
ATHABASCA CHIPEWYAN FIRST NATION
INDUSTRY RELATIONS CORPORATION

220 Taiganova Crescent Fort McMurray, AB T9K 0T4 (780) 791-3311



January 17, 2014

Pierre River Mine
Joint Review Panel Secretariat
160 Elgin Street, 22nd Floor
Ottawa, ON K1A 0H3
Shell.Reviews@ceaa-acee.gc.ca

[VIA EMAIL]

Dear Panel Chair and Members:

RE: Adequacy of Shell's Additional Information Provided October 13, 2013 (CEAR #191)

We are providing this submission in response to the Joint Review Panel's invitation for public comment the adequacy of the additional information submitted by Shell to the Joint Review Panel on October 13, 2013 (CEAR #191).

On behalf of Athabasca Chipewyan First Nation (ACFN), the ACFN Industry Relations Corporation (IRC) has, with the assistance of technical experts, reviewed Shell's responses (including supporting appendices) to the JRP's supplemental information requests. The detailed technical reviews are enclosed as follows:

- Attachment "A" – Larcombe, P.M. (Symbion Consultants) 2014. *Technical Review of Shell Canada Energy Responses (dated October 31, 2013) to Joint Review Panel Supplemental Information Request (dated October 25, 2012) Regarding the Integrated Application for the Pierre River Mine Project.*
- Attachment "B" – McCormack, P. (Native Bridges Consulting) 2014. *Assessing Supplemental Information about Cultural and Social Elements Provided by Shell Canada Limited with Respect to the Proposed Pierre River Mine Project.*
- Attachment "C" – MSES. 2014. *Sufficiency Review of Shell Canada's Responses to the Joint Review Panel's Supplemental Information Requests for the Pierre River Mine Project*
- Attachment "D" – Carver, M. (Aqua Associates). 2014. *Shell Energy Canada Pierre River Mine Joint Review Panel SIR Hydrology Review of Shell Responses*

For the reasons summarized here, and detailed in the attached technical reviews, it is our informed view that Shell's additional information is, for the most part, inadequate to answer a number of supplemental information requests that are critical for an assessment of impacts to ACFN and to address ACFN concerns about the Project. While the attached

reviews identify a number of deficiencies, ACFN also reserves the right to bring forward additional concerns as they may arise with respect to the Project.

Our technical reviewers have found instances where Shell continues to rely on assumptions and methods that were found by the JRP for the Jackpine Mine Expansion Project to be inadequate. Data gaps (both as a result of data simply not yet existing as well as inadequacies in Shell's research) abound throughout Shell's responses. Shell's dependence on "professional opinion" in the absence of empirical data, and without providing justification (credentials and experience of authors) for those opinions continues to be pervasive throughout Shell's additional information and is particularly of concern when those opinions conflict with ACFN traditional knowledge, the peer-reviewed scientific community, and previously documented concerns. It is our fear that because this information will become part of the grey literature for the oil sands region, if it is not corrected by the authors of the reports themselves (as opposed to relying on intervenor submission to fill gaps), it may lead to compounding inaccuracies, inadequacies and errors in future assessments.

The JME identified critical information gaps that are within the Crowns' ability to fulfill, and necessary to ensure a full and fair consideration of the impacts of the Pierre River Mine project on ACFN. For example, the JME Panel found that the absence of a management framework and associated thresholds for TLU makes it very difficult for panels to evaluate the impact of individual projects on TLU. Despite the Panel's recommendation that a TLU management framework should be developed to allow better assessment of both project and cumulative effects on Aboriginal TLU, rights and culture, to our knowledge neither Alberta nor Canada has taken any steps to attempt to fill this gap over the past six months. A draft Recovery Strategy for wood bison remains outstanding despite Environment Canada's evidence in the Total hearing that it would be produced in 2011, EC's evidence during the JME hearing that the strategy was targeted to be produced in 2013, and despite the Panel's urging that Canada ensure its "expeditious delivery".

The absence of this critical information could change the course of this assessment. This is not, as JME was, an extension to an existing mine, or a development proposed for an area surrounded by mines. This is a new development on the west side of the River within key bison habitat, in a context where ACFN's rights, culture and TLU have already suffered significant, adverse and in some cases irreversible impacts. We urge the Panel to proceed with the utmost diligence in assessing the impacts of this Project on ACFN's Rights, culture and TLU. The assessment of the proposed Pierre River Mine should be undertaken on the basis of the best and most complete information possible.

Overall, in consideration that many of Shell's SIRs responses are inadequate and that many of the frameworks, thresholds and information that were identified by the JME JRP as necessary are still not in place, **we respectfully submit that there are serious deficiencies that must be addressed before this project can proceed to hearing.**

The risks to Shell of a relatively short delay in order to allow the production of information must not be given more weight than the risks of an incomplete assessment, and consequently the impacts of yet another large oil sands mine that ACFN members may have to live with on a daily basis over the coming decades and centuries.

Additional work is required. For at least some of this work, it is our view that Shell should be compelled to involve First Nations in collaborative research and assessment. We note that the JME JRP relied on information submitted by First Nations, in particular ACFN, and other interveners (e.g., Environment Canada) to fill gaps in Shell's assessments. ACFN is not in a position to undertake, individually, fulsome research to fill all of the gaps identified, especially in a short time-frame (between now and April). We would like to undertake work to help fill gaps, provided we are assured of adequate time and resources.

We would also like to take this opportunity to alert the JRP that two of our key expert witnesses will be unavailable prior to, and throughout, April. As such, we request that even if the JRP determines that sufficient information is available to proceed to hearing, that the hearing not be held until after April, 2014.

Sincerely,

<original signed by>

Lisa King
IRC Director

Enclosures:

- Attachment "A" – Larcombe, P.M. (Symbion Consultants) 2014. *Technical Review of Shell Canada Energy Responses (dated October 31, 2013) to Joint Review Panel Supplemental Information Request (dated October 25, 2012) Regarding the Integrated Application for the Pierre River Mine Project.*
- Attachment "B" – McCormack, P. (Native Bridges Consulting) 2014. *Assessing Supplemental Information about Cultural and Social Elements Provided by Shell Canada Limited with Respect to the Proposed Pierre River Mine Project.*
- Attachment "C" – MSES. 2014. *Sufficiency Review of Shell Canada's Responses to the Joint Review Panel's Supplemental Information Requests for the Pierre River Mine Project*
- Attachment "D" – Carver, M. (Aqua Associates). 2014. *Shell Energy Canada Pierre River Mine Joint Review Panel SIR Hydrology Review of Shell Responses*

**Technical Review of
Shell Canada Energy Responses (dated October 31, 2013)**

to

**Joint Review Panel
Supplemental Information Request (dated October 25, 2012)**

**Regarding the Integrated Application for the
Pierre River Mine Project**

PREPARED FOR:

Athabasca Chipewyan First Nation Industry Relations Corporation

PREPARED BY:

P.M. (Patt) Larcombe, Symbion Consultants

January 16, 2014

TABLE OF CONTENTS

ACRONYMS	iii
INTRODUCTION.....	1
SIR Reference - 6.....	2
SIR Reference - 7.....	4
SIR Reference - 8.....	6
SIR Reference - 34c.....	9
SIR Reference - 60.....	11
SIR Reference - 63.....	14
SIR Reference - 64.....	14
SIR Reference - 65.....	15
SIR Reference - 68.....	17
SIR Reference - 69a.....	20
SIR Reference - 69b.....	23
SIR Reference - 70.....	25
SIR Reference - 71.....	27

ACRONYMS

ACFN	Athabasca Chipewyan First Nation
ACFN IRC	Athabasca Chipewyan First Nation Industry Relations Corporation
CEAR	Canadian Environmental Assessment Registry document number on the registry for the Pierre River Mine Project
'Shell Main Body of Response'	Pierre River Mine Project - Responses to the Joint Review Panel's Supplemental Information Requests (Submitted by Shell Canada Limited to the Joint Review Panel), October 31, 2013. Section 3-Responses to Supplemental Information Requests, contained in CEAR #191.
DFO	Department of Fisheries and Oceans
EC	Environment Canada
JMEP	Shell's Jackpine Mine Expansion Project
JMEP JRP	Report of the Joint Review Panel Shell Canada Energy Jackpine Mine Expansion Project Application to Amend Approval 9756 Fort McMurray Area. July 9, 2013. 2013 ABAER 011. CEAA Reference No. 59540.
JRP	Pierre River Mine Joint Review Panel
KIR	Key Indicator Resource
LSA	Local Study Area
PAD	Peace Athabasca Delta
PIC	Pre-Industrial Case. As defined in Pierre River Mine Project - Responses to the Joint Review Panel's Supplemental Information Requests (Submitted by Shell Canada Limited to the Joint Review Panel), October 31, 2013.
PRM	Pierre River Mine
TK or TEK	Traditional Knowledge or Traditional Ecological Knowledge
TLU	Traditional Land Use

RSA	Regional Study Area
SIR	Supplemental Information Request
RFMA	Registered Fur Management Area
RMWB	Regional Municipality of Wood Buffalo
2013 Application Case	As defined in Pierre River Mine Project - Responses to the Joint Review Panel's Supplemental Information Requests (Submitted by Shell Canada Limited to the Joint Review Panel), October 31, 2013.
2013 Base Case	As defined in Pierre River Mine Project - Responses to the Joint Review Panel's Supplemental Information Requests (Submitted by Shell Canada Limited to the Joint Review Panel), October 31, 2013.
2013 PDC	2013 Planned Development Case as defined in Pierre River Mine Project - Responses to the Joint Review Panel's Supplemental Information Requests (Submitted by Shell Canada Limited to the Joint Review Panel), October 31, 2013.

INTRODUCTION

Athabasca Chipewyan First Nation Industry Relations Corporation (ACFN IRC) retained Patt Larcombe of Symbion Consultants to assist with reviewing Shell Canada Energy's (Shell) response (dated October 31, 2013, CEAR #191) to the Supplemental Information Request issued by the Joint Review Panel (JRP) established for the Pierre River Mine Project (dated October 25, 2012, CEAR #170). Ms. Larcombe's review is a component of a broader submission by ACFN IRC pursuant to the November 7, 2013 JRP invitation for comments (CEAR #192).

Ms. Larcombe's review uses the following template for organizational and referencing purposes:

Issue ID:¹ _____ **Reviewer:** PL_SC
SIR Reference:² _____
Document Reference(s):³ _____
JME Panel Reference⁴ (if applicable): _____

Gaps and/or Shortcomings:

Request(s):

¹ Main and sub-heading subject descriptors in the JRP SIR request dated October 25, 2012 (CEAR 170).

² JRP's SIR request number from CEAR 170.

³ Relevant document and page reference(s) of Shell's October 31, 2013 response to the SIR.

⁴ Paragraph number for conclusions or guidance deemed relevant by the Reviewer from the Report of the Joint Review Panel Shell Canada Energy Jackpine Mine Expansion Project. Application to Amend Approval 9756 Fort McMurray Area. July 9, 2013. 2013 ABAER 011, CEAA Reference No. 59540.

Document Reference(s): Shell Main Body of Response, Section 3, pg. 3-26 and Appendix 3.1

JME Panel Reference (if applicable):

Gaps and/or Shortcoming:

Part (a) of SIR 6 requests Shell provide information about the numerical ranking system and weighting system used to determine environmental significance of project effects. Shell was requested to provide information such as peer reviewed literature or other scientific basis to support the weighting system employed. Part (b) requests substantiation that the methods, including scale, criteria, definitions, and thresholds for significance determination are reasonable. Part (c) requires Shell to provide details of how and where professional judgement is used.

The response to SIR 6 (pg. 3-26) introduces a number of assumptions and factors said to be important in considering and determining significance of effects on Aboriginal rights and interests. This discussion lacks reference to peer-reviewed literature and fails to consider a substantial body of legal jurisprudence and information provided by Aboriginal groups, including ACFN, on this matter. In the absence of such reference, it is concluded that the factors discussed on pg. 3-26 are opinion-based. Verification or substantiation of the assumptions and factors described is required to determine if they are reasonable.

The JRP's Terms of Reference require an examination of "any changes to the environment caused by the project on...current use of lands and resources for traditional purposes by Aboriginal persons."⁵ The response to SIR 6 does not address the methods, including scale, criteria, definitions, and thresholds for significance determination employed for assessing project effects and significance of project effects on current use of lands and resources for traditional purposes. Not referenced in the response to SIR 6, is the approach described by Shell in Appendix 3.1 (pgs. 37-39 and 48-49) which appears to have been employed in their cumulative effects assessment on TLU (Appendix 2) and to some extent in their Local Study Area effects assessment described in their response to SIR 65. The factors for determining significance described in Appendix 3.1 (pgs. 37-38 and 48-49) are different than those discussed on pg. 3-26 in the Main Body of Response.

Main Body of Response (pg. 3-26) states; "The effects to the exercise of Aboriginal rights and interests may be considered significant if they represent sustained, long-term adverse effects to KIRs that are relied upon, are regularly and preferentially used, and are readily accessible. Furthermore, changes to the

⁵ Agreement to Establish a Joint Review Panel for the Pierre River Mine Project. Appendix Terms of Reference, pg. 15, section titled "Effects of Changes to the Environment." June 8, 2012. CEAR #130.

ability or desire to exercise particular Aboriginal rights related to the KIRs may contribute to the significance of an effect on Aboriginal rights and interests.”

Appendix 3.1 (pgs. 48-49) states; “Generally, significant effects were considered to be high magnitude effects of long duration and affecting the group as a whole. The determination of significance also considered the following: perceptions and values of affected Aboriginal groups; [and] qualitative data and interpretation, and observations of patterns of Aboriginal traditional use of land and resources of a project area.” “Significant: the overall effect is experienced at the Aboriginal group level, and results in substantial changes in the overall patterns of traditional land and resource use.”

The criteria discussed in Appendix 3.1 are not supported by professional literature, legal jurisprudence and/or information by Aboriginal Groups, and ACFN in particular.

Request(s):

- a. Explain the reasonableness of the assumptions and factors discussed on page 3-26 and those discussed in Appendix 3.1 (including the criteria) by providing a thorough discussion of what the professional literature, legal jurisprudence, and ACFN evidence contributes on the subject. If Shell’s assumptions, factors, and method are inconsistent with the findings of the external material review, describe the differences and explain why Shell’s approach is valid.

Document Reference(s): Shell Main Body of Response, Section 3, pgs. 3-47.

JME Panel Reference (if applicable): Para 35.

Gaps and/or Shortcoming:

This SIR requested, among other things, an assessment of environmental consequences of project effects and cumulative effects, prior to reclamation, for Aboriginal rights and interests. It is noted that this SIR did not request the same information concerning current use of lands and resources for traditional purposes.

Shell does not provide the requested information in the series of tables included in their response to SIR 7 but comments (pg. 3-47);

“To determine the environmental consequences to Aboriginal Rights and Interests as a KIR, it is necessary to consider the environmental consequences for the rest of the aforementioned biological or environmental KIRs. This is because the vast majority of Aboriginal Rights and Interests are based on access to and use of those biological and environmental KIRs at the LSA level, and throughout and beyond the RSA level. Accordingly, Shell’s view is that the environmental consequences to a particular Aboriginal Right or Interest will be closely tied or directly related to the environmental consequences of the supporting environmental or biological KIR.”

To illustrate, Shell uses the example that environmental consequence to traditional use plants is an analogue for environmental consequence to Aboriginal rights and interests for this KIR. For the LSA assessment, Shell concludes that the environmental consequence for traditional use plants is moderate (Table 7-1, pg. 3-29) and therefore the effect on Aboriginal rights and interests is also moderate. However, the calculation leading to the ‘moderate’ finding for traditional use plants is flawed on a number of accounts as follows:

- assumes the effect is reversible (-3 score). Traditional use of plants within the LSA will be lost for decades and therefore in the case of effects on TLU and Aboriginal rights and interests ‘reversibility’ should be calculated as ‘+3’ not ‘-3’.
- assumes the frequency is ‘low’. Frequency should be ranked as ‘+2-high (occurs continuously)’, not ‘0-low’ (occurs once) because the loss of opportunity to harvest traditional plants is continuous.
- Converting the reversibility ranking to ‘+3 irreversible’ and frequency rating to ‘+2 high’ for the LSA leads to a ‘high’ effect conclusion for Aboriginal rights and interests, not ‘moderate’, as suggested by Shell.

Appropriate rankings for reversibility and frequency, and in some cases magnitude, for all KIRs important to TLU and Aboriginal rights and interests leads to substantially

different conclusions overall. Importantly, the approach described by Shell does not account for the fact that TLU and Aboriginal rights and interests will be prohibited throughout the proposed project footprint, regardless of the biophysical environmental consequence rating for any KIR.

Request(s):

- a. Provide an environmental consequence table for PRM project effects classification on TLU and Aboriginal rights and interests for the LSA and RSA, taking into account the flaws identified above that make the biophysical environmental consequence determination a poor analogue.

Document Reference(s): Shell Main Body of Response, Section 3, pgs. 3-52.

JME Panel Reference (if applicable): Para 1265

Gaps and/or Shortcoming:

Recently through a lease exchange with Teck Resources Ltd., Shell has acquired rights to the land and resources Teck Resources Ltd. had proposed for their South Mine Development. The footprint of the former proposed South Mine Development area is within the Terrestrial and TLU LSA's identified by Shell, and included in Shell's 2013 PDC. It is recognized this exchange is very recent and a project-specific assessment for a future phase incorporating development of this newly acquired lease by Shell is likely forthcoming. However Shell has not discussed the project-specific implications of this likely additional development within the LSA on ACFN TLU.

The narrative on pg. 3-52 in the Section entitled Pre-Industrial Case Summary-Human Environment is not a description of the Pre-Industrial Case, nor does it compare the Pre-Industrial Case to the Application Case, as requested in the SIR, i.e. it discusses the Base Case.

Appendix 2 is not transparent about how quantitative and qualitative data and assessment (as described in Appendix 3.1) led to conclusions about "high" and "significant" adverse effects on TLU in the 2013 Application Case or 2013 PDC. There is virtually no analysis of how and/or the extent the proposed PRM would contribute to or exacerbate existing and/or cumulative adverse effects.

Shell's description of ACFN's *k'es hochela nene* Homeland Zone in Appendix 2, pg. 166, Section 3.5.1.5.1.4, Para 2 does not fully characterize the importance of this area. The *k'es hochela nene* Homeland Zone is also identified by ACFN as an area of "critical importance to past, present, and future practice of ACFN use and rights." They are the places where ACFN "history, culture, and livelihood are most firmly rooted" – places where "there is not only a cultural connection, but also a familial and spiritual connection that is integral to one's identity as ACFN and Dené suline. ACFN members consider the homelands sacred as they are necessary to the rights, identity, and ultimately, the cultural survival of ACFN." *k'es hochela nene* is also described as being "critical to ACFN members at large and particularly families affiliated with the Poplar Point (IR Chipewyan 201G) and Point Brule (IR Chipewyan 201F) areas."

Request(s):

- a. Provide a description for the Pre-Industrial Case on "Human Environment" and compare to the 2013 Application Case as requested in the SIR.

- b. Main Body of Response, pg. 3-56, section titled “Traditional Knowledge and Land Use”. Please provide the percentage of ACFN’s lands within the RSA that will be disturbed at the 2013 PDC in order for comparison with the figure identified on pg. 3-52 for the 2013 Base Case.
- c. Main Body of Response, pg. 3-61, section titled “Significance Post-Reclamation”. Please provide evidence for the conclusion the effects of the 2013 Application Case post-reclamation on TLU would be ‘not significant’ in light of the JMEP JRP finding (para 1284) that [recognized]; “disturbed areas will eventually be reclaimed, but this will not occur for many years, some types of habitat cannot be reclaimed, the landscape will be significantly altered, and some species loss may be irreversible. The long-term and possibly irreversible nature of these effects has significant implications for the sustainability of TEK, TLU practices, Aboriginal and treaty rights, and culture.”
- d. Appendix 2, pg. 44, Section 2.5.2.2.1, first bulleted item in para 2. It is stated that Aboriginal persons in the region have benefited from oil sands industry-driven growth. It is further stated that labour market indicators for Aboriginal persons in the region “lag” behind the non-Aboriginal population, but are comparable to indicators of Aboriginal persons in other communities. What other communities were considered in this statement? What are the statistics for ACFN compared to “Aboriginal persons in the region”?
- e. Appendix 2, pg. 46, Table 2.5-5. It is stated that oil sands development-related taking up portions of land for a period of time reduces “opportunities to carry out traditional activities on oil sands industry-affected lands....” This statement suggests that traditional use, to an unspecified extent, continues to be practicable on lands taken up and affected by oil sands development. Please explain what opportunities, if any, exist to undertake traditional land use on lands taken up and/or affected (e.g. cleared, fenced, gated, designated no hunt zones) by oils sands development.
- f. Appendix 2, pg. 46, Table 2.5-5. It is stated that increasing incomes associated with oil sands development wage economy can contribute to negative behaviours. In particular this table states that increased alcohol and drug abuse is especially prevalent among those lacking financial experience. Please provide the data or research relied upon for this latter statement.
- g. Appendix 2, pg. 49, Section 2.6.4, para 1. Please confirm if the 2013 Base Case disturbance calculation for ACFN (17%) accounts for areas where traditional land use is: (1) prohibited due to fencing, gates, barriers, no trespassing signage, and areas where discharge of a firearm is prohibited for public safety reasons; (2) difficult or impossible due to open water navigability constraints; and (3) impracticable due to noise, odour, visual effects, and contaminant concerns. If the stated 17% does not include the areal extent of these human induced disturbances, or in the case of waterway navigation a combination of human induced and climate change factors, what is the total area and proportion of ACFN lands within the RSA that are unavailable or have lost practical utility for traditional land use purposes?
- h. Appendix 2, pg. 141, Section 3.5.1.2.5, Para 1. Broad statements about socio-economic effects on TLU in this section are unsubstantiated. As discussed in

comments for SIR 69b, the socio-economic effects assessment is severely lacking and does not provide suitable references to support the statements in this section of Appendix 2. Provide a comprehensive literature review on the subjects discussed in this section of Appendix 2, indicating where the literature supports or contradicts these statements.

- i. Appendix 2, pg. 141, Section 3.5.1.2.5, Para 2. ACFN has also indicated that the increase in non-Aboriginal population has increased activity not associated with harvesting of traditional resources, such as skidooing, all-terrain vehicle traffic, camping, etc. adding to disturbance of traditional land use and loss of security and solitude. This has not been addressed in the effects assessment. Please explain how these additional influences add to cumulative effects on ACFN TLU.
- j. Appendix 2, pg. 164, Section 3.5.1.5.1.2, Para 2. The information referenced to Candler et al. (2012a) is correct for the ACFN RSA. The ACFN LSA for the PRM lies entirely within the 2013 RSA. Please explain why pertinent ACFN TLU information within 250 meters of the PRM footprint and within 5 km. of the PRM footprint is not considered in the assessment.
- k. Appendix 2, Section 3.5.1.5, (e.g. pgs. 16, 166, 169, 170). Please provide a map indicating the land trails in the 2013 TLU LSA for the following cases: PIC, 2013 Base Case, 2013 Application Case, and 2013 PDC. For the latter 3 case maps, indicate by use of colour coding, segments of trails that: (1) are already disturbed; (2) will be disturbed specifically by the proposed PRM; and (3) will be disturbed by other projects in the future. Identify on the maps the alternate trails which are suggested would maintain some access.
- l. Appendix 2, pg. 165, Section 3.5.1.5.1.3, Para 1. Would restrictions on use of firearms within certain distances of infrastructure and active work sites also have an effect on access or opportunity to utilize preferred harvest areas?
- m. Appendix 2, pg. 166, Section 3.5.1.5.1.3, Para 1. The last statement in this paragraph states that the 2013 PDC results in mean seasonal flow reduction of less than 2 cm. As noted at the beginning of this paragraph, the Athabasca River is an important access route during summer. It is especially important in the fall when moose and bird harvesting is most predominant. Annual and seasonal predictions may mask changes during critical navigational periods. Explain the changes in weekly flow depth under the 2013 PDC for the summer and fall seasons.
- n. Appendix 2, pg. 169, Section 3.5.1.5.3.2, Para 2. Please explain what disturbance is expected to the Firebag River for the 2013 PDC.
- o. Appendix 2, pg. 171, Section 3.5.1.5.4.2, Para 1. It is noted that Figure 14 (same as Figure 7) in Candler et al. (2012a) indicates high concentration of TLU within 15 km of the north end of the 2013 RSA, on both the east and west sides of the Athabasca River.
- p. Appendix 2, pg. 199, Section 3.5.2.3, last bullet on page. Please explain the nature of impacts that the AOSA CRISP and LARP could have on population growth.
- q. Appendix 2, pg. 322, Section 4.4.3, Para 2. Shell has concluded that the proposed PRM on its own is not expected to have a substantial effect on ACFN access to preferred areas for harvesting in the RSA – on the basis that 1% of

ACFN's *k'és hochela nene* and Fort McKay Proximate Zones within the RSA would be taken up or disturbed by the proposed PRM. Please provide an estimate of the total aerial extent (hectares) of land that the proposed PRM would have on ACFN TLU factoring in the following: noise, odour (20 km radius), firearm restriction zones, loss of land trails and attendant loss of access to areas outside the footprint, and general avoidance due to contaminant concerns.

Issue ID: Environment-Wildlife
SIR Reference - 34c

Reviewer: PL_SC

Document Reference(s): Shell Main Body of Response, Section 3, pgs. 3-131 to 3-132.

JME Panel Reference (if applicable): 925, 950, 1267

Gaps and/or Shortcoming:

On pg. 3-131 (last para) Shell refers to ACFN traditional ecological knowledge (TEK) concerning observations about migratory birds as “anecdotal information.” The importance of TEK is well recognized within the environmental review process. The reviewer finds Shell’s language disrespectful and incorrect. On this very matter, the JMEP JRP stated (para 1267);

“The Panel understands the challenges associated with attempting to reconcile information collected by western scientific methods with TEK provided by Aboriginal groups or individuals. The Agency’s guidance document, “Considering Aboriginal traditional knowledge in environmental assessments conducted under the Canadian Environmental Assessment Act –Interim Principles”, states that where TEK and western knowledge cannot be reconciled, the EIA practitioners should juxtapose what is suggested by each knowledge system in the EIA report and demonstrate how they have considered each in their EIA. The Panel notes that Shell did not do this and it is unclear to the Panel how Shell considered the TEK it received. Shell’s assertion that all of the TLU and TEK information it received from the Aboriginal groups since filing the EIA in 2007 did not provide any new information or change the conclusions of the EIA is somewhat surprising. The Panel would be concerned if the inability to reconcile TEK with scientific data was used as justification for limiting the utilization of the TEK in the analysis.”

At pg. 3-134 (para 4, last sentence), Shell concludes that the effects of existing, approved and planned developments in the RSA on the abundance, habitat, and movement of waterfowl in the Peace Athabasca Delta (PAD) are predicted to be negligible. The JMEP JRP (para 925) states;

“Aboriginal groups stated that the migration pathways for many waterfowl appear to have changed in that they are no longer flying over the oil sands region or using the PAD in the same way. EC [Environment Canada] confirmed that it has observed the shifting patterns in migration pathways but that further study is required.”

The JMEP JRP (para 950) also recorded Environment Canada had indicated;

“...the migration routes of birds may be changing and this change could affect the availability of these birds in the PAD” and that “the oil sands industry may or may not be contributing to change in the migration routes and to decline of migratory birds in the PAD, as the reasons for the changes in the migration routes are not clear.”

Request(s):

- a. Provide a map showing the boundaries of the referenced United States Fish and Wildlife Service ‘Strata 77’ relative to the RSA and PAD.
- b. Provide an explanation for the apparent contrary conclusion that the 2013 PDC will have negligible effect on migratory birds in the PAD in light of ACFN’s TEK and Environment Canada’s comments described above.

Document Reference(s): Shell Main Body of Response, Section 3, pgs. 3-197 to 3-198.

JME Panel Reference (if applicable): 36, 1277.

Gaps and/or Shortcoming:

Shell's response to part (a) and (b) of this SIR is grossly inadequate.

The first part of (a) requested Shell describe how traditional practices may be impacted by changes or perceived changes in the levels of toxic substances in traditional food items. Shell's response to this question is addressed in two sentences at the bottom of pg. 3-197. These two sentences minimize the concerns and evidence on the public record. ACFN, as well as other Aboriginal groups, have consistently and repeatedly voiced their concerns about oil sands development-related contaminants. They have also informed Shell, the PRM JRP, the JMEP JRP and government that observed physical (condition, texture, colour, odour, lesions, etc.) changes in traditional resources is causing harvesters to avoid harvesting certain traditional resources and/or harvesting in particular geographic locations. This change in TLU is not of the same ilk as the generalized statements about 'shifting away' or 'moving away' made by Shell in their response. While the limited information provided in Shell's response concerning physical health effects of reduced nutritional intake from traditional foods is relevant in the case of reduced consumption by ACFN, the response fails to account for impacts on other equally important components of health, namely mental, emotional and spiritual health.

Larcombe (2012)⁶ summarized the professional literature concerning health impacts associated with contaminant concerns and traditional resource consumption avoidance. McDonald (2012)⁷ reported on ACFN health concerns and health goals.

On pg. 3-197 of the Main Body Response, Shell attributes the following text to (Fediuk 2003); "Traditional foods are an important component of good health among Aboriginal peoples. The social, cultural, spiritual, nutritional and economic benefits of these foods and their preparation, procurement and consumption are important in the maintenance of Aboriginal culture as indigenous relationships to the land are based on such traditional practices." A review of this document (proper citation should be Fediuk and

⁶ Larcombe, Patt. Symbion Consultants. September 28, 2012. A Narrative of Encroachment Experienced by Athabasca Chipewyan First Nation. Prepared for Athabasca Chipewyan First Nation Industry Relations Corporation. Filed by ACFN as evidence in the Jackpine Mine Expansion Project Joint Panel Review. JMEP CEAR #465. http://www.ceaa.gc.ca/050/documents_staticpost/59540/82080/Appendix_D_-_Part_04.pdf

⁷ McDonald, Alistair. The Firelight Group Research Cooperative. September 29, 2012. Supplemental Social, Economic and Cultural Effects Submission for Shell Canada's Proposed Jackpine Mine Expansion. Filed by ACFN as evidence in the Jackpine Mine Expansion Project Joint Panel Review. JMEP CEAR #465. http://www.ceaa.gc.ca/050/documents_staticpost/59540/82080/Appendix_D_-_Part_05.pdf

Thom, 2003) indicates this document does not speak at all about the noted benefits derived from “preparation, procurement and consumption”, nor does this document state “traditional foods are an important component of good health.” ACFN has previously commented on Shell’s improper citation and referencing in Appendices 2, 3.8, and 7.⁸

The second part of (a) of this SIR requested Shell describe how any avoidance of food items due to changes or perceived changes in levels of toxic substances may affect Aboriginal health. The first two paragraphs in this response are generalized and poorly referenced comments about ‘shifting away’ and “moving away’ from traditional foods and physical health effects associated with non-traditional food diets. There is an abundance of credible literature regarding the full realm of health effects (including physical, emotional, and mental health) associated with avoidance of traditional foods due to contaminant concerns that has not been reviewed or presented to properly address this SIR.

Part (b) of this SIR has not been answered by Shell. Shell’s response does not address effects on Aboriginal health due to cumulative impacts on traditional lifestyle caused by the PRM in combination with past, existing and future development using a pre-industrial baseline.

Shell’s response to part (c) of this SIR is misleading and inadequate. Shell’s intimation there is a potential “shift away from traditional foods” is incongruent with its own statements in para 2, pg. 3-197 and evidence and facts submitted by ACFN regarding oil sands-related impacts on TLU harvesting, traditional resource consumption, and overall health and well-being. Shell’s proffered mitigation measures to address direct and cumulative impacts of the project on health consist of (pg. 3-198): continued consultation with Aboriginal Groups, and “maintaining, whenever possible, traditional user access to the area encompassed by the PRM, maintaining active wildlife movement corridors, and maintaining to the extent practical access to traditional trails.” The JMEP JRP concluded such proposed measures have not been effective in mitigating project-specific or cumulative effects on TLU (paras 36 and 1277).

Request(s):

- a. Please provide the source or evidence for the statement in para 2 (pg. 3-197) of response (a) that “Canada’s Aboriginal communities in general have been moving from a country food diet to one that more closely resembles that of the general population.” Provide evidence, if any is available, that such a trend is applicable to ACFN.
- b. Provide a comprehensive and credible discussion, based on information provided by Aboriginal groups, including ACFN, and peer-reviewed reports, about the full spectrum of health effects associated with declines in traditional resource harvesting and consumption due to loss of opportunity and/or avoidance due to contaminant concerns.
- c. Provide an assessment of health effects as requested in part (b) of this SIR.

⁸ ACFN IRC letter to Shell, October 16, 2013. CEAR 194.

- d. Assess the incremental and cumulative impacts of the proposed PRM on ACFN health associated with avoidance of TLU, in light of the fact that the proposed PRM, if approved, would represent the most northerly mine development to date.
- e. Please explain how continued consultation with ACFN will mitigate existing and additional concerns about the health and safety of traditional resource use and consumption.
- f. Please explain how maintaining access to the proposed PRM, whenever possible, will minimize the risk of potential health impacts from a reduction in hunting opportunity. What does “whenever possible” mean? Provide evidence that ACFN members would engage in hunting activity within the PRM given their stated concerns about the safety of traditional resources adjacent to, never mind within active mining sites.
- g. Explain in detail how participation in the mentioned regional multi-stakeholder planning and research initiatives will mitigate increased concern among ACFN members about the safety of traditional resources and/or avoidance responses.

Issue ID: Aboriginal Rights and Interests
SIR Reference - 63

Reviewer: PL_SC

Document Reference(s): Shell Main Body of Response, Section 3, pg. 3-202.

JME Panel Reference (if applicable):

Gaps and/or Shortcoming:

There is an error in Shell's response to this SIR. The tables referenced in the EIS are based on the 2007 versions of the Base Case, Application Case and Planned Development Case – not the 2013 PDC as indicated in this response. Shell has provided updated tables in Appendix 2, however the TLU Regional Study Area boundaries are different than those depicted in the 2007 versions of the tables.

Request(s):

- a. Please clarify that the tables referenced in this SIR are based on the 2007 PDC and not the 2013 PDC.

Issue ID: Aboriginal Rights and Interests
SIR Reference - 64

Reviewer: PL_SC

Document Reference(s): Shell Main Body of Response, Section 3, pgs. 3-202 to 3-203.

JME Panel Reference (if applicable):

Gaps and/or Shortcoming:

The last paragraph of Shell's response to this SIR states no Aboriginal use of RFMA #2939 has been identified. Candler et al. (2012:84)⁹ shows subsistence, habitation and transportation routes in the geographic area of RFMA #2939.

Request(s):

- a. Please clarify if the statement "no Aboriginal use" in the response refers strictly to commercial trapping activity. If not, please explain this statement in light of the information contained in Candler et al (2012:84) above.

⁹ Craig Candler (Ph.D) and the Firelight Group Research Cooperative with the Athabasca Chipewyan First Nation (ACFN) Athabasca Chipewyan First Nation. April 20, 2011 (Updated September 15, 2012). Integrated Knowledge and Land Use Report and Assessment for Shell Canada's Proposed Jackpine Mine Expansion and Pierre River Mine.

Document Reference(s): Shell Main Body of Response, Section 3, pgs. 3-203 to 3-214.

JME Panel Reference (if applicable):

Gaps and/or Shortcoming:

Part (a) of this SIR requests a description of the impacts of the PRM on TLU and Aboriginal and treaty rights at the TLU LSA level. Shell states (a.ii, pg. 3-205) that its response to this question is located in Section 5 of Appendix 7. Section 5 of Appendix 7 indicates the information in that section addresses the cumulative assessment of the PRM on Aboriginal culture, lifestyle and quality of life. This section further states (pg. 43) "...effects on culture cannot be attributed to a single project, effects ...can be described for the region." Section 5 of Appendix 7 does not assess or describe the impacts of the PRM, at the TLU LSA level, on TLU or Aboriginal and treaty rights.

