319b), the actual containment efficiency achieved will depend on the scope and comprehensiveness of design of the proposed ETDA-groundwater monitoring well system, as well as groundwater quality monitoring frequency. Given that groundwater plumes are often lenticular (i.e. long, narrow plumes aligned in the direction of groundwater flow), it is possible that the proposed monitoring well network may not detect all potential ETDA-derived groundwater seepage. Furthermore, Shell proposes to monitor groundwater quality semi-annually to annually (PRM Round 2 ERCB SIR #55), and thus a significant amount of ETDA-sourced contamination could migrate beyond the interception well network before the subsequent round of groundwater quality monitoring occurs.

Lastly, in order to understand the long-term ecological implications of habitat shifts, such as the ones that will occur through the current lake compensation plan (primarily stream/river to primarily lake), it is important to predict end land use opportunities with some degree of certainty. Yet Shell provides no discussion as to how ecosystem shifts of this magnitude might influence fish and wildlife populations (in terms of life history parameters such as size, demographics, etc.) at the local or even the regional level.

c. Requests

1. Please quantify the impacts on traditional resource use and culture relating to groundwater contaminants loadings comparing the application case to the pre-industrial case.

2. Please quantify the impacts on traditional resource use and culture relating to groundwater contaminants loadings comparing the planned development case to the pre-industrial case.

3. Please discuss proposed contingency measures, if any, to address any long-term (i.e., 100 years post-mine closure) tailings-related groundwater contaminant mitigation requirements. Please discuss the implications for future generations using traditional resources in light of evidence that pre-disturbance groundwater quality will not be restored and thus the impact not being reversed.

VII. Capacity of Renewable Resources

a. JRP Requirement

<table>
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<tr>
<th>JRP Terms of Reference</th>
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<tbody>
<tr>
<td>Renewable resources are resources such as fish, wildlife, trees, water quality and quantity and airshed which are replaced or replenished, on an ongoing basis, either naturally or by human actions.</td>
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</tbody>
</table>
The Joint Review Panel shall consider the capacity of renewable resources that are likely to be significantly affected by the project to meet the needs of the present and those of the future. The following points should be addressed:

- A description of the renewable resources that may be affected by the project;
- A brief description of the project’s environmental effects on the renewable resource;
- an indication as to the way in which the capacity of this resource was measured or evaluated;
- an indication of the temporal and geographic boundaries used to assess the capacity of the affected resource;
- a description of any other appropriate mitigation measures;
- a determination of the significance of the residual effects on the renewable resource and its capacity to meet the needs of current and future generations;
- an identification of the risks and uncertainties that remain and the description of the next steps, if any, that will be required to address this effect.

Part II (2)(h): the capacity of renewable resources that are likely to be significantly affected by the project to meet the needs of the present and those of the future.

b. Commentary

Shell has not provided evidence to support the conclusion that “the effects of fragmentation and habitat loss are predicted to be reversed.” Several wildlife species are already in decline and listed as Species at Risk. For example, woodland caribou are likely to be extirpated from northeastern Alberta as their sustainability is considered “very unlikely” by Environment Canada (2011). For wetland ecosystems, such as bogs and fens, Shell has virtually no plans for their re-establishment, even though these habitats represent critical habitat for many wetland Species at Risk.

In light of the fact that a large number of non-native plant species are found in human-disturbed areas, Shell’s expectation that impacts to traditional plant community resources will be reversible is not supported. The presence of a large number and variety of non-native plant species in human-disturbed areas, even after reclamation, shows that the reestablishment of native plant communities without non-native plant species has not been possible. This indicates that the effects of non-native plant species on native vegetation are likely irreversible.

Moreover, the interrelationship between groundwater, surface water, and wetland ecosystems is not acknowledged, as is evident in their contention that they can reverse habitat loss. Contrary to
this contention, there will be irreversible impacts to groundwater, and by implication, irreversible impacts to wetland ecosystems. Shell has not provided information on how it intends to re-establish the pre-industrial groundwater regime and diversity of plant or animal species. Shell has not provided targets for the re-establishment of these TR. Also, please see our comments on reversibility of impacts to and capacity of renewable resources under the TOR Section for Cumulative Effects Assessment.

c. Requests

1. Assess the effects of the Project on lifestyle, culture, health and quality of life and exercise of rights, including the ability of future generations to pursue traditional activities, obtain a livelihood from exercising their rights and maintain their cultures.