The response in the Main Body of Response to this SIR does not assess or describe impacts of the PRM, at the TLU LSA level, on Aboriginal and treaty rights.

Under the subject "Effects to Access within the LSA" of the Main Body response (pg. 3-205), Shell states that PRM disturbance may overlap portions of traditional trails within the LSA. No assessment of the effect of traditional trail disturbance on TLU and/or Aboriginal and treaty rights is provided.

In describing effects on ACFN (pg. 3-211), Shell states that since the PRM LSA is situated within one of ACFN's Homeland Zones, the assessment conservatively assumes ACFN conducts TLU activities within the LSA. Shell has in its possession a report by Candler et al. (2012:82-85) that clearly identifies ACFN TUS activities (harvesting and transportation routes) occur within 250 m of the proposed PRM footprint and in other areas of the PRM LSA.¹⁰

Shell indicates the effects of the PRM on hunting for ACFN are the same as described for Fort McKay First Nation and Fort McKay Metis (pg. 3-209). With respect to traditional hunting, Shell states under the 2013 Application Case disturbance in the LSA is 11,322 ha. In Appendix 1 of Shell's SIR response (Table 4.2-1 on pg.96) it is stated that 11,742 ha or 51% of the LSA will be disturbed. It is important to note that this table also indicates that currently (Base Case) only 503 ha in the LSA are reportedly disturbed.

¹⁰ Craig Candler (Ph.D) and the Firelight Group Research Cooperative with the Athabasca Chipewyan First Nation (ACFN) Athabasca Chipewyan First Nation. April 20, 2011 (Updated September 15, 2012). Integrated Knowledge and Land Use Report and Assessment for Shell Canada's Proposed Jackpine Mine Expansion and Pierre River Mine.

As discussed under SIR 8, through a lease exchange with Teck Resources Ltd., Shell has recently acquired rights to the land and resources Teck Resources Ltd. had proposed for their South Mine Development. The footprint of the former proposed South Mine Development area is within the Terrestrial and TLU LSA's identified by Shell, and included in Shell's 2013 PDC. It is recognized this exchange is very recent and a project-specific assessment for a future phase incorporating development of this newly acquired lease by Shell is likely forthcoming. However Shell has not discussed the project-specific implications of this likely additional development within the LSA on ACFN TLU.

Comments and requests on the section titled "Socio-Economic Effects to Traditional Land Use" are included in the review of SIR 69b.

Request(s):

- a. What additional area of land within the LSA would be lost for TLU purposes as a consequence of access restrictions? In answering this question please itemize the total additional areal extent of lands (i.e. beyond the noted 11,322 or 11,742 ha disturbance) where discharge of a firearm would be prohibited for public safety purposes.
- b. What additional area of land within the LSA, beyond the noted physical disturbance area (11,322 or 11,742 ha), would be disturbed by odour, noise and visual impact. For example, it has been reported that odour from emissions are detectable within 20 km.
- c. Provide an assessment of the effect of traditional trail disturbance including the effect on access to areas within and outside the LSA. Describe the locations of trails that will be disturbed, and the distance (km) and time (hours) that would be involved in utilizing alternative existing trails.
- d. Notwithstanding that the TLU LSA adopted by Shell does not include the Athabasca River (the Terrestrial LSA was employed as a proxy for the TLU LSA), describe the likely effect of the proposed PRM on traditional food fishing in the Athabasca River in sections of the river immediately adjacent to the proposed mine and within the lower reaches of tributaries within the LSA that flow into the Athabasca River.
- e. Based upon information and evidence previously submitted by ACFN, describe the likely extent of the LSA that would likely no longer support TLU due to contaminant concerns.
- f. Assess the effects on the proposed PRM within the LSA on Aboriginal and treaty rights as requested in this SIR.

Document Reference(s): Shell Main Body of Response, Section 3, pgs. 3-238 to 3-242 and 3-244 to 3-245.

JME Panel Reference (if applicable): 36, 1265, 1277

Gaps and/or Shortcoming:

Shell's response in the section titled "Significance Post-Reclamation" on pg. 3-239 states that the 2013 Application Case closure landscape is expected to facilitate access to preferred fishing areas. This conclusion lacks supporting evidence.

Shell's response in the section titled "Significance Post-Reclamation" on pg. 3-239 states it is not possible to determine the degree to which the mentioned socio-economic factors will affect Aboriginal populations at the time of reclamation or closure. Two of the factors mentioned are "desire to continue with traditional land use activities" and perceptions of contamination. Community evidence to the JMEP JRP indicates that ACFN and other Aboriginal groups would lose all cultural connection and traditional knowledge of landscapes they are displaced or alienated from within a generation. As well, ACFN has indicated the likelihood that TLU would be resumed on reclaimed landscapes is low as contaminant concerns would continue. In this regard, it is important to recognize that reclaimed landscapes will continue to have pit lakes and tailings ponds. Shell has not provided any references to research concerning Aboriginal TLU of reclaimed mine sites. A thorough literature review of cross-Canada, U.S.A., Australia and other locales where indigenous populations have TLU-based lifestyles, would contribute to the PRM JRP's better understanding whether or not Aboriginal TLU has resumed within reclaimed mine site areas.

On the subject of literature referencing, it is noted that in para 3 on pg. 3-241 the entire paragraph appears to be referenced to Larcombe (2012). In fact, only the first sentence in this paragraph is attributable to this author and the balance of the paragraph is Shell opinion.

Shell states in the last paragraph on pg. 3-241 it will apply various policies and commitments to mitigate potential effects of the PRM on TLU, lifestyle and culture (listed in Appendix 7, Attachment A). The JMEP JRP concluded (para 36) "It is apparent to the Panel that the mitigations being proposed by individual project proponents are not effective at avoiding significant adverse cumulative effects on TLU in the Project region." Further at para 1277 it was stated; "The Panel does not believe that the mitigation measures proposed by Shell will address the loss of traditional use during this interim period [pre closure]."

Shell describes its methodology for assessing effects and the significance of effects on TLU in Appendix 3.1. The methodology describes the use of both quantitative and

qualitative criteria. Quantitative criteria for assessing magnitude of effects is based on areal extent (ha.) of disturbance with magnitude deemed “high” if greater than 20% of an Aboriginal group’s preferred harvesting area within the confines of the RSA are disturbed. There are three problems with this approach which were correctly identified by the JMEP JRP.

First, the JMEP JRP concluded (para 1265) that the use of a large RSA;

“compared with the size of an LSA or project footprint has the effect of diluting potential effects and may do so to the point where they do not appear to be significant. The Panel has a similar concern about Shell’s choice of RSAs for the assessment of effects to TLU and Aboriginal and treaty rights. The Panel does not believe that use of the entire traditional territory of a First Nation or Aboriginal group is an appropriate basis for determining the significance of effects. These traditional territories tend to be very large and not all areas of the traditional territory may be used or are readily accessible for TLU or cultural activities.”

While Shell has narrowed its quantitative assessment of TLU effects to Aboriginal lands within the RSA, the size of the RSA for TLU in Shell’s updated assessment is the same Terrestrial RSA that the JMEP JRP concluded was too large.

Secondly, Shell’s method of quantifying the extent (percentage) of ACFN land that lies within the Terrestrial RSA continues to suggest that all areas within the non-disturbed portions of the RSA are used or readily accessible for TLU and/or cultural activity. Notwithstanding that Shell concludes overall the effects of the 2013 Application Case and 2013 PDC on TLU will be significant, from a methodological stand point the approach is flawed. For example, at pg. 3-244 of the response to SIR 68, Shell concludes that 4% of ACFN’s [*k’es hochela nene*] Homeland Zone would be disturbed under the 2013 Application Case and therefore the effect for magnitude is rated ‘low’ [less than 10%]. This approach does not distinguish if the area to be disturbed is more productive, accessible, and preferred than other areas, or if other areas within the Homeland have equal or similar preference, productivity and/or accessibility characteristics. Lastly, this approach fails to recognize that the current level of disturbance within the *k’es hochela nene* Homeland Zone, relative to the RSA, is low, and that the 2013 Application Case and the 2013 PDC would introduce substantial new disturbance into an area of this Homeland Zone.

Lastly the quantification of disturbance used by Shell in all base scenarios is based largely on industrial footprints (infrastructure, open pits, roads, linear features, etc., but also now forest fires). The estimated extents of disturbance for each base scenario do not include the additional extent of land where ACFN members are prohibited from engaging in TLU due to fencing, gates, no hunting postings, and no firearm discharge zones for public safety purposes. These estimated disturbance extents also do not include areas where ACFN members have lost TLU opportunities due to noise, odour, loss of solitude, and concerns about the safety of traditional resources, or lost

opportunities to engage in TLU due to waterway navigation difficulties in the Peace-Athabasca Delta, Athabasca River, and tributaries of the Athabasca River.

Request(s):

- a. Please explain in detail how the 2013 Application Case closure landscape will facilitate access to preferred fishing areas.
- b. To address the uncertainty of the significance of post-reclamation effects on TLU, provide a comprehensive review of literature across Canada, the U.S.A., Australia, and other relevant locales, pertaining to Aboriginal TLU on reclaimed mine sites.
- c. In light of the conclusions of the JMEP JRP introduced above, please describe in detail the efficacy of the policies and mitigation measures employed to date to address effects on TLU, lifestyle and culture for existing Shell projects in the RSA. If such information is not available, provide a detailed proposal describing the type of research and/or monitoring necessary to address this gap and how this would inform effective mitigation for the PRM.
- d. Please explain the rationale for continuing to use the same sized RSA given the noted JMEP JPR conclusions noted in the preamble statement above.
- e. Describe the traditional resource productivity and accessibility of ACFN's *k'és hochela nene* Homeland Zone that would be disturbed in the 2013 Application Case and 2013 PDC relative to the balance of this Homeland Zone.
- f. Provide an estimate of the total extent of all disturbance in the RSA for the Base Case, 2013 Application Case, and 2013 PDC, including: (1) land areas that ACFN has been/would be displaced from due to fencing, gates, no hunting postings, and no firearm discharge zones for public safety purposes; (2) opportunity to engage in TLU has been/would be lost due to noise, odour, loss of solitude, and concerns about the safety of traditional resources; and (3) opportunities to engage in TLU have been/would be lost due to waterway navigation difficulties in the Peace-Athabasca Delta, Athabasca River, and tributaries of the Athabasca River.
- g. Please confirm that only the first sentence in para 3 on pg. 3-241 is attributable to Larcombe (2012:x) and that the balance of the text in this paragraph is not from this reference.
- h. Requests pertaining to the balance of Shell's response for parts (a) and (b) of this SIR are discussed under the reviews of SIR 8 and/or SIR 69a.

Document Reference(s): Shell Main Body of Response, Section 3, pgs. 3-247 to 3-249 and Appendix 7

JME Panel Reference (if applicable): Para 35, pg. 8.

Gaps and/or Shortcoming:

SIR 69a requested Shell “Provide a cumulative assessment of the project’s effects on Aboriginal culture, lifestyle and quality of life of Aboriginal persons for each First Nation or Aboriginal group potentially affected before and after reclamation using a pre-industrial baseline.”

Shell provides a summary response (pages 3-247 to 3-249) within the Main Body Response to this SIR and indicates details are contained in Appendix 7. Shell (page 3-247) indicates it “completed a review of the potential PRM and cumulative effects on Aboriginal culture, lifestyle and quality of life.” Appendix 7, excluding appendices, includes some 50 pages, of which 2 pages address culture, lifestyle and quality of life effects. Within these two pages, Shell has not provided a cumulative assessment specific to ACFN as requested, nor has it provided a cumulative assessment of the proposed Pierre River Mine effects, nor does it present a cumulative assessment before and after reclamation using a pre-industrial baseline.

Shell opines “it is not feasible to assess the relative contribution of one project in isolation. It is not practical or realistic to consider effects of one project separately from the cumulative effects experienced by each Aboriginal group.” Shell further opines that “Culture, lifestyle and quality of life are not affected by one factor or one action but by the cumulative (current and historical) results of all projects, developments, practices and policies.” These opinions are not supported or substantiated by professional literature or credible evidence. Three environmental review panels charged with reviewing single projects in British Columbia and Labrador have concluded project-specific adverse effects on TLU and/or culture.¹¹

As reported by ACFN (November 16, 2013, CEAR 194), Appendix 7 contains language that minimizes and undermines TK and ACFN concerns and/or implies the responsibility for impacts is that of Aboriginal persons. Shell’s presentation of ACFN material is misleading and in some cases incorrect due to compilation and referencing errors such as improper citation, improper quotation, and paraphrasing. Overall, it is extremely

¹¹ See: (1) Report of the Joint Review Panel. August 2011. CEAA Reference No. 07-05-26178. Lower Churchill Hydroelectric Generation Project. Nalcor Energy Newfoundland and Labrador. <http://www.ceaa.gc.ca/050/documents/53120/53120E.pdf>, Pgs. xii and xxv; (2) Report of the Federal Review Panel. October 31, 2013. New Prosperity Gold-Copper Mine Project. Taseko Mines Ltd. CEAA Reference No. 63928. <http://www.ceaa.gc.ca/050/documents/p63928/95631E.pdf> pg. 197; and (3) Joint Review Panel Report. September 17, 2007. Kemess North Copper-Gold Mine Project. http://www.ceaa.gc.ca/050/documents/staticpost/cearef_3394/24441E.pdf pg. 221.

difficult to distinguish between direct quotes from referenced sources and paraphrasing or summarizing by Shell.

In Appendix 7, pg. 21, Section 1.8, para 2, footnote 4, Shell states estimates of the Aboriginal population in the RMWB should be considered conservative because a number of First Nation reserves were not enumerated in the 2011 Census. The Aboriginal Peoples Reference Guide, National Household Survey Guide, 2011, indicates 36 “Indian Reserves” were not completely enumerated. However, only one First Nation in Alberta is included in the group of 36 and this First Nation is not located in the RMWB. <http://www12.statcan.gc.ca/nhs-enm/2011/ref/guides/99-011-x/99-011-x2011006-eng.pdf>.

In Appendix 7, pg. 21, last sentence on page, Shell states the figure reported for the Aboriginal population in the RMWB for 2011 does not include the population residing on Reserves. This is incorrect. The National Household Survey 2011 for the RMWB referenced in this sentence does not specify on or off-Reserve Aboriginal population. The reference to “off-Reserve” is incorrect.

Request(s):

- a. Provide a cumulative assessment as requested in the SIR.
- b. Para 3 on page 3-248 states that effects on the environment have resulted in changing patterns and intensity of land use (i.e. through avoidance, abandonment and adaptation). Please explain the implications of displacement or alienation on TLU, as these terms are described in Larcombe (2012:x and 5-2).
- c. Appendix 7, pg. 1, para 2 and pg. 44, para 2. Explain in detail the evidence and rationale behind the assumption that effects on TLU and culture cannot be determined for a single or specific project.
- d. Appendix 7, pg. 36, para 1. Provide evidence that the findings discussed in this paragraph are relevant or representative of ACFN views or concerns in light of the fact that no ACFN Members participated in the survey conducted by Treefrog Research Corporation and Dialogos Educational Consultants, 2007.
- e. Appendix 7, pg. 36, para 2. Describe the other health implications associated with decline in traditional food harvesting and consumption that are described in the noted references.
- f. Appendix 7, pg. 36, para 4. Shell states a potential solution to “avoidance of country food” may be community-based monitoring of the safety of traditional foods. Provide evidence that community-based monitoring in other circumstances or locales has mitigated this effect.
- g. Appendix 7, pg. 43, para 4. Explain the validity of the statements “disturbed lands may not be considered available....” and “If areas are avoided while disturbed...” in circumstances where disturbed lands are de-vegetated or under active mining and thus have no utility for TLU and/or where harvest activity is prohibited.
- h. Appendix 7, pg. 43, para 4. Would displacement or alienation from the land also result in changes in patterns and intensity of TLU?

- i. Main Body of Response, pg. 3-248, para 4 and Appendix 7, pg. 43, para 5. It is stated that wildlife KIRs moose and black bear are predicted under the 2013 PDC to continue to be viable. Provide evidence that these traditional resource populations under the 2013 PDC will be sufficient to support sustainable harvests by current and future ACFN and other First Nation/Aboriginal groups, in locations that are accessible and preferred.
- j. Main Body of Response, pg. 3-249, 2nd paragraph and Appendix 7, pg. 44, para 3. Please clarify that only the first sentence in this paragraph is attributable to Larcombe (2012:x) and that the balance of statements in the paragraph are the views of Shell.

Document Reference(s): Shell Main Body of Response, Section 3, pgs. 3-249 to 3-251 and Appendix 8.

JME Panel Reference (if applicable): 1092, 1094, 1215, 1257

Gaps and/or Shortcomings:

SIR 69b requested Shell “Provide an assessment of the socio-economic effects for each First Nation or Aboriginal group respecting Aboriginal rights and interests before and after reclamation.” An identical request was made by the JMEP JRP (January 30, 2012, JMEP CEAR 198, SIR 32).

ACFN reviewed the approach proposed by Shell to respond to JMEP JRP SIR 32, outlining numerous shortcomings and provided recommendations on ethical research guidelines, scope and the importance of meaningful ACFN involvement (see letters: JMEP CEAR 221¹², February 24, 2012 and JMEP CEAR 465, Appendix G, Part 3, pdf pg. 120, March 30, 2012¹³; see also hearing evidence provided by Ms. Nicole Nicholls, ACFN IRC¹⁴). Again, on May 8, 2012, ACFN submitted its concerns about the approach proposed by Shell for this requested socio-economic effects assessment (JMEP CEAR 236¹⁵).

On May 16, 2012, Shell filed its response to the January 30, 2012 request (JMEP CEAR 238). On August 3, 2012, ACFN and Mikisew Cree First Nation jointly provide their comments on the substance and adequacy of Shell’s JMEP response. Finally, on October 1, 2012, ACFN submitted an expert report entitled “Supplemental Social, Economic, and Cultural Effects Submission” by Alastair McDonald (JMEP CEAR 465, Appendix D, Part 5). Although not a full assessment, this report addressed many of the gaps in Shell’s response.

The JMEP JRP report summarized ACFN’s concerns about the JMEP socio-economic effects assessment as follows;

“ACFN raised concerns about the methodology Shell used for its socioeconomic impact assessment (SEIA). It submitted that Shell did not link sociocultural indicators to its assessment of impacts on the exercise of Aboriginal and treaty rights.” [para 1092] “ACFN was critical of Shell’s approach to the assessment of social, economic, and cultural effects on ACFN. ACFN stated that Shell’s

¹² <http://www.ceaa.gc.ca/050/documents/56895/56895E.pdf>

¹³ http://www.ceaa.gc.ca/050/documents_staticpost/59540/82080/Appendix_G_-_Part_03.pdf

¹⁴ <http://www.ceaa.gc.ca/050/documents/p59540/83451E.pdf> Volume 10, November 8, 2012, Page 2115, Lines 10-25 and Page 2116, Lines 1-5.

¹⁵ <http://www.ceaa.gc.ca/050/documents/55954/55954E.pdf>

socioeconomic assessment focused narrowly on mainstream economic issues and did not appropriately consider the unique interests, values, and culture of ACFN.” [para 1257]

Under the subject of methodology for socio-economic effects assessment, the JMEP JRP concluded (para 1094); “The Panel accepts that project-specific EIA requirements can be improved. Currently, the socioeconomic impacts of developments are addressed in only a general and qualitative manner.” At para 1215, it stated; “To assess the effects of the Project on Aboriginal TLU, rights, and culture, it is necessary to consider the effects of the Project on the biophysical resources important to Aboriginal people and other economic and sociocultural effects of the Project.” [emphasis added]

All of the comments, concerns, and gaps identified by ACFN in these referenced documents are highly relevant because the response filed by Shell to the PRM JRP SIR 69b - with the exception of a few statistical updates, changes reflective of the PRM (e.g., employment statistics, remote camp), and additional of a section on TLU - is exactly the same socio-economic assessment they filed for the JMEP.

Request(s):

- a. Please describe how the response to SIR 69b builds on the socio-economic assessment prepared for the JMEP taking into consideration responses by Aboriginal groups, ACFN in particular, as stated in the first bulleted item on pg. 1 of Appendix 8.

Document Reference(s): Shell Main Body of Response, Section 3, pgs. 3-251 to 3-253 and Appendix 2.

JME Panel Reference (if applicable):

Gaps and/or Shortcoming:

Shell states its response to part (a) of this SIR is located in Appendix 2, Section 3.5.1. The section for ACFN is 3.5.1.5 (starting at pg. 162). Shell reports that overland trails within the RSA under the 2013 PDC will be adversely impacted. No information concerning the impact of the proposed PRM specifically on trails is provided. Section 3.5.1.5 of Appendix 2 is highly qualitative and does not describe the effects of alteration of access for TLU. For example, Shell has not described the implications of the loss of trails on TLU, if practical alternative routes exist, and if so the implications of additional time and cost.

Shell states its response to part (a) is also addressed in Appendix 7, Section 3.2. This section is titled “Observed Effects Reported by Aboriginal Groups”. This section is simply a summary of information provided by Aboriginal groups. It does not constitute an assessment as requested by this SIR. There is no reference in this section to potential effects of fragmentation on access. Finally, this referenced section deals with cumulative effects under the 2013 PDC; there is no information concerning the impact of the proposed PRM specifically on access or trails.

Shell’s response to part (c) of this SIR states a discussion of cumulative effects of access on avoidance of use and loss of enjoyment is found in Appendix 7, Section 3.0. Appendix 7 deals with cumulative effects under the 2013 PDC. The Joint Review Panel Agreement Terms of Reference (January 25, 2012) states the JRP shall consider evidence of project effects. Shell has not assessed the contribution that the proposed PRM would have on cumulative effects on access.

Shell’s response to part (e) of this SIR indicates a single traditional trail will be preserved. Shell also indicates (Appendix 7, Pg. 30); “Effects of PRM on access for Traditional Land Users would be limited to access management through and within the PRM development area itself prior to site reclamation.” No details are provided regarding this access management plan, or the efficacy of similar plans that may be in operation by Shell itself, other oil sand operators in northeastern Alberta, or in other locations within or outside the province. No mitigation or compensation is identified for the loss of other traditional trails or access. No mitigation or compensation is identified for the loss of opportunity to utilize the proposed project footprint for TLU purposes for multiple decades.

Request(s):

- a. Provide an assessment of the effects of the proposed PRM as requested in part (a) of this SIR.
- b. Provide an assessment of the cumulative effect of the proposed PRM as requested in parts (b) and (c) of this SIR.
- c. Please explain how participation in the various organizations described at the bottom of pg. 3-252 will mitigate the loss of trails, loss of access, and loss of TLU opportunity within and adjacent to the proposed PRM footprint.
- d. Further requests related to this SIR are included in the review of SIR 8 and SIR 60a.

Document Reference(s): Shell Main Body of Response, Section 3, pg. 3-255 and 3-262.

JME Panel Reference (if applicable): 1206, 1208, 1214, 1265

Gaps and/or Shortcoming:

Shell's response to part (a) of this SIR at para 1 on pg. 3-255 states: "Therefore, after mitigation, the expected future pressures of human harvest of renewable resources in the RSA are similar to those in the present, and the main factor affecting the capacity of renewable resources will be landscape change due to development." Shell appears to assume that the Aboriginal population, and therefore harvest of renewable resources, will not grow over the next 40-60 years.

Shell's assessment in response to part (e) of this SIR is based strictly on a biophysical assessment of individual traditional resource species. In the case of moose and bison, Shell has assessed these species at the RSA level. As noted by the JMEP JRP (para 1265);

"The Panel does not accept that the effects on TLU or Aboriginal and treaty rights are not significant so long as resources are available anywhere within the traditional territory of a First Nation or Aboriginal group. The Panel believes that the resources must be in areas that are familiar and accessible to Aboriginal persons with a reasonable level of effort."

Shell's approach assumes the entire RSA is accessible and implicitly assumes all Aboriginal rights holders have the ability (time, cost) to access every area of the RSA.

Shell has not identified what the current renewable resource requirements are of the rights bearing Aboriginal population that relies upon the RSA, nor has Shell projected requirements to a future point in time which would extend at least until multiple decades after closure for all developments under the 2013 PDC. Additionally, Shell has not identified what areas within the RSA not proposed to be disturbed under the 2013 PDC are: (1) accessible within practical limitations of cost and time for TUS purposes and (2) contain sufficient quantity and quality of traditional resource species for TLU activity to be meaningful and successful.

Request(s):

- a. Explain the basis for concluding that future pressures of human harvest of renewable resources in the RSA are similar to those in the present. Has growth in the Aboriginal rights bearing population that relies on the renewable resources in the RSA been considered? Have changes in Aboriginal rights holder spatial

patterns of TLU, and therefore harvest pressure, in response to displacement from developments under the 2013 PDC been considered?

- b. Explain how a conclusion (with the exception of woodland caribou) that the capacity of renewable resources relied upon for TLU and Aboriginal rights can be reached in the absence of credible information about current and future needs for those traditional resources.

**Assessing Supplemental Information about
Cultural and Social Issues provided by
Shell Canada Limited for the
Proposed Pierre River Mine Project**

**Prepared for Athabasca Chipewyan First Nation
Industry Relations Corporation**

Patricia A. McCormack, Ph.D.

**Native Bridges Consulting
Professor emerita
Faculty of Native Studies
University of Alberta**

16 January 2014

Table of Contents

Introduction and Terms of Reference	1
Organization of the Report	3
Table 1. Recommendations for Reports submitted by Industry Proponents and for Research and Monitoring in Cultural and Social Domains	4
Table 2. Summary Remarks about the Appendices Reviewed	6
Appendix 2: JRP SIR 8 - Cumulative Effects, prepared by Golder Associates	8
Lack of Named Authors	8
Organizational Problems	9
2.0 The Pre-Industrial Case	10
2.5.2 Socio-economic Considerations Presented as Part of the Pre-industrial Case	14
3.0 Planned Development Case = 2013 PDC	21
3.5.1 Traditional Land Use	21
3.5.2 Socio-Economic Assessment	25
Appendix 3.8. Traditional Land Use Environmental Setting Report Update, prepared by Golder Associates	26
Appendix 7. Response to Supplemental Information Request 69a - Cultural Effects, prepared by Golder Associates	29
1.7 The Pre-Development Context (Pre-industrial Case)	32
Some Errors in Appendix 7	38
Interpretation of Métis	38
Nation Building	39
Treaty No. 8	40
1.8 Aboriginal Groups	41
2.0 Connecting Traditional Land Use, Culture, Lifestyle, and Quality of Life (and)	
3.0 Effects on Traditional Land Use	44

4.0	Culture, Lifestyle and Quality of Life Effects	48
	Attachment A	49
Appendix 8.	Response to Supplemental Information Request 69b - Assessment of the Socio-Economic Effects for Each First Nation or Aboriginal Group Respecting Aboriginal Rights and Interests Before and After Reclamation	51
	Lack of Named Authors	51
	Problems with Theory and Method: A Summary	52
3.0	Socio-Economic Setting	60
4.0	Socio-Economic Effects	63
4.1	Population	63
4.2	Wage Economy	64
4.3	Health and Well-Being	65
4.4	Housing	71
4.5	Education	71
4.6	Public Safety and Protective Services	72
4.7	Traditional Land Use	72
	Conclusion	77
	References	82

Introduction and Terms of Reference

I was asked by the Athabasca Chipewyan First Nation Industry Relations Corporation (ACFN IRC) to evaluate several documents related to Aboriginal culture, culture change, and socio-economic matters submitted by Shell Canada Energy as supplemental information for the forthcoming hearing into the proposed Pierre River Mine Project.

This report looks at portions of Appendix 2 and at Appendix 3.8 and Appendix 7, all prepared by Golder Associates (Golder Associates 2013a, b, c), and also at Appendix 8, prepared by Nichols Applied Management (2013a). The report addresses questions of methodology, theory, research undertaken and presented, and results found in those documents. It is my professional opinion, which this report will show, that the supplementary reports do *not* adequately address the subjects of culture, culture change, and socio-economic impacts, not for the Pierre River Mine Project itself and especially not for the cumulative impacts of the oil sands projects. My opinion is based on my 45 years of experience as an anthropologist and ethnohistorian, with specialization in the Western Subarctic and Northwestern Plains, and on the extensive research I have undertaken into and published about the cultures and histories of Aboriginal peoples, especially those of northeast Alberta (see c.v., submitted separately). As well, for several years I have been reviewing documents for oil sands hearings in the broader context of the scholarly literature about impact assessment.

The goal of my report is to assist the Review Panel in making an informed recommendation about whether or not the Pierre River Mine Project should be approved. That is complicated by the fact that I do not believe that the appendices that I reviewed provide Panel members with the information that will allow them to make a truly informed decision with respect to impacts either on the cultures and societies of Aboriginal people or on their Aboriginal

and Treaty Rights. Thus, much of my report is devoted to explaining why those particular appendices (or portions thereof) are *not* adequate for the purposes of this hearing.

This report begins by providing a series of recommendations with regard to reports submitted by industry proponents (for this set of hearings, Shell Canada Energy) for oil sands projects. The reports I have reviewed for this and other hearings were all prepared by consulting companies hired by the proponents to undertake work on their behalf. The recommendations made here follow from the analysis of the appendices contained in this report and other materials prepared for last year's Jackpine Mine Expansion Project hearings. They build on the review that I did in 2012 of the "Cultural Assessment" submitted by Shell for the Jackpine Mine Expansion Project hearings (McCormack 2012b). They are informed by a review of other documents submitted for oil sands projects (most recently, by Dover) and by an extensive literature review of published, peer-reviewed articles about impact assessment.

When I reviewed the "Cultural Assessment" that Shell submitted for the Jackpine Mine Expansion Project hearings in 2012, I was dismayed by its overall amateurish character and the substantial problems it contained, which I identified and discussed in the Review that I prepared (McCormack 2012b). It may be that after years of hearings, in which the same consultants have submitted similar reports year after year, reports which may have been received without serious review or challenge, consultants have become accustomed to preparing reports that are mediocre and poorly thought out and developed and that may also be incorrect in many ways, just as I found for the reports and appendices I reviewed for the Jackpine Mine Expansion Project hearings and for this current hearing into the Pierre River Mine Project.

While review panels do not have the final word, nevertheless they are the first level of

review and decision-making before governments provide the final approvals. The oil sands projects have enormous implications for the future lives of Aboriginal people in northeast Alberta, including whether or not they and their descendants will be able to continue to practice their Aboriginal and Treaty Rights into the future. Thus, it is reasonable for all parties to expect - even to insist - that review panel recommendations be based on reports that demonstrate outstanding professional standards, not mediocrity and error. It is my opinion that the content and analysis that I saw in the “Cultural Assessment” and in the appendices submitted by Shell for the Pierre River Mine hearings do *not* meet normal professional standards for adequate social science research, nor do they meet normal professional standards for cultural and social impact assessments.

Organization of the report: The report begins with a series of recommendations, presented in Table 1. It then presents a series of summary remarks in Table 2, based on my review of Appendices 2 (relevant portions), 3.8, 7, and 8. The two tables are followed by an assessment or critique of each of the four documents (or relevant portions of the documents) I was asked to review, in numerical order. The evaluation focuses on problems with or gaps in information and analysis. Finally, I offer some summary remarks about these reports and potential Aboriginal futures, especially in the light of the conclusions reached in portions of the appendices that the oil sands projects already have significant, adverse, and permanent effects on the ability of Aboriginal people to spend time on much of their traditional lands practicing their Aboriginal and Treaty Rights. This situation can only be expected to worsen if more oil sands projects are allowed to be built and operate in northeast Alberta.

Table 1. Recommendations for Reports submitted by Industry Proponents and for Research and Monitoring in Cultural and Social Domains

1	All reports must demonstrate authorship clearly and provide detailed information about the credentials of each author. This information is required by Sections 50 and 53(2) of the AER's "Rules of Practice" (2013:47, 48). If several authors contribute to a document, the document must indicate the authors of each section.
2	Authors must indicate the theoretical premises which underlie their analyses and the methodologies they use to arrive at their conclusions, in order to demonstrate the reasoning that led to those conclusions.
3	Specialized terminology such as "culture," "culture change," "social structure" or "society," "socio-economic," and "adaptation" must be clearly defined. Definitions should be substantiated by reference to accepted anthropological theory when they address topics that refer to Aboriginal people (the discipline of anthropology has become the standard for these terms in the social sciences, especially with reference to Indigenous peoples in North America and elsewhere). Definitions must also reference those used by Aboriginal people.
4	Authors must undertake literature reviews that are substantial rather than truncated. Sources must include not only literature related to the immediate subject but also literature related to comparable projects elsewhere, in order to help in formulating hypotheses about local impacts in the absence of local data.
5	All information presented must include citations showing the references that were used and indicating how they were used.
6	Citations to references must include page numbers, to facilitate finding specific points of information in often-lengthy sources.
7	Information provided in reports must be meticulous in its details, so that these facts can be relied on without feeling it is necessary to double-check citations. Consultants who are unfamiliar with local histories and cultures should double-check their facts or have someone else do it for them to ensure accuracy.
8	Authors must indicate clearly the gaps in the available information that prevent them from drawing evidence-based conclusions.
9	Authors should use the literature reviews, combined with the gaps in information that they identify, to develop hypotheses about potential impacts that can then be studied by specific research projects or some form of monitoring.
10	Authors should identify clearly the values they use to address matters of "benefits" and "challenges" (i.e., problems) and "positive" and "negative" impacts.
11	Descriptions of Pre-industrial Cases (i.e., the state of affair prior to the expansion of

	contemporary oil sands industries) must be based on historical/ethnohistorical and cultural literature as well as evidence presented by local Aboriginal groups and their members. They must integrate the findings of archaeological investigations into those descriptions.
12	The concept of “significance” of Aboriginal archaeological sites must be carefully defined, and archaeologists need to verify their concepts with local Aboriginal people.
13	Archaeological investigations must be far broader in scope than is currently the case. Archaeologists must consider features of the cultural landscape created by Aboriginal people in the past, for which cross-country trails provide the grid. Trails within Local Study Areas must be clearly identified and digitized and surveyed for more specific archaeological features that lie along those trails. Archaeologists must also document archaeological features that date from contact between Aboriginal people and Europeans, such as log houses, bush settlements, cemeteries, and other material evidence. The names and qualifications of the archaeologists who did the surveys need to be provided.
14	Discussions of potential impacts of oil sands industries must be based on real (empirical) data, not guesswork or speculation. If such data does not exist, then hypotheses can and should be developed to serve as the basis for future study. Developing such hypotheses may need to draw upon research about impacts of comparable industries on Aboriginal people elsewhere (in Canada or internationally).
15	Discussions of impacts should be considered in terms of the promises made to Aboriginal people by Treaty Commissioners when Treaty No. 8 was negotiated in 1899 and that constitute part of the oral dimension of Treaty No. 8.
16	There should be formal guidelines for both panels and consultants to follow in determining what constitutes the “public interest” in the event that significant, adverse effects are identified by the impact assessment documents. Such guidelines need to address treaty issues explicitly, in that First Nations in northeast Alberta enjoy rights under Treaty No. 8 in perpetuity. Discussions of public interest must include the consideration of the values that underlie determinations of public interest. It is local Aboriginal people who have to live with the decisions made by review panels and by the governments that issue final approvals. They have a right to understand in very specific terms how those decisions are made.