2. Discuss how the shift from wetland to upland plant communities will impact future generations to pursue traditional life styles.

3. Assess the impacts on Traditional Resources using evidence indicating that impacts to Traditional Resources will not be reversible and that the impacts will be of far-future duration.

4. Assess the capacity of renewable resources to meet the needs of current and future generations of traditional land users in light of the finding that impacts will last more than 20 years.

VIII. Accidents and Malfunctions

Please provide the Panel with detailed information regarding any malfunctions or accidents experienced at Shell’s other oil sands operations, including both reported and unreported events, and including information regarding any and all hydrocarbon and other spills.

In particular, please include a detailed description of any incidents and Shell’s responses in relation to cracks, failures, or instability in the dykes separating the Muskeg River Mine tailings pond from the Athabasca River. Please include dyke maintenance records circa 2007-2008.

IX. Water Quantity

i. Accidents and Malfunctions

a. JRP Requirements

<table>
<thead>
<tr>
<th>Relevant Sections of EIA Documents</th>
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</thead>
<tbody>
<tr>
<td>Shell (2012) Volume 2, section 12.3</td>
</tr>
<tr>
<td>Joint Review Panel – Terms of Reference</td>
</tr>
</tbody>
</table>
Part II: Scope of the Environmental Assessment at s.2(a)(b)

(a) The environmental effects of the project, including the environmental effects of malfunctions or accidents that may occur in connection with the project and any cumulative environmental effects that are likely to result from the project in combination with other projects or activities that have been or will be carried out;

(b) The significance of the effects referred to in paragraph a.

(d) measures that are technically and economically feasible and that would mitigate any significant adverse environmental effects of the project

(h) the capacity of renewable resources that are likely to be significantly affected by the project to meet the needs of the present and those of the future.

Part III at page 13: Accidents and Malfunctions

In considering the environmental effects of malfunctions or accidents that may occur in connection with the project, the Joint Review Panel should include potential malfunctions or accidents associated with the following components. . .

- Any other project components or systems that have the potential, through accident or malfunction, to adversely affect the natural environment.

The Joint Review Panel should consider the likelihood of occurrence of a malfunction or an accident and the sensitive elements of the environment (e.g. communities, homes, natural sites of interest, areas of major use) that may be affected in the event of any such malfunction or accident.

Plans, measures and systems to reduce the potential occurrence of a malfunction or accident should be considered in the assessment and should indicate how they will reduce the effects or consequences of any such malfunction or accident.

JRP Terms of Reference Incorporated from the Provincial Terms of Reference

4.9 Environmental Management System and Contingency Plans

... Provide:

b) plans to prevent or minimize the production or release into the environment of substances that may have an adverse effect;

c) a conceptual contingency plan that considers environmental effects associated with operational upset conditions, such as serious malfunctions or accidents, or extreme weather events;
b. Commentary

Groundwater and surface water interact intimately to support ecosystems and species and traditional land use. If ecosystems are to be sustained under an approved mining regime, and if the Panel is to be able to assess the environmental effects of the Project, adequate hydrogeologic data must be available and the appropriate analyses completed. Oilsands mining makes significant incursions into the local hydrogeology. In addition, there remain significant uncertainties involved within groundwater systems arising from data gaps and incomplete assessments. CEMA (2012, p17) echoes this: “the cumulative effects of mining and in-situ operations on regional groundwater are not fully understood.” The EIA work to date is inadequate to provide the scientific basis for rendering a decision.

On October 16, 2010, a major rupture of the Methy Aquifer below the Muskeg River Mine (MRM) was noticed by Shell. It was caused by Shell’s excavation of ore down to the surface of the limestone cap rock separating the ore from the confined aquifer below. With the ore body removed, the pressurized water in the Methy Aquifer was able to move upward through a pre-existing dissolution feature in the limestone. It has resulted in an estimated eight million m$^3$ of water escaping from the Methy Aquifer, now located in Cell 2A of the MRM. Shell has indicated that the leak is ongoing and will continue until it has asymptotically declined to a level at which the head (the pressure due to the overlying water) prevents further leakage. This water is saline thus is toxic to terrestrial ecosystems. Shell opted to allow this water to continue to leak with the intention that they will “entomb” it in Cell 2A indefinitely once the rupture has slowed down sufficiently for them to more easily plug the leak. Until they were able to fully assess this hazard, Shell temporarily sterilized the 20-m depth of ore immediately above the limestone cap rock within sections of the MRM to reduce the hazard to a level it deems acceptable.