Table 2. Summary Remarks about the Appendices Reviewed

1	None of the appendices identify the authors or provide the authors' qualifications, despite the requirement to do by Sections 50 and 53(2) of the AER's "Rules of Practice" (2013:47, 48).
2	The appendices ignore almost completely the existence of Treaty No. 8 other than in a general way, despite the fact that "Aboriginal Rights and Interests" is the heading that encompasses SIRs 63-70. If Aboriginal and Treaty Rights are not considered in detail in the appendices, then the appendices are of little value in contributing to an understanding of whether or not the potential effects (impacts) of the Pierre River Mine Project and the cumulative effects of all oil sands projects will make it difficult or impossible for Aboriginal people to practice their Aboriginal and Treaty Rights.
3	The appendices ignore documents submitted to and problems raised for consideration at the Jackpine Mine Expansion Project hearings in 2012, especially relating to the lack of theoretical underpinnings for consideration of culture and culture change, clear methodology relating theory to conclusions, and inadequate literature reviews. The authors should have attempted to address problem areas raised at that time; they did not do so.
4	A literature review relating to cultural and social aspects of the Pre-industrial Case is virtually lacking in any of the appendices.
5	The discussion of the Pre-industrial Case, the baseline that is used to evaluate and predict subsequent impacts of oil sands industries, omits any discussion about the nature of Aboriginal cultures and structures of Aboriginal societies in the time prior to oil sands industrial expansion. Nor does the discussion of the Pre-industrial Case include any information based on archaeological investigations. As well, the Pre-industrial Case ignores at least half a century of substantial impacts on land and animal resources in northeast Alberta and adjacent northwest Saskatchewan prior to the development of the modern oil sands industry. The consequences of these previous impacts are that the uses of portions of the traditional lands of Aboriginal people have already been severely limited, or their resource base has been harmed, or both. Some information that is presented is incorrect in its details. The bottom line: information presented in the appendices related to the Pre-industrial Case is completely inadequate and therefore worthless for assessing subsequent impacts.
6	Archaeological investigations of the Local Study Area are inadequate for the purpose of assessing the degree of loss from a new oil sands project. Archaeologists do not seem to have identified features that indicate the existing cultural landscapes of Aboriginal people, such as traditional trails, nor have they identified post-contact archaeological evidence such as log houses, bush settlements, cemeteries, and other features of Aboriginal life. As well, the survey archaeologists are not required to discuss their findings with local Aboriginal people, who typically know the features of the land in an

	intimate way that the archaeologists do not. Moreover, archaeologists make their assessments about “significance” of the sites that they identify without consultation about cultural features and issues with the very people whose ancestors may have created those sites. (The summary discussion about archaeological investigations are not included in the appendices reviewed, but it was included in the original EIA submitted to the Jackpine Mine Expansion Project hearings and could reasonably have been expected to contribute to the picture of the Pre-industrial Case.)
7	The appendices do not demonstrate an adequate knowledge of the history of northeast Alberta and related historical topics.
8	The literature review relating to culture and socio-economic impacts/effects is inadequate in defining the concepts under consideration (culture, culture change, social structure or society, adaptation), and therefore it does not adequately identify the details of culture and socio-economic impacts, past, present, and future.
9	An old-fashioned and outdated concept of environmental determinism is employed, in which patterns of Aboriginal cultures and social structures are considered to have been determined by Aboriginal adaptation to the northern boreal forest.
10	Most of the discussion about impacts on Aboriginal people involves guesswork and speculation, not data based on research. The appendices provide little substantial data. While some concerns of Aboriginal people are presented, these are not integrated into the summary discussions of impacts on Aboriginal people.
11	After four decades of expanding oil sands activities, one would expect that much research would have been done about the impacts of oil sands activities on Aboriginal people (e.g., the impacts of new sources of wage labor and differential participation in wage labor by Aboriginal people, impacts of fly-in/fly-out jobs for Aboriginal people, etc.). However, it appears that virtually no research of this kind has been conducted. Research and monitoring seem to be limited solely to bio-physical impacts. This shocking state of affairs reflects the broader historical problems with lack of adequate monitoring of oil sands industries. It may also reflect broader historical problems with the Crown’s interpretation and implementation of its obligations under Treaty No. 8, with its corresponding fiduciary responsibilities. In short, the need exists for a long-term research program into cultural and social impacts. Such work needs to be done in a transparent and collaborative way involving local Aboriginal groups.
12	While the appendices posit or suggest possible consequences/“effects” of various oil sands activities, they do not propose any of these as hypotheses that can then be researched and/or monitored.

Appendix 2: JRP SIR 8 - Cumulative Effects, prepared by Golder Associates (Golder Associates 2013a)¹

The report contained in this appendix was written to provide information in response to the SIR 8:

(8) The Terms of Reference for the Joint Review Panel indicates that the cumulative effects assessment should include a Pre-industrial Case to allow the 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. At present, Shell's assessment does not include a pre-industrial baseline. Shell did include some future foreseeable projects and activities, however additional projects and activities have been disclosed and/or occurred since Shell completed the cumulative effects assessment, and thus an update is required to account for these projects. The Panel also requests that Shell include forest harvesting plans for the period of time up until the closure and reclamation of the Project. Shell has included timber harvesting plans only up until 2011.... The Panel also requires Shell to include the effects of past and future forest fires within the regional study area (RSA) when updating the cumulative effects assessment.

Shell provided a cumulative effects assessment for both the Jackpine Mine Expansion and Pierre River Mine Projects combined. The Panel requires information on any KIR that is affected by the Pierre River Mine Project and not by the Jackpine Mine Expansion Project and the outcome of any change to the cumulative effects assessment resulting from this distinction.

The Panel requests a comparison of the information from the Pre-industrial Case to the Application Case and to the Planned Development Case. The Panel notes that this information would provide a more complete picture of cumulative effects for PRM.

The report contains a number of problems, some that are general to the report and others that are specific to the areas falling within my area of expertise.

Lack of Named Authors

While the complexity of Appendix 2 suggests that it was the result of multiple authors, no

¹Citations for specific items in the discussion of each appendix use only page numbers, not full citations.

specific authors or their relationships to specific portions of the document are identified. This problem applies to all of the other appendices that I reviewed, which were prepared either by Golder Associates or by Nichols Applied Management. Sections 50 and 53(2) of the “Alberta Energy Regulator Rules of Practice” (AER 2013:47, 48) require that authorship be identified and the qualifications of that person be provided. However, none of that information is provided. Qualifications are important in helping to evaluate the credibility and reliability of the content of the appendices.

Knowing authorship is also essential in order to identify the appropriate witnesses to be examined at the hearings (see AER 2013 sec. 23[1]). The omission of authors and their qualifications in these appendices is unacceptable. It is also surprising, in that the consulting companies ought to have realized that they would be asked to disclose this information.

Organizational Problems

Appendix 2 features a number of organizational issues that I found led to difficult reading at some points:

- It relies on a hierarchy of numbers, leading to a confusing plethora of numbered sub-sections, up to six numbers in length, that could have been presented more clearly by using some hierarchical numbers in conjunction with clearly laid out headings and sub-headings.
- It contains much repetition from section to section, which leads to reader fatigue and a tendency to skim sections that should be read carefully. Highly repetitive information could have been presented as single units.
- There are no maps, which requires the reader to consult other reports while reading.
- There is no glossary for acronyms.

- There is inconsistency and lack of clear definition for terms such as “culture,” socio-economic,” “rights,” “traditional land use,” and sometimes no definitions at all.
- There is only limited cross-referencing to other appendices, even when the reader is referred to them directly.
- There are virtually no page references for citations, which makes it difficult to locate the portions of sources that were used, especially in lengthy works.

2.0 *The Pre-Industrial Case*

The Panel asked for information about the “Pre-industrial Case” (PIC) so that it could consider “the effects that may have already been experienced prior to the Project and future foreseeable projects or activities” (from JRP SIR 8, above). As the term indicates, the Pre-industrial Case is the state of affairs prior to the expansion of regional oil and gas developments and consequent impacts on humans and the environments. However, this appendix and all the other appendices I reviewed that address this area tended not to draw a clear distinction between the Pre-industrial Case and developments that followed.

As it turns out, Appendix 2 does not provide *any* description of the state of affairs of the human environment - the nature of Aboriginal cultures, social structures, and land uses - for either the Regional Study Area or the Local Study Area before oil sands development. All it provides is information about the presumed extent of First Nations Traditional Territories falling within the Regional Study Area (in 2.5.1, p. 35, especially Table 2.5-1) and some brief remarks - some inaccurate - under the heading “Socio-Economic” (2.5.2, pp. 38-39) about regional populations, transportation, and Aboriginal economy. The even briefer discussion titled “Historical Context” (2.5.2.1.1, on p. 38) contains nothing of substance and is useless in

understanding any of the factors that led to the state of affairs that constituted the Pre-industrial Case (the baseline).

The appendix claims that “Pre-Industrial Case disturbance was estimated at effectively zero, due to the negligible nature of PIC disturbance” (p. 35). This claim is wrong. It reflects the lack of historical awareness of the author(s) about the expansion of competing land use activities and policies into northeast Alberta and northwest Saskatchewan prior to oil sands activities, which had significant adverse effects on land and resources available for Aboriginal uses.

The author(s) does not appear to have attempted any kind of literature review about this subject, not even referring to materials that addressed this subject which provided multiple references about history of northeast Alberta that were submitted or referred to in the Jackpine Mine Expansion Project hearings (McCormack 1984; 2010a; 2012a; 2012b; Larcombe 2012). This omission is especially surprising in light of the remarks I made in my review of Golder Associates’ “Cultural Assessment” (McCormack 2012b) with respect to its discussion of “Drivers to Change Contributing to Present Day Conditions for Aboriginal Groups in the Wood Buffalo Region,” which was about reasons for changes over the past 50 years. I wrote:

No discussion of these factors is provided, nor are there any citations to either the scholarly literature or other literature (e.g., reports, submissions of various kinds). Indeed, the basis for this particular list of factors is unclear, especially when it is clear that the list is truncated. For example, it does not specify the on-going and continued loss of control over the land, resources, and communities; the continued undermining of Aboriginal political structures; and the ignoring of many terms of Treaty No. 8 [McCormack 2012b:6].

The Golder Report has claimed, incorrectly, that it is not possible to sort out the sources of change in what it calls the “pre-development” days. If Golder believed that it was unable to talk about such change in the past, it is unclear how it can do so with respect to the cultural changes that might be associated with current industrial expansion, yet that is what Golder was asked to do and purports to do. The Golder Report never considers this

fundamental methodological problem [*ibid.*:12].

In addition to the references referred to immediately above, there is a great deal of literature about 20th century economic initiatives in the Mackenzie Basin, including northeast Alberta. Older comprehensive sources that are easily available include works such as Morris Zaslow's *The Opening of the Canadian North 1870-1914* (1971) and *The Northward Expansion of Canada, 1914-1967* (1988) and K. J. Rae's *The Political Economy of the Canadian North* (1968) and "The Political Economy of Northern Development" (1976). Newer works include *Alberta's North, A History 1890-1950*, by Donald G. Wetherell and Irene R. A. Kmet (2000), John Sandlos' *Hunters at the Margin* (2007), and Liza Piper's *The Industrial Transformation of Subarctic Canada* (2009). There are many other useful sources about more specific topics. It is difficult to understand why consultants working for Golder Associates and Nichols Applied Management who are supposed to write about historical factors affecting northern people (both Aboriginal and non-Aboriginal) and their lands and resources have not attempted to read *any* history about the region.

The Review Panel should be aware that multiple factors were of great importance in the 20th century in northeast Alberta in altering Aboriginal access to their lands and resources and affecting the distribution and abundance of wildlife, all in harmful ways, and all prior to expansion of oil sands industries. Golder Associates should have included information about the following in their discussion of the Pre-industrial Case:

- The prohibition on controlled burning, an important form of land management, imposed on Aboriginal people by the federal government.
- The invasion of northern Alberta by White trappers.

- The creation of Wood Buffalo National Park.
- The destruction of barren-ground caribou winter habitat and migration routes.
- The creation of a system of registered trapping areas.
- The arrival of new resource industries prior to the oil sands industries.
- The operation of the W. A. C. Bennett Dam.

These developments can all be considered violations of promises made by the Treaty Commissioners in 1899 who negotiated Treaty No. 8. Changes in Aboriginal access to portions of their traditional lands caused by factors such as the creation of Wood Buffalo National Park, the creation of registered trap lines, and the drying up of the Peace-Athabasca Delta have implications for potential uses of other portions of their traditional lands, especially lands within the Regional Study Area. Therefore, I am not convinced that it is possible to speak solely about cumulative changes of mining expansion in the Regional Study Area, when clearly cumulative changes are broader in their impacts.

The bottom line is that the presentation of aspects of a Pre-industrial Case in Appendix 2 that relate to Aboriginal people and their history was improperly conceptualized, and easily-available information about events with significant adverse effects was not considered. The result was that Appendix 2 arrived at incorrect conclusions. Contrary to the statements in Appendix 2, both the lands and the resources utilized by Aboriginal people experienced substantial changes prior to oil sands industrial development that resulted in a reduction in land availability and wildlife populations. By 1955, the date used in Appendix 2 for a baseline, Aboriginal people had already suffered significant displacement from portions of their traditional

lands and had experienced significant difficulties in supporting themselves, due to an increasingly impoverished resource base. Because those changes were not considered in calculations of animal populations and discussions of traditional lands, the Panel cannot rely on the “facts” presented in Appendix 2 about the Pre-industrial Case.

In turn, that has major implications for cumulative impacts. Aboriginal people did not experience the expansion of oil sands industries with what Golder Associates suggest was a clean slate in terms of their lands and resources, but with lands and wildlife resources that were already considerably reduced in extent and number. Therefore, the oil sands industries have already had a far greater impact on Aboriginal people than is commonly assumed and should lead to the re-drafting of at least some of the tables contained in the appendices and/or the interpreting of the figures available.

2.5.2 Socio-economic Considerations Presented as Part of the Pre-industrial Case

The author(s) of Appendix 2 justifies using material drawn from Appendix 8, which was prepared by Nichols Applied Management, on the grounds that “Nichols has been engaged in socio-economic work in the region for over 30 years and drew on that experience in preparing this section” (Golder Associates 2013a:37). However, none of the Nichols authors was identified, and, based on the brief notes about Nichols employees from the Nichols Applied Management website, none has demonstrable social science expertise (Nichols Applied Management 2013). The company represents its staff as “management and economic consultants.” Appendix 2 continues: “The challenge in carrying out this analysis is that historical data are sometimes not available, or were often collected only infrequently, and are

affected by changing definitions and assessment methods” (*ibid.*). The previous section has pointed to the easy availability of documents directly related to many Aboriginal issues for northeast Alberta. One also has to wonder why persons working for Nichols who have been doing this “work” in northeast Alberta for over 30 years have not themselves done research to provide data that would fill some of the gaps related to socio-economic information or at least identified the gaps more clearly so that research could be done on them.

It is my opinion that the summary in this section of Appendix 2 contains numerous errors or gaps.

- Most of this discussion in this section (2.5.2) seems to belong more properly in the following section of the appendix, in that it concerns consequences of oil sands industrial expansion, the 2013 Planned Development Case or PDC. There is little that addresses the Pre-industrial Case.
- There is little information about the social structure or the economy of Aboriginal people or their communities, which means that it is unclear how the Nichols author(s) will be able to evaluate impacts on either.
- The discussion of community services applies only to Fort McMurray (*ibid.*), excluding Fort Chipewyan and the neighboring services available in Fort Smith.
- “Hunting” is classified as a “resource industry,” while for Aboriginal people it was (and

still is) not an industry *per se* but was done as part of a mixed economy that was oriented to subsistence, not profit. Fishing was a resource industry mostly for “outside” fishermen (fishermen who came to the region from elsewhere to work for commercial fish companies); for Aboriginal people it was done primarily for subsistence purposes, to feed themselves and their dogs. A few local Aboriginal people who worked for commercial fishermen received wages, as did Aboriginal people who fished for the missionaries or the local traders/store owners. Trapping was done both for immediate subsistence (i.e., for food, furs, and skins for family use) and for the production of exchange value realized as credits or cash, which was then used mainly to buy items needed for subsistence activities (e.g., firearms, ammunition, netting twine or nets, outboard motors).

- The discussion of the labor force in 1961 ignores the labor force in Fort Chipewyan, where there was seasonal employment in transport and commercial fishing and also with local traders/store owners, the Roman Catholic Mission, and Wood Buffalo National Park.
- This section claims that Aboriginal people “settled more permanently in stable communities as a result of the declining fur trade and under the pressure of government policies” (*ibid.*:39). This statement overlooks the stable winter settlements where many or most Aboriginal people had lived since at least the time of Treaty No. 8. It also greatly oversimplifies the factors related to the relocation of Aboriginal people from these bush settlements into the towns. It is true that the fur trade declined, as it had from time to

time in earlier years, but the real problems after World War II were the decline in buying power that stemmed from post-war inflation and the unwillingness by the federal government to provide interim assistance (see Clancy 1991; McCormack 1984:chps. 7, 8).² Those difficulties were compounded by the reduction in land and resources available for Aboriginal use. In fact, the first government-built houses for Treaty Indians in the Fort Chipewyan region were built on the Athabasca Chipewyan First Nation reserve and were intended to help Chipewyans remain in the bush (McCormack 1984:527-8). Programs in Fort Chipewyan mostly *followed* the settlement of Aboriginal people in towns, not the other way around. The relocation of Aboriginal people to Fort Chipewyan has been discussed extensively in an earlier work (McCormack 1984:chp. 8).

- This section of Appendix 2 refers to Appendix 7 (Golder Associates 2013c:14-2) for the “pre-development context.” However, what Appendix 7 contains is brief and mostly uninformative: a few brief remarks about pre-contact days (with no citations provided); a brief glimpse of “industrial development,” much of which actually has to do with the post-oil sands development era (very few citations provided); population growth during the post-oil sands development era; an uninformative section titled “Nation Building” that lists some events of the pre-oil sands development era (uneven and inadequate citations); and limited information about Treaty No. 8 that contains some substantial errors (see discussion below).

²After the initial decline in the fur trade, which led governments to decide that it would probably never recover, it rebounded as it always had in the past, and fur buyers still sought to acquire different kinds of furs.

- Table 2.5-4 is not comprehensive and omits important points. For example, for Period 1, early 1960s to 1986, “Other Economic Sectors,” the table rightly states that “the traditional economy remains important for many people in the region, especially in the outlying areas.” Yet nothing is said about the traditional economy in Periods 2-4, which implies that the traditional economy ceased to be important, a point that many First Nations people would dispute and which is important for the issue about continuing Aboriginal and Treaty Rights as they relate to land uses. (Period 1 was also the time when most Aboriginal people living in bush settlements began to relocate to small towns for permanent residence.) In the summaries for “Population,” the table does not include any reference to Bill C-31, which led to substantial increases in the sizes of legal Indian Bands (First Nations) during Period 2. For Period 3, the statement is made that “Population of the other small communities is relatively stable,” yet it was during this period - late 1990s to 2008 - that many Aboriginal people from Fort Chipewyan moved to Fort McMurray or Fort McKay either permanently or temporarily for wage employment. The discussion of “Housing” concerns only Fort McMurray. The discussion of “Local Government” makes no reference to the Athabasca Tribal Council and its mandate; this organization signed a formal political accord in 1993, in Period 2.
- What is described as “socio-economic” is primarily economic, with little that addresses social matters directly. Economic benefits and “challenges” (i.e., problems) may have social implications or impacts, but most of what is described in this portion of Appendix

2 is conjecture and speculation, presented with little or no supporting evidence (p. 44).

- Socio-economic effects on Aboriginal people are presented as a separate topic from broader socio-economic impacts (p. 45). The appendix states that Aboriginal people “...have also experienced a number of cultural changes” and refers the reader to Appendix 7, which is evaluated later in this review. There is a brief discussion about changes to Aboriginal way of life, with claims that the changes were the result of “increasing contact with non-Aboriginal peoples, values and norms...” (p. 46). However, the situation of contact itself did not produce the changes listed on pages 45-46. Such contact has been on-going since the late 17th century, which means that Aboriginal people have had much “access to other cultural influences” during that lengthy history, yet their basic cultures and ways of life changed little until the 20th century, when government legislation and policies began to interfere with Aboriginal access to the land and the resource base. The 20th century was characterized by a form of internal colonization of northern people and lands (McCormack 2010a) that created the problems Aboriginal people were experiencing at the time that the oil sands industry began to develop. As the discussion above indicated, most of these problems resulted from violations of promises made by the Treaty Commissioners who negotiated Treaty No. 8 in 1899. By not considering the historic context of Aboriginal people adequately, Appendix 2 does not properly conceptualize the Aboriginal situation as one of underdevelopment stemming from colonial dispossession. Aboriginal people today are still struggling to de-colonize their societies, which is a difficult process that involves Aboriginal efforts to regain an

increasing amount of control over their communities and over their lands and resources.

These efforts are occurring at the same time as new oil sands industries are expanding their footprint over those same lands, a situation that is governed by external governments (the Province of Alberta and the Government of Canada), not First Nations governments, which have been struggling to build their capacity in many directions, including those that allow them to contribute effectively to the debate over industrial expansion.

- Table 2.5-5 identifies a series of oil sands practices and their alleged effects on local Aboriginal people. I do not necessarily disagree with the information in this table, but I expect to see evidence presented in support of the causal relationships presented. Supporting evidence is lacking. If good evidence is not available, there should be at least acknowledgment of the gaps that exist and recognition that research and investigation are required to confirm and evaluate these effects. Also, some of the suggested causal relationships are simplistic. For example, an increased non-Aboriginal population might not be a problem for Aboriginal people, or at least not the same kind of problem, if the Government of Alberta prohibited this sector of the regional population from hunting on Aboriginal lands and if the education system were more responsive to and inclusive of Aboriginal culture and history.
- Appendix 2 states on p. 46: “Aboriginal peoples in the region are concerned that environmental effects related to industrial development have affected their way of life.” There is no further commentary by the author of the appendix. Does the author agree?

How does this statement relate to other portions of Appendix 2? Without further discussion, there is no context to assist the Review Panel in deciding what to do with this comment.

3.0 *Planned Development Case = 2013 PDC*

3.5.1 Traditional Land Use Section 3.5 concerns the “Human Environment,” with Section 3.5.1 labeled “Traditional Knowledge and Land Use” (Golder Associates 2013a:139). However, this section does not actually discuss traditional knowledge in any substantial way but only some “opportunities to undertake each traditional land use activity” (*ibid.*). The general remarks made on page 141 about socio-economic factors that may affect land use do not seem to be based on any evidence and provide only a single citation. If this discussion is to be meaningful and useful for informing the Review Panel recommendations and subsequent decision-making processes about the impacts of the project, it needs to be embedded in a broader discussion of the literature about impacts of mining and energy-sector industries on Aboriginal peoples, for which there is an extensive literature both in Canada and internationally. Each of the possibilities identified here could then be framed as a hypothesis for future research and monitoring. Given the potential significance of these factors for the lives of Aboriginal people and the fact that oil sands industries have been in existence for decades, it is unfortunate that there seems to be no regulatory mechanism or requirement for undertaking the research required to address these factors. First Nations have continued to raise the same or similar issues in different regulatory proceedings and consultations, and it should be widely known by now that

there are concerns about impacts that are not being addressed. If research had been done in this area in the past, by this time there could have been some solid empirical data about cultural and socio-economic impacts of oil sands development. Given the dearth of such data, it is unclear how the consultants who prepared these appendices reached their conclusions.

This section also includes some odd language. Aboriginal people engage in “traditional hunting,” “traditional trapping,” “traditional fishing,” “traditional plant and berry harvesting opportunities.” It is not clear what the term “traditional” means in this context; it suggests that the author thinks there are also non-traditional modes that could be considered. *All* Aboriginal land uses relate to their traditions as Aboriginal people with rights under Treaty No. 8.

There is some discussion of overland trails, which are of enormous importance for access of Aboriginal people to their lands and have been so for centuries. The discussion points out that trails have already been heavily disrupted and will continue to be so in the future, “although alternative trails and upgraded access [undefined] continue to be available” (p. 165). Nothing further is said to indicate what this statement means for the quality or utility of trails that are still available and whether or not they will make access more difficult than it is now. There seems to be an assumption that all trails are equivalent to one another, but that is not so. Information is needed about whether the trails that were destroyed were primary or secondary trails and about how inconvenient it will be for Aboriginal people to resort to the remaining trails. The consultants have evidently not consulted with Aboriginal people about the alternative, remaining trails to discover their thoughts about the suitability of those trails. If data is lacking, as it seems to be, this kind of discussion is one place where hypotheses or predictions about future overland travel could be developed, work which ideally would be done in partnership with the Aboriginal

people who are the land users.

There is another huge omission about traditional trails, not even mentioned in Appendix 2. This discussion also relates to the inadequate picture provided of the Pre-industrial Case. Aboriginal people did not live in a trackless “wilderness,” despite the fact that it has long appeared to be so to Euro-Canadians. Instead, their lands were well-known to them, constituting a cultural landscape. The concept of the cultural landscape has been identified by both UNESCO and the Government of Canada for Aboriginal and non-Aboriginal groups alike. UNESCO defines such landscapes as “combined works of nature and humankind...[that] express a long and intimate relationship between peoples and their natural environment” (UNESCO 1992-2013; see also Mitchell et al. 2009; Buggey 1999; Buggey and Mitchell 2003; Olivier 2003; King 2003). It is beyond the scope of this report to elaborate on this concept, other than to point out that today there is a strong appreciation and recognition that what non-Aboriginal people perceive as “pristine wilderness” is usually the homeland for one or more Aboriginal groups. This point was made eloquently over 30 years ago by Justice Thomas R. Berger in his pathbreaking report, *Northern Frontier, Northern Homeland. The Report of the Mackenzie Valley Pipeline Inquiry* (1977). He called the northern homeland “...a heritage, a unique environment that we are called upon to preserve for all Canadians” (*ibid.*:vii). As Susan Buggey and Nora Mitchell have explained, “Their [Aboriginal] management of these landscapes altered the original ecosystem, but equally it contributed to the biological diversity long regarded as the result of natural factors, contributing to the value of wilderness. Cultural diversity thus often coincides with rich biological diversity” (Buggey and Mitchell 2003:93). Even when physical features are primarily “natural,” or not created or affected substantially by humans, “...cultural values transform them

from solely natural environments to associative cultural landscapes,” whose values include “languages, rituals and social practices, cosmologies and knowledge systems, and beliefs and practices about nature” (*ibid.*). As Thomas King has commented, such places “embody or sustain values, character, or cultural coherence” and can be considered as “cultural resources” (2003:1, 11). More broadly, the literature about cultural landscape relates closely to scholarly research about the significance of *place* to human beings.

In northern Alberta, overland trails provide a grid of sorts for Aboriginal places and uses of their lands. They have provided travel routes across the land for centuries of Aboriginal people, and they connect the lands of northern Alberta to adjacent regions and from there, to other parts of North America. Despite their singular importance, the archaeological surveys that are required to be conducted prior to a new oil sands project have not required the documentation of trails, many of which may be of great antiquity, or of features that are associated with Aboriginal trails (especially place names, stories, and other features that may not be immediately apparent from a visual inspection). The destruction of each trail involves the loss of crucial evidence attesting to the long history of Aboriginal occupation and settlement of northeast Alberta and the Aboriginal creation of a cultural landscape. Clearly much of that evidence has already been lost in northeast Alberta. Yet the assessment by Alberta Tourism, Parks, Recreation and Culture of its review of the Historical Resources Impact Assessment considered “the level of investigation completed during the HRIA...adequate to identify any substantial historical resource concerns within the areas investigated in the proposed 10-year development area” (Shell Canada Limited 2007:8-10). I disagree. While the Alberta Government may require that additional research be conducted on the actual footprint of a newly approved industrial project, by that time

any new information will be collected only for salvage purposes, not to influence the recommendations to be made by the Joint Review Panel. More comprehensive archaeological investigations, *done in cooperation with Aboriginal land users and prior to review panel recommendations*, will help to identify important additional features related to cultural landscapes and may also offer some guidance for how to use such joint work to keep the knowledge meaningful, available, and alive within Aboriginal communities.

Serious consideration of the discussion of the Pre-industrial Case would require the figures for much of this post PIC sections to be recalculated, to take into consideration reduced amounts of land available for all Aboriginal land uses and reduced wildlife populations. That means that the situation for Aboriginal people in terms of their land uses and land available to them is actually worse than the conclusions drawn in this appendix. The fact that Aboriginal people persist in using their lands, in the face of the enormous difficulties they have faced, is an indicator of how important such land use is to them.

3.5.2 Socio-Economic Assessment This section of Appendix 2 lists new agencies and structures and new planning initiatives that are supposed to help rationalize some of the oil sands expansion process (p. 200). A major omission here is the provincial Lower Athabasca Regional Plan, or LARP, which has been embraced by Impact Assessment documents as an important planning tool but was rejected as inadequate by local First Nations, including Athabasca Chipewyan First Nation. A notable problem with LARP was its lack of any mention of Treaty No. 8 or the promises made under that treaty to First Nations.

Appendix 3.8. Traditional Land Use Environmental Setting Report Update, prepared by Golder Associates (Golder Associates 2013b)

The SIR(s) to which this appendix is related is not indicated.

This appendix contains an introduction with two maps. The first map shows the “Traditional Land Use” area, presumably for all the Aboriginal people of the Regional Study Area (Fig. 1.1-1, p. 2); however, the specific land use areas of the different First Nations are not shown. The second map, “Traditional Land Use Local Study Area and Local Registered Fur Management Areas” (Fig. 1.1.2, p. 3), does not distinguish between registered fur management areas held by Aboriginal people (either First Nation or Métis) and non-Aboriginal people; the latter areas reduce the total lands available for trapping by Aboriginal people.

The remainder of this appendix is divided into two sections. The first is 2.0, “Traditional Ecological Knowledge and Land Use within the Regional Study Area.” It actually contains little information about traditional knowledge; instead, the introduction to the appendix recommends that the Panel and other readers “examine the referenced source material in its entirety to have a fulsome perspective of the TLU information provided in those documents” (p. 1).

It is not realistic to expect the reader to read all source materials, many of which are difficult to obtain. This appendix should have provided an adequate summary and overview of key points based on “the referenced source material.” The source material is itself variable in its coverage and content, and at the very least this appendix could have provided a content analysis which could also have been presented in one or more tables. What Section 2.0 provides instead is a brief snapshot of land use for each Aboriginal community or group. Each snapshot contains a brief summary of information about hunting, trapping, fishing, plant harvesting, and a catch-all

category of “historical, cultural and spiritual sites.” The last category does not integrate archaeological information into the description, nor is it clear what kinds of sites would be included under this heading.

Each snapshot ends with a statement about “industry related and project-specific concerns and issues.” The section is organized into the following sections of concern by the First Nation, community, or Métis group about the following:

- Access to land
- Disturbances to land caused by industry
- Fears about water quantity; air, soil, and water quality; eventual reclamation; “other”
- Concerns about the specific project (Pierre River Mine)
- Recommendations to address these concerns

The section about the Community of Fort McKay (2.1) contains six maps with ecosystem information. There are no equivalent maps for any of the other groups (First Nations or Métis). It would have been helpful to see an explanation about what materials are or are not available for or from each Aboriginal group. Although Métis are localized in their communities and the lands they use, they are treated as a single group, and their concerns and recommendations are not subdivided to correspond to those of Métis of specific regions.

The second section of this appendix is 3.0, “Traditional Ecological Knowledge and Land Use Within the Local Study Area.” It has the same overall format, except that there are no “industry related and project-specific concerns and issues.” Presumably these concerns and issues are considered to have been covered in the first section, but it would have been helpful to have had the information from that first section summarized for the smaller Local Study Area. It

is difficult in this appendix to distinguish between the concerns for the Regional Study Area and those specific to the Local Study Area.

Despite the lengthy list of “concerns and issues,” there are few summary remarks to provide guidance to the Review Panel. Section 4.0, “Summary of Results,” indicates that none of the Registered Fur Management Areas overlapping the Local Study Area is registered to Aboriginal trappers, although one non-Aboriginal trapper has a Métis wife. It is important to remember that trapping includes harvesting of fur-bearers for subsistence purposes (especially beavers and muskrats) as well as for sale (commodity production). The appendix indicates that there are Aboriginal land use areas within the Local Study Area for hunting, possibly fishing, and berry picking. However, once Aboriginal people were denied access for trapping to areas that are now licenced to or “owned” by non-Aboriginal trappers, it seemed to have led to changes in their other patterns of land use on those lands, and much of their land uses end up concentrated in the Registered Fur Management Areas registered to Aboriginal people, or at least to those people to whom they are linked by ties of kinship and friendship. The relationship between Registered Fur Management Areas and Aboriginal land use has a complex history. The outcomes of this relationship for patterns of land use continue to be a significant gap in information. While the appendix refers to “several cabins and a cemetery,” it does not indicate whose they were/are or whether or not that information relates to information from archaeological investigations of the area. In fact, the 2007 EIA notes that only “precontact” sites were found during the Historical Resources Impact Assessment (Shell Canada Limited 2007:8-10). One wonders what the archaeologists were doing that they did not notice cabins and a cemetery.

The question I am left with after reading this short report is: what will the Review Panel

do with it? At the very least, the “Summary of Results” should have included a summary of the “concerns and issues” raised by Aboriginal people as well as their recommendations. The former relates to issues of consultation about the proposed project; the latter speak to potential forms of accommodation. It would have assisted the Panel if the appendix had provided more analysis of both topics.

Appendix 7. Response to Supplemental Information Request 69a - Cultural Effects, prepared by Golder Associates (Golder Associates 2013c)

The report contained in this appendix was written to provide information in response to the SIR 69a:

The Panel’s Terms of Reference requires it to consider any effects on hunting, fishing, trapping, cultural and other traditional uses of the land as well as related effects on lifestyle, culture and quality of life of the Aboriginal persons.

- a) Provide a cumulative assessment of the project’s effects on Aboriginal culture, lifestyle and quality of life of Aboriginal persons for each First Nation or Aboriginal group potentially affected before and after reclamation using a pre-industrial baseline.

Appendix 7 begins with a disclaimer: “...effects on Aboriginal culture in the region are understood to be cumulative, as a result of all development, and institutional and societal changes over time. Cultural effects cannot be attributed to a single oil sands project in the context of development in northern Alberta” (p. 1). Shell was asked to provide information about cumulative effects of the Pierre River Mine Project in combination with all the other oil sands projects currently underway or anticipated. However, the disclaimer is saying that the author(s) cannot do so. If so, then this appendix needs a carefully developed section about the theory and

methodology that underlie the discussion of cumulative cultural effects that it does contain. That is, the author should explain how s/he intends to approach the topic of cumulative impact and sort out the impacts caused by oil sands projects from impacts with other causes. That is an important question that unfortunately is *not* addressed in this appendix.

While this appendix includes as references my 2010 book about Fort Chipewyan and the ethnohistories I prepared for Mikisew Cree Nation and Athabasca Chipewyan First Nation (McCormack 2010a; 2010b; 2012a), it is not clear whether or not they were actually used. However, it is significant that the appendix does not even reference the “Review of the ‘Cultural Assessment’ prepared by Golder Associates” (McCormack 2012b), which was an important critique of significant problems associated with that particular report. This “Cultural Assessment” was prepared for the 2012 Jackpine Mine Expansion Project hearings. It lacked adequate knowledge about culture, culture change, and cultural ecology. It lacked any formal methodology for approaching the topic. It lacked an adequate literature review. My Review concluded that the Golder Associates’ “Cultural Assessment” did “...not provide a proper assessment of effects on hunting, fishing, trapping, cultural and other traditional uses of the land, or of related effects on lifestyle, culture, health and quality of life of Aboriginal persons” (McCormack 2012b:1). It did not identify cultural elements for the Aboriginal people of northeast Alberta, nor did it provide even a working definition of “culture.” It concluded that the Jackpine Mine Expansion Project would have “little or no impact on the ability of people to transmit their knowledge” (*ibid.*:5). It claimed that losses that Aboriginal people might or would experience “...will be compensated for by new opportunities in labor and contracting” (*ibid.*), although how those might balance out was never explained. The reasoning behind each claim or

conclusion was never provided, and there was little or no supporting evidence provided.

I raised other potential cumulative effects in my Review:

Such impacts can be expected to affect the fundamental social fabric of the First Nations, whose members have lived in egalitarian societies for thousands of years. They will likely include the following: social fragmentation; social dysfunction of various kinds; economic disparities; increasing language loss; and new patterns of disease, among others. Enforced transformation to wage labor can be considered a form of involuntary assimilation. As with earlier processes of involuntary assimilation, Aboriginal people are expected to be assimilated into the lower ranks of the class society, not as equals economically, politically, or socially. There is nothing in the Golder Report about these broader problems or that addresses these issues in any meaningful way [McCormack 2012b:5].