This leak raises serious concerns for the unassessed and escalating risk to aquatic and terrestrial ecosystems as Shell carries out its open-pit mining over this limestone cap rock. The PRM EIA documents are silent on this incident as well as on the spatial likelihood of this geohazard and the significance of the risk to aquatic and terrestrial ecosystems as mining continues. The PRM EIA does not provide Shell’s assessment of the risk factors associated with this type of ingress and where these risk factors are located. It also does not indicate the monitoring steps that will be put in place to manage these risk factors in relation to progressive build out of the mine. In its Integrated Application for the Frontier mine, Teck (2011, V1, p 14-36) provides its “adaptive management” approach “to control the eventuality of encountering karst” that includes staged monitoring steps to determine whether karst is “in front of the advancing mine.” Teck (2011, V5, p 2-39) acknowledges, however, that early detection of karst is uncertain: “karst development generically tends to be unpredictable, rendering it difficult to have more than moderate confidence.” Shell faces the same challenges in its PRM proposal and hence should provide a detailed karst detection plan. At an Oct-5-2011 meeting between Shell and the ACFN, Shell was unable to provide detailed mapping of this limestone layer including the occurrence and size distribution of these openings between the underlying aquifer and the overlying ore body, and interpretations of the risk associated with fissures of different types and sizes. In addition, in its
response to the JME JRP’s request for supplementary information, Shell was unable to provide this mapping, instead indicating that should the mine be approved, it would proceed with the said mapping. Yet, its 2007 PRM EIA documents clearly recognize the Eymundson Sinkholes (PRM Base Case Report, p 50 section 5.4.3), located in the immediate vicinity of the main excavation zone for the PRM, and goes on to say (PRM EIA, volume 3, section 2.7.2.2): “In addition, 46 sinkholes were identified in a 4 x 4 township area (Townships 7-10 and Ranges 98-101 W4M) in the vicinity of the Project indicating that this karst topography is relatively common in the RSA.” Despite this recognized broad occurrence of karstic topography within or in the vicinity of the PRM, Shell does not provide a management strategy in the 2007 EIA documents to address the potential for ingress of underlying aquifer water into its proposed PRM mine pits. It is also unknown the extent to which other operators may be experiencing operational and unattributed versions of the same problem. It is possible that removal of pit water routinely believed to be due to precipitation and runoff may actually be due, at times, to smaller versions of this type of rupture. Until this situation has been assessed and understood, additional avoidable ruptures may be forthcoming as the ore body is removed on a broader scale. The Panel needs the information required by the terms of reference for both the JRP and AEW listed above in relation to risk of similar ruptures. Because these types of incidents have the potential to contaminate aquatic and terrestrial ecosystems, the Panel will be unable to assess the environmental effects of the Project without sufficient information regarding the nature and extent of the risk.

In responding to SIRs associated with its JME application, Shell has provided further incomplete information concerning its response elsewhere to this geohazard. Shell (2012) indicates that it will develop a geohazard protocol to identify and characterize hydraulic pathways in the Devonian stratum so that it can act upon areas of concern. It indicates that a collection of investigative methods will be used but unfortunately does not explain what each method will accomplish, how the methods complement each other, what data sets the methods must yield to resolve the problem, and how the acquired data will be interpreted to identify the various hazard features within the Devonian limestone. In summary, Shell does not explain how its generalized methods and approach will meet the objectives presented. Shell (2012) also presents four factors that it will consider in its geohazard risk assessment. For example, it will establish elevation limits to mining based on areas identified by geo-hazard protocols as low, medium, and high risk. Again, Shell’s response provides only general information on factors that will be considered in setting these risk levels, however Shell does not indicate how this information will be used to establish the risk levels spatially. When mining an area mapped as medium risk, the protocol provides for increased observation and awareness during mining. In high risk areas, the protocol requires that a material buffer be left intact however the response is again vague in that it does not indicate how the depth of this buffer is determined.