I am disappointed that the current appendices do not attempt to address these concerns. It is my opinion that additional information needs to be provided and additional analysis about this subject must be undertaken to answer SIR 69a (just as they were needed to address SIR 30 for the Jackpine Mine Expansion Project). I concluded that the “Cultural Assessment” prepared by Golder was based on “...the underlying and racist premise that ‘modernization’ is inherently preferable to traditional cultures and livelihoods” (McCormack 2012b:4).

There is no evidence in Appendix 7 that the author(s), writing again on behalf of Golder Associates, considered any of the issues I raised in my Review. The author did not consult any of the lengthy list of sources I included as starting points for learning about the cultures of Aboriginal peoples in northeast Alberta (McCormack 2012b:7-8). The questions I posed on page 11 of my Review were not addressed. I raised serious problems; I have to wonder why the author chose not to address them. Proponent-led cultural and social impact assessment in the oil sands region does not appear to be meeting standards for cultural and social analysis. It would be helpful for regulatory bodies, such as review panels, to provide more criteria for and guidance on

the preparation of submissions, so that industry proponents will provide reports that will be more useful in informing the panels about anticipated impacts on cultures, societies, and treaty rights. In my opinion, the work submitted in the appendices that I have reviewed is completely inadequate for understanding impacts on cultures, societies, and Aboriginal and Treaty rights of Aboriginal people in the oil sands region. Table 1 makes recommendations for what is required to produce better reports.

1.7 The Pre-Development Context (Pre-industrial Case)

In its “Overview of Findings,” Appendix 7 states: “While effects on culture cannot be attributed to a single project, effects on Aboriginal culture, lifestyle and quality of life can be described for the region” (p. 3). The SIR asks for a comparison of changes to a pre-industrial baseline, and the appendix states that “this review begins from a pre-development context” (p. 3). Moreover, it makes the point on the following page (4) that “It is important to be aware of the Pre-Development Context and especially Treaty 8, to begin to understand the effects on Aboriginal culture that have been reported today by Aboriginal groups.” I agree. So what does the appendix actually have to say about Aboriginal culture, society, and the Pre-Development Context (in Appendix 2, called the Pre-industrial Case)?

As with the “Cultural Assessment” submitted to the Jackpine Mine Expansion Project hearings, the discussion in Appendix 7 is totally lacking in any adequate consideration about culture and culture change, and it does not even provide working definitions of these terms. It does not present any information about the nature of northern Aboriginal societies. What it does do is propose a theory of environmental determinism: “The social system is adapted to a

physical environment and what flows from that are the culture or mechanisms by which an individual acquires characteristics to fit himself or herself to that life” (p. 13). Even if this claim were true, the report does not build on this notion in any way in terms of discussing post-oil sands changes in Aboriginal culture and society. However, I submit to the Review Panel that this claim is wrong. It does not reflect contemporary anthropological concepts of culture, social structure/society, or cultural ecology.³ It is also at odds with what we now understand about how Aboriginal peoples of northeast Alberta actively shaped their physical environments by using controlled burning as a form of extensive land management. Aboriginal people also invested the land with many forms of cultural meanings, none of which are discussed in Appendix 7. Thus, as an earlier part of this report indicated, Aboriginal peoples of northeast Alberta were *not* at the mercy of their environment. Their cultures and social structures were closely *related* to the land and its resources but not *determined* by them in the way proposed in Appendix 7. Those cultures and social structures developed over a very long period of time and involved complex relationships between people and their lands and resources.⁴ Changes in cultures and societies resulted from the ways in which people resolved the dynamics and potential tensions inherent in these relationships, with Aboriginal people exercising what is often termed “agency,” the conscious and deliberate actions they took as they faced and resolved issues, whether those were internal - generated within their societies - or external - posed by external forces, whether human

³These theoretical difficulties were pointed out in my “Review” of Golder Associates’ “Cultural Assessment” (McCormack 2012b:2-3). One wonders why the author of the present appendix did not address these points and insists on clinging to outdated theory.

⁴The Aboriginal world also included/includes an important spiritual dimension and non-human persons who are considered to exercise agency and influence humans. That is, spiritual aspects are part of these complex relationships.

or bio-physical and climatic.⁵

Because Appendix 7 does not try to define “culture” in any way, it is difficult to know how the author believes that s/he can talk about impacts on culture or even what that term means to him(her). Culture is a complex term that has itself been the subject of anthropological study. In his useful review of anthropological history and theory, Alan Bernard drew on work by A. L. Kroeber and Clyde Kluckhohn to talk about six groups of or approaches to anthropological definitions (2000:102). The term “culture” has also been widely adopted by scholars in other disciplines and by members of the general public in a variety of ways, though rarely with definitions. One of the most influential theoreticians of the concept of culture in the late 20th century has been Clifford Geertz, who wrote that “...man is an animal suspended in webs of significance he himself has spun...” (1973:5). To Geertz, culture *is* those webs, and the analysis of culture is a matter of interpretation that necessarily involves a search for meanings, or the “structures of signification” (*ibid.*:9). Thus, studying culture change involves understanding how and why such meanings change. Geertz looks at human behavior as forms of “symbolic action,” with culture existing in the personal understandings and beliefs of members of a human society. At the same time, those understandings and beliefs are expressed in “patterned conduct” or behavior (*ibid.*:10). His concepts are admirably re-phrased by Roger Keesing in his excellent

⁵The *Collins Dictionary of Sociology* defines agency as “the power of Actors to operate independently of the determining constraints of social structure. The term is intended to convey the volitional, purposive nature of human activity as opposed to its constrained, determined aspects” (Jary and Jary 2000:9). It is more clearly and succinctly presented in *Wikipedia* as “the capacity of individuals to act independently and to make their own free choices” (2013). Aboriginal people have not always been seen by Europeans/Euro-Canadians as exercising agency in influencing and determining how their cultures and societies changed over time, which is one reason for explanations such as environmental determinism, which reduces or even eliminates Aboriginal agency.

textbook on cultural anthropology. Keesing provides what he calls an “ideational” definition of culture, in which cultures “...comprise systems of shared ideas, systems of concepts and rules and meanings that underlie and are expressed in the ways that humans live” (1981:68). Cultures are not activities *per se* but rather constitute the understandings that people have that lead them to behave and engage in activities as they do. Keesing uses the term “sociocultural system” for “...the pattern of residence, resource exploitation, and so on, characteristic of a people” (*ibid.*).

It is these understandings of culture that have led impact assessment scholars such as Rabel Burdge and Frank Vanclay to define cultural impacts of projects as “...changes to the norms, values, and beliefs of individuals that guide and rationalize their cognition of themselves and society” (Burdge 2002:5; Burdge and Vanclay 1996:59). They embed their discussion of cultural impact assessment, which Vanclay terms a “specialist sub-field,” within the broader field of social impact assessment (Vanclay 2003:7). No references to any of this important impact assessment literature appears in Appendix 7 or the other appendices.

Aboriginal people offer their own definitions of what “culture” is or means to them in their testimony at oil sands hearings and in other documents where their understandings are recorded, such as traditional land use studies. The Mackenzie Valley Review Board has published its own working definition that is closely related to the ways in which Aboriginal people talk about culture: “‘culture is a way of life, a system of knowledge, beliefs, values and behaviours passed down to each generation’” (MVRB 2009:6).

Some of the elements that make up Aboriginal cultures in the Mackenzie Valley are: traditional knowledge, commonly held values such as respect for Elders, oral history, spiritual practices, language, physical heritage resources, traditional dances and songs, place names, spiritual sites and cultural landscapes, traditional land use, values associated with the land [*ibid.*]

Alan Ehrlich and Sherry Sian have pointed out that “...traditional knowledge about culture is not subject to external validation as is scientific knowledge. Cultural information is largely qualitative, consisting of narratives about the historic occupation and use of an area” (Ehrlich and Sian 2004:7). Although it seems as if they are pointing to activities as well as ideational elements, they are writing about the meanings that are embodied within the narratives, which leads back to Geertz’ definition of culture as “webs of significance.”

Unfortunately, none of the appendices submitted for the Pierre River Project hearings that address culture and culture change provide any explanations about what these understandings and activities are for the Aboriginal people of northeast Alberta. They do not lay out the details of the Aboriginal sociocultural systems. They do not attempt to present either anthropological or Aboriginal definitions of culture. They do not cite impact assessment literature related to social or cultural impact assessment, not even that produced in the neighboring Northwest Territories.

The most important potential sources of cultural and societal changes during the past 150 years were the arrival of the missionaries, who introduced new ideologies, and federal and provincial government agents, who enforced new policies (underwritten by other ideologies) that imposed restrictions on Aboriginal peoples and their uses of the land and its resources.

Appendix 7 ignores all of these factors, and it does not even attempt to talk about changes resulting from Aboriginal engagement in the fur trade, despite the facts that this subject has been written about extensively in Canadian fur trade literature and that Aboriginal trapping was part of the baseline or Pre-industrial Case. Nor is there any consideration of the extent to which change occurred in fundamental cultural systems as opposed to the more visible sociocultural systems. Change in aspects of the latter, such as the development of permanent winter bush settlements

and the production of commodities (items for sale) as part of bush-based, subsistence-oriented activities, does not necessary mean that there were changes in fundamental cultural understandings and values.

The appendix does not provide *any* specific details about Aboriginal cultures or social systems, not even in a summary list or table, despite the fact that much information was provided in my book about Fort Chipewyan and the ethnohistories I prepared for the two Fort Chipewyan First Nations (McCormack 2010a; 2010b; 2012a). The “Cultural Assessment” prepared by Golder Associates for the 2012 Jackpine Mine Expansion Project hearings stated that “cultural and social elements important to Aboriginal groups in the region emerge from common themes identified in the literature review” (Golder Associates 2012), but that report never provided even a summary of those common themes. Such a summary would have been equally appropriate for Appendix 7. As my Review pointed out, “Such an analysis could have been taken back to Aboriginal groups for verification of the significance of those elements” (McCormack 2012b:5), an approach that would have been supported by Alan Ehrlich of the Mackenzie Valley Review Board. It could have also been verified by comparing it to the published, peer-reviewed literature. One wonders why the author of the present appendix has not made even a modest effort at providing this information. Nor does the author consider any significant factors in 20th century history. While changes did occur to Aboriginal ways of life in the years before the development of the oil sands industries, none of those changes are identified, other than the fact that Aboriginal people engaged in trapping and wage labor. It seems that the author is equating these changes in activities with changes in cultures and social structures, but such an equation is incorrect. While these new economic endeavors certainly had implications for potential changes

in cultures and social structures, those possibilities are not discussed in this appendix.

Some Errors in Appendix 7

Appendix 7 contains several specific errors that are outlined below.

Interpretation of Métis The appendix contains an error of interpretation when it equates Métis with “the offspring” of marriages between Europeans and Aboriginal people. While that is true for some Métis, it is too broad a generalization, for there were many mixed-ancestry offspring who were absorbed into the societies of First Nations. That is, many offspring of such marriages did *not* become Métis. The differences in culture, social structure, and identity between Métis and First Nations in northeast Alberta were not particularly prominent in the years prior to the treaty, nor do they appear to have provided an important organizing principle of the local regional society. It was Treaty No. 8 that required Aboriginal people to opt formally either for specific “Indian” identities or for “Half-breed” (“Métis”) identities, the latter by applying for scrip to the associated Half-breed Scrip Commission (McCormack 2010a:chp. 8). It was the treaty that divided the collective Aboriginal people of the region into two distinctive groups with different rights in and access to the land and its resources, which then had substantial long-term effects on both group and personal identities (*ibid.*:202-3). This complex history is another topic that is not considered in the discussion of baseline culture and social structure.

The reference in this appendix to the Half-breed scrip process contains an error of fact. Footnote 1 on page 17 claims that the scrip process developed after the Northwest Rebellion of 1885, whereas it actually began when the Province of Manitoba was created. Such an error

points to a lack of adequate historical background by the author of the appendix.

Nation Building A brief section with this title looks at the roles of Canada and Alberta under the rubric of “nation building.” It contains a number of errors of information or interpretation which indicate a lack of knowledge about the history of northeast Alberta.

- There are errors of information about the negotiations for Treaty No. 8. Only four locations are identified in the appendix, but negotiations actually occurred at nine places (McCormack 2010a:175).
- Alberta did not establish Wood Buffalo National Park; that was strictly a federal initiative.
- The appendix claims that it was the creation of the park that led to the prohibition on hunting bison (buffalo), but in fact the hunting of bison was prohibited in 1894 by the *Unorganized Territories Game Preservation Act*. The prohibition on hunting continued after the park was created. The park regulations did not otherwise regulate hunting in the park by the Status Indians (First Nations) who were allowed into the park and whose rights to hunt were protected by Treaty No. 8. The reference to an end to “most hunting restrictions” has to do with current access regulations, not hunting restrictions *per se*. Although the section about the park mentions that a system of “trapping licences” - actually, registered trap lines - was introduced in Alberta outside the park (and it began in the 1940s), it neglects to include the parallel system of group and individual trapping areas in the park, also introduced in the 1940s.
- Also under the broad topic of nation building, the appendix states that “Generally, the

concentration of educational opportunities and other government services contributed to a movement of Aboriginal people to Fort Chipewyan, Fort McKay and Fort McMurray” (p. 17). This statement is simplistic. Most Aboriginal people relocated to Fort Chipewyan for a complex set of reasons.

Treaty No. 8

- Although the section on nation building notes that Treaty No. 8 was signed in 1899 (p. 17), a separate section about the treaty states, oddly, that the treaty was first negotiated “...in 1889 and was later renegotiated in 1899 and 1900” (p. 18). No citation is provided for this incorrect statement.
- The appendix notes that treaty rights exist in perpetuity but does not discuss either here or elsewhere how those treaty rights have been violated in the years since the treaty was signed. Such a discussion might have been expected to lead to a consideration of potential impacts of current industry and related regional growth on Aboriginal cultures and social structures and how they relate to rights under Treaty No. 8. That would have been useful information for the Review Panel with respect to the Pre-industrial Case as well as current expansion.
- The appendix claims that the treaty system has affected Aboriginal culture in the region, but it does not explain how. Its “evidence” or example is another odd statement that “the MCFN formed when Cree and Chipewyan people from the Fort Chipewyan region came together to enter into Treaty under the framework of the Indian Act in 1889.” The Cree and Chipewyan people of the Fort Chipewyan did not come together to enter into treaty;

they entered into treaty as two separate legal bands. Also, the treaty was not “under the framework” of the *Indian Act*, although the *Indian Act* was thereafter held to apply to people who entered into treaty, as it did to all signatories of the numbered treaties.⁶ The fact that two legal Status Indian Bands were created was not itself a change in Aboriginal culture, but rather a superimposition of a political system on a pre-existing Aboriginal system of governance. More is needed in the appendix if the author wants to show how the treaty affected Aboriginal culture.

1.8 *Aboriginal Groups*

This section purports to describe the following groups: Fort McKay First Nation, Fort McMurray #468 First Nation, Mikisew Cree First Nation, Athabasca Chipewyan First Nation, and three Métis Locals, treated as a collectivity. However, there is no discussion about either the cultures or the social structures of any of these individual groups. Without such a discussion, the author is in no position to talk about impacts to their cultures or social structures. In short, the appendix does not provide a Pre-industrial Case or baseline of any kind for culture and social structure, which begs the question of how the author can address changes from that baseline.

What does appear in the snapshot descriptions of the individual Aboriginal groups are numerous errors, some of which are pointed to below. Many of the errors are fundamental,

⁶It surprises many people to learn that the *Indian Act* is not set up to administer the treaties, but rather to administer reserve lands and people with legal Indian status, which itself was mostly created by the process of adhering to a treaty. Thus, a complex and ambiguous relationship exists between the treaties and the *Indian Act*. Canada has never had a formal policy to ensure that the treaties are properly implemented, nor has Alberta taken any action in this regard.

showing a profound and inexcusable lack of knowledge by a consultant who has worked in northeast Alberta for many companies and should therefore know better.

- Mikisew Cree First Nation (p. 22) is identified not just as the creation of Treaty No. 8, which it was, but as the product of the Chipewyan and Cree Bands, following the incorrect information mentioned above. This section then states: “The Chipewyan Band was subsumed into the Cree Band in 1946, forming the Cree Band of Fort McKay” (p. 23). A citation for that particular erroneous point is not provided. The Chipewyans of the Fort Chipewyan area were constituted as a legal Indian Band by the treaty in 1899. When Wood Buffalo National Park was expanded in 1926, only the Chipewyans then living in the park were allowed to continue to stay there. They included people living in the Birch River and Peace River areas. Other Chipewyan Band members whose winter settlements were located outside the park - those at Old Fort and along the Athabasca River - were thereafter prohibited from entering the park. In 1946, the result of a complex set of factors, the Chipewyans with park access were all deleted from the Chipewyan Band and added to the Cree Band list. Nothing changed for the Chipewyans living outside the park, except that the size of the Chipewyan Band was reduced.
- The members of the Chipewyan Band did *not* join the Crees of Fort McKay; in fact, there never was a Cree Band at Fort McKay. The original Indian Band in this area was the Cree-Chipewyan Band, established at Fort McMurray in 1899. The members of that Band who traded at Fort McKay were mainly Chipewyans, although in the 20th century

the Band accepted into its ranks a number of Crees who traveled eastward using traditional overland trails from the Chipewyan Lake area, part of the broader Lesser Slave Lake region. The Cree-Chipewyan Band was divided in 1949-51, which is when the Fort McKay Band was created as an independent legal Indian Band. The history of these legal bands is complex but has been laid out clearly in publications and ethnohistories (McCormack 2010a; 2010b; 2012a). There is no excuse for the egregious errors found in this appendix.

- The only Mikisew Cree First Nation reserves used for residence are those at Peace Point, Allison Bay, and Dog Head (the latter two are part of Fort Chipewyan). The other reserves were selected for their potential for economic development, and members do not live there. Old Fort is a reserve belonging to Athabasca Chipewyan First Nation, not to Mikisew Cree First Nation (p. 23).
- The section about the Athabasca Chipewyan First Nation states that “informal agreements delineating trapping boundaries were in place prior to the early 20th century,” but no evidence is provided to explain or support this statement. Aboriginal people governed their own interactions with one another, which would also include their land uses, but it is not clear if this governance is what this point is about. The Province of Alberta did not “formalize” trapping in terms of land use until the 1940s, when it introduced a system of registered trap lines. The Registered Fur Management Area system was a later outgrowth of this new system. What the province did do, however, was to allow non-Aboriginal

trappers to trap and hunt in northern Alberta in direct competition with Aboriginal people, despite the fact that to do so was a clear violation of the promises made by the Treaty Commissioners in 1899 to afford First Nations priority in land uses. Despite the many changes in government regulations that affected Aboriginal people, members of the Athabasca Chipewyan First Nation did not begin to relocate to Fort Chipewyan until the late 1960s, when the low waters in the Peace-Athabasca Delta significantly and adversely affected their ability to continue to produce a livelihood in the bush for themselves. Although much of the delta lay outside the park in lands controlled by Alberta, there is no evidence that Alberta tried either to stop the dam or to obtain any compensation for anyone - Aboriginal or non-Aboriginal - who was affected.

- The discussion in 1.8.4, “Metis Locals #125, #63, #1935” (p. 24) states that “The Métis people were originally designated as ‘Treaty Status Indians,’” which is just plain wrong. The citation provided is about the Half-breed scrip process. However, the source did not make any reference to Métis being designated as Status Indians, Treaty or otherwise. Such an error suggests sloppy research and leads to considerable uncertainty about whether one should rely on other parts of the appendix or must check every citation for accuracy.

2.0 *Connecting Traditional Land Use, Culture, Lifestyle, and Quality of Life (and)*
 3.0 *Effects on Traditional Land Use*

These two sections intend to speak about implications of oil sands development “for the

retention and transmission of Aboriginal culture” (p. 24). However, as was pointed out earlier, the appendix never explains explicitly what Aboriginal culture is, how it is reproduced from one generation to the next, or how it changes over time. Nor does it distinguish between culture change that is voluntary and leads to cultural and social continuity over time or is forcibly imposed upon a group by outsiders, as in a colonial situation, resulting in what may be substantial discontinuities. Nor does it discuss what constitutes “cultural erosion.” Without a more focused discussion, it is impossible for the author to identify cause and effect directly, what the author terms the “implications for quality of life” (p. 25).

The author draws on materials provided by Aboriginal groups to create a list of “several ‘conditions’ or incidental rights [that] underlie how Aboriginal groups define the meaningful practice of rights (p. 25). The list is followed by a summary of industrial effects, reported by Aboriginal groups, that have harmed their ability “to access traditional land use opportunities, [and] ...to exercise Treaty and Aboriginal rights” and that have affected “their culture, quality of life, health and wellness” (p. 26).

The summary comprises impacts of industry on the following categories: land base; water quantity; access to land; air, soil and water quality; noise, odour, and visual effects; preferred species quality, abundance, and behavior. Taken together, they indicate substantial cumulative impacts within the region. However, in Section 3.3, “Assessed Effects on TLU,” the appendix claims that the immediate effects of the Pierre River Mine Project alone will be minimal. There is no evidence that the author has sought to validate this claim with the Aboriginal people about whom s/he is talking, to see if they agree.

A significant problem with the figures provided is that the total number of “low impact

seismic lines which are being constructed for oil sands exploration” does not seem to be known (p. 35). The figures for these linear disturbances are crucial, for two reasons. First, some individual lease holders may limit access to those lands. Second, the Lower Athabasca Regional Plan allows *all* non-Aboriginal people living in the area access to lands open to the general public for their various recreational purposes, which include competing land uses with Aboriginal peoples for resources. The appendix does raise the problem of such competition by non-Aboriginal people traveling on the land with snowmobiles and all-terrain vehicles for recreation and to hunt, fish, and pick berries (p. 36). Despite the fact that such competition has been a well-known risk factor for Aboriginal land uses, there are no “reliable and recent data” on their numbers (p. 36), and one wonders why research into such activities and monitoring of the numbers of non-Aboriginal people involved has not been undertaken. The appendix presents some data on hunting (pp. 37-38), but they have not been compiled into tables. No details on kills by outfitters’ clients are provided in the appendix, although such numbers evidently do exist, as indicated by tables in two government moose survey reports (Morgan and Powell 2009:11; 2010:13). As a side note, it is unfortunate to see non-Aboriginal hunting called “harvesting,” a term that implies some form of land management and that does not apply to most non-Aboriginal hunters. That is especially the case for outsiders who enter the area to hunt with outfitters.

The figures shown are mostly discouraging, in that they indicate that the number of animals killed has increased markedly, especially in more southerly areas, where access to bush lands is easier (p. 38). That could easily become the basis of a hypothesis for the numbers of animals that may be killed in the future in more northern areas and areas west and east of the

Athabasca River, once access becomes easier, thanks to roads, bridges, and other linear disturbances resulting from the expanding industrial footprint. The material in the appendix does not consider recent moose surveys for Wildlife Management Unit (WMU) 529, 530, and 531 (Morgan and Powell 2009; 2010; Morgan and Powell 2009).

Morgan and Powell discuss the process of allocating hunting licences for moose to non-Aboriginal people as the regulatory vehicle to ensure that overall moose numbers and desirable bull/cow/calf ratios persist (2009:10), another topic that would have informed the discussion in the appendix. It appears that Alberta wildlife officials are unfamiliar with the promises made when Treaty No. 8 was negotiated, first, that “...only such laws as to hunting and fishing as were *in the interest of the Indians* and were found necessary to protect the fish and fur-bearing animals would be made” (Govt. of Canada 1966:6; emphasis added). Treaty Commissioner David Laird also promised that Indians who entered into treaty would be protected from White people (circular sent by Laird, LAC RG18 v. 1435 f. RCMP 1899 no. 76 pt. 1; also Mair 1908:56). Taken together, these promises mean that moose hunting by First Nations must enjoy priority over hunting by others, despite the general public’s desire to hunt moose. Yet there is no indication that provincial officials know how many moose First Nations people in each area require or how successful they are being in taking the moose they need. Surely such information is essential in order to set the number of moose licences for non-Aboriginal people and to insure that moose populations remain strong.

Overall, this part of the appendix points to cumulative impacts of such significance that people will only be able to practice their Aboriginal and Treaty Rights if they go a considerable distance away, an unsatisfactory “solution” that shifts the burden in terms of time and money to

Aboriginal people. It points to a permanent loss of the ability to transmit traditional knowledge. It points to negative impacts on health as people avoid their traditional foods for fear of contaminated meat, fish, and berries, and offers only another unsatisfactory “solution” of community-based monitoring of the safety of such foods. Such a initiative would be a solution only if it shows convincingly that the foods are safe. Indeed, such monitoring is long overdue. Aboriginal people have been identifying problems with meat and fish for many years, with little or no response by government officials.

4.0 Culture, Lifestyle and Quality of Life Effects

This final concluding section of Appendix 7 does not address details about culture any more than earlier parts of the appendix did. It states that “Aboriginal cultural heritage is inextricably linked to the land...” (p. 41) but without any apparent awareness about *how* Aboriginal culture and the transmission of culture, identities, and societies from one generation to the next are related to their traditional lands.

The main point of this section seems to be a motherhood statement on page 41 that “The cumulative effects of development on TLU in the Athabasca Oil Sands Region can affect the culture, lifestyle and quality of life in Aboriginal communities in many different ways.” However, this statement does not inform the Review Panel about potential impacts, and all of the discussion is only suggestive: “For example, taking up training and new economic opportunities has implications for traditional culture and quality of life” (p. 41). The appendix does not propose what those implications might be. Nor is there any discussion of what a “cultural shift” might entail, nor can there be, because nowhere in the report is there any discussion of what the

fundamental cultural features of the Aboriginal people are. The author appears to equate “culture” with activity, which is flawed. On page 42, the author makes the statement, “Social and cultural practices and values confirm the identity of the people...,” but the author never explains what these social or cultural practices and values are or how they “confirm” identities. Similarly, on page 44, the author writes about “cultural change as a result of development...” but without ever explaining what that culture change is or has been.

These are complex cultural and social matters that lie beyond the knowledge and analytical abilities of the author. If that were not the case, we could expect to see them laid out clearly, and it is what good cultural and social impact analysis should provide. Instead, what this report gives the Review Panel is a hodge-podge of meaningless statements about culture, culture change, and “adaptation” by Aboriginal people, none of which is ever defined or operationalized in terms of real evidence or information about those same Aboriginal people.

Attachment A

Attachment A, which follows the body of the appendix, is titled “Shell’s Commitment and Policies Regarding Culture.” Given the lack of a clear framework in this appendix about what constitute Aboriginal culture and social structures and how they relate to continued Aboriginal access to their lands and resources, the principles identified in Table A-1 as “Shell principles” seem only distantly related to genuine cultural issues. I want to make a few remarks about some points in this attachment.

- Shell acknowledges that the Pierre River Mine will result in “temporary loss of specific

traditional resources...until such time as reclamation is carried out” (p. A-1). The facts that the mine will exist for decades, till the “Far Future,” and that there is no guarantee that reclamation will be adequate in the “Far Future,” makes the use of the term “temporary” laughable. Even if all goes well and reclamation can be done successfully according to the present plan, there will be multiple generations unable to exercise their Aboriginal and Treaty Rights on the lands of this particular mine and the lands of other neighboring mines.

- “Shell acknowledges the value of the culture of its Aboriginal neighbours” is a trite motherhood statement that means nothing (p. A-1). There is no evidence that Shell has any idea what constitutes the culture of local Aboriginal people.
- The statement that participation in the wage economy has provided Aboriginal people with “...resources with which to manage social and cultural change” (p. A-2) is a glib comment taken directly from the “Cultural Assessment” prepared by Golder Associates for the 2012 Jackpine Mine Expansion Project hearings. There is no more evidence to support this statement now than there was a year ago.
- While Shell undoubtedly considers that its “actions and mitigations” demonstrate company willingness to engage seriously with Aboriginal people, there is no evidence of it has initiated any kind of research or monitoring program to understand the impacts of such programs on the reproduction of core cultural values and social structures from one

generation to the next. I would be more enthusiastic about Shell's initiatives vis-à-vis Aboriginal groups if I saw Shell being more pro-active in encouraging substantial research into cultural and social topics.

Appendix 8. Response to Supplemental Information Request 69b - Assessment of the Socio-Economic Effects for Each First Nation or Aboriginal Group Respecting Aboriginal Rights and Interests Before and After Reclamation, prepared by Nichols Applied Management (Nichols Applied Management 2013a)

The report contained in this appendix was written to provide information in response to the SIR 69b:

The Panel's Terms of Reference requires it to consider any effects on hunting, fishing, trapping, cultural and other traditional uses of the land as well as related effects on lifestyle, culture and quality of life of the Aboriginal persons.

- b) Provide an assessment of the socio-economic effects for each First Nation or Aboriginal group respecting Aboriginal rights and interests before and after reclamation.

Lack of Named Authors

The appendix does not provide the name of its author(s) or the author's qualifications in the field of socio-economic studies and assessment. The consultant's website does not indicate that this consulting firm has much expertise in areas relating to social issues. It offers "management and economic consulting services in the fields of economic and financial analysis, strategic and business planning, program and policy evaluation, and general management. The firm offers specialized expertise in the local government and education sectors and in the general

field of quantitative research” (Nichols Applied Management 2013b). The website indicates that only a single staff member, Maarten Ingen-Housz, has experience in socio-economic evaluation. It does not indicate what his experience is or whether or not he is the author of Appendix 8. Another staff member, David Schaaf, has “a strong background in health care policy and research,” but the website does not indicate whether he has actually conducted research, and if so, whether or not any of it has been published, or if he contributed to Appendix 8. While some of this firm’s expertise in economic and quantitative research may be useful in contributing to socio-economic assessments, overall the firm seems to be an unlikely choice for a consultant for this topic. Appendix 2 indicated that Nichols Applied Management has a history of 30 years’ worth of work in the oil sands area, which it drew on for the present work, but nowhere is the scope of that work or who did it provided.

Problems with Theory and Method: A Summary

- There is no definition of “socio-economic.” The author never tells the reader what it means to him - and thus to the Review Panel - to conduct a socio-economic impact assessment. Rabel Burdge, a prominent scholar in the impact assessment field, calls “socio-economic impact assessment” another term for social impact assessment, or SIA (2003:226). He says that the term is favored in Europe, where analysis tends to be limited to employment and infrastructure change, as well as by analysts “...who favor a definition of social impacts that is mostly economic” (*ibid.*), which seems to be the case for the analysis in Appendix 8. Doing good predictive work is difficult, he continues, partly because of “...the lack of agreed-upon social indicators for which data are collected on a

continuing basis” (*ibid.*). “We need more SIA research done after the fact or as social follow-ups...” (*ibid.*); that is, research and monitoring into impacts of oil sands projects.

- There is no discussion in Appendix 8 of what a social impact assessment or socio-economic assessment should look like, nor is there any discussion in the appendix that links this one to this broader professional impact assessment literature. Burdge defines social impact assessment as “...the systematic analysis, in advance, of the likely impacts a proposed action will have on the day-to-day life of individuals and communities” (2002:5; also see Vanclay 2003:7). To Frank Vanclay, another highly respected impact assessment scholar, “the objective of SIA is to ensure that development maximises its benefits and minimises its costs, especially those costs borne by people.... Costs and benefits may not be measurable or quantifiable and are often not adequately taken into account by decision-makers, regulatory authorities and developers” (Vanclay 2003:7). A good social impact assessment “...gives a rich picture of the local cultural context, and develops an understanding of local community values, particularly how they relate to the planned intervention” (*ibid.*:8). Burdge also calls social impact assessment “the orphan of the assessment process” (2002), an aspect that has unfortunately lagged behind studies of biophysical components. He and Vanclay claim that social factors tend to be “...treated as external or peripheral to the planning process” rather than as central to the planning process as environmental factors (1996:78). One can see this lower valuation at work in hearings for oil sands projects in the fact that neither the federal government nor the provincial government appoints people to be members of review panels whose

qualifications are primarily in social and cultural domains. Given the social and cultural implications of these projects for both Aboriginal and non-Aboriginal people, one has to ask, why not?

- The International Association for Impact Assessment has accepted “International Principles for Social Impact Assessment,” presented in a statement prepared by Frank Vanclay (2003). It articulates numerous guidelines and principles that do not seem to have been followed by the consultant(s) who prepared Appendix 8. For example, “SIA builds on local knowledge and utilises participatory processes to analyse the concerns of interested and affected parties. It involves stakeholders in the assessment of social impacts, the analysis of alternatives, and monitoring of the planned intervention” (Vanclay 2003:6). Therefore, one of the tasks of the staff of Nichols Applied Management who undertook the work that produced Appendix 8 should have been to facilitate and coordinate “the participation of stakeholders” (*ibid.*:8). Yet the analysis in Appendix 8 is top-down; there is no evidence it was done using participatory processes or even much, if any, consultation with Aboriginal people.
- The appendix states that someone from the consulting firm conducted “additional interviews with representatives of agencies and authorities that participate in the development and/or delivery of programs and services for Aboriginal community members” (p. 1, also p. 8). Presumably these interviews were conducted with the people listed in Section 7.2 as “Personal Communications” (p. 102). None of these individuals

appear to be those employed by First Nations or Métis to deliver services within their own communities. First Nations, in particular, typically deliver multiple services to their members. While the people interviewed may have useful information to contribute and be knowledgeable about certain areas, conversations with them are no substitute for additional conversations directly with representatives of First Nations or Métis groups.

- The appendix does not show how it updated its original socio-economic impact assessment done for the 2007 Jackpine Mine Expansion Project jointly with the Pierre River Mine Project or how it responded to “responses” by Aboriginal groups or other stakeholders and intervenors. That puts the burden of understanding how the socio-economic analysis has changed on readers and the Review Panel. While the appendix states that community input was provided (p. 6), it does not indicate what kind of input or by whom. Aboriginal people remain subjects of analysis, not participants in helping to develop predictions about how the oil sands industry will impact their lives.
- The “International Guidelines” state: “In order for the discipline of SIA to learn and grow, there must be analysis of the impacts that occurred as a result of past activities. SIA must be reflexive and evaluative of its theoretical bases and of its practice” (Vanclay 2003:6). Burdge makes a similar point when he writes: “A social impact assessment provides direction based on research findings from similar situations in the past (2002:7). Yet there has been virtually no research into social and economic impacts on Aboriginal people of expanding oil sands projects. As Burdge and Vanclay explain, one of the

problems with the Social Impact Assessment process is:

Data are often poorly collected, and therefore projections are based on inadequate information which is often isolated, not systematically collected and therefore lacks validity checks. Estimates about the consequences to human communities of likely future events should be based on conceptual relationships developed from theory and previous research supported by data collecting utilising the appropriate methods and subject to empirical verification [Burdge and Vanclay 1996:66]. [and]

SIAs are often done by consultants who do not know relevant social and economic theory, and who may not be trained in either SIA or social science methodology. ...Regulatory agencies and corporations have not ...insist[ed] that SIA consultants have appropriate social science training [*ibid.*].

The author of Appendix 8 did not try to compensate for the lack of real data from the oil sands area by doing a literature review of comparable non-renewable resource projects elsewhere. More troubling, the author of Appendix 8 neither calls for such research nor presents predictions about future impacts strictly as hypotheses for future research and monitoring. Without that, the conclusions of this social impact assessment and others that are done in similar ways will remain simply guesswork and speculation. Thus, they cannot provide review panels with the information they require to make informed recommendations.

- The “International Guidelines” call Social Impact Assessment “a field of research and practice, or a paradigm consisting of a body of knowledge, techniques, and values” (Vanclay 2003:6). The preceding point referred to “theoretical bases.” Yet Appendix 8 contains no discussion of theory or methodology used in developing the topical area. The appendix refers to an “impact model” but does not lay this model out clearly (e.g., pp. 2,

3). Perhaps the identification of “pathways” constitutes the extent of the model; if so, that is exceedingly simplistic.

- Appendix 8 identifies four “pathways by which Shell’s Pierre River Mine Project may impact socio-economic conditions” as well as “Aboriginal rights and interests” (p. 2):
 - (1) Changes in the biophysical environment and associated changes in traditional land use and human health;
 - (2) Job creation and associated population growth;
 - (3) Materials and supply requirements, and associated changes in traffic;
 - (4) Changes in government revenue and associated changes in programs, services and infrastructure.

The Appendix does not explain the reasoning or justification behind the identification of these four particular pathways. For example, changes in human health are almost certainly a consequence of all four pathways, not just changes in the biophysical environment. The four pathways are not clearly linked to either the “key questions” or “key indicators” listed in Sections 2.2 and 2.3 (p. 4), nor are they clearly linked to the seven sections discussed in Section 4, “Socio-economic effects.”

- I suggest three additional pathways for consideration (there may be more). The first is “development of government policies and regulations to accommodate the expanding oil sands industry,” which can be expected to have major effects on Aboriginal and non-Aboriginal people alike in socio-economic areas. The Public Lands Administration

Regulation (Alta Reg. 187/2011; see Govt. of Alberta 2011) and the Lower Athabasca Regional Plan, 2012 (Govt. of Alberta 2012) are two such examples not considered in this appendix. A second pathway is “development of government policies and regulations about Aboriginal and Treaty Rights and the process of consultation and accommodation.” A third possible pathway are “mitigative programs,” such as those programs that Shell sponsors in Aboriginal communities, which are summarized in Appendix 7 in 1.4, “Shell’s Approach to Community Engagement,” and 1.5, “Shell’s Support for Cultural Initiatives” and also in Attachment A (Golder Associates 2013c:6-7). While one hopes that they are having a positive impact of some kind, in fact neither Shell nor anyone else knows what their impacts are now or might be for the future.

- The appendix states that it used “academic sources,” and it refers specifically to the Royal Society of Canada Expert Panel report on “Environmental and Health Impacts of Canada’s Oil Sands Industry” (Gosselin *et al.* 2010). However, the appendix does not indicate how the Royal Society report was used or why it did not consider all of the health determinants identified in the Royal Society report or the list of for public health. The report revealed:

...that there are major gaps in the published and particularly peer-reviewed scientific literature on many of the topics to be reviewed in this section [about public health]. Given the size and importance of the oil sands development, a finding of major gaps in knowledge concerning public health impacts poses a concern in itself [Gosselin *et al.* 2010:197].

This point could have been expected to lead the author of the appendix to identify those gaps and use them to make recommendations for research that needs to be done, but he

did not do so.

- There is no clear discussion of data used in the appendix. It seems to be mostly what is easily available, such as Statistics Canada data. The level of much of it is too macro to provide useful information for socio-economic impacts on local Aboriginal people. The references include Section 7.3, “Additional Sources.” The appendix states that these sources were “reviewed” in preparing Appendix 8 “although not directly referenced” (p. 103). If they were helpful in some way, they need to be directly referenced. If they were not helpful or not used, they should not be included as references.
- The distinction drawn between Aboriginal people who live in urban areas versus reserves is not necessarily useful; it simply reflects the way some data has been amassed. For example, Fort Chipewyan has two reserves locally, but residence on those reserves is not significant compared to residence off-reserve in Fort Chipewyan.
- The appendix emphasizes possible economic and population changes, not impacts on Aboriginal societies or social structures. The two cannot be conflated, for they are not the same thing.
- The appendix contains many tables and figures, but they can not stand on their own as evidence of impact. They need to be discussed. Moreover, the author should be using the information in the tables and figures to develop hypotheses and/or make predictions.

Otherwise, why are they here? It is not clear how they will help the Review Panel make its assessment.

- The positive and negative impacts identified by the author of this appendix are presented without substantiating evidence. *All* need to be supported by evidence from other oil sands projects or other similar projects elsewhere, rather than simply what seems to be the unsubstantiated judgment or guess-work and speculation of the author.
- The appendix refers the reader to “other sections of the filed EIA or ...subsequent work being carried out on behalf of Shell” (p. 2 and Fig. 2.1, p. 3) but never provides details about those sections: what they are, where to find them, or who is carrying out the “subsequent work.” Also, how does the discussion of health in the appendix relate to the “Changes in Human Health” section that are addressed in other sections? That is, there are two different discussions about human health, yet the relationship between them has not been made explicit.

3.0 *Socio-Economic Setting*

This appendix faces the same problem as the other appendices in discussing the Pre-industrial Case. Both the short “Pre-Contact” and “European Contact” sections (p. 9) are so perfunctory as to be useless; one wonders why the author even bothered including them. The author also makes an error in interpreting cause and effect in claiming that “daily activities and interactions changed as a result of exposure to non-Aboriginal ways and traditions” (p. 10).

Simple exposure to someone else's culture and way of life does not necessarily have such an impact; there is no automatic process of diffusion that occurs with contact. In fact, sometimes the oppositions that occur with contact may lead to the strengthening of boundaries between groups, between "Us" and "Them." The more important consideration for change during earlier times of contact between Aboriginal and Europeans/Euro-Canadians was Aboriginal agency: decisions Aboriginal people made to become involved in the European fur trade, to become involved with missionaries and schooling, to enter into treaty, and to honor the promises they made at the time of treaty. Those decisions were what led to changes in activities and ways of life for Aboriginal people, though not necessarily in their cultural understandings and values, which seem to have been remarkably persistent over the centuries of contact with Europeans, the result of the persistence of Aboriginal control over their own lives until interventions by the federal and provincial governments in the 20th century.

On page 11, in a short section about the situation from the "1980s to current day," the appendix states that it is during this period that Aboriginal people began to have concerns about the environmental impacts of industrial development, which in turn led to less traditional land use, which then "helped drive socio-economic change within Aboriginal communities," including "changes in family and community practices and relations." No citations are provided, and there is no discussion of what such changes involved or looked like. Such discussion is at the heart of the matter. In fact, it is easy to make a case for Aboriginal concerns about industrial development beginning much earlier in the 20th century and occurring in connection with each new economic enterprise that resulted in a diminished resource base (e.g., the White trappers industry, commercial fishing industry, bison slaughter industry, logging industry). Aboriginal

people regularly protested such enterprises, especially when they saw the resources on which they themselves relied disappearing, but with no result in terms of either government awareness or action. Instead, there is a history of government officials discounting Aboriginal knowledge and input while at the same time relying on early “science” that was often badly done and reached wrong conclusions.⁷ Contemporary Aboriginal protests rest on a lengthy history of protests, most of which were framed by Aboriginal people as violations of treaty promises. However, Appendix 8 does not recognize such a lengthy history of either problems or concerns and protests.

Despite the heading, “Socio-economic Setting,” this section says virtually nothing about either the social or the economic setting, not even in the snapshots for each Aboriginal group. It provides some basic information on population, reserves, location of members, and something about First Nations governance, most of which is not particularly informative.⁸ There is much more to “setting” than that. The appendix does not include any discussion of the social and economic structures of the Aboriginal populations or how those changed over time as a result of either Aboriginal relocation from bush settlements to small towns (e.g., Fort Chipewyan, Fort McKay) or Aboriginal involvement in capitalist industries (e.g., producing furs and provisions

⁷For example, when I tried to talk about Aboriginal controlled burning with a respected biologist who had worked in Wood Buffalo National Park in earlier years, he could not believe that Aboriginal people were knowledgeable enough to do such a thing. His point of view about Aboriginal knowledge and abilities was widely shared by government officials. Discussions of some of these problems can be found in McCormack 2010a and 1984 and in Sandlos 2007 (and his earlier works).

⁸The discussion of the regional population that is part of this section of the appendix does not show the number of non-resident, non-Aboriginal workers (p. 12, also Table 3.1 on p.13), which is a problematic omission.

for the fur trade and missionaries; working in transport, commercial fishing and logging and other industries; working as guides for prospectors, etc.). Without that, how can potential impacts on these structures be assessed except in the most general of ways? In short, there is neither an adequate Pre-industrial Case presented to use as the baseline or jumping-off point for a discussion of impacts of oil sands industries nor an adequate discussion of current social and economic structures of Aboriginal groups.

4.0 Socio-Economic Effects

The topics discussed as effects (impacts) or potential effects include:

- 4.1 Population (p. 21)
- 4.2 Wage economy (p. 26)
- 4.3 Health and well-being (p. 43)
- 4.4 Housing (p. 61)
- 4.5 Education (p. 70)
- 4.6 Public safety and protective services (p. 81)
- 4.7 Traditional land use (p. 84)

Each topic contains two parts. A “situation analysis” is followed by an “effects assessment.”

The discussion below provides brief comments about each topic.

4.1 Population The appendix makes the point that it is difficult to be accurate about the numbers of people living in Fort McMurray, the oil sands-related work camps, or the region more generally. It predicts that the Pierre River Mine Project will not drive population growth in a “sizeable” way, in that it will lead to an urban service population that is “only” 4.5% higher than the base case during “peak construction activity” and about 1% higher than the 2013 Base Case (p. 23). Yet cumulative population growth is estimated to be 5.1% annually between

2012 and 2015 (p. 24). The author predicts that “much of the Pierre River Mine Project’s population impact will be mitigated by the Project’s remote location; use of a camp-based model for housing workers during both construction and operations; and use of a fly-in/fly-out approach...” (p. 23). The appendix theorizes that because the Pierre River Mine workers will live in a full-service camp, it will limit “...the need for workers to visit local communities or engage with local Aboriginal peoples outside the Project Development Area” (p. 24). However, the appendix does not present any evidence to support this supposition. Is there evidence that workers do stay in the camps in such circumstances? And, the appendix does not discuss what steps Shell is taking to prevent workers who live in camps from traveling into the bush to hunt and fish in competition with Aboriginal people who are entitled to do so under Treaty No. 8. At the very least, this section could make more substantial predictions about how a steadily growing population, much of it situated in the bush itself, in the heartland of Aboriginal people, might engage in land-based competition for resources with Aboriginal people, a likelihood which is of vital concern to Aboriginal people.

4.2 *Wage Economy* This section begins with a general statement that “Today, a number of Aboriginal people in the region have become reliant on wage economy participation and some [how many?] no longer engage in traditional activities on a regular basis...” (p. 26). It is unclear what this statement is intended to mean for impact assessment, unless it is intended to be suggestive about a value shift, implying that land-based activities are less important to Aboriginal people who work for wages. However, there is no evidence that indicates that the lack of “regular” time spent on the land means that land-based activities have lost their meanings

for Aboriginal people. It is not an either-or situation. In fact, many Aboriginal people continue to practice their Aboriginal and Treaty Rights on their lands because it contributes to how they define themselves as Chipewyans, Crees, or Métis culturally and socially, as well as for the other benefits they realize from doing so. Practicing these rights is now an important part of their self-identity as Aboriginal people. Aboriginal people have identified the ability to be able to continue to engage in traditional activities on the land as an element that needs to be accommodated in oil sands workplaces, if they are to work in those industries (p. 33). Those who are willing to work in oil sands industries (and not all are) want workplaces that are “more inclusive and culturally-sensitive” (p. 33) and that “accommodate cultural diversity and promote inclusion...” (p. 39). That is, they want workplaces to be organized in such a way that they are accommodated as Aboriginal people rather than being expected to assimilate to a non-Aboriginal norm. And, they want to be able to work there without fear of experiencing discrimination and racism. In other words, while many Aboriginal people may wish to work in industry, they want to do so in such a way that they can continue to spend time on the land and maintain their distinctive identities and cultures.

The appendix addresses Shell’s initiatives to employ Aboriginal workers, but there does not seem to be any hard data about the success of such initiatives. This area is badly in need of research.

4.3 *Health and Well-Being* This section could be the subject of a full health impact assessment rather than a sub-set of a social impact assessment. Given the serious concerns of local Aboriginal people about the health of the environment and their own health,

which they see as linked, it seems critical that health impact assessments should be part of the package of impact assessments done for proposed oil sands industries. Such assessments should encompass the broader determinants of Aboriginal health, which include many aspects not included in this section.

There is no definition of the scope of “health and well-being” in this section, which also includes a sub-section on “social issues and concerns.” In a recent important paper, not included in the references for Appendix 8, Naomi Adelson points to differences “between Aboriginal and biomedical perspectives on health and healing” (2005:S46). These concerns are echoed in other reports, including Orenstein *et al.*’s “Determinants of Health and Industrial Development in the Regional Municipality of Wood Buffalo” (2013:2) and Reading and Wien’s “Health Inequalities and Social Determinants of Aboriginal Peoples’ Health” (2009). Adelson (and others) refers to “the present-day health effects of decades of inequity” for Canadian Aboriginal people, who bear a “disproportionate burden of illness” (2005:S45). And, “...time and again health disparities are directly and indirectly associated with or related to social, economic, cultural and political inequities; the end result of which is a disproportionate burden of ill health and social suffering on the Aboriginal populations of Canada” (*ibid.*). That is, many or most of “the underlying causes of the disparities... sit largely outside the typically constituted domain of ‘health’” (*ibid.*). “[T]he problems are entrenched in the history of relations between Aboriginal peoples and the nation-state” and relate to the limited autonomy of Aboriginal people in health care governance (*ibid.*:S45, S46). Paul Hackett is even more explicit in calling health disparities “...an enduring legacy of the colonial process” (2005:S17). The conclusions reached by Adelson and Hackett (and others) indicate that when talking about health issues with respect to Aboriginal people, it is

especially important to begin with an adequate baseline of health information and indicators that are based in solid historical analysis. This aspect of a baseline is lacking in Appendix 8, despite the fact that the author does state that there is a broader historical context that is related to “past government policies of racism and social exclusion” (p. 49), but with no discussion of either those policies or their impacts.

A relatively recent example of government policy squarely in the field of medical treatment was how governments addressed tuberculosis among Aboriginal people after World War II. The treatment afforded northern Aboriginal people suffering from tuberculosis in the 1950s and 1960s - the period when the modern oil sands industries began - was to remove them from their home communities to southern sanatoria for treatment. Some people remained in the sanatoria for many years, and many people died there, often with no notification to their families. It was a program that paralleled the residential schools and was traumatic and disruptive for both the patients and the families they left behind, often for years. More recently, highly disturbing information has come to light about government collusion with nutritional scientists from 1942 to 1952 who failed to treat Aboriginal people suffering from malnutrition in order to conduct nutritional experiments (Mosby 2013). Less well known may be earlier Indian Affairs policies that used deprivation of rations and starvation as a tool to compel Indians to behave as government agents wanted them to behave. Indian Affairs officials - all Euro-Canadians in earlier years - have historically denied basic human rights to Aboriginal people, believing that Aboriginal people were incapable of making informed decisions about their own interests, especially when Aboriginal decisions conflicted with what the officials wanted them to do. The lesson for this review is that there is an important and extensive history of problems in the health

care field that need to be marshaled to provide an adequate baseline for purposes of understanding future impacts on health of expanding oil sands projects.

Adelson also points out that health and healing is not just of the individual but also of the community and the society: "...the government mandate imposed upon Aboriginal people continues to resonate as social upheaval, as mental illness, as violence, as crime, as suicide, and as disease" (2005:S52). The discussion in this section of the appendix about "Social Issues" concerning problems with alcohol and drugs is really just a subset of this list, although the appendix presents it as a separate topic (p. 47). Yet "health status and meanings of health are not adequately developed in...large scale survey instruments" (Adelson 2005:S53). She reasons that the way in which health is defined in turn helps determine the kinds of assessments of health that surveys will produce.

Mental health is an important aspect of over-all health and well-being, and it is a separate heading in the Royal Society's report (Gosselin *et al.* 2010:210), yet it is not discussed explicitly in Appendix 8. This is a conspicuous absence, especially in light of published literature linking issues of cultural and social change to mental health and suicide. It is well known that Aboriginal people have much higher rates of suicide than other Canadians (e.g. Kirmayer 1994), constituting a social tragedy with which no government has come to grips effectively. Michael Chandler and Christopher Lalonde have theorized that the exceptionally high rates of suicide by Aboriginal youth is related to lack of cultural continuity. All Canadian adolescents - youth - have higher rates of suicide, but the risk "...can be made even more acute within communities that lack a concomitant sense of cultural continuity which might otherwise support the efforts of young persons to develop more adequate self-continuity-warranting practices" (Chandler and Lalonde

1998:192; see also Chandler 2000). “[A]nyone whose identity is undermined by radical personal and cultural change is at special risk of suicide for the reason that they lose those future commitments that are necessary to guarantee appropriate care and concern for their own well-being” (*ibid.*:191). By way of explanation, they propose that when “...the grounds upon which a coherent sense of self is ordinarily made to rest are cut away, life is made cheap, and the prospect of one’s own death becomes a matter of indifference” (*ibid.*:193). They point explicitly to government policies and practices as the cause; in British Columbia, as elsewhere in Canada, including Alberta, governments tried “systematically” to eliminate all distinctive Aboriginal culture and were so successful “...that much of what remains is not so much continuous cultural life, as an attempt to reconstruct it” (*ibid.*:200). Their analysis of suicide rates in different British Columbia communities indicates that where those communities have some measure of self-government, suicide rates are correspondingly much lower and even disappear.

Michel Tousignant, who has also theorized about suicide by people who live in small societies, such as those in northeast Alberta, echoes Chandler and Lalonde when he points to the “radical transformation of culture, family and self” that may be at work. He suggests that such suicides may be viewed as “...a way to reconstitute some form of lost integrity” (1998:293). As a scholar of suicides, Tousignant is also contributing to a growing literature about resilience in Aboriginal communities. For example, Tousignant and Nibisha Sioui have tried to understand “...the pathways to resilience among Canadian Aboriginal communities facing a period of social crisis” (2009:43), claiming that “the concept of resilience has been a rallying emblem among Aboriginal communities and other oppressed populations because it inspires hope in the face of harsh adversity” (*ibid.*:45). Others who have contributed useful work on this subject include

Laurence Kirmayer *et al.* (2009) and Christopher Sonn and Meredith Green (2006).

The subject of resilience is an important topic for understanding impacts of changes resulting from industrial expansion, but it is not mentioned in the appendix. It would have been especially useful had Appendix 8 addressed the connections between an Aboriginal baseline (the result of decades of efforts by the Canadian government to eliminate distinctive aspects of Aboriginality) and how the pathways identified by the authors may enhance conditions for resilience or enhance conditions for further cultural dysfunction and mental distress. While the appendix states that “social conditions for Aboriginal people should also be placed within the larger context of past and current events” (p. 13), it does not do so. Such a discussion may also suggest new pathways that should be considered, such as those I proposed about government policies. Given the lack of clear data, such possibilities would be best presented as hypotheses for future research.

In short, the discussion of health issues in Appendix 8 simply does not do enough to address issues that matter. It appears to stick closely to data drawn mainly from publicly reported findings, such as statistics provided by Health Canada and Alberta Health and Wellness (p. 43). The author had “discussions” with Alberta Health Services but does not indicate whether it was management or front-line personnel. There do not appear to have been discussions directly with Aboriginal people themselves.

The appendix includes possible negative and positive social effects of increased participation in the wage economy, only some of which have to do with health and wellness directly (pp. 47-48). However, these are presented only as lists, with very little supporting evidence. They would have been better addressed as hypotheses for study.

4.4 Housing This section provides information on a variety of housing markets and programs for First Nations and Métis and non-Aboriginal people, as well as information about homelessness (p. 61). It identifies about one-third of homeless people as Aboriginal, most of whom cope by staying with family or friends (p. 64). This section does not believe that the Pierre River Mine Project will make much difference to housing problems, but they will continue to exist in the future. This section could have provided a series of related hypotheses about housing futures that could then be the subject of study.

4.5 Education Aboriginal people still lag behind non-Aboriginal people in formal educational levels and training. According to the tables presented in this section, their levels of educational attainment are comparable to those of Aboriginal people in other Treaty No. 8 communities (pp. 70-71). Such levels are important because degrees, diplomas, and certificates are often required for employment. The appendix does not address the state of local education, upon which most post-secondary programs are based. Given the economy of northeast Alberta and the supposed benefits it confers on Aboriginal people, the appendix could have done more to discuss why educational attainment is not higher for Aboriginal people and how that could change.

As with housing, the Pierre River Mine Project is not expected to make much difference to education, in that it "...will not be a sizeable driver of demand for education services" (p. 76). While Shell has supported education initiatives, no information is available that allows the Review Panel to know whether or not funding for Science and Technology camps, for example (p. 77), has led more students to stay in school and then seek out post-secondary educational

opportunities.⁹ There does not appear to be any monitoring or research into such programs or actions undertaken by oil sands companies or other agencies that allow their efficacy to be assessed.

4.6 Public Safety and Protective Services This section identifies three safety issues: alcohol- and drug-related offences, traffic safety, and safety of land use for Aboriginal people. They are discussed primarily in terms of the RCMP presence and policing priorities, even though both traffic safety and safety on the land for Aboriginal users have significant structural causes. Traffic safety can be greatly enhanced by infrastructure improvements, and the problems with Highway 63 have been well-known for a long time. However, the Government of Alberta is being remarkably slow at investing the money it realizes from oil sands industries in the improvements to this highway that would produce a safer road. Similarly, the threats to Aboriginal land users are the direct result of government policy allowing non-Aboriginal people unimpeded access to northern lands, despite the way in which many non-Aboriginal land uses constitute a violation of Treaty No. 8 promises. This section of the appendix seems short-sighted in not considering these causes, which have obvious implications for possible solutions and mitigations.

4.7 Traditional Land Use The situation analysis begins with a strong statement about

⁹Several years ago, a geologist colleague of mine at the University of Alberta asked me why there were *no* Aboriginal students majoring in geology or pursuing graduate degrees in that field. That's a good question. Ideally, science-focused workshops and camps should be designed to foster such educational choices.

how “the relationship between Aboriginal peoples and their traditional lands is integral to community well-being,” as well as being “the place where traditional pursuits and knowledge are passed from generation to generation” (p. 84). They also point to the continuing economic importance of traditional land use.

The subsequent discussion lists a series of changes to the biophysical environment that are all negative and a series of changes to the socio-economic environment that are presented as both negative and positive (p. 85). No citations are presented to support either this discussion or the following discussion about the negative changes discussed by Aboriginal people (p. 86).

There is no evidence whether or not the positive changes outweigh the negative changes, or vice versa, although my own discussions with First Nations people and their representatives lead me to conclude that overall they believe they are being harmed, not helped. The author does not consider even how to approach a weighting or evaluation of the various factors, which would be a useful discussion for the Review Panel.

The appendix identifies several ways in which “many industrial developers attempt to directly manage, mitigate or compensate for the effects of development on traditional land use by:

- “consulting with local Aboriginal communities...;
- “providing compensation to trappers directly affected by development;
- “facilitating access across development areas for trappers and traditional users;
- “minimizing as far as is practicable the land disturbance and practicing progressive reclamation;
- “participating in regional multi-stakeholder planning and research initiatives...; and
- “supporting the collection of traditional ecological knowledge” (p. 87).

I will speak briefly to each of these actions.

- In my opinion, while on-going consultation by companies is important to relationship-building, and it has also become important for the formal consultations that governments required with First Nations, it does not constitute a form of management, mitigation, or compensation.
- Compensation to trappers benefits only the individuals to whom the fur management areas are registered, not anyone else who uses the land for traditional pursuits. Given that the licences for most of the fur management areas in the Pierre River Mine Project area are held by non-Aboriginal trappers, none of that compensation will go to Aboriginal people, yet they will still lose use of the land for hunting, fishing, and gathering of plants.
- Facilitating access is a minor mitigative step, though useful, if it works well. But, according to a submission by Dan Stuckless for Fort McKay at the recent Dover hearings, it does *not* work well and is plagued by multiple problems. Athabasca Chipewyan First Nation members spoke at the hearings for the Jackpine Mine Expansion Project about the substantial problems its members have in getting past barriers to use their lands (para. 1435, Joint Review Panel 2013:241).
- No matter how much companies talk about minimizing disturbance, the reality is that the land in entire regions will be destroyed if it is necessary to do so to obtain the underlying bitumen. For example, the Jackpine Mine Expansion Project was given permission to

divert a river over the strong objections of First Nations people. Fort McKay has a legal action underway to compel the Dover Commercial Project to provide a 20 km “no development buffer zone” around its Moose Lake reserves; the company was willing to provide, at best, a 3 km buffer and preferred not to provide a buffer at all, not even as an interim measure. Both companies could have accommodated the First Nations, but it would have reduced their anticipated profits. Moreover, the ability of Aboriginal people to return to those lands is not expected to occur for decades, in the “Far Future,” and then only if successful reclamation has been done, if Aboriginal people are then willing to use reclaimed lands, and if there still is sufficient knowledge for the Aboriginal people of that time to be able to go onto the land and to want to do so. And, at this time, reclamation is not expected to return the land to its current condition. Finally, there is no sense that “progressive reclamation” will support any substantial land use by Aboriginal people. It sounds good, but are there any models showing how exactly it will work and that can be used in predicting success? The discussion in Section 5 of this appendix, “After Reclamation,” is so far in the future that making predictions about what might happen then seems pointless.

- While companies that participate in regional multi-stakeholder planning and research initiatives may be trying to contribute to management, that does not necessarily constitute mitigation unless Aboriginal people are satisfied with the results.
- Finally, supporting the collection of traditional knowledge is a step toward creating a

library or data base of this information that removes it from its context on the land, where Aboriginal people are engaged in a dynamic fashion with the landscape and its features. The traditional knowledge that has been provided is at best only a partial sample of the vast knowledge distributed among the Aboriginal members of the northern societies, and it mostly omits key aspects of traditional knowledge that relate to the spiritual domain. Collecting a subset of the traditional knowledge that still exists and adding it to a data base is no substitute for ongoing travel and activities on the land itself by Aboriginal people.

None of these activities by the company can be construed as adequate accommodation of Aboriginal people and their Aboriginal and Treaty Rights.

In its summary (Section 6), Appendix 8 proposes that opportunities afforded Aboriginal communities by industry proponents, such as Shell, to build local capacity "...can help individuals and communities to regain some authority over and manage future change" (p. 89). I disagree strongly. There is no indication that the Province of Alberta will ever be willing to relinquish any portion of its regulatory power to small northern communities or to the Aboriginal people who live there. The extent to which the Regional Municipality of Wood Buffalo could share power with its residents is an interesting question, but the reality is that the province controls much of what goes on in the Municipality too.

Appendix 8 contains some interesting and suggestive statistics, but in the end its scope is limited. It does not provide any kind of baseline which to use as a basis of discussion about future changes. The changes it does suggest overlook many of the structural problems at work.

And, most importantly, it does not provide any information that allows for a sense that its predictions are more than guess-work and speculation. Burdge and Vanclay advise that in doing project-level Social Impact Assessment, “the researcher or practitioner uses past social science research to better understand what is likely to happen to human populations given different development events” (1996:78). That is, Social Impact Assessment, including socio-economic assessment, is about “predicting the future based on the past” (*ibid.*:83). Appendix 8, however, does not rely on social science research or evidence from the past. For example, when the appendix suggests that a change in demography *might* have an impact of some kind, it does not provide any supporting evidence, either from the oil sands region or from other comparable industrial situations. Given the lack of solid data, the next best thing for the author to have done for this appendix would have been to identify the gaps in information available and then draw on research data and gaps identified to present possible impacts as hypotheses. I would have been more satisfied with this appendix if the author had been willing to talk about what isn’t known and how little can be predicted with any degree of certainty. As a result, this appendix does not provide the Review Panel with any substantial information to assist it in making its recommendations.

Conclusion

Despite all the concerns that Shell’s consultants acknowledge exist for the potential negative effects of oil sands industries on Aboriginal people in northeast Alberta, Appendix 7 and Appendix 8 both end up making strong positive statements about how Aboriginal people will benefit, or at least be able to cope, with the presence of industry in their midst and on their

traditional lands. Attachment A in Appendix 7 states:

Shell acknowledges that participation in the wage economy can impact participation in traditional pursuits. However, participation in the wage economy has also provided Aboriginal persons, companies and communities with benefits including *resources with which to manage social and cultural change* [Golder Associates 2013c:A-2; emphasis added].

Appendix 8 makes a similar statement:

Many of the approaches taken by proponents, such as Shell, that are listed in the responses to this SIR and JRP SIR 69a, offer local Aboriginal communities opportunities that can help build local capacity. Employment and training opportunities in close proximity to home communities, support for capacity-building initiatives, the establishment and enhancement of institutional mechanisms, and the disbursement of funding and other resources to local Aboriginal groups *can help individuals and communities to regain some authority over and manage future change* [Nichols Applied Management 2013:89; emphasis added].

Yet neither appendix offers *any* supporting evidence for these statements, which means that they are nothing more than glib generalizations. Both statements are wishful thinking intended to put a positive spin on potential impacts on Aboriginal people. But no amount of glib talk can hide the lack of any real knowledge about Aboriginal cultures and societies in these various appendices or the lack of either real data or carefully constructed hypotheses about causes and effects to support discussions about potential impacts. That has been a troubling element throughout all of the appendices I reviewed.

I raised these problems with respect to the “Cultural Assessment” that Shell submitted to the Jackpine Mine Expansion Project hearings in 2012 (McCormack 2012b; see Golder Associates 2012). Yet the current appendices submitted by Shell for the current hearings and reviewed in this report have not attempted to address these problems.

The “Report of the Joint Review Panel” called the Lower Athabasca Regional Plan “...an

appropriate mechanism for identifying and managing regional cumulative effects...” (Joint Review Panel 2013:3), while acknowledging that LARP does not constitute a management framework for Aboriginal land use (*ibid.*: 221). Such a concern was not even on the radar of the the appendices, which did not consider government policies as either issues or pathways.

It would have been helpful had the authors of the appendices been explicit in explaining the reasoning behind many of their evaluative statements. It is local Aboriginal people who will have to live with the decisions made by the Review Panel and by the governments that issue the final approval for the Pierre River Mine Project, if they decide to approve it. Aboriginal people have a right to understand in very specific terms how such effects are factored into Shell’s analysis about impacts.

The Review Panel members must consider cultural and social elements in their evaluations, including an understanding of what culture and social change is and how it occurs. It is unclear how they will be able to do so capably without better advice than what they have received from the appendices submitted by Shell. The authors of the appendices have either little real data to offer or logical discussions of cause and effect, but Aboriginal people *live* in the current world of expanding industry. Review Panel members should not be surprised to discover that Aboriginal people in general and Athabasca Chipewyan First Nations members in particular have a very keen awareness of whether they are benefitting or being hurt by industrial expansion.

The bottom line for most Aboriginal people in northeast Alberta is that their historic land base is being steadily taken away from them. Another way of saying this is that Aboriginal people are being treated as if they are part of the overburden of the land. They have to be cleared from the land so that the land can be used for other purposes (mainly bitumen extraction).

Despite the fact that northern Aboriginal people are distinctive culturally and enjoy constitutionally-protected Aboriginal and Treaty Rights, they are being forced to sacrifice their centuries-old traditions of cultural landscape and place to make possible industrial expansion into their homelands. They are paying the highest price, although they are not the primary beneficiaries.

Despite the pressures on them to do so, Aboriginal people are not willing to be cleared from their lands or to have their lands destroyed, especially in light of the fact that there is no guarantee that future reclamation will ever be successful, or, if it is, it will be in a time so far away that people now living, and perhaps their children and grandchildren, will have passed away. Nor are they necessarily willing to become strictly wage earners. That is why they continue to protest the unrestricted expansion of the oil sands industrial footprint.

The very act of being on the land is culturally and socially important to Aboriginal people, even those with full-time paid jobs. Being on the land is not just about going to the bush to hunt for a day and then returning to town. It is a place of fundamental importance to Aboriginal people for the knowledge they produce there about their pasts, their present cultures and operation of their societies, their persistent identities as Aboriginal people - Chipewyan, Cree, Métis - and about a spiritual domain that can be accessed primarily only in the bush, along with the spiritual experiences that can happen there. For Athabasca Chipewyan First Nation members, there is an interdependence between their harvesting activities and their social system which is part of their legacy as one of the world's great hunting peoples. That means that it is essential for them to spend time on the land, over and over again - walking, traveling by waterways, camping, and engaging in all the activities possible at the locations they visit. While

Aboriginal people have spoken strongly about what being on the land means to them, it is clear that the significance of their words has not filtered through to the members of review panels who listen to them. There is a problem of cultural translation at work.

Many Aboriginal people and their leaders have stated strongly that they do not consent to what is happening to their lands and their relationships to their lands, which they believe are (or ought to be) protected by their Aboriginal and Treaty rights. Yet First Nations do not believe that their rights are being protected by the governments that should do so, especially the federal government, despite with its fiduciary obligations toward First Nations, part of “the honour of the Crown.” The requirement to uphold the honour of the Crown extends to *all* government representatives who deal with Aboriginal people, which includes both federal and provincial employees. While the members of the government-appointed Review Panel are not technically considered government employees, one hopes that they, too, will feel the need to act in “the honour of the Crown.” One implication is that government agencies and Review Panel members should make social factors related to Aboriginal people central to the assessment process rather than treating them as secondary or peripheral. My report has been intended to provide the Review Panel with the information that will help it do so, by advising Panel members about the considerable shortcomings of the appendices submitted by Shell in the areas of culture and social-economic matters so that such gaps may be filled and provided essential data to the assessment process *prior* to any decisions being made about the project..

References

Adelson, Naomi

- 2005 The embodiment of inequity. Health disparities in Aboriginal Canada. *Canadian Journal of Public Health*. 96(Supplement 2):S45-S61.

Alberta Energy Regulator (AER)

- 2013 Alberta Energy Regulator Rules of Practice. Province of Alberta.
<http://www.aer.ca/rules-and-regulations/acts-and-rules> (Accessed 19 Dec. 2013)

Athabasca Chipewyan First Nation (ACFN)

- 2003 Footprints on the Land. Tracing the Path of the Athabasca Chipewyan First Nation. Fort Chipewyan, AB: Athabasca Chipewyan First Nation.

Berger, Thomas R., Justice

- 1977 Northern frontier, northern homeland. The Report of the Mackenzie Valley Pipeline Inquiry. Vol. 1. Ottawa: Minister of Supply and Services Canada.

Bernard, Alan

- 2000 History and Theory in Anthropology. Cambridge, UK: Cambridge University Press.

Buggey, Susan

- 1999 An approach to Aboriginal cultural landscapes. Historic Sites and Monuments Board of Canada Framework Paper. www.pc.gc.ca/docs/r/pca-acl/index_e.asp (Accessed 26 Dec. 2013)

Buggey, Susan, and Nora Mitchell

- 2003 Cultural landscape management challenges and promising new directions in the United States and Canada. In *Cultural Landscapes: the Challenge of Conservation*. Pp. 92-100. World Heritage Papers 7. Paris: UNESCO World Heritage Centre.

Burdge, Rabel J.

- 2002 Why is social impact assessment the orphan of the assessment process? *Impact Assessment and Project Appraisal*. 20(1):3-9.
- 2003 Benefiting from the practice of social impact assessment. *Impact Assessment and Project Appraisal*. 21(3):225-9.

Burdge, Rabel J., and Frank Vanclay

- 1996 Social impact assessment: a contribution to the state of the art series. *Impact Assessment*. 14:59-86.

Chandler, Michael J.

2000 Surviving time: the persistence of identity in this culture and that. *Culture and Psychology*. 6(2):209-231.

Chandler, Michael J., and Christopher Lalonde

1998 Cultural continuity as a hedge against suicide in Canada's First Nations. *Transcultural Psychiatry*. 35(2):191-219.

Clancy, Peter

1991 State policy and the Native trapper. Post-war policy toward fur in the Northwest Territories. In Kerry Abel and Jean Friesen, eds., *Aboriginal Resource Use in Canada: Historical and Legal Aspects*. Pp. 191-218. Winnipeg, MB: University of Manitoba Press.

Ehrlich, Alan J., and Sherry Sian

2004 Cultural cumulative impact assessment in Canada's Far North. Proceedings of the 24th Annual Conference, International Association for Impact Assessment. Vancouver, BC, April 2004.