It is notable that although Shell (2012) refers to its response program currently active within the Muskeg River Mine and the Jackpine Mines, its response leaves it unclear whether there is a detailed procedure already available from those mines, or whether a procedure is under development. If a procedure is in place, then Shell should provide the details of that procedure because that procedure will presumably guide what it does in the proposed PRM mine. For example, where associated recognized hazard factors are assessed and interpreted to revise mining operations, Shell should explain how it combines these factors to yield adjustments in mining operations: what objective basis is built into the interpretations? Without this
information, Shell’s highly generalized approach provides no assurances that it knows what to do to manage this geohazard.

It is important that a map be prepared in advance of mine approval indicating all areas that have been identified as having the potential to act as conduits for flow of Devonian-sourced groundwater into mine pits. Teck Resource’s proposed Frontier Mine is located in the immediate vicinity of the proposed PRM mine and has the same responsibility to address the karst concern. Unlike Shell, Teck provides explicit discussion of its management needs in its Integrated Application (p 14-36, V1). And despite this explicit recognition of the hazard it must manage, regulators have responded to Teck Resources with extensive additional requirements – see SIR #16 and #17 in ERCB (2012) and SIR #47, #52, and #59 in ESRD & CEAA (2012) – clearly identifying a level of detail and preparedness that regulators expect before mines can be considered for approval. Shell has not demonstrated that it has understood the hazard, identified its extent, prepared a strong response plan, described and quantified the mining implications, nor assessed the scope of potential environmental impacts. Such information is essential because it provides the foundation for interpreting the significance of the features present, communicating the implications of the risk levels to regulators and other concerned and affected parties, identifying the adjustments needed to mining operations (mitigation), and overall demonstrating preparedness in addressing this complex and uncertain geohazard.

c. Requests

1. Hazard Extent

   a. Provide detailed mapping showing all dissolution and other karst-susceptible features with the potential to act as conduits for flow of Devonian-sourced groundwater into the mine pits. Provide a brief discussion on each of the identified areas including why they are considered a potential risk, and how such risk will be mitigated in the context of mine operations and environmental risk.

   b. Review the latest groundwater data from industry and Alberta Environment regarding the nature and extent of the aquifers beneath and adjacent to the proposed mining cells and integrate this information with hazard mapping interpretation to fully describe the hazard and its potential environmental consequences.

2. Hazard Understanding

   a. Provide a regional investigation of existing and potential aquifer leaks and vulnerabilities arising from mining above the limestone layer. Which oilsands companies have agreed to share related data (and for which locations) and when will those data be made available for independent review?

   b. With respect to Shell’s four identified geohazard risk factors (Shell 2012), how are they evaluated and integrated to yield a combined risk? Define the risk ratings quantitatively.
c. Discuss the relative effectiveness of intact native *in situ* material versus placed capping deposits in inhibiting water releases through the Devonian layer.

3. Hazard Response

a. Provide details on the status of geo-hazard management (karst) in the Muskeg River and Jackpine Mines and explain what specific knowledge gained in those mines Shell intends to transfer to geohazard management in the proposed PRM.

b. Describe the monitoring steps that Shell will put in place and the specific data sets that Shell will acquire to manage its identified risk factors in relation to progressive mine build-out.

c. With respect to Shell’s proposed response for the JME, a) identify the depth of buffer that will be left in place in high risk areas; b) specify the horizontal area over which mining will cease when a seep or release of concern is identified; and c) explain how the elevation limit for mining is determined from the hazard factors.

d. With respect to Shell’s proposed response in its JME application: a) indicate when the Execution Plan will be completed and made available; and b) indicate when the Execution Plan will be implemented at MRM and when the Panel can expect an update as to its effectiveness.

e. Provide evidence from elsewhere around the world that demonstrates that Shell’s response in addressing the Cell 2A rupture will be successful in preventing environmental contamination beyond Cell 2A.

f. Provide the names and contact information of the leading world experts on subsurface feature grouting who Shell has consulted in addressing the rupture associated with MRM Cell 2A.