Geertz, Clifford

1973 *The Interpretation of Cultures*. New York: Basic Books, Inc., Publishers.

Golder Associates

2012 Cultural assessment. Prepared for Shell Canada Energy. CEEA Registry Doc. no. 238, appendix 5.

2013a Cumulative effects. Submitted to Shell Canada Energy. Project No. 13-1346-0001.

<http://www.ceaa-acee.gc.ca/050/document-eng.cfm?document=95925> (Accessed 7 Nov. 2013)

2013b Appendix 3.8. Traditional land use environmental setting report update.

2013c Appendix 7. Response to Supplemental Information Request 69a - cultural effects.

Gosselin, Pierre, Steve E. Hrudey, M. Anne Naeth, André Plourde, René Therrien, Glen Van Der Kraak, Zhenghe Xu

2010 The Royal Society of Canada Expert Panel: Environmental and Health Impacts of Canada's Oil Sands Industry. Ottawa, ON.

Government of Alberta

2011 Public Lands Administration Regulation. Alta. Reg. 187/2011. Passed 25 Aug. 2011 and implemented 12 Sept. 2011.

2012 Lower Athabasca Regional Plan, 2012-2022. (LARP)

Government of Canada

1966 Treaty No. 8. Ottawa: Queen's Printer. Facsimile copy; orig. 1899.

Hackett, Paul

2005 From past to present: understanding First Nations health patterns in a historical context. Canadian Journal of Public Health. 96(Supplement 1):S17-S21.

Jary, David, and Julia Jary

2000 Collins Dictionary Sociology. 3rd ed. Glasgow, Great Britain: HarperCollins Publishers.

Joint Review Panel

2013 Report of the Joint Review Panel. Shell Canada Energy, Jackpine Mine Expansion Project. Application to amend Approval 9756, Fort McMurray area. 9 July 2013. 2013 ABAER 011. CEAA Reference No. 59540.

Keesing, Roger M.

1981 Cultural Anthropology. A Contemporary Perspective. 2nd ed. New York: Holt, Rinehart and Winston.

King, Thomas F.

2003 Places That Count. Traditional Cultural Properties in Cultural Resource Management. Walnut Creek, CA: AltaMira Press.

Kirmayer, Laurence J.

1994 Suicide among Canadian Aboriginal peoples. Transcultural Psychiatric Research Review. 31:3-58.

Kirmayer, Laurence J., Rob Whitley, Stéphan F. Dandeneau, and Colette Isaac

2009 Community resilience: models, metaphors and measures. Journal of Aboriginal Health. 5(1):62-117.

Larcombe, P. M.

2012 A narrative of encroachment experience by Athabasca Chipewyan First Nation. Prepared for ACFN IRC. Symbion Consultants, Winnipeg. 28 Sept. 2012.

Library and Archives Canada (LAC)

RG18 Royal Canadian Mounted Police. V. 1435 f. RCMP 1899 no. 76 pt. 1.

Mackenzie Valley Review Board

2009 Developing cultural impact assessment guidelines: a Mackenzie Valley Board initiative. Status Report Band Information Circular. Mackenzie Valley Review Board, Yellowknife, NWT. May 2009.

www.reviewboard.ca/reference/cultural_impact_assessment.php (Accessed 29 Dec.

2013)

Mair, Charles

- 1908 Through the Mackenzie Basin. A Narrative of the Athabasca and Peace River Treaty Expedition of 1899. Toronto, ON: William Briggs.

McCormack, Patricia A.

- 1984 How the (north) west was won: development and underdevelopment in the Fort Chipewyan region. Ph.D. thesis, Department of Anthropology, University of Alberta.

- 2010a Fort Chipewyan and the Shaping of Canadian History, 1788-1920s. We like to be free in this country. Vancouver, BC: UBC Press.

- 2010b Research report. An ethnohistory of the Mikisew Cree First Nation. Prepared for Janes Freedman Kyle and Mikisew Cree First Nation.

- 2012a Research report. An ethnohistory of the Athabasca Chipewyan First Nation. 2 September 2012. Prepared for the Athabasca Chipewyan First Nation and submitted to the Jackpine Mine Expansion Project hearings.

- 2012b Review of the "Cultural Assessment" prepared by Golder Associates (July 2012). Submitted to the Jackpine Mine Expansion Project hearings.

Mitchell, Nora, Mechtild Rössler, Pierre-Marie Tricaud

- 2009 World Heritage Cultural Landscapes. A Handbook for Conservation and Management. World Heritage Papers 26. Paris: UNESCO World Heritage Centre.

Morgan, Traci, and Todd Powell

- 2009 WMU 531. Aerial moose (*Alces alces*) survey. February 2009. Alberta Sustainable Resource Development, Wildlife Division. October 2009.

- 2010 WMU 530. South portion. Aerial moose (*Alces alces*) survey. February 2010. Alberta Sustainable Resource Development, Wildlife Division. November 2010.

Mosby, Ian

- 2013 Administering colonial science: nutrition research and human biomedical experimentation in Aboriginal communities and residential schools, 1942-1952. Social History. 46(91):145-172.

Nichols Applied Management

- 2013a Appendix 8. Response to Supplemental Information Request 69b - Assessment of the socio-economic effects for each First Nation or Aboriginal group respecting Aboriginal rights and interests before and after reclamation.

- 2013b Nichols Applied Management - Management and Economic Consultants.
<http://nicholsconsulting.com/WP/> (Accessed 18 Nov. 2013 and 2 Dec. 2013)
- Olivier, Meryl
 2003 Cultural landscape conservation experiences in Canada. *In* Cultural Landscapes: the Challenge of Conservation. Pp. 101-103. World Heritage Papers 7. Paris: UNESCO World Heritage Centre.
- Orenstein, M., A. Angel, and M. Lee
 2013 Determinants of health and industrial development in the Regional Municipality of Wood Buffalo. Feb. 2013. Fort McMurray, AB: Cumulative Environmental Management Association (CEMA) and Habitat Health Impact Consulting Corp.
- Piper, Liza
 2009 The Industrial Transformation of Subarctic Canada. Vancouver, BC: UBC Press.
- Powell, Todd, and Ashley Blackwood
 2009 WMU 529. Aerial moose (*Alces alces*) survey. February 2009. Alberta Sustainable Resource Development, Wildlife Division. March 2009.
- Rea, K. J.
 1968 The Political Economy of the Canadian North. Toronto, ON: University of Toronto Press.
- 1976 The political economy of northern development. Science Council of Canada Background Study No. 36. Ottawa: Information Canada.
- Reading, Charlotte Loppie, and Fred Wien
 2009 Health Inequalities and Social Determinants of Aboriginal Peoples' Health. National Collaborating Centre for Aboriginal Health.
- Sandlos, John
 2007 Hunters at the Margin. Native People and Wildlife Conservation in the Northwest Territories. Vancouver, BC: UBC Press.
- Shell Canada Limited
 2007 Environmental Impact Assessment. Vol. 5: Terrestrial Resources and Human Environment. Submitted to Alberta Energy and Utilities Board and Alberta Environment. Dec. 2007.
- Sonn, Christopher C., and Meredith J. Green
 2006 Disrupting the dynamics of oppression in intercultural research and practice. *Journal of Community and Applied Social Psychology*. 16(5):337-356.

Tousignant, Michel

1998 Suicide in small-scale societies. *Transcultural Psychiatry*. 35(2):291-306.

Tousignant, Michel, and Nibisha Sioui

2009 Resilience and Aboriginal communities in crisis: theory and interventions. *Journal of Aboriginal Health*. 5(1):43-61.

UNESCO

1992-2013 Cultural landscape. World Heritage Centre - Cultural Landscape.
<http://whc.unesco.org/en/culturallandscape/> (Accessed 26 Dec. 2013)

Vanclay, Frank

2003 International principles for Social Impact Assessment. *Impact Assessment and Project Appraisal*. 21(1):5-11.

Wetherell, Donald G., and Irene R. A. Kmet

2000 Alberta's North. A History, 1890-1950. Edmonton: Canadian Circumpolar Institute and University of Alberta Press.

Wikipedia

2013 Agency (sociology). <http://en.wikipedia.org/wiki/Agency-sociology> (Accessed 14 Nov. 2013)

Zaslow, Morris

1971 The Opening of the Canadian North 1870-1914. Toronto, ON: McClelland and Stewart Limited.

1988 The Northward Expansion of Canada 1914-1967. Toronto, ON: McClelland and Stewart.

CURRICULUM VITAE

PATRICIA A. McCORMACK

Professor Emerita
Faculty of Native Studies
2-31 Pembina Hall
University of Alberta
Edmonton, AB T6G 2H8

Native Bridges Consulting
18-56019 Range Road 230
Sturgeon County, AB T0A 1N2

Phone <personal information removed>
Fax

Formal Education

- 1984 Ph.D. Department of Anthropology, University of Alberta
Thesis: "How the (North) West Was Won: Development and Underdevelopment in the Fort Chipewyan Region"
- 1975 M.A. Department of Anthropology, University of Alberta
Thesis: "A Model to Determine Possible Adaptive Strategies for the Aboriginal Treeline Dene"
- 1969 B.A. (Honors) Department of Anthropology, University of Alberta
Thesis: "A Colonial Factory: Fort Chipewyan"

Skills Overview

1. *Subject interests*
 - North American Aboriginal peoples: Aboriginal and traditional cultures and identities, cultural suppression and racism, cultural transformation/renewal, modern cultures and societies
 - Subarctic and Canadian North, northwestern Plains
 - Canadian history: expansion of the state and internal colonialism; political economy; numbered treaties
 - The Canadian fur trade and Scottish workers; cultures and histories of Orkney and Lewis
 - Ethnohistory
 - Oral traditions and indigenous knowledge
 - Genealogy and kinship, social structure
 - Material culture, museology, repatriation
 - Discourse and representation

- Gender relations
 - Cultural and social impact assessment
2. *Research process and outcomes*
 - Community-based research and partnership projects
 - Archival and museum-based research
 - Expert reports and courtroom testimony
 - Research ethics
 3. *Education*
 - Adult education; course design and instruction
 - Evaluation of students
 4. *Administration*
 - Participation on university, government, and interagency committees
 - Budget preparation and management
 - Hiring, management, and evaluation of personnel
 - Volunteer recruitment and management
 - Conference planning
 5. *Heritage and museums programs*
 - Heritage preservation and interpretation; cultural resource management
 - Material culture research and collecting; collections management and conservation
 - Exhibit development
 - Public programming
 6. *Media and public relations*
 - Radio and T.V. experience
 - Public speaking to diverse audiences

Awards

Scholarly Awards

- 2012 *Recollecting: Lives of Aboriginal Women of the Canadian Northwest and Borderlands* (AU Press, 2011) was awarded the following awards: Canadian Historical Association prize for the best Aboriginal book in 2011; 2011 Best Scholarly and Academic Book of the Year by the Book Publishers Association of Alberta; 2011 Armitage-Jameson Prize (Western Historical Association and the Coalition for Western Women's History); 2012 WILLA Literary Award for Scholarly Nonfiction (Women Writing the West).

1993 Fellow of the American Anthropological Association

1969 Woodrow Wilson Fellowship

Public Awards

1993 Fort Chipewyan Historical Society, Lifetime Membership

1983 Yukon Historical and Museums Association, Honorary Life Membership

Professional Employment for Aboriginal Groups and Other Organizations

2013 “Assessing supplemental information about cultural and social elements provided by Shell Canada Limited with respect to the proposed Pierre River Mine project.”
An expert report prepared for Athabasca Chipewyan First Nation, represented by Jenny Biem, Woodward & Company LLP, for the forthcoming hearings by a Joint Review Panel. 31 Dec. 2013.

“Indigenous Knowledge Study for the Mikisew Cree First Nation Regarding Imperial Oil’s Aspen Project.”
Co-author with Towagh Behr and Trevor Dixon Bennett of Kwusen Research & Media Ltd. Submitted to Imperial Oil and Alberta Energy Regulator. 31 Dec. 2013.

“Treaties Nos. 7 and 7 and the Aboriginal signatories of Alberta.”
An expert report prepared for MacPherson Leslie & Tyerman LLP on behalf of Whitefish Lake First Nation #128, Ermineskin Cree Nation, Blood Tribe, Cold Lake First Nation, and Tsuu T’ina Nation (Notice of Application for Judicial Review 1203-01520). 29 Nov. 2013.

“Treaty No. 8 and the Aboriginal signatories of Northern Alberta.”
An expert report prepared for Janes Freedman Kyle Law Corporation on behalf of Athabasca Chipewyan First Nation, Dene Tha’ First Nation, Driftpile First Nation, Duncan’s First Nation, Fort McKay First Nation, Horse Lake First Nation, Loon River First Nation, Mikisew Cree First Nation, and Swan River First Nation (Notice of Application for Judicial Review 1203-01106) and MacPherson Leslie & Tyerman LLP on behalf of Bigstone Cree First Nation and Sucker Creek First Nation (Notice of Application for Judicial Review 1203-01520). 29 Oct. 2013.

“Research report. The treaty rights of Fort McKay First Nation, with special reference to the Moose Lake area.”
An expert report prepared for Fort McKay First Nation, represented by Karin Buss and Keltie Lambert. 22 March 2013. Submitted to the Energy Resources Conservation Board

in connection with the Dover Commercial Project ERCB Application No. 1673682.

- 2012 “Research report. An ethnohistory of the Athabasca Chipewyan First Nation.”
An expert report prepared for Athabasca Chipewyan First Nation, represented by Jay Nelson and Sean Nixon, Woodward & Company Lawyers. 2 Sept. 2012. Submitted to the Joint Review Panel for the hearing into Shell’s proposed Jackpine Mine Expansion.
- “Review of the ‘Cultural Assessment’ prepared by Golder Associates.”
An expert report prepared for Athabasca Chipewyan First Nation and Mikisew Cree First Nation, represented by Jay Nelson, Woodward & Company Lawyers LLP. July 2012. Submitted to the Joint Review Panel for the hearing into Shell’s proposed Jackpine Mine Expansion Project.
- “Research report. Treaty No. 8 and the Fort McKay First Nation.”
An expert report prepared for Fort McKay First Nation, represented by Karin Buss, Ackroyd, Piasta, Roth & Day. 22 May 2012. Submitted to the Joint Review Panel for the hearing into Shell’s proposed Jackpine Mine Expansion.
- 2011 “Research report. The ethnogenesis of the Northern Métis of the Great Slave Lake area.”
An expert report prepared for North Slave Métis Alliance, represented by Christopher G. Devlin, Devlin Gailus, Victoria. 28 Dec. 2011.
- 2010 “Research report. An ethnohistory of the Mikisew Cree First Nation.”
Prepared for Mikisew Cree First Nation, represented by Janes Freedman Kyle Law Corporation. 20 Aug. 2010. Submitted to the Joslyn North Mine Project Hearing.
- “Research report in the case of *Moulton Contracting Ltd. v. Behn et al.*”
An expert report relating to ethnohistorical and Treaty No. 8 issues prepared for a Fort Nelson First Nation family, represented by Karey M. Brooks, Janes Freedman Kyle Law Corporation.
- 2007 For Mikisew Cree First Nation, represented by Peter McMahon, Rath & Company, genealogical consultation regarding a Treaty Eight claim, used in “Report on the Southern Territory Use and Occupancy Mapping Project,” prepared for MCFN by PACTeam Canada Inc., Sept. 2007.
- 2005 “The history and nature of Métis presence and settlement in Blackfoot territory.”
An expert report prepared for Siksika Nation, represented by Clayton Leonard, MacPherson Leslie & Tyerman.
- 2004 “An economic history of Mikisew Cree First Nation.”
An expert report prepared for Mikisew Cree First Nation, represented by Peter C. Graburn, Rath & Company.

2003-2006 For Big Island Lake Cree Nation, Saskatchewan, represented by James Jodouin (Woloshyn & Company, Saskatoon): research in connection with a Treaty Six claim.

1999-2002 “Treaty No. 8 and issues of taxation.”

An expert report prepared in collaboration with Gordon Drever, for Treaty 8 First Nations (Akaitcho Tribal Council, Lesser Slave Lake Indian Regional Council, Athabasca Tribal Council, Kee Tas Kee Now Tribal Council), represented by Karin Ross and Elizabeth Johnson, Ackroyd, Piasta, Roth & Day, Edmonton. 30 April 1999. Subject: research about what Aboriginal peoples in the Treaty 8 region may have known about taxation when they negotiated the treaty in 1899 and 1900.

“Rebuttal report,” also in collaboration with Gordon Drever. 20 March 2001.

1999-present Appraisals of Native artifacts for various clients (e.g., University of Alberta, Royal Alberta Museum, Northern Cultural Arts Museum, Motor Association Insurance Company, private individuals)

1998 “The economic history of Smith's Landing/Fort Fitzgerald.”

An expert report prepared for Smith's Landing First Nation, represented by Jerome Slavik, Ackroyd, Piasta, Roth & Day.

1997 For the Métis Heritage Association of the Northwest Territories: a chapter about the history of northern Métis in relation to Treaties No. 8 and No. 11 and scrip for a book on Métis of the Mackenzie Basin. Subsequently published as “Northern Métis and the treaties” in *Picking Up the Threads; Métis History in the Mackenzie Basin*. Pp. 171-201. Yellowknife, Métis Heritage Association of the Northwest Territories.

For the Provincial Museum of Alberta: wrote the script for two units of the new Gallery of Aboriginal Peoples dealing with contemporary economic ventures and political activities.

1996-98 For Little Red River Cree Nation and Tallcree First Nation: Project Director, Cultural Resource Inventory Project. Designed project, provided training to members of four research teams (1996) and one research team (1997), and supervised the teams as they researched places of cultural significance in the traditional lands of these two First Nations. Prepared regular reports for Chiefs and Councils. Contributed to development of project software (LightHouse) and user manual and coordinated with a parallel Biophysical Inventory Project. Participated as requested in meetings with the two First Nations.

1996 For Treaty Land Entitlement, Indian and Northern Affairs Canada: a confidential report on a northern claim that consisted of an historical analysis and an annotated bibliography.

- 1983 Community study kits for Pelly Crossing, Carmacks, Burwash Landing, Destruction Bay. Prepared for the Yukon Native Languages Project, Whitehorse.
- 1980-83 Commentaries for national and regional programs on Native and northern affairs. Prepared for CBC Radio.
- 1982 "Homeland": 12 episode series tracing the development of the concept of Aboriginal rights and land claims in Canada. Prepared for CBC and taped for CBC Radio, Whitehorse, Whitehorse with broadcaster Neil Ford.
- "Contemporary Native Issues," a draft correspondence course prepared for Athabasca University.
- 1981-82 Briefs on three Yukon historical figures (Leroy Napoleon "Jack" McQuesten, William Ogilvie, and Skookum Jim, or Keish) prepared for the Yukon Educational Television Society. Used as background information for three episodes of *The Yukoners*, a series of videotaped interviews between CBC broadcaster Neil Ford and each historical figure, played by a local actor.
- 1980-81 For Council for Yukon Indians: researcher-consultant to oral history program. Assisted in coordinating an oral history workshop for Native researchers (1981).
- 1979-80 "Yukon Studies" course outline developed for the Yukon Native Brotherhood and the University of British Columbia. Included a survey of literature related to all aspects of the Yukon's history and socioeconomic development and provided an overview of Yukon social, economic, political, and constitutional history, with an annotated bibliography of nearly 500 sources.

Expert Witness

On-going advice provided to lawyers in Alberta, Saskatchewan, and British Columbia regarding Native cultures, lifeways, and histories related to the First Nations and Métis peoples of the Treaties No. 6, 7, 8, and 11 regions, and to alleged offenses under fisheries and wildlife legislation.

Qualified as an expert witness in the following trials and hearings:

- | | |
|--------------|-------------------------------------------------------------------------------------------------|
| 1986 | Expert witness by way of Affidavit, in <i>The Queen and John Piche</i> . |
| 20 Jan. 1986 | <i>R. vs. Donald Harvey et al.</i> (Sturgeon Lake First Nation). Fishing regulations violation. |

12 May 1986	<i>R. v. Joe Desjarlais, William Durocher, and Dorothy Durocher</i> (Fishing Lake Metis Settlement). Fishing regulations violation.
9 Sept. 1987	<i>R. v. Walter Janvier and R. v. John Cardinal</i> (Janvier First Nation). Fishing regulations violation.
14 Oct. 1988	<i>R. v. Vic Machatis</i> (Cold Lake First Nation). Fishing regulations violation.
2-5 Dec. 1991	<i>R. v. Ernest Wolf</i> (Onion Lake First Nation). Hunting regulations violation.
10-11 Sept. 1992	<i>R. vs. Larry Littlewolfe</i> (Onion Lake First Nation). Hunting regulations violation.
8 Feb. 1995	<i>R. v. Angelique Janvier</i> (Cold Lake First Nation). Hunting regulations violation.
16 Sept. 1996	<i>R. v. Hazel Jacko et al. and R. v. Jobby Metchewais et al.</i> (Cold Lake First Nation). Fishing regulations violation.
Summer 1997	Appeared in Edmonton, before Judge Meuwissen, with the U.S. Department of the Interior, in connection with the U.S. White Earth Lands Settlement Act.
23 May 2001	<i>Benoit et al. v. the Queen</i> (Treaty No. 8 First Nations). Treaty Eight litigation in federal court. Justice Douglas Campbell.
12 May 2005	<i>Brett Janvier v. the Queen</i> (Cold Lake First Nation). Fishing regulations violation. Judge Wheatley.
29 Sept. 2009	<i>Betty Woodward and Mickey Cockerill and Harry Cockerill vs. Chief and Council of the Fort McMurray No. 268 First Nation</i> (Treaty 8 First Nation). Judicial review of two cases heard concurrently concerning band membership. Federal Court Justice O'Reilly.

Publications, Exhibits, Papers, Conference Development

Refereed Publications

- 2013 Transatlantic rhythms: to the Far Nor'West and back again. In Graeme Morton and David A. Wilson, eds., *Irish and Scottish Encounters with Indigenous Peoples: Canada, the United States, New Zealand, and Australia*. Pp. 253-286, Montreal: McGill-Queen's

Press.

- 2012 "A world we have lost": the plural society of Fort Chipewyan. *In* Robin Jarvis Brownlie and Valerie J. Korinek, eds., *Finding a Way to the Heart. Feminist Writings on Aboriginal and Women's History in Canada*. Pp. 146-169. Winnipeg, MB: University of Manitoba Press.
- 2011 *Recollecting: Lives of Aboriginal Women of the Canadian Northwest and the U.S. Borderlands*. Edited jointly with Sarah Carter, with a jointly written introduction, "Lifelines," (pp. 5-25). Athabasca, AB: Athabasca University Press. Includes my own article: "Lost women: Native wives in Orkney and Lewis" (pp. 61-88). Awards: Canadian Historical Association prize for the best Aboriginal book in 2011; 2011 Best Scholarly and Academic Book of the Year by the Book Publishers Association of Alberta; 2011 Armitage-Jameson Prize (Western Historical Association and the Coalition for Western Women's History); 2012 WILLA Literary Award for Scholarly Nonfiction (Women Writing the West). Short listed for the 2011 Margaret McWilliams Award in Scholarly History (Manitoba Historical Society).
- 2010 *Fort Chipewyan and the Shaping of Canadian History, 1788-1920s: We like to be free in this country*. Vancouver: UBC Press. Listed in the "Canadian Aboriginal Books for Schools," 2011-2012.
- 2007 Visioning Thanadelthur: shaping a Canadian icon. *Manitoba History*. No. 55:2-6. June 2007.
- 2005 Competing narratives: barriers between Indigenous peoples and the Canadian state. *In* Duane Champagne, Karen Jo Torjesen, and Susan Steiner, eds., *Indigenous Peoples and the Modern State*. Pp. 109-120. Walnut Creek, Calif.: AltaMira Press.
- 2003 The many faces of Thanadelthur: documents, stories, and images. *In* Jennifer S. H. Brown and Elizabeth Vibert, eds., *Reading Beyond Words: Contexts for Native History*. 2nd ed. Pp. 329-364. Peterborough, Ont.: Broadview Press.
- 2000 Overcoming the differences of treaty and scrip: the Community Development Program in Fort Chipewyan. *In* Duff Crerar and Jaroslav Petryshyn, eds., *Treaty 8 Revisited: Selected Papers on the 1999 Centennial Conference*. *Lobstick*. 1(1):277-295.
- 1999 *Securing Northern Futures: Developing Research Partnerships*. Co-editor with D. Wall, M.M.R. Freeman, M. Payne, E. E. Wein, and R. W. Wein. Edmonton: Canadian Circumpolar Institute Press, University of Alberta.
- 1998 Native homelands as cultural landscapes: decentering the wilderness paradigm. *In* Jill Oakes, Rick Riewe, and Kathi Kinew, eds., *Sacred Lands: Claims, Conflicts and*

Resolutions. Pp. 25-32. Occasional Publication No. 43. Edmonton: Canadian Circumpolar Institute, University of Alberta.

Northern Métis and the treaties. *In Picking Up the Threads; Métis History in the Mackenzie Basin*. Pp. 171-201. Yellowknife, Métis Heritage Association of the Northwest Territories.

- 1996 The Canol project at Fort Chipewyan. *In* Bob Hesketh, ed., *Three Northern Wartime Projects*. Pp. 183-199. CCI Occasional Publication No. 38. Edmonton: Canadian Circumpolar Institute, University of Alberta, and Edmonton & District Historical Society.

- 1994 Linking bush and town: the mixed economy of the Aboriginal peoples of Fort Chipewyan. *In Proceedings of the 8th International Abashiri Symposium on Peoples and Cultures of the Boreal Forest*. Pp. 21-33. Hokkaido Museum of Northern Peoples, Abashiri City, Hokkaido, Japan.

- 1993 Romancing the northwest as prescriptive history: Fort Chipewyan and the northern expansion of the Canadian state. *In* Patricia A. McCormack and R. Geoffrey Ironside, eds., *The Uncovered Past: Roots of Northern Alberta Societies*. Pp. 89-104. Circumpolar Research Series No. 3. Edmonton: Canadian Circumpolar Institute, University of Alberta.

Co-editor with R. Geoffrey Ironside. *The Uncovered Past: Roots of Northern Alberta Societies*. Includes the "Introduction" and "Conclusion." Circumpolar Research Series No. 3. Edmonton: Canadian Circumpolar Institute, University of Alberta.

Images of the buffalo in the collection of the Provincial Museum of Alberta. *Alberta*. 3(2):37-43. With Ruth McConnell.

- 1992 The political economy of bison management in Wood Buffalo National Park. *Arctic*. 45(4):367-380. Nominated for the Eleanor B. Leacock award.

The Ethnology Oblate Collection at the Provincial Museum of Alberta. *Western Oblate Studies* 2. Pp. 231-236. Queenston, Ont.: The Edwin Mellen Press. With Ruth McConnell.

Editor: *Prairie Forum*. Vol. 17, no. 2. Special issue on Aboriginal peoples.

- 1991 "That's a piece of junk": issues in contemporary subarctic collecting. *Arctic Anthropology*. 28(1):124-137.

- 1989 Chipewyans turn Cree: governmental and structural factors in ethnic processes. *In* K. S. Coates and W. R. Morrison, eds., *For Purposes of Dominion: Essays in Honour of*

Morris Zaslow. Pp. 125-138. North York, Ont.: Captus Press.

Working with the community: a dialectical approach to exhibit development. *Alberta Museums Review*. 14(2):4-8.

- 1987 Fort Chipewyan and the Great Depression. *Canadian Issues*. 8:69-92.
- 1986 The Yukon. In R.B. Byers, ed., *Canadian Annual Review of Politics and Public Affairs 1983*. Toronto: University of Toronto Press.
- 1985 The Yukon. In R.B. Byers, ed., *Canadian Annual Review of Politics and Public Affairs 1982*. Toronto: University of Toronto Press.
- 1984 Becoming trappers: the transformation to a fur trade mode of production at Fort Chipewyan. In *Rendezvous, Selected Papers of the Fourth North American Fur Trade Conference, 1981*. Pp. 155-173. St. Paul, Minnesota: North American Fur Trade Conference.

Accepted (refereed)

Evolving accommodations: the sled dog in the Canadian fur trade. For publication at the Université de Valenciennes, France. In press.

In Preparation (will be refereed)

Deconstructing Canadian subarctic grasslands.

Other Publications (non-refereed)

- 2010 Popularizing contact: Thanadelthur, the Sacagawea of the North. In *Papers of the Rupert's Land Colloquium 2010*. Pp. 409-416. Compiled by David Malaher; edited by Anne Lindsay and Jennifer Ching. Winnipeg: The Centre for Rupert's Land Studies at the University of Winnipeg.
- 2004 Telling the story of Canada: the roles of the fur trade. In *Selected Papers of Rupert's Land Colloquium 2004*. David G. Malaher, compiler. Pp. 473-482. Winnipeg: Centre for Rupert's Land Studies, University of Winnipeg.
- 2002 Introduction: "A promise by any other name...." Treaty No. 8 and taxation. P. 283. With Gordon Drever. Imposing tax: taxation in the Northwest Territories and Aboriginal fears in the Treaty Eight region. In *David G. Malaher, compiler, Selected Papers of Rupert's Land Colloquium 2002*. Pp. 309-315. Winnipeg: Centre for Rupert's Land Studies, University of Winnipeg.

- 2001 Genealogical studies in community-based research. Proceedings, Canadian Indigenous/Native Studies Association Annual Conference. CD ROM.
- 1996 The Athabasca influenza epidemic of 1835. Issues in the North. CCI Occasional Publication No. 40. Pp. 33-42. Edmonton: Canadian Circumpolar Institute, University of Alberta.
- 1995 Revision of the entry on "Chipewyan" for the *Canadian Encyclopedia*, originally written by James G. E. Smith (deceased); revised version carries both names as co-authors.
- 1993 Living Cultures: The Aboriginal Peoples of Alberta. Exhibit catalogue. Hokkaido, Japan: Historical Museum of Hokkaido.
- Editor: Soapstone and Seedbeads: Arts and Crafts at the Charles Camsell Hospital, by Annalisa Staples and Ruth McConnell. Provincial Museum of Alberta Special Publication No. 7. Edmonton: Provincial Museum of Alberta.
- 1990 Government comes to Fort Chipewyan: expansion of the state into the heart of the fur trade country. In Patricia A. McCormack and R. Geoffrey Ironside, eds., Fort Chipewyan-Fort Vermilion Bicentennial Conference Proceedings. Pp. 133-137. Edmonton: Boreal Institute for Northern Studies.
- Co-editor with R. Geoffrey Ironside. Proceedings of the Fort Chipewyan and Fort Vermilion Bicentennial Conference. Edmonton: Boreal Institute for Northern Studies.
- A survey of the Scriver Blackfoot collection. In Philip H. R. Stepney and David J. Goa, eds., The Scriver Blackfoot Collection: Repatriation of Canada's Heritage. Pp. 105-134. Edmonton: Provincial Museum of Alberta. With Karen Robbins.
- 1988 Northwind Dreaming: Fort Chipewyan 1788-1988. Exhibit catalogue. Provincial Museum of Alberta Special Publication No. 6. Edmonton: Provincial Museum of Alberta.
- 1981-82 Newsletters of the Yukon Historical and Museums Association, nos. 8-11.
- 1977 Introduction. The Western Canadian Journal of Anthropology. 7(1):1-14. Special issue: Environmental Manipulation, P. McCormack, ed.
- 1976 Introduction. The Western Canadian Journal of Anthropology. 6(3):1-7. Special issue: Native Peoples: Cross-Sex Relations, P. McCormack, ed.
- "Big Man" on the steppes: social causes for economic transformations. Abstract in the AMQUA Fourth Biennial Conference abstract Volume.

- 1975 A theoretical approach to northeastern Dene archaeology. *The Western Canadian Journal of Anthropology*. 5(3,4):187-229. Special issue: Athapaskan Archaeology, D. Hudson and D. Derry, eds.

Book and Film Reviews

- 2011-12 Ron Scollon, *This is What They Say*. Stories by François Mandeville. Vancouver: Douglas & McIntyre, 2009. *BC Studies*. No. 172:136-37. Winter 2011-12.
- 2006 Betty Bastien, *Blackfoot Ways of Knowing: The Worldview of the Siksikaitstapi*. Calgary, Alberta, University of Calgary Press, 2004. *Great Plains Quarterly*. 26(2):134-5.
- 2004 Celeste Ray, *Highland Heritage. Scottish Americans in the American South*. Chapel Hill, North Carolina: University of North Carolina Press, 2001. *American Anthropologist*. 106(3):631-2.
- 1998 Flora Beardy and Robert Coutts, editors and compilers, *Voices from Hudson Bay. Cree Stories from York Factory*. Montreal and Kingston: McGill-Queen's University Press, 1996. Vol. 5 in the Rupert's Land Record Society Series. *Manitoba History*. No. 35 (Spring/Summer):25-26.
- Julie Cruikshank, *The Social Life of Stories. Narrative and Knowledge in the Yukon Territory*. Lincoln and London: University of Nebraska Press, 1998. *American Indian Quarterly*. 22(4):499-500.
- Katherine Pettipas, *Severing the Ties that Bind. Government Repression of Indigenous Religious Ceremonies on the Prairies*. Winnipeg: The University of Manitoba Press, 1994. *Canadian Ethnic Studies*. 30(2):161-2.
- 1997 Clark Wissler and D.C. Duvall, *Mythology of the Blackfoot Indians*. Introduction to the Bison Book Edition by Alice Beck Kehoe. Lincoln and London: University of Nebraska Press, 1995. *The Canadian Journal of Native Studies*.
- 1995 Kerry Abel, *Drum Songs: Glimpses of Dene History*. *The Canadian Journal of Native Studies*. 14(2):395-398.
- David V. Burley, John D. Brandon, and Gayle A. Horsfall, *Structural Considerations of Metis Ethnicity: An Archaeological, Architectural, and Historical Study*. *The Canadian Historical Review*. Pp. 692-694.
- Peter Iverson, *When Indians Became Cowboys: Native Peoples and Cattle Ranching in the American West*. *The Journal of American History*. 82(3):1239-1240.

- Jocelyn Riley, *Mountain Wolf Woman: 1884-1960 and Her Mother Before Her: Women's Stories of their Mothers and Grandmothers*. *The Public Historian*. With William R. Swagerty. 18(4):148-149. [Film review]
- 1994 Lynda Shorten, *Without Reserve*. *Great Plains Quarterly*. 14(3):221-2.
- Michael Ames, *Cannibal Tours and Glass Boxes*. *The Anthropology of Museums*. *Alberta Museums Review*. 20(2):42.
- 1993 Terry Garvin, *Bush Land People*. *Arctic*. Vol. 46, no. 4:367-8.
- James W. VanStone, *Material Culture of the Blackfoot (Blood) Indians of Southern Alberta*. *Museum Anthropology*. 17(3):72-73.
- 1992 Kerry Abel and Jean Friesen, eds., *Aboriginal Resource Use in Canada: Historical and Legal Aspects*. *Manitoba History*. No. 24:45-46.
- Arthur J. Ray, *The Canadian Fur Trade in the Industrial Age*. *The Western Historical Quarterly*. 25(2):237-239.
- 1986 *The Great Buffalo Saga*. *The Canadian Field-Naturalist*. 100(3):398-399. [Film review]
- Robert G. McCandless, *Yukon Wildlife: A Social History*. *Archivaria*. 22:209-12.
- 1985 Julie Cruikshank, *The Stolen Woman: Female Journeys in Tagish and Tutchone Narrative*. *The American Indian Quarterly*. 9(1):115-6.
- Shepard Krech III, *The Subarctic Fur Trade: Native Social and Economic Adaptations*. *Canadian Ethnic Studies*. 17(3):135-137.
- 1982 Sylvia Van Kirk, *"Many Tender Ties": Women in Fur Trade Society, 1670-1870*. *Resources for Feminist Research*. 11(3):313.
- 1979 Rene Fumoleau, *As Long as this Land Shall Last*. *Canadian Ethnic Studies*. 11(1):174-175.