4. Mining Implications

a. What amount of recoverable ore is vulnerable as a consequence of adequately managing the karst geohazard?

b. To what extent are tailings plans (and reclamation plans) subject to change due to managing this hazard?

c. How will the four hazard factors identified by Shell be combined to shape its overall mining plan?

d. Describe quantitatively the operational measures that will be put in place at the proposed PRM site to avoid the risk of saline aquifer water migrating to the surface as a result of removing ore body down to the underlying limestone cap rock.
5. Environmental Implications

a. How will existing commitments, particularly to First Nations and environmental protection, be delivered when significant changes to mine planning and design need to be made after approval?

b. In situations such as MRM Cell 2A where saline Devonian water is “entombed” in a mining cell, discuss the long-term implications for environmental protection of holding contaminated water in place indefinitely by mine walls and constructed dykes, particularly in light of the fact that the surrounding walls were not designed for this purpose.

c. Discuss the potential for rupture contamination from the Methy aquifer to affect the water quality of pit lakes.

ii. Climate Change Outcomes

a. JRP Requirements

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<th>Relevant Sections of EIA Documents</th>
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<td><em>EIA Volume 3, Appendix 3-4</em></td>
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2. The assessment shall include a consideration of...:

a. the environmental effects of the project... and any cumulative environmental effects that are likely to result from the project in combination with other projects or activities that have been or will be carried out;

b. the significance of the effects referred to in paragraph (a).

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... The Joint Review Panel should also take into account the potential influence of climate change scenarios presented by the proponent and interveners on climate parameters (e.g. precipitation, temperature), and physical environmental processes.

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<th>JRP Terms of Reference Incorporated from the Provincial Terms of Reference</th>
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<td>s. 5.4.3 Discuss:</td>
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a) climate change and the local and/or regional inter-provincial/territorial changes to environmental conditions resulting from climate conditions, including trends and projections where available;

b) stages or elements of the Project that are sensitive to changes or variability in climate parameters, including frequency and severity of extreme weather events. Discuss what impacts the change to climate parameters may have on elements of the Project that are sensitive to climate parameters; and

c) the adaptability of the Project in the event the region’s climate changes. Discuss any follow-up programs and adaptive management considerations.

s. 5.6.6  Discuss

(a) the impacts of water withdrawals. Include cumulative effects and consider emergency operating, low-flow conditions and in-stream flow needs criteria established for the Athabasca River;

b. Commentary

Shell has not demonstrated that the Athabasca River water it depends on for PRM will be available to it when needed, nor has it shown that the future hydrograph of PRM streams is understood. Shell’s projections are not based upon the best information and science available to determine most likely future climates and their hydrologic implications. There is a global scientific consensus that climates are changing in response to the anthropogenic burning of fossil fuels. As discussed in detail in Carver (2010), emissions are outpacing even the most severe scenario presented by the Intergovernmental Panel on Climate Change. It is clear that the region’s climate will change. In order to discuss changes to environmental conditions resulting from climate conditions and the impacts of such changes to climate parameters on area hydrology, Shell must use the best available science to ascertain what those changes to climate parameters may be. Projecting future climates and using these projections to determine future water dynamics is a rapidly evolving field of hydrologic science. Peer-reviewed scientific guidance is available to support practitioners in making informed and defensible projections of future hydrologic behavior and expressing them in a manner that is supportive of sound decision making. However, Shell uses an approach taken from an unpublished paper, internal to the Indian and Northern Affairs Canada to filter the emissions scenarios. As a result, Shell sharply underestimates the potential impacts to area hydrology. This approach does not select appropriate emission scenarios and it is also almost a decade old. Many additional years of intense climate change science has resulted in new data and tools that enable more effective integration of climate change science into EIAs. New information regarding current trends and improved projections are available. Such integration is required to enable the JRP to conduct an accurate assessment of the environmental effects of the Project that takes into account the potential influence of climate change scenarios.

In addition, Shell takes several additional incorrect positions that render its conclusions false. Shell holds that a history of change taken from a 50-year instrumental record is exaggerated in comparison with a 90-year record. This is false and serves to diminish its characterization of the
accelerating rate of climate change. Shell also determines the 7Q10 for two example large systems rather than the 7Q100 for the systems within PRM which further serves to downplay the magnitude of the potential impacts. Lastly, the Alberta and Canadian governments have led a multistakeholder process (Phase Two Framework Committee – P2FC) created to establish a set of rules for oilsands water withdrawals from the lower Athabasca River over the coming decades (called the Phase Two Water Management Framework – P2WMF). This was a science-based process that has included completion of a collection of assessments that attempted to integrate knowledge of future climates into the P2WMF. These assessments contained errors and omissions in approach (see Carver 2010 for details) and are now two years out of date, but they offer an improved and more up to date approach than what is provided by Shell in its PRM EIA. However, even this understanding, supported by AENV and DFO, is not recognized in the PRM EIA materials, highlighting the severity of the climate-change gaps in its EIA.