Exhibits

- 2001 Muse Project (with Lisa Barty). A teaching exhibit in the foyer of the Education Building featuring Blackfoot and Inuit artifacts. In cooperation with Museums and Collections Services. Designed by Kevin Zak and Bernd Hildebrandt.
- 1999 *Treaty No. 8 and the Northern Collecting of Dr. O. C. Edwards*

500 square foot centennial commemoration exhibit developed in cooperation with NS480 students. Designed by Bernd Hildebrandt. School of Native Studies and Museums and Collections Services, University of Alberta.

- 1997 Script for portions of *The Syncrude Gallery of Aboriginal Culture*, Provincial Museum of Alberta: "For Every Three Families, One Plow and One Harrow" (Native farming and ranching, with Rhonda Delorme) and units on Economic Ventures and Political Activity.
- 1994 Storyline for the ethnology portion of *The Syncrude Gallery of Aboriginal Culture*: a new permanent gallery (9,500 square feet). Developed with Ruth McConnell, Assistant Curator of Ethnology, in consultation with other museum staff and a Native Advisory Committee.
- 1993 *"In All their Finery": A Legacy from the Past*
1,000 square foot exhibit featuring aesthetically distinctive, older items made by Aboriginal peoples of the northwestern Plains and western Subarctic; the first phase of a new permanent gallery. Designed by Bryan McMullen.

Aboriginal Peoples of Alberta

Large traveling exhibit and catalogue developed for the Historical Museum of Hokkaido. Designed by Virginia Penny.

- 1992 *Gateway from the North: The Charles Camsell Hospital Collection*
One case display featuring "arts and crafts" from the Camsell Collection (with catalogue); circulated to other venues in Edmonton 1992-93. Designed by Bill Gordon.
- 1990 *Kayasayawina Ka Wapahtihitohk: To Show the Old Things*
500 square foot exhibit of artifacts showing the diversity of the collection and of the Aboriginal peoples of Alberta. Designed by Paul Beier. (The exhibit became part of the Royal Alberta Museum *Syncrude Gallery of Aboriginal Culture*)

Clothing of the Northern Plains

Three-case display for Head-Smashed-In Historic Site. Designed by Bill Gordon.

- 1989 *Northwind Dreaming: Fort Chipewyan 1788-1988*
500 square foot traveling exhibit, for venues in Alberta, NWT, Yukon, B.C., Sask., and Manitoba, 1990-94. Designed by Vic Clapp.
- 1989 *Dr. Robert Bell: Geologist and Collection*
One case display.
- 1989 *Douglas Light Collection*
Temporary display prepared for the Alberta Historical Resources Foundation.

- 1988 *Northwind Dreaming: Fort Chipewyan 1788-1988*
3,000 square feet feature exhibit commemorating the bicentennial of the founding of Fort Chipewyan, Alberta's oldest, permanently occupied community, and celebrating the lives of the Indian, Métis, and non-Native peoples who have made their homes there for 200 years and longer. Developed in collaboration with community residents. Contained over 400 artifacts, many borrowed from collections in Canada, U.S., and Scotland. Designed by Vic Clapp.
- 1987 *Indian Tipis*
One case traveling display, for the library case circuit. Designed by Julian West.
- 1986 *Trapping in Transition: Native Trapping in Northern Alberta*
1,000 square feet exhibit depicting the roles of trapping in Aboriginal economies in northern Alberta in the years before World War II and in the present. Designed by Shelby Craigen.
- 1985 *Rigging the Chiefs*
500 square feet exhibit depicting historical relations between Indians and non-Indians mediated through the giving of gifts. Cases show the fur trade, treaty, and modern eras. Designed by Julian West.
- Métis Artifacts* Temporary display.
- Native Games* One case traveling display, for the library case circuit.
- Indian Dolls* One case display.

Papers

- 2013 The Canadian fur trade, John Rae, and evolving dog teams. Presented at the John Rae 200 Conference, Stromness, Orkney, Scotland. 28-30 Sept. 2013.
- Doing credible cultural assessment. Presented at the Impact Assessment International Association 2013 conference, Calgary, Alberta. 13-16 May 2013.
- 2012 Conflicting obligations: oil sands development and Treaty No. 8. Presented at the Impact Assessment International Association 2012 conference, Porto, Portugal. 27 May-1 June 2012.
- Down the Fond du Lac River with David Thompson/ Descendre la Rivière Fond du Lac avec David Thompson. Updated paper with PowerPoint slides presented at L'Ecriture qui Voyage: Conditions de Production des Recits de Voyages Maritimes et Fluviaux Veritables. 16-18 November, Clermont-Ferrand, France.

- 2011 The invisible parkland: rethinking the plains and subarctic culture areas. Updated paper with PowerPoint slides presented at the Native American and Indigenous Studies Association, 19 - 21 May 2011, Sacramento, California.

Defining the scope of assessment: traditional territories of indigenous people. Presented at the Impact Assessment International Association 2011 conference, Puebla, Mexico, 31 May - 3 June 2011 (with PowerPoint slides).

Lewismen and Aboriginal people of the Canadian Northwest - the *Talamh Fuar*. Prepared for the Celts in the Americas Conference, 29 June - 2 July 2011, St. Francis Xavier University, Antigonish, Nova Scotia.

- 2010 Evolving accommodations: the sled dog in the Canadian fur trade. Revised from a paper presented in 2009 and presented as an invited luncheon talk at the Rupert's Land Colloquium, 19-22 May 2010, Winnipeg (estimated attendance: 130+).

Popularizing contact: Thanadelthur, the Sacagawea of the north. Revised and presented in "Performances and Representations," at the 2010 Rupert's Land Colloquium, 19-22 May 2010, Winnipeg.

Transatlantic rhythms: to the far Nor'West and back again. Invited keynote talk for an international conference sponsored by the University of Aberdeen, University of Guelph, and St. Michael's College. Held at the University of Toronto and University of Guelph, 10-12 June 2010.

- 2009 Ethical requirements: how far is too far? Going overboard to satisfy university risk management. Invited for "Practical Problems and Pragmatic Solutions in Conducting Ethical Research," sponsored by the Native History Group of the CHA, 88th Annual General Meeting, Canadian Historical Association, Ottawa, 25 May 2009.

Rethinking the Blackfoot and the fur trade of the northern Plains. Invited for the Fourth International Fur Trade Symposium, Fort Whoop-Up National Historic Site, Lethbridge, AB, 9-13 September 2009.

James Thomson and his fur trade wives: fur trade reality or the soap opera of Fort Chipewyan? Invited paper for a session at Ethnohistory, 30 Sept.- 4 Oct. 2009, New Orleans, Louisiana.

The racialization of traditional knowledge. Invited for the Cumulative Environmental Management Association (CEMA) TEK 2009 Coaching Workshop, "Perspectives into Practice." 28 October 2009, Fort McMurray, AB.

Evolving accommodations: the sled dog in the Canadian fur trade. Third International meeting of the conference series, "Des bêtes et des hommes": "Une bête parmi les

hommes: le chien.” Université de Valenciennes, France, 5-6 November 2009.

- 2008 Down the Fond du Lac River with David Thompson. Prepared for the 13th Rupert’s Land Colloquium, Rocky Mountain House, Alberta, 14-16 May 2008.

The invisible parkland: rethinking the Plains and Subarctic culture areas. Presented at *The West and Beyond: Historians Past, Present, Future*, University of Alberta, 19-21 June 2008.

- 2007 Tipi dweller: all the comforts of home. Invited paper prepared for *Domestic Space, Domestic Practice: Exploring the Materiality of Home*, the inaugural symposium of the Material Culture Institute, University of Alberta, 20 April 2007.

“A world we have lost”: the plural society of Fort Chipewyan. Presented as part of “Many Tender Ties: A Forum in Honour of Sylvia Van Kirk,” for Canadian Historic Association, 28-30 May 2007, Saskatoon, SK.

Deconstructing Canadian subarctic grasslands. Presented as part of “Grassland Construction, Deconstruction, and Reconstruction: Global Perspectives,” a session at the European Environmental History Conference, Amsterdam, 5-9 June 2007.

Telling the story of Canada: the roles of the fur trade. Presented at “Research as Resistance,” a symposium organized by the Faculty of Native Studies, University of Alberta, 22-24 August 2007. Revised paper based on paper delivered in 2004 at the Rupert’s Land Conference.

Building a new society in western Canada: the world of the early fur trade. Invited paper for *David Thompson: New Perspectives, New Knowledge*, a symposium organized by the Glenbow Museum, 26-27 Oct. 2007.

Lost women: Native wives in Orkney and Lewis. Presented as part of “Negotiating Identities: Aboriginal Women’s Stories of Northwestern America,” a session for the American Society for Ethnohistory annual conference, Tulsa, Oklahoma, 7-10 Nov. 2007.

- 2006 The government foot in the door: beginnings of state regulation in the Fort Chipewyan-Fort Smith Region. The 9th North American Fur Trade Conference and 12th Rupert’s Land Colloquium, St. Louis, Mo., 24-28 May 2006. (Earlier version presented at the School of Native Studies Annual Research Day, University of Alberta, 1 April 2005.)

Visioning Thanadelthur. The American Society for Ethnohistory Annual Meeting, Williamsburg, Virginia, 1-4 Nov. 2006.

- 2005 Building national history: how should we talk about Canada’s past? Presentation for “Philosophers Café,” University of Alberta Office of Public Affairs, 3 Dec. 2005.

2004 Telling the story of Canada: the roles of the fur trade. Rupert's Land Studies Colloquium 2004. Kenora, Ontario, 24-30 May 2004.

2003, 2004, 2005 The narratives at the heart: stereotypes and stories about Aboriginal peoples and their place in Canadian history. With slides and artifacts. Greater Edmonton Teachers' Convention Association, Edmonton. Feb. 28, 2003. Revised for the Bonnyville Support Staff Conference, Bonnyville, 13 Feb. 2004 and 18 Feb. 2005.

2003 British identities and Canadian Aboriginal identities: evolving in tandem. British World Conference II, *British Identities*, University of Calgary, 10-12 July 2003.

Popularizing contact: Thanadelthur, the Sacagawea of the North. American Society for Ethnohistory Annual Meeting, Riverside, California, 5-9 Nov. 2003.

2002 Popularizing contact: the many faces of Thanadelthur. Presented at *Worlds in Collision: Critically Analyzing Aboriginal and European Contact Narratives*, a colloquium at Dunsmuir Lodge, University of Victoria, B.C., 22-23 Feb. 2002.

Competing Narratives: Barriers between Indigenous Peoples and the Canadian State. Indigenous Peoples and the Modern State, Claremont Graduate University, California, 5-7 April 2002. This paper was revised for a conference proceedings. A revised version was presented as an invited keynote address at *Re-Visioning Canada Workshop: Integrating the History of Aboriginal/Non-Aboriginal Relations*, University of Toronto, 27-28 Sept. 2002.

Imposing tax: taxation in the Northwest Territories and Aboriginal fears in the Treaty Eight region. Co-authored with Gordon Drever. Presented as part of "A promise by any other name...": Treaty No. 8 and Taxation," at the 10th Rupert's Land Colloquium, 9-12 April 2002, Mansfield College, University of Oxford.

Deconstructing Barbie! A popular lecture invited by the University of Alberta Museums and Collections Service, delivered 10 Feb. 2002.

2001 Expanding the boundaries: studying Dene kinship. Presented as part of "Dene Kinship and Ethnohistory," at the 100th Annual Meeting of the American Anthropology Association, 28 Nov. - 2 Dec. 2001, Washington, D.C.

2000 Scenes from an exhibit: "From the Far North": Treaty No. 8 and the northern collecting of Dr. O. C. Edwards. A curatorial lecture invited by the Friends of the University of Alberta Museums, 23 Jan. 2000.

Canadian nation-building: a pretty name for internal colonialism. Presented at *Nation Building*, British Association for Canadian Studies 25th Annual Conference, 11-14 April 2000, University of Edinburgh, Scotland.

Presentation as part of a panel, "Representing Aboriginal Histories and Cultures at Historic Sites and Museums." Canadian Indigenous/Native Studies Association Annual Meeting and Conference, 28-31 May 2000, Edmonton. Co-presenters were Flora Beardy, Robert Coutts, and Michael Payne.

Genealogical studies in community-based research. Presented at the Canadian Indigenous/Native Studies Association Annual Conference, as part of a session on "Genealogical Research and Methods," 29-31 May 2000, Edmonton.

- 1999 Overcoming the differences between treaty and scrip. For the *1899 Centennial Conference*, a conference in commemoration of the initial signing of Treaty No. 8 and the distribution of scrip in 1899, Grouard, Alberta, 17-19 June 1999.

Treaty No. 8 and issues of taxation. Co-authored with Gordon Drever. Prepared for Akaithcho Tribal Council, Lesser Slave Lake Indian Regional Council, Athabasca Tribal Council, and Kee Tas Kee Now Tribal Council, 30 April 1999. (Expert report)

- 1998 Smith's Landing/Fort Fitzgerald: an economic history. Prepared for the Smith's Landing First Nation, 23 October 1998.

Building partnerships: Canadian museums, Aboriginal peoples, and the spirit and intent of the Task Force on Museums and First Peoples. With Arthur J. Sciorra. For the annual meeting of the Canadian Association for the Conservation of Cultural Property, Whitehorse, Yukon, 29-31 May 1998.

Northern Métis, Treaties No. 8 and No. 11, and the issuance of scrip. For the Rupert's Land Colloquium 1998, Winnipeg, 4-7 June 1998.

The communities: after European contact. Description of the human communities of the Wood Buffalo National Park region, for a handbook about the park, edited by Ross Wein. (Accepted for the handbook, which was never completed.)

- 1997 From buffalo to beef: the emergence of a Blackfoot cattle industry. For *The Fur Trade Era: The Influence of the Rocky Mountain Fur Trade on the Development of the American West*, Museum of the Mountain Man, Pinedale, Wyoming, 11-13 Sept. 1997.

- 1996 Orkney men and Lewis men: distinctive cultures and identities in the Canadian fur trade. For *Scots and Aboriginal Culture*, a Scottish Studies Colloquium, University of Guelph, 22-24 March 1996. A revised version was given at the Rupert's Land Research Centre Colloquium, Whitehorse, 1-4 June 1996.

Native homelands as cultural landscapes: decentering the wilderness paradigm. For the *Sacred Lands* conference, University of Manitoba, Winnipeg, 24-26 Oct. 1996.

- 1995 The invisible parkland: rethinking the Plains and Subarctic culture areas. For the 53rd

Plains Anthropological Conference, Laramie, Wyoming, 18-21 Oct. 1995.

Native peoples and cultural renewal. For *Managing Change: Drawing on the Dynamics of Cultural Traditions*, a session developed by Anne M. Lambert and Patricia A. McCormack as part of the Canadian Home Economics Conference, *Beyond Tradition*, Edmonton, 9-11 July 1995.

- 1994 James and Isabella Thomson: a Lewis family in the Canadian fur trade. For the Sixth Biennial Rupert's Land Research Centre Colloquium, Edmonton, 25-27 May 1994.

The smokescreen of technology: the mixed economy of Fort Chipewyan and the persistence of Aboriginal cultures. For the School of Native Studies, 21 Jan. 1994.

The invisible parkland: ethnohistoric considerations. For *Diversity on your Doorstep*, a program presented by the Beaver Hills Ecological Network, as part of the Beaverhills Lake-Fall Migration Celebration, Tofield, Alberta, 24 Sept. 1994.

Peigan horse traditions and ranching: persistence and change in Peigan cultural patterns. With Willard Yellowface. For the Plains Indian Seminar at the Buffalo Bill Historical Center, Cody, Wyoming, 30 Sept. - 2 Oct. 1994.

The Indian trade of the northern Rockies as reflected in the collections of the Provincial Museum of Alberta and the Glenbow. For the Western History Association Conference, Albuquerque, New Mexico, 20-23 Oct. 1994.

The Athabasca influenza epidemic of 1835. For the Chacmool Conference, Calgary, 10-13 Nov. 1994. Revised version delivered 24 Jan. 1995, as part of the *Issues in the North* lectures series, sponsored by the Canadian Circumpolar Institute.

- 1993 Linking bush and town: the mixed economy of the Aboriginal peoples of Fort Chipewyan. For the 8th International Abashiri Symposium on Peoples and Cultures of the North, *Peoples and Cultures of the Boreal Forest*, Hokkaido Museum of Northern Peoples, Abashiri City, Hokkaido, Japan, 11-12 Nov. 1993.

- 1992 The bison of Wood Buffalo National Park and their future. For the Sierra Club of Alberta, Calgary, 8 Jan. 1992.

Bringing home wives. Native Hudson's Bay families in Orkney, Scotland. For the Department of History, University of Winnipeg, 5 Feb. 1992.

The expansion of the state into the Fort Chipewyan region. For a Department of Geography Colloquium, University of Alberta, 31 Jan. 1992 and a Department of History Graduate Seminar, University of Winnipeg, 5 Feb. 1992.

Two solitudes: museum displays and Indians in the fur trade. For a session, "Inventing

Fur Trade Traditions,” organized by Patricia A. McCormack and Robert Coutts, for the Fifth Biennial Rupert's Land Colloquium, Winnipeg, 6-9 Feb. 1992.

Indian cowboys: mythologies of the west and museum collecting. For a Department of Textiles and Clothing class in the History of Native Clothing, University of Alberta, 18 Feb. 1992.

The Canol Pipeline and northern Alberta. For the *Alaska Highway Conference*, Edmonton, 5-6 June 1992.

Native trapping in northern Alberta. For a seminar at the Glenbow Museum in conjunction with the exhibit *Trapline Lifeline*, Calgary, 13 June 1992.

Alexander Mackenzie, the Scot. For *Ten Great Days*, a celebration of Alexander Mackenzie's arrival at Peace River in 1792, Peace River, Alberta, 30-31 Aug. 1992.

The Blackfoot and the fur trade. For *Meet Me on the Green: The Rocky Mountain Fur Trade*, a symposium organized by the Museum of the Mountain Man, Pinedale, Wyoming, 10-12 Sept. 1992.

Perceptions of place: Natives and Europeans of the fur trade era. For the Alberta Museums Association Conference, Medicine Hat, Alberta, 29-31 Oct. 1992.

Expanding state regulatory systems and their impacts on northern and Native peoples. For *Symposium on Contemporary and Historical Issues in Legal Pluralism: Prairie and Northern Canada*, organized by the Canadian Institute for Advanced Research, Law in Society Program, Winnipeg, 7-8 Nov. 1992.

Blackfoot horse traditions and modern museum collection. For a special session, *Contemporary Collecting: The Production of New Collections for the Future*, organized by Patricia A. McCormack and invited by the Council for Museum Anthropology for the 91st Annual Meeting of the American Anthropological Association, San Francisco, 2-6 Dec. 1992.

1991 Reconstituting a Natoas bundle: a Provincial Museum of Alberta-Peigan collaboration. For the Task Force on Museums and First Peoples.

Working with Native communities. Seminar prepared for Parks Canada research staff, Winnipeg.

Evolving Blackfoot dress styles and their representation in museum collections. For *It's a Material World*, an Interdisciplinary Material Culture Lecture Series at the University of Alberta.

The Canadian fur trade: the Orkney connection. For *Focus on the Forks*, a conference on

the historical significance of the forks region, Winnipeg, April, 1991.

With Ruth McConnell. The Ethnology Oblate Collections at the Provincial Museum of Alberta. For the Oblate Conference, Edmonton, 22-23 July 1991.

- 1990 Northern boats. Paper on Native lake skiffs and their possible Orkney origin. For the Orkney Museum Service; delivered in three Orkney towns, September 1990.

Saving Canada's wild bison: the political economy of bison management in Wood Buffalo National Park. For *The Wood Bison Issue*, a Circumpolar Lecture Series of the Canadian Circumpolar Institute, University of Alberta, 7 Dec. 1990.

The Orkney Islands and the Canadian fur trade and Native communities. For *Partnerships: Museums and Native Living Cultures*, Alberta Museums Association Professional Development Series, Edmonton, 3-4 Dec. 1990.

- 1989 From their labor: a material slant to ethnohistorical research. For the American Society for Ethnohistory Conference, Chicago, 2-5 Nov. 1989.

Reviving contemporary collecting: the Fort Chipewyan collection at the Provincial Museum of Alberta. For a special session, *Collecting the Objects of Others*, at the 88th Annual Meeting of the American Anthropological Association, Washington, D.C., 15-19 Nov. 1989.

"That's a piece of junk": issues in contemporary subarctic collecting. For *Out of the North: A Symposium on the Native Arts and Material Culture of the Canadian and Alaskan North*, Haffenreffer Museum of Anthropology, 20-21 Oct. 1989.

Working with the community: a dialectical approach to exhibit development. Prepared for *Canada's Native Community and Museums: A New Dialogue and New Initiatives*, a seminar in the Alberta Museums Association's Professional Development Series, Calgary, 7-9 April 1989

- 1988 Surrounded by Crees: Chipewyan persistence in Fort Chipewyan, Alberta. For an invitational session on *Variations in Chipewyan Thought and Behavior*, 87th Annual Meeting of the American Anthropological Association Annual Meeting, Phoenix, 16-20 Nov. 1988.

Hub of the North: Fort Chipewyan 1788-1988. For the Rupertsland Colloquium, Winnipeg and Churchill, 29 June - 3 July 1988, and also delivered as a public lecture at the Provincial Museum of Alberta.

Government comes to Fort Chipewyan: expansion of the state into the heart of the fur trade country. For the *Fort Chipewyan-Fort Vermilion Bicentennial Conference*,

Edmonton, 23-24 Sept. 1988.

- 1987 Fort Chipewyan and community development. For *Nurturing Community*, a conference on community development organized by the Edmonton Social Planning Council, 27-29 April 1987.
- 1986 Rooted in the past: the modern community of Fort Chipewyan. For the Boreal Institute for Northern Studies 25th anniversary conference, *Knowing the North*.
- 1982 Fur trade society to class society: the development of ethnic stratification at Fort Chipewyan, Alberta. For the Canadian Ethnology Society meetings, Vancouver, B.C.
- Skookum Jim (Keish); an historical brief. For the Yukon Educational Television Society, Whitehorse.
- 1981 Leroy Napoleon "Jack" McQuesten; an historical brief. For the Yukon Educational Television Society, Whitehorse.
- William Ogilvie; an historical brief. For the Yukon Educational Television Society, Whitehorse.
- 1979 The Cree Band land entitlement in Wood Buffalo National Park: history and issues. For the Edmonton Chapter of the National and Provincial Parks Association of Canada.

Conference/Session Development

- 2014 Organizing a session, "Enhancing Indigenous Values and Knowledge in Cultural Impact Assessment," for the 2014 International Association for Impact Assessment conference, in Viña del Mar, Chile. 8-11 April 2014.
- 2011 With Jennifer S. H. Brown, organized "Aboriginal People as Part of Plural Societies: Searching for Multi-vocality," for the American Society for Ethnohistory annual conference, Pasadena, California, 19-22 Oct. 2011.
- 2006-8 Organizing committee, Centre for Rupert's Land Studies 2008 Colloquium, Rocky Mountain House.
- 2007 With Sarah Carter, organized "Negotiating Identities: Aboriginal Women's Stories of Northwestern America," a session for the American Society for Ethnohistory annual conference, Tulsa, Oklahoma, 7-10 Nov. 2007.
- 2006 Organized "Imagining the Unknown: Visual and Textual Images of Early History Makers," a session for the American Society for Ethnohistory annual conference,

- Williamsburg, Virginia, 1-5 Nov. 2006.
- 2005-6 Member of the Scientific Committee for the 12th Qualitative Health Research Conference, 2-5 April 2006.
- 2001-2 Organized "A promise by any other name...': Treaty No. 8 and Taxation," a session for the 10th Rupert's Land Colloquium, 9-12 April 2002, Mansfield College, University of Oxford.
- 2001 Organized "Dene Kinship and Ethnohistory," a session for the 100th Annual Meeting of the American Anthropology Association, 28 Nov. - 2 Dec. 2001, Washington, D.C.
- 2000 With Michael Payne, organized "Representing Aboriginal Histories and Cultures at Historic Sites and Museums," a panel for the Canadian Indigenous/Native Studies Association Annual Meeting and Conference, 28-31 May 2000, Edmonton.
- 1997-9 Member of the organizing committee for the 1899 Centennial Conference, A Conference in Commemoration of the Initial Signing of Treaty #8 & the Distribution of Scrip in 1899; serving also on the program and publicity subcommittees.
- 1997-99 Member of the organizing committee for *Traditions for Today: Building on Cultural Traditions*, an International Indigenous Research Institute organized by the School of Native Studies, University of Alberta, and held at the University May 26-28, 1998. Proposed the Institute's theme and planned the session, "How can we talk about indigenous Christianity."
- 1995-99 Member of the organizing committee for an international conference, Securing Northern Futures: Developing Research Partnerships, sponsored by the Canadian Circumpolar Institute, held in Edmonton 1-4 May 1997. Special responsibility for organizing the sessions on "Reconfiguring the North," with Michael Payne. Co-edited proceedings with Michael Payne.
- 1995 On behalf of Native Studies, chaired a campus working group that assisted in planning a Parks Canada workshop on cooperative management of protected areas. Developed the final program jointly with a Parks Canada staff member, attended the workshop on March 4-5, chaired one day's proceedings, and acted as a rapporteur the second day. Co-edited proceedings with Richard Stuart (proceedings never published).
- With Anne M. Lambert, organized *Managing Change: Drawing on the Dynamics of Cultural Traditions*, a session of the Canadian Home Economics Conference, *Beyond Tradition*, Edmonton, 9-11 July 1995.
- 1992-94 Co-organized the Sixth Biennial Rupert's Land Research Centre Colloquium, held in

Edmonton, May 25-27, 1994.

- 1993 With Joseph Tiffany, organized a session on museums and Plains archaeology for the 1993 Plains Anthropology annual meetings, Saskatoon, Saskatchewan.
- 1992 Organized "Contemporary Collecting: The Production of New Collections for the Future," a session for the 91st Annual Meeting of the American Anthropological Association, San Francisco, Dec. 2-6, 1992. Session was invited by the Council for Museum Anthropology.
- 1991-92 With Robert Coutts (Parks Canada, Winnipeg), organized "Inventing Fur Trade Traditions," a session for the 1992 Rupert's Land Colloquium, Winnipeg.
- 1985-88 With R. G. Ironside, organized a major conference to commemorate the 200th anniversary of Fort Chipewyan and Fort Vermilion, in northern Alberta. Served as liaison with Fort Chipewyan residents and conference participants.

University and Museum Employment & Research

University of Alberta

- 2012-2015 Professor emerita; part-time appointment at the Faculty of Native Studies, University of Alberta
- 2011-2012 Professor, Faculty of Native Studies, University of Alberta, awarded 17 Feb. 2011 (retired 30 June 2012)
- 1998-2011 Associate Professor; tenure and promotion to Associate Professor awarded December 1997
- 1994-98 Assistant Professor, School of Native Studies, University of Alberta

Position involves research into Aboriginal cultures, histories, and identities and dissemination of scholarship through publications of various kinds (especially peer-reviewed); development of courses with an emphasis on Aboriginal perspectives and instruction to Aboriginal and non-Aboriginal students; professional contributions; university and community service.

Current research: A primary focus is a broad research program designed to study the transformation of the cultures, identities, social structures, lifeways, and material cultures of the Aboriginal peoples of northwestern Canada, with particular reference to Chipewyans, Crees, Scots-Métis, and French-Métis. Major projects underway include: "Fort Chipewyan and the Shaping of Canadian History," with one book in press and a second in revision; a book about Thanadelthur and the early fur trade on the west coast of Hudson Bay; Chipewyan and Cree occupations of the western Lake Athabasca region, and a transatlantic study of Orcadian/Lewis connections to Canadian Native peoples and

cultures.

A secondary focus is research into traditional Blackfoot culture and history (northwestern Plains) and contemporary cultural revitalization/redefinition, its material aspects and representation in museum collections and interpretation, and the meanings of repatriation. The "Blackfoot Traditions Research Program" includes two major components: the history of Blackfoot ranching and the revitalization of Blackfoot religious traditions. The continued importance of horses is a thread that connects both projects and also relates to my personal life.

Artifact collection: I have developed and continue to build a personal collection of artifacts with two dimensions: stereotypes about Aboriginal people and contemporary Aboriginal iconography.

Provincial Museum of Alberta

1984-94 Curator of Ethnology at the Provincial Museum of Alberta (now the Royal Alberta Museum)

Administered the Ethnology Program, a sub-unit of the museum, which involved program and policy development, budget planning and management, and personnel recruitment and management. Program activities focused on the curation of a large collection of material culture of the Aboriginal peoples of Alberta and other regions (First Nations, Métis, Inuit), documentation of Aboriginal cultures and lifeways through field and archival investigations and collection of additional artifacts, interpretation through publications, exhibits, and public programs, and cooperation with a wide range of client groups. Program responsibility was for the entire province and related regions (primarily the western Subarctic, northern Plains, and Canadian Arctic). Collecting activities emphasized contemporary materials with good documentation, although older artifacts were also acquired.

Research: Conducted research at Fort Chipewyan, Janvier, Sucker Creek, Saddle Lake, Kehewin, Blood Reserve, Peigan Reserve, Poorman Reserve, and in Scotland, especially the Orkney Islands and the Outer Hebrides. Museum and archival collections were studied in the United States, Canada, and Britain.

Major project: Initiated, coordinated, and conducted research for a special project to commemorate the Fort Chipewyan Bicentennial with a major in-house exhibit, travelling exhibit, exhibit catalogue, conference, and public programming. Served on two committees, one to plan the conference and publish proceedings and a book of referred papers, and the second to administer a special research fund for scholarly research in the Fort Chipewyan and Fort Vermilion regions. Participated in extensive fund-raising and coordinated activities with Fort Chipewyan residents. Co-edited conference proceedings (1990) and a book of refereed papers (1993). In 1993 was awarded a lifetime membership

in the Fort Chipewyan Historical Society in recognition of work researching and promoting the heritage of the community.

Adjunct/Associated Positions

- 2010-2013 Adjunct Professor, Comparative Literature Program, Office of Interdisciplinary Studies, Faculty of Arts, University of Alberta. 1 Jan. 2010-31 Dec. 2014.
- 1996-present Curator, University of Alberta Art and Artifact (Ethnographic) Collection (six Ethnology Collections: Edwards/Scully, Smith, Lord, Mason, Molly Cork Congo Collection). Part of the Multi-MIMSY Users' Group (computer-based collections database).
- 1995-present Research Associate, Royal Alberta Museum (formerly, Provincial Museum of Alberta)
- 1990-present Adjunct Associate Professor, Canadian Circumpolar Institute, University of Alberta
- Adjunct Professor, Department of Human Ecology, Faculty of Agricultural, Life, and Environmental Sciences, University of Alberta
- 1992-98 Adjunct Professor, Dept. of Anthropology
- 1991-95 Associate Curator of Ethnology, Glenbow Museum
- 1988-90 Adjunct Researcher, Boreal Institute for Northern Studies, University of Alberta

Other Employment and Activities

- 1984 For the Friends of Jezebel, a society organized to promote tolerance and understanding of prostitutes in Edmonton: developed a research proposal on the "sex industry" in Edmonton
- 1975-76 For the Department of Anthropology, University of Alberta: General Editor of *The Western Canadian Journal of Anthropology*, a quarterly professional journal. Solicited manuscripts, edited and published several special issues as well as general issues
- 1971 For Keith Crowe, DIAND: research to support a history of northern Native Canadians. Included library research and fieldwork in communities in the Great Slave Lake and upper MacKenzie regions.
- 1978 Archival investigations in Edmonton (Provincial Archives), Ottawa (Public Archives of Canada), and Fort Smith (Archives of the Oblates of Mary Immaculate; Archives of the

Bishop)

1977-78 Community research in Fort Chipewyan, Alberta

1975-76 Fieldwork on Native uses of fire as an habitat management tool in the Lake Athabasca region (Fort Chipewyan and Black Lake).

1970 Research in the Hudson's Bay Company archival collection in the Public Archives of Canada, Ottawa

1968 Alberta Service Corps, Fort Chipewyan, Alberta: conducted community service projects.

1967 Ward Aide, Charles Camsell Hospital, Edmonton, Alberta.

1966 Nurse Aide, Delaware General Hospital, Wilmington, Delaware.

Teaching Positions

University of Alberta

2012-2015 Professor emerita, part-time appointment, Faculty of Native Studies, University of Alberta

2011-2012 Professor, Faculty of Native Studies, University of Alberta

1998-2011 Associate Professor, Faculty of Native Studies, University of Alberta

1994-1997 Assistant Professor, School of Native Studies, University of Alberta

1972-76, 1978, 1984-89, 1993, 1994 Sessional Lecturer/Instructor (Anthropology, Canadian Studies, Geography)

Sessional Lecturer/Instructor: other institutions

1993 University of Idaho

1984 Grant MacEwan Community College at Alexis Reserve

1979-83 Yukon Campus, Whitehorse, for the University of British Columbia (from 1979-81, Yukon Teacher Education Program)

1979, 1983 Athabasca University at Blue Quills Native Education Centre, St. Paul, Alberta

Graduate Teaching Assistantships

1970-71, 1973-75 Department of Anthropology, University of Alberta

For Parks Canada

1995 Developed and delivered a curriculum package on "Partnerships and the Parks Canada Cultural Resource Management Policy" for a Cultural Resource Management Orientation Course, held in Haines Junction, Yukon, 19-21 Oct. 1995.

For the Alberta Government

- 1993 Insights toward Understanding Contemporary Aboriginal Cultures. Developed with Art Sciorra for instruction to forestry service staff from Alberta, B.C., and the N.W.T., at the Forest Technology School, Hinton, Alberta, 25 October 1993.

Understanding Contemporary Aboriginal Issues and Working with Aboriginal Cultures and Communities. Developed with Art Sciorra for instruction to senior managers, Department of Environmental Protection, Lands and Wildlife Division, 13-14 May 1993.

Courses Offered

An asterisk [*] denotes the development of a new course.

University of Alberta

Faculty of Native Studies

- 100 Introduction to Native Studies
- 110 Historical Perspectives in Native Studies
- 210 Native Issues and Insights I (Issues in Native History)
- 300* Traditional Cultural Foundations I
- 330* Native Economic Development
- 335* Native People and the Fur Trade
- 355* Oral Traditions and Indigenous Knowledge
- 361* Challenging Racism and Stereotypes
- 376* Native Demography and Disease
- 380* Selected Topics in Native Studies
 - Oral Traditions and Indigenous Knowledge (became NS355)
 - Traditional Cultural Foundations (became NS300 and paved the way for NS361)
 - Native Material Culture
 - Challenging Racism and Stereotypes (became NS361)
- 390 Community Research Methods
- 390* Research Methods in Native Studies (new course in 2008)
- 400* Traditional Cultural Foundations II
- 403* Selected Topics in Native Studies
 - Aboriginal Origins; Traditional Cultural Foundations II (became NS400)
 - Native Demography and Disease (became NS376)
 - Alternative Voices: Reading Narratives of Contact (also offered as NS503)
- 480* Métis/Indian/Inuit Issues Seminar: Treaty No. 8 and Métis Scrip (1999)
- 490* Community-Based Research
- 499* Research Project
- 503 Directed Readings in Native Studies
- 520* Honors Seminar
- 590* Community-Based Research

Anthropology

- 202 Man and Culture
- 210* Sex, Society, and the Individual
- 282* Canadian Issues in Ethnographic Perspective
- 306 Introduction to Prehistory
- 346 Circumpolar Peoples
- 350 North American Indians
- 355 Contemporary Canadian Indians
- 410* Sex and Status in Comparative Perspective

Canadian Studies

- 402* Canada's North: The Human Dimension
- 302* Canada's North: The Human Dimension

Geography

- 446 Northern Human Geography

Human Ecology

- 238 Material Culture

University of Idaho

History 404-504 Anthropologist on teaching team for a course about Chief Joseph and the Nez Perce War

University of British Columbia (in Whitehorse, at Yukon College)

- Anthro/Soc 100* Elementary Problems in Anthropological and Sociological Analysis
- 200* Introduction to Social Organization
- 201* Ethnic Relations
- 329* Indians and Eskimos of Canada

Athabasca University

- Anthro 207 Introductory Anthropology
- 326* Contemporary Native Issues

Grants

Research Grants

- 1998 University of Alberta: EEF Support for the Advancement of Scholarship Operating Grant (Small Faculties Research Grants Program), for "The Making of Modern Fort Chipewyan, a Contemporary Native Community," \$4,998.00. 13 May 1998.