The P2FC is relevant to the JRP’s PRM assessment for two reasons. First, it demonstrates that the regulators agree that future climates must be taken into account in the EIA and provides guidance on regulators’ approach and assumptions in this regard. Second, Shell is relying on water from the Athabasca River to meet incremental demands associated with amendments to its original EIA and these water demands depend on a future supply being available from the Athabasca River and allowed under the P2WMF. It is not clear that this will be available for the PRM particularly given the emerging limitations imposed by future climates. And Shell estimated potential low flows in terms of the 7Q10 which, in this situation, is an inappropriate metric as a surrogate for extreme situations and, further, is inconsistent with the 7Q100 which has been the focus of P2FC projections. Shell has not demonstrated that this water will be available to it when it needs it given its lack of consideration of P2FC climate change science. Its contingency plan is to have a 30-day storage facility yet no information is provided as to why that would be sufficient to address all future shortfalls in water supply availability.

c. Requests

1. Provide current downscaled climate projections from Global Climate Models (GCMs) and Regional Climate Models (RCMs) taking into consideration the most likely ranges in greenhouse-gas emissions scenarios (consistent with current trends). Present the results and interpret the uncertainty in a manner that supports informed decision-making and is consistent with the best available hydrologic science as presented in the applied scientific literature.

2. Incorporate appropriate revised climate change projections directly into all the hydrologic modeling work that is undertaken within the scope of the EIA to describe future hydrologic behaviour of PRM streams and adjust all model outputs accordingly, recognizing the attendant uncertainty.

3. Obtain from DFO and AEW the most recent projections of Athabasca River water supply under future climates and revise and update this information in conjunction with a) the current appropriate revised climate change projections, and b) the corrected outputs from hydrologic models to assess water availability to the PRM during its operational life, and in consideration of extreme low flow situations (using the 7Q100).
iii. Interactions with Future Regional and Local Development

a. JRP Requirements

**Relevant Sections of EIA Documents**

*Volume 4A, section 6.4.6 and Appendix 4-4*

**Joint Review Panel – Terms of Reference**

*Part III: Cumulative Effects Assessment at page 13*

The cumulative effects assessment should...include, but not be limited to the following:

- A pre-industrial case to allow the Joint Review Panel to take into account the effect that may have already been experienced prior to the project; and
- Future foreseeable projects or activities as of the issuance of the Joint Review Panel’s Terms of Reference.

**JRP Terms of Reference Incorporated from the Provincial Terms of Reference**

*4.2 Project Components and Site Selection*

Describe the nature, size, design capacity, location and duration of the components of the Project. Include:

i) potential cooperative ventures with other oil sands operators and other resource users to minimize the environmental impact of the Project or the environmental impact of regional oil sands development. Discuss how Shell will work to develop such cooperative opportunities and identify a timeframe for their implementation to minimize the environmental impact of the Project. Identify environmental implications of lease boundary agreements with adjacent operators and indicate plans to address any lease boundary issues that may arise;

*4.6 Water Supply, Water Management and Wastewater Management*

Provide the following information for the Project:

a) a water balance for each phase of the Project including assumptions made and methods chosen;

i) discuss potential cooperation with other oil sands companies with regard to water-related infrastructure and management including, but not limited to, water intakes, pipelines, water storage and withdrawals.

Provide a Water Management Plan. Document and discuss:
b. Commentary

The proposed mine requires the modification of various surface streams and the creation of new and temporary diversion channels. These requirements vary during the life of the mine, culminating in reclaimed streams integral to the closure landscape. At each stage, the hydrologic behaviour of these channels needs to be characterized sufficiently so that the designs can be confidently created in the coming decades, including the far future case (closure landscape). These requirements invoke complex considerations because stream hydrographs are shaped by the climate and surface and subsurface conditions of the contributing areas, all of which will be changing in the decades during which mine development proceeds. Specifically, the following factors must be understood and quantified so that the appropriate hydrologic models can be applied:

1. The prevailing climate (rainfall total and intensity, snowfall accumulation, melt rates, evaporation, etc) and its corresponding hydrologic surface behaviour (runoff coefficients, rainfall erosivity, etc);
2. The surface cover and condition of contributing areas (ie, percentage of wetlands, lakes, upland/forests, etc and their associated characteristics including history of forest fires);
3. Sufficient baseline data of present streams to calibrate hydrologic models (minimum 3-5 complete years);
4. Bed and bank erodibility of diversion channels; and
5. Inputs into new diversion channels of water from mining activities occurring on adjacent leases.

Once these drivers are adequately characterized, these input data can be provided to appropriate hydrologic models so that projected hydrographs can be quantified, enabling channels to be sized and restoration prescriptions developed.

The PRM EIA documents leave this work unfinished in several respects. Current land-use condition and its subsequent changes through the life of the mine (due to foreseeable projects and activities such as forest harvest, road building, wildfires, climate change, and mining activities) are not spatially quantified. Future climates remain uncertain (see IR #2 above) during the incremental mine build-out and including the far future closure case. Baseline data are too brief and punctuated by gaps, rendering the data inadequate for model calibration. There is an unspecified contribution to diversion channels from adjacent leases (ie, the proposed Frontier mine) so that the design capacity of the channels remains unknown. Groundwater changes are not understood and these knowledge gaps have implications for future low flows (see CEMA 2012 and AENV 2010). The nature of the subsurface will also change due largely to mining.
activities, including existing mines in the region and reasonably foreseeable future approvals. Some of these changes will be within the tenure of the proposed PRM while others will be outside this area, potentially within the tenure of other oilsands operators. In addition to these data gaps, the hydrologic models have inherent limitations (significant errors and uncertainties) and these have not been presented quantitatively in the EIA nor have they been extended in light of the various shortcomings in the input data.

Similarly, the ESRD and CEAA have previously required this kind of reciprocity and compatibility assessment in their response to Teck Resources’ Integrated Application for the Frontier Mine. For example, ESRD and CEAA (2012, p14) state:

“40. Volume 1, Section 7.7.2.1, Page 7-11

The Frontier Project diverts the drainage system from the Birch Mountains such that the delivery of water-borne detritus will not reach the west side of the Athabasca River from Pierre River to Redclay Creek – a distance of about 15 miles.

a. Describe and illustrate the conveyance of this diversion of natural flow across the proposed Shell PRM, the end pit lakes and the fish habitat compensation lakes without quality impairment or water withdrawal.

b. Clarify the relationship between Redclay Creek and the Shell PRM Fish Habitat Compensation Lake. Shell’s application shows that Redclay Creek does not flow into their Compensation lake whereas Teck’s application does.”

41. Volume 1, Section 7.7.2.4, Page 7-15

The natural channels will have a significantly modified flow regime as a result of flow diversion. Redclay Creek, between its mouth on the Athabasca River and 7 km upstream is an example of a stream which will have a change in flow regime – i.e., peak flows.

a. Discuss how the natural channels will be protected from bank erosion and bed erosion and any change in platform that may result.”

Requirements such as these are equally applicable to Shell’s PRM proposal.

c. Requests

1. Provide the future design hydrographs of restored streams and temporary diversion channels, incorporating accurate prevailing information for land cover, surface condition, regional groundwater status, and climate.

2. Describe the design of temporary channels needed to accommodate the full range of potential flows and in consideration of the uncertainties associated with each hydrologic model and its input data.

3. How is Shell coordinating the design and construction of its diversion channels with adjacent lease holders who may be using these channels at a subsequent future date?
What is Shell’s plan if it cannot coordinate activities or if Shell or another operator has mined out or dewatered an area on which the other party is relying?

Conclusion

For the reasons set out above, the information provided to date by Shell is insufficient for the JRP to be able to meet its obligations under the Terms of Reference and other sources to assess the potential adverse impacts and infringements of our section 35 rights.

Respectfully, the JRP must request that Shell address these insufficiencies. We hope that this submission, and the specific requests contained in it, assist the JRP in that regard.
REFERENCES


Shell Canada Ltd. 2010. Shell Response to MCFN Technical Review by MSES.