Alberta Historical Resources Foundation, for "The Making of Modern Fort Chipewyan, a

- Contemporary Native Community," \$8,000.00. 18 December 1998.
- 1996 University of Alberta: Central Research Fund Operating Grant for "Blackfoot Traditions Project," \$4,755.00.
- 1989 Wenner-Gren Grant-in-Aid for "The Orcadian/Scottish Roots of Canadian Native Cultures: An Ethnohistorical Study," \$8,000.00 US.
- 1987 Canadian Museums Association Short-Term Study Grant for "Fort Chipewyan Bicentennial Project: Research in British Collections," \$1,000.00.
- 1985 Boreal Institute Research Grant for "The Fort Chipewyan Fur Trade - Fort Chipewyan, Alberta," \$4,552.50
- 1975 Boreal Institute Research Grant for "Native Uses of Fire in the Lake Athabasca Region"
- 1970, 1974-1977 University of Alberta Summer Bursaries

Travel Grants

- 2006 EFF Support for the Advancement of Scholarship, Travel Grant, to present a paper at the 9th North American Fur Trade Conference and 12th Rupert's Land Colloquium, St. Louis, Mo., 24-28, 2006. Grant #A026663 for \$2,000.00 awarded 9 May 2006.
- 2004 EFF Support for the Advancement of Scholarship (Small Faculties), Travel Grant, to present a paper at the 11th Rupert's Land Colloquium 2004, 24-31 May 2004, Kenora, Ontario. Grant #A017639 for \$1,404.00 awarded 27 April 2004.
- 2003 HFASSR Humanities, Fine Arts and Social Sciences Research Travel Grant, to present a paper at the American Society for Ethnohistory Annual Meeting, 5-9 Nov. 2003, Riverside, California. Grant #A014704 for \$800.00 awarded 22 Sept. 2003.
- 2002 UFASSR Humanities, Fine Arts and Social Sciences Research Travel Grant to present a paper at the Rupert's Land Research Centre Colloquium, 9-12 April 2002, Oxford, England. Grant #G124120491 for \$1,200.00 awarded 10 January 2002.
- 2001 EFF Support for the Advancement of Scholarship (Small Faculties) grant to present a paper at the 100th Annual Meeting of the American Anthropological Session, 28 Nov. - 2 Dec. 2001, Washington, D.C. Grant #G018000417 for \$1,737.889 awarded 10 May 2001.
- 2000 SSR Conference Travel Fund grant to present a paper at "Nation Building," British Association for Canadian Studies 25th Annual Conference, 11-14 April 2000, University of Edinburgh, Scotland. Grant #G124120312 for \$1,200.00 awarded 12 April 2000.

- 1997 Central Research Fund grant to present a paper at *The Fur Trade Era: The Influence of the Rocky Mountain Fur Trade on the Development of the American West*, Museum of the Mountain Man, 11-13 Sept. 1997, Pinedale, Wyoming.
- 1996 CRF grant to present a paper at the *Sacred Lands* conference, 24-26 Oct. 1996, Winnipeg, Manitoba.
- 1995 CRF travel grant to present a paper at the Rupert's Land Research Centre Colloquium, 1-4 June 1996, Whitehorse, Yukon.
- 1994 CRF travel grant to present a paper at the Western History Association 34th Annual Conference, 19-24 Oct. 1994, Albuquerque, New Mexico.

University Administration and Service

University Committees

- 2013 Member of the University of Alberta Research Ethics Board (Board 1).
- 2012-13 Member of the University Writing Committee
- 2011-13 Member of the Panel of Chairs of the University Appeal Board (1 July 2011-30 June 2013)
- 2009-12 General Faculties Council representative for the Faculty of Native Studies (24 Nov. 2009-30 June 2012)
- 2009 Association for Academic Staff, University of Alberta representative for faculty members at the Faculty of Native Studies
- 2005-11 Faculty member on GFC Academic Appeals Committee
- 2001-09 University Committee on Human Research Ethics (UCHRE)
- 2003-present Council for the Interdisciplinary Program in Religious Studies (formerly, Religious Studies Advisory Council), University of Alberta
- 1997-present Multi MIMSY Users' Group (University curators)
- 2003-04 General Faculties Council representative for the School of Native Studies
- 2003-04 Henry Marshall Tory Selection Committee

- 2002-03, 1997 Selection Committees, Director of the School of Native Studies
- 2003-06, 1997-2000 Association for Academic Staff, University of Alberta, for faculty members at the School of Native Studies
- 1995-98 General Faculties Council Special Sessions Committee, Univ. of Alberta, 1 July 1995 - 30 June 1998

Faculty of Native Studies

- 2011-12 Member, Faculty Evaluation Committee
- 2009-12 AASUA representative
- 2009-12 Member, Academic Affairs Committee
- 2010 Member, Budget Benchmarks Working Group
- 2006-09 Chair, Faculty Evaluation Committee
- 2007-09 Ad hoc Curriculum Review Committee
- 2007-08 Ad hoc committee to coordinate NS210 and NS211
- 2006-present Research Methods and Theory Undergraduate Curriculum Working Group
- 2003-2007 Acting Dean in the Dean's absence, upon request (originally appointed 3 Dec. 2003), until Associate Deans appointed
- 1996-97, 1998-99, 2003-04 Selection Committees for faculty positions
- 1994-present Faculty of Native Studies Council
- 1999-2006, 2007-09 Chair, Research Ethics Board
- 2007 Member, Research Ethics Board
- 1996-2000 School of Native Studies Executive Committee
- 1997-99 Committee on Retention and Support

Other University Involvement

- 1990 Department of Textiles and Clothing, University of Alberta: participated in developing new departmental material cultural focus

Graduate and Honours Supervision

Graduate Supervision

University of Alberta:

- The Faculty of Native Studies M.A. program began fall 2012. Supervised two students. I am also serving on the supervisory committees of two M.A. students in the Faculty of Engineering.
- Previously, I have worked with 18 graduate students at the University of Alberta, 8 at the Ph.D. level and 10 at the Master's level, serving on their supervisory committees and additionally as an external examiner for candidacy exams and dissertation defenses in the following faculties (departments in parentheses): Agriculture, Forestry, and Home Economics (Human Ecology), Arts (Anthropology, Comparative Literature, English, History, Human Geography, Political Science), Education (Educational Policy Studies), Physical Education and Recreation (Recreation, Sport, and Tourism), Science (Biology), and Business.

External committee member for: M.A. in Design at the University of Calgary

External examiner for:

- M.A. defense in Anthropology at the University of Lethbridge
- Ph.D. defense in History at Carleton University
- Ph.D. defense in History at the University of Manitoba

Honours Supervision

1998-99 The School of Native Studies initiated an Honours Program and accepted its first honors students - a class of four - in September 1998. I supervised the first year of this program and developed a draft Honours Program guide.

1998-2010 NS Honours student supervision (11 in total)

2002-03 Supervised one honours student for the Department of Anthropology

Professional Activities

Referee

Grant applications Canadian Circumpolar Institute, the Boreal Institute for Northern Studies, Social Sciences and Humanities Research Council (SSHRC), and other institutions as requested.

Publications

Book manuscripts: University of Oklahoma Press, University of Nebraska Press, University of Washington Press, UBC Press, McGill-Queen's University Press, Harcourt Brace, NeWest Press, Canadian Circumpolar Institute, Crabtree Publishing Company, Canadian Plains Research Centre.

Journal manuscripts: *Ethnohistory*, *Canadian Ethnic Studies*, *American Indian Culture and Research Journal*, *Society and Natural Resources*.

External faculty referee

Promotion from Assistant to Associate Professor, University of Winnipeg, 2004

Professional Development Courses

2007 2007 PRE-conference and National Conference, "Empowering Research Participants, 16-18 Feb. 2007, Ottawa.

2005 2005 National Conference, National Council on Ethics in Human Research, 5-6 March 2005, Ottawa, and the associated Pre-Conference, 4 March 2005.

2004 Training in Research Ethics, Social and Behavioral Sciences and Humanities, 22 Feb. 2004. National Council on Ethics in Human Research.

2003 Innovative Instructors Institute, University of Alberta. Stream One: Effective Electronic Presentations (PowerPoint). 28 April-2 May.

At the Provincial Museum of Alberta, completed two management/supervision courses: "Supervision" and "Managing the Difficult Employee."

Committees and Advisory Boards

2013-present Member of University of Alberta Research Ethics Board (Board 1)

2011-2012 Treasurer and Director, Alberta Equestrian Federation. Chair of the Finance Committee and responsible for a budget of approximately \$175,000.

2009-2011 Director, Alberta Equestrian Federation. Member of the Finance Committee.

2007-10 Advisory Council, The Centre for Rupert's Land Studies at the University of Winnipeg

2003-present Advisory Board of Material History Review

2003-06 Member of the Aid to Scholarly Publications (ASP) Committee, on behalf of the Canadian Federation for the Humanities and Social Sciences.

1997-99	Treaty 8/Scrip Conference Steering Committee, Program Committee, Publicity Committee
1992-93	Steering Committee and Research Sub-committee, Frog Lake Historic Site Project
1991	Erminie Wheeler-Voegelin Prize Committee for the American Society for Ethnohistory
1985-91	Fort Chipewyan-Fort Vermilion Bicentennial Conference Committee and Research Grant Committee
1987-98	Prairie Forum Editorial Board
1988-89	Alberta Museums Association Standards Committee
1985-89	Canadian Studies Committee

Societies

1986-90	President, Boreal Circle Society
1983	Board member, MacBride Museum Society
1980-82	President, Yukon Historical and Museums Association <ul style="list-style-type: none"> • Ex-officio board member 1982-84, Vice-president 1979-80 • Honorary Life Membership awarded 1983

Miscellaneous

On-going:

- Guest lectures, colloquia, and workshops for University of Alberta staff and students.
- Responses to numerous requests for information and assistance from University staff and students, lawyers, and the general public.

Academic consultant:

- Radio, television, and films: *Death of a Delta* (Tom Radford, Filmwest 1972), *Coppermine* (NFB 1992), *Indian America* series (1992), and *Honour of the Crown* (Tom Radford, NFB 2001).
- Popular books: *The Buffalo Hunters* (Time-Life, 1993) and *Native North American Foods and Recipes* (Crabtree Publishing Company, 2006).

For ACFN Business Group: developed culturally-related display materials for its new building in Fort McMurray, AB, 2012-2013.

For Treaty Eight First Nations of Alberta, Education Commission Project: served as resource person for curriculum development project, 2005, 2008.

For Wood Buffalo National Park: participated in Cultural Resource Management Workshops (18-20 July 1999, Fort Smith; 18-19 Oct. 2002, Fort Chipewyan), an Ecological Integrity Workshop (11-14 March 1999, Fort Smith), and research at the House Lake site, August 2011. Cooperative work with park staff is on-going.

For Teacher and Teacher Aid Conventions (Edmonton and Bonneville): presentations about stereotypes of “Indian-ness” and Canadian history.

For Daniel Wolf, author of *The Rebels: An Outlaw Motorcycle Club* (University of Toronto Press, 1991): extensive editorial assistance.

Professional Memberships

American Anthropological Association
 American Ethnology Society
 American Society for Ethnohistory
 Canadian Historical Association
 International Association for Impact Assessment
 Rupert's Land Research Centre
 Yukon Historical and Museums Association

Interests

Equestrian sports
 Snowshoeing and dog walking
 Herb gardening and pickling

Review of the *Cultural Assessment* prepared by Golder Associates (July 2012)

By: Dr. Patricia A. McCormack

Introduction

This is a review of the report prepared by Golder Associates, entitled *Cultural Assessment*, filed by Shell Canada Energy (the “**Golder Report**”)¹ in response to the Joint Review Panel’s Supplemental Information Request #30 (“**SIR #30**”).

The purpose of this review is to assess the sufficiency of the Golder Report as a response to SIR #30 and to identify gaps in the information provided. I have focussed my comments below on those gaps and issues that are, in my opinion, most important in terms of providing a sufficient response to SIR #30. The following comments are not exhaustive.

There are a number of issues that call the credibility of the cultural assessment into question, as well as a number of highly inaccurate core assumptions that underlie the assessment itself. As a result, the report does not provide a proper assessment of effects on hunting, fishing, trapping, cultural and other traditional uses of the land, or of related effects on lifestyle, culture, health and quality of life of Aboriginal persons. Furthermore, the report does not include an assessment of such effects specific to each First Nation. This review report first summarizes the key issues with credibility and core assumptions, followed by a summary of some of the gaps in the information provided.

Qualifications

I am a Professor Emerita in the Faculty of Native Studies, University of Alberta. I am a socio-cultural anthropologist and an ethnohistorian. My primary focus is a broad research program designed to study the transformation of the cultures, identities, social structures, lifeways, and material cultures of the Aboriginal peoples of northwestern Canada, with particular reference to Chipewyans, Crees, Scots-Métis, and French-Métis. Major projects underway include “Fort Chipewyan and the Shaping of Canadian History,” with one major book recently published (*Fort Chipewyan and the Shaping of Canadian History, 1788-1920s*, UBC Press, 2010) and a second in revision.

I have researched and written extensively on the history of northeastern Alberta, including Fort Chipewyan, with particular attention to the history and cultures of the Aboriginal peoples of this region and their experience of cultural change and transformation from contact to the present day.

I have attached my *curriculum vitae* to this report.

¹ CEAA Registry Doc. #238, Appendix 5.

Panel SIR #30

For ease of reference, the Panel's SIR #30 reads as follows:

Aboriginal Rights and Interests

30) Shell states, in its January 18 response under Aboriginal Rights and Interests, page 36 that "In consideration of the TEK and TLU information available, Shell is undertaking to assess cultural effects."

The Panel's Terms of Reference indicate that the Joint Review Panel shall consider 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 plants, use of sacred sites), as well as related effects on lifestyle, culture, health and quality of life of Aboriginal persons. The Panel requests that Shell:

- a) ensure that the above requirements are included in its assessment of the cultural effects and provide a date of when this assessment will be made available to the Panel.
- b) ensure Shell's assessment includes the potential effects specific to each First Nation or Aboriginal group.

Findings

1. Failure to Identify Author(s) or Qualifications

The author(s) of the Golder Report is(are) not named, nor his/her/their qualifications. This information should be provided. Given the difficulties demonstrated by the Golder Report in addressing basic anthropological concepts (see next remark), Golder is either sorely lacking in people with this capacity or has not considered these concepts to be important in doing analytical work related to the assessment of cultural effects or impacts.

2. Outdated and Poor Use of Critical Anthropological Concepts

Critical anthropological concepts of "culture", "culture change", and "cultural ecology", all contained in section 2, are badly presented and rely on long-outdated theorists (A. R. Radcliffe-Brown and Julian Steward are the only anthropologists mentioned). The author(s) of the Golder Report does(do) not know how to talk about "culture," "culture change," and "cultural ecology," all key anthropological concepts that are important for an assessment of the impacts of mine expansion on the cultures of the Aboriginal people concerned. In fact, the apparent lack of capacity in this area is shocking. Furthermore, the

point of Golder's discussion of these matters is unclear in the Golder Report, nor is this material directly related to other parts of the report.

Golder's definition of culture as a "system of relationships between social institutions" is limited. Golder's definition of cultural ecology, "how ecosystems and physical environments could influence culture," is actually a statement of environmental determinism, not cultural ecology as understood today by anthropologists. The Golder Report refers to A. R. Radcliffe-Brown and Julian Steward, who were two honoured, early anthropologists whose concepts of culture and cultural ecology are no longer considered to be current or representative of mainstream anthropological approaches. No specific works by Radcliffe-Brown or Steward are cited in the Golder Report, and in fact I believe their positions are both misrepresented in the Report.

The use of current mainstream anthropological concepts of culture and cultural ecology would have expanded the information that could or would have been considered and come to light in the assessment.

It is unclear why the Golder authors did not turn for their anthropological concepts to some of the cultural anthropologists who have worked in the north with concepts of culture and the details of northern cultures. These anthropologists have included Irving Hollowell, Robin Ridington, Jean-Guy Goulet, and Michael Asch, among many others. Some of their publications are listed below. Their scholarship is in line with that of modern anthropologists working outside the north. Many of the anthropologists who have worked in the north as well as others are represented in my own work about Fort Chipewyan, which is easily available. Hollowell, Ridington, and Goulet, among others, have explained the behavioral environment of northern Aboriginal people and how they experience the world as individual persons – a first-person point of view - and how their lived experiences are represented through narratives that use complex symbolic systems. Modern anthropologists understand that what outsiders believe to be some kind of "objective" reality cannot be substituted for what local people actually experience. This approach strives to understand how northern Aboriginal people understand their worlds and use these understandings as they interact with one another and with non-Aboriginal people. Asch has approached culture from a somewhat different approach, one which has focused on material production. In his work, he has separated the process of production (the interaction of resources, technology, and labor) from the social relations that provide for the distribution and appropriation of the products of production and shown how both are supported by a superstructure of political and juridical relations and ideology that leads members of that cultural formation to accept and support the system rather than to challenge it. These approaches are broadly complementary, in that they both consider how northern Aboriginal people understand and experience the worlds in which they live and condition the behavioral choices they make, which in turn may lead to changes in the commonalities of behaviors, social relationships, and systems of symbols that are often called their "cultures." Both require the kind of careful fieldwork that requires actual lived

experience and on-going relationships with First Nations communities, which are the hallmark of cultural anthropology as a discipline.

The Golder Report implies that there *is* an objective reality for Aboriginal people of northern Alberta that not only can be easily known, but that they know it and can therefore speak easily about the nature of impacts on Aboriginal people of the economic development of additional oil sands development. However, the details they present as aspects of the cultures of Aboriginal peoples of the oil sands region are incorrect, despite the existence of easily-obtainable information about these peoples. Given the fundamentally flawed elements they present, it seems that they have no reliable understanding of the cultures of these Aboriginal groups even on a surface level, let alone on the deeper experiential level of Aboriginal understandings. In short, the approach and conclusions of the Golder Report do not seem to be based on any real understanding of Aboriginal cultural traditions of the region. Without such an understanding, it is not possible to provide accurate information on the effects to culture, traditional land use, lifestyle, health and quality of life. In short, the absence of a real understanding of Aboriginal cultural traditions of the region is a significant gap in Golder's response to SIR #30.

The Golder Report talks about whether Aboriginal people will be able to pass on traditional knowledge, but there is no broader discussion of the reproduction of culture and identity, which is where the concepts of culture and culture change become important. An understanding of how these Aboriginal cultures and identities are passed on (reproduced) over time is a key component to assessing cultural impacts, but it is lacking in the Golder Report – another significant gap.

The Report does not consider the impacts of multiple mines (cumulative effects) and the fact that there will be a significantly larger regional population in the oil sands region in the future. The question of cultural loss is not addressed, nor is the issue about forcible transformation of way of life to wage labor as a result of this project (in the context of multiple projects in the same region and the Alberta Government's land use planning strategy). These are deeply serious and troubling questions for all the First Nations of the region, yet they seem to be of no consequence to the author(s) of the Golder Report. Forcible transformation is a complex subject involving multiple consequences such as anomie, loss of identity, social dysfunction, and new disease patterns. There is a substantial body of literature regarding forcible transformations of Aboriginal people and their societies in North America. In my opinion, information and analysis on this subject is required to answer SIR #30, and the subject should have been explicitly addressed by Golder. As it stands, the Golder Report appears to rest on the underlying and racist premise that "modernization" is inherently preferable to traditional cultures and livelihoods.

It seems to me that these are the very questions about which the Panel was seeking additional information from Shell. The First Nations have already experienced a century of attempts to limit their access to their traditional lands and resource base, and their ability to survive with

their cultures relatively intact (though not unchanged) has been remarkable and demonstrates great resilience. However, they fear that the expansion of the industrial footprint in northeastern Alberta may prove to be an insurmountable challenge to their struggle to maintain some degree of cultural integrity rather than to become simply one of many hyphenated Canadians. These are serious questions that deserve serious discussion, but the Golder Report does not provide it.

The Golder Report claims that it presents “... a discussion of the effects associated with the Project on Aboriginal cultural elements that are important to Aboriginal communities near the Project, and is structured to provide a definition of culture, components of culture, environmental effects on culture and discussions of cumulative effects,” but the Golder Report:

- does not identify those cultural elements;
- does not explain how it will use a definition of culture, components of culture change, and environmental effects on culture to inform the discussion (and it does not become clearer in Sec. 2); and
- does not discuss the impacts of cumulative effects (discussed below).

These failures have led to substantial information gaps, with the result that the Golder Report fails to address the Panel’s questions in SIR 30.

The Report states that “cultural and social elements important to Aboriginal groups in the region emerge from common themes identified in the literature review.” However, the Report does not provide any discussion of these elements or even a table that summarizes them, based on the literature review. Such an analysis could have been taken back to Aboriginal groups for verification of the significance of those elements.

The Report basically concludes that the mine will have little or no impact on the ability of people to transmit their knowledge, and it implies that losses will be compensated for by new opportunities in labor and contracting. But, the Report does not address a fuller consideration of cultural impacts, which can only be considered within the far-reaching context of expanding industries in the traditional lands of the First Nations, not simply this single mine. Such impacts can be expected to affect the fundamental social fabric of the First Nations, whose members have lived in egalitarian societies for thousands of years. They will likely include the following: social fragmentation; social dysfunction of various kinds; economic disparities; increasing language loss, and new patterns of disease, among others. Enforced transformation to wage labor can be considered a form of involuntary assimilation. As with earlier processes of involuntary assimilation, Aboriginal people are expected to be assimilated into the lower ranks of the class society, not as equals economically, politically, or socially. There is nothing in the Golder Report about these broader problems or that addresses these issues in any meaningful way.

Given my experience and expertise in this area, my opinion is that the Panel requires a more thoughtful and expansive consideration of this subject, including the issues just mentioned, than is provided in the Golder Report.

3. Poor Scholarship

The Report is characterized overall by shoddy scholarship and sloppy work, both in research and writing.

- No pages are provided for citations, which often come from lengthy documents, making it difficult to check the information.
- Many references are missing.
- There are many glib generalizations and terms used without definitions. Or, the definitions are poor or just plain wrong. Some examples of what I call glib generalizations are the following:
 - The statement in the Report that prior to the arrival of Europeans, “Aboriginal peoples maintained a relatively stable way of life” (p. 10). No evidence is presented to support this statement or to define what would constitute “stability.” In fact, archaeologists have no idea how “stable” their way of life was. There were significant changes in the environment, technologies, and even the groups of people who occupied what is now northeastern Alberta. There is no reason to assume that it was stable at all, in any sense of the term.
 - The discussion of “Drivers to Change Contributing to Present Day Conditions for Aboriginal Groups in the Wood Buffalo Region,” which purports to present the reasons for changes over the past 50 years. No discussion of these factors is provided, nor are there any citations to either the scholarly literature or other literature (e.g., reports, submissions of various kinds). Indeed, the basis for this particular list of factors is unclear, especially when it is clear that the list is truncated. For example, it does not specify the on-going and continued loss of control over the land, resources, and communities; the continued undermining of Aboriginal political structures; and the ignoring of many terms of Treaty No. 8.

This section seems to be included to support later discussion in this section, which contends that “there is no clearly defined way to assign those changes to specific Oil Sands projects, Oil Sands development in general, or other external factors such as government policy, education and technology” (p. 18). This conclusion is simply wrong, as a careful reading of the historical literature shows.

- The statement in section 4.7 “Socio-economic Impact Assessment,” that claims that “Wage economy income may contribute to negative behaviours, including increased alcohol, drug abuse, and gambling, especially among those lacking financial experience” (p. 33). This important value statement is not supported by any sociological theory, nor is the issue clear, especially in light of the fact that lack of wage income and poverty are also known to contribute to “negative behaviours.”
- No glossary is provided for acronyms. [
- There is no serious literature review (see next point).

The magnitude of these issues is such that it goes beyond poor scholarship, in my opinion, to seriously undermine the value of the Golder Report. In my opinion, pages of sweeping generalizations and assertions of fact or theory, for the most part unsupported by references, undermine the credibility of the Golder Report as an informed response to the Panel’s SIR #30.

4. No Literature Review

It is remarkable that a report that purports to assess cultural change for the Crees and Chipewyans of northeastern Alberta does not even try to review or consider the available literature on the topic.

A vast literature exists about Crees, Chipewyans, and Métis and about proto-contact and post-contact historic eras. There is extensive literature about either northeastern Alberta itself, especially Fort Chipewyan – especially but not limited to my own publications in this field – as well as adjacent regions. Some sources related to cultural aspects include the following:

Michael I. Asch and Shirleen Smith, “Some Facts and Myths about the Future of the Hunting and Trapping Economy in Alberta’s North,” in *The Uncovered North: Roots of Northern Alberta Societies*, ed. By P. A. McCormack and R. G. Ironside, pp. 149-156 (Edmonton: Canadian Circumpolar Institute, University of Alberta, 1993).

Jean-Guy Goulet, *Ways of Knowing: Experience, Knowledge, and Power among the Dene Tha* (Vancouver: UBC Press, 1998).

Robert Jarvenpa, “Silot’ine: An Insurance Perspective on Northern Dene Kinship Networks in Recent History,” *Journal of Anthropological Research*, 60(2):153-178 (2004).

June Helm MacNeish, “Leadership among the Northeastern Athabascans,” *Anthropologica*, 2:131-163 (1956).

J. M. Penard, “Land Ownership and Chieftaincy among the Chippewayan and Caribou-Eaters,” *Primitive Man*, 2(1-2):20-24 (1929).

Richard J. Preston, *Cree Narrative: Expressing the Personal Meaning of Events*, 2nd ed. (Montreal/Kingston: McGill-Queen's University Press, 2002 [origin. 1975]).

Robin Ridington, "Technology, World View, and Adaptive Strategy in a Northern Hunting Society," *Canadian Review of Sociology and Anthropology*, 19(4):469-481 (1982).

Robin Ridington, *Little Bit Know Something* (Iowa City: University of Iowa Press, 1990).

Dale R. Russell, *Eighteenth-Century Western Cree and their Neighbours*, Archaeological Survey of Canada, Mercury Series Paper 143 (Ottawa: Canadian Museum of Civilization, 1991).

Henry S. Sharp, *Loon, Memory, Meaning, and Reality in a Northern Dene Community* (Lincoln: University of Nebraska Press, 2001).

David M. Smith, *Moose-Deer Island House People: A History of the Native People of Fort Resolution*, Canadian Ethnology Service Paper No. 81, National Museum of Man Mercury Series (Ottawa: National Museums of Canada).

None of these works was referenced in the Golder Report. The single study of mine that is referenced in the Golder Report (*Fort Chipewyan and the Shaping of Canadian History, 1788-1920s*, UBC Press, 2010) – notably, the *only* ethno-historical work cited – was not included in the Golder Report's list of references and seems to be used only once. Incidentally, this study contains an extensive list of references that could have been consulted but were not.

Golder lists a number of "sources" in Table 1 (*Traditional Knowledge and Traditional Land Use Information Sources*) but many are not included as references (as listed in Section 7). It is impossible to know whether or how such "sources" were considered.

A proper study of cultural effects of industrial projects for Cree and Chipewyan peoples requires, at a minimum, a review of the available literature, including the works listed above and more, especially other works by Robert Jarvenpa, Henry S. Sharp, David M. Smith, and James G. E. Smith, all scholars of Chipewyan cultures. Various chapters in the *Subarctic Handbook of North American Indians*, edited by June Helm (Washington DC: Smithsonian Institution Press, 1981), provide a baseline of scholarship as of 1981 and an extensive bibliography. Other useful sources that should be consulted are sources about culture change for Aboriginal people in northern Canada after World War II and for Aboriginal people in North America more broadly, for the lessons that have been learned about the cultural consequences for Aboriginal peoples of having been incorporated into encompassing industrial frameworks.

5. Culture and Cultural Change – Errors and Inaccuracies in Golder Report

When I reviewed an earlier draft of the Golder Report (April 2012), the section on Cultural Change (Section 2.3) was replete with errors and misrepresentations. For example, the Report described “clans” and “lineages” as primary domestic units, when neither accurately describes the traditional cultures of Crees, Chipewyans, or Métis. It suggested that an “autocratic patriarchal family structure” was the norm in the past – also not the case. The draft Report also implied that Aboriginal peoples are possessed of an “unjustified nostalgia for a golden age.”

The final Golder Report omits the above statements, perhaps in response to the reaction of MCFN and ACFN; presumably, this is an acknowledgment that the draft Report was inaccurate and misleading on these basic features of Cree and Chipewyan culture and history.

Nonetheless, serious errors and inaccuracies remain. For example, the Golder Report discusses “traditionally centralized societies” (p. 6), though the report does not provide a definition of this term. In fact, the Aboriginal societies of northeastern Alberta were not “centralized” but highly de-centralized. They were egalitarian societies in which chiefs and elders had authority, but no real power in the sense of coercive power. There was a strong Aboriginal emphasis on personal autonomy and independence of decision-making that has persisted to today. Many authors have commented on this aspect of Chipewyan and Cree life, and I address it explicitly in my 2010 book (for example, see p. 28 and footnote 5, pp. 277-8).

Golder claims that the introduction of a cash economy altered relationships and values in the community, leading to resentment of young people with large salaries, who asserted a status to which they were not entitled (p. 6 and elsewhere). No evidence is presented to support this claim.

To the surprise of many people, wage labor - although not with cash - has been part of the Aboriginal economy since the arrival of the fur trade many centuries ago. Cash has been part of the economy since Treaty No. 8 in 1899. If there is a study (not anecdotal comments) that shows how the Aboriginal economy has been restructured because of the modern cash society, then the Golder Report should provide that reference. In my own experience, many contemporary wage earners use their income to help their extended families and are highly respected for using their earnings in such traditional ways, and that was certainly the pattern in the past. This area is one that would benefit from direct study.

Golder cautions that “social and cultural change is not necessarily from better to worse” (p. 6) but throughout the report does not provide any indication of how it is assessing change as positive or negative. The assessment of whether change is positive (better) or negative (worse) is a value judgment that often reflects the position of the assessor. The Golder Report uses specific, Eurocentric cultural-laden values and presents the results as if they were value free. Further, the Golder Report does not consider the values of the affected Aboriginal people. An assessment of change cannot be considered credible or accurate without consideration of the

Aboriginal perspective. A fair report with a good cultural underpinning would acknowledge and make transparent the ethnocentric values the Golder Report has applied to this assessment and would also present an assessment scenario based on Aboriginal values.

At the same time, there are many well-documented histories of Aboriginal people in North America, including Canada, and in Alberta in particular that indicate that most changes since the advent of extensive European contact and especially incorporation into North American state societies (the U.S.A., Canada) have had mainly deleterious consequences for Aboriginal people, in that they created impoverishment and social dysfunction that was not balanced by benefits (for one directly-related example, see my Ph.D. thesis, “How the North (West) Was Won: Development and Underdevelopment in the Fort Chipewyan Region,” University of Alberta, 1984). In my experience, Aboriginal people who used to live the traditional bush life in northeastern Alberta, or who know a lot about that life, did and do not have an “unjustified nostalgia for a golden age” (as Golder previously implied). The elders typically talked about how the bush life was hard, but that did not stop them from considering it to be a good life, one that they did not want to abandon.

Golder later states that “[n]o amount of statistics will help us to understand a people’s concept of spirit, for example, or their notion of substance, or their different categories of kinship. A good working knowledge of a group’s social and cultural institutions is important” (p. 6). The Golder Report does not live up to this statement; it does not demonstrate any real attempt to acquire “a good working knowledge” of the culture, history or institutions of the Aboriginal groups affected by the Project.

6. Competition for Resources

The Golder Report does not seriously consider hunting, fishing, and other land-uses by non-Aboriginal people, even though the Panel and the Golder Report both identify “competition for resources” as an issue affecting traditional uses and the availability of game. This is a major gap in Golder’s response to SIR #30.

Such competition is not identified in the Golder Report as one reason that Aboriginal people may avoid certain areas, although it is. Also, the Lower Athabasca Regional Plan (LARP) envisions open access to traditional First Nations lands by everyone, not just Aboriginal people. That will include the substantially increasing numbers of people who, according to the Golder Report, will be “accommodated” in Fort McMurray. The Golder Report focuses on how the work camps will be structured, but this is far too limited an assessment of competition for resources to address this topic in a satisfactory way.

7. Assessment of Benefits and “Challenges” of Oil Sands Development for First Nations

The Golder Report makes the following important statement: “While Oil Sands development has contributed to ongoing social and cultural change [to] Aboriginal peoples in the region, it has also offered resources and tools for managing the challenges brought about not only by Oil

Sands development but [also by] other external factors” (p. 18). In short, the Golder Report concludes that the benefits of oil sands expansion will outweigh the “challenges” or problems associated with oil sands expansion. The problem is that there is nothing in the Report to indicate whether or not this statement is true or even realistic. Without a more sophisticated discussion of the problems currently faced by First Nations and how participating in industry will provide them with “tools,” this important statement is just one more glib generalization.

The Golder Report frequently lauds the economic benefits to First Nations of oil sands employment without providing a solid analysis of such participation. Serious information gaps have resulted from the Report’s failure to attempt to answer important questions such as:

- How much temporary and permanent employment is likely to go to First Nations as opposed to outsiders?
- What will the level be of each form of employment in the company hierarchy of salary, skills, and influence?
- How will increased First Nations incomes from wage labor relate to the cost of living?
- What changes in First Nations spending patterns can be expected?
- What is the expected impact on income disparity in the region between First Nations and non-First Nations families, or will the influx of new outside workers contribute to greater income disparity?
- What percentage of contract work and what kinds of contract work will be done by First Nations versus other Aboriginal and non-First Nations contractors?
- What barriers will First Nations face in obtaining employment and exactly what will be done to reduce those barriers?
- What barriers will First Nations face as they try to remain in the work force (e.g., racism directed at First Nations people by other workers)?
- Are there any specific Aboriginal cultural values at stake in the workplace, and if so, how can they be mediated?
- How is such employment viewed by the First Nations people themselves?

The Report does not discuss these questions by using information learned from other oil sands sites. The problems raised in the Report are not new ones; there are decades of First Nation and other Aboriginal involvement in earlier oil sands projects that should have been able to

help answer the questions or at least allow Golder to make empirically-based predictions. If such information does not exist, then it raises questions about the monitoring associated with other oil sands operations. Nor does the Golder Report present comparative information from industrial sites elsewhere in Canada or the USA with an Aboriginal labor force to help address these questions.

The Golder Report has claimed, incorrectly, that it is not possible to sort out the sources of change in what it calls the “pre-development” days. If Golder believed that it was unable to talk about such change in the past, it is unclear how it can do so with respect to the cultural changes that might be associated with current industrial expansion, yet that is what Golder was asked to do and purports to do. The Golder Report never considers this fundamental methodological problem.

Instead, it seems that the Golder Report wants the Panel to take the benefits of further oil sands industrial development on faith, which is a distinctly Euro-Canadian approach to resource extraction industrial expansion. To the extent to which the Golder Report makes sweeping and value-laden statements without any empirical analysis, solid research background, or community validation, it does not provide the Panel with the information that it requires to understand the likely cultural and social impacts for First Nations, as the Panel has requested and requires.

Sufficiency Review of Shell Canada's Responses to the Joint Review Panel's Supplemental Information Requests for the Pierre River Mine Project

Prepared for

Athabasca Chipewyan First Nation Industry Relations Corporation

January 2014

Prepared by

<personal information removed>



List of Contributors

Project Management	Dr. Sheri Gutsell Ms. Shannon Gavin, M.Sc., P. Biol.
Surface Water Quality	Dr. Megan Thompson
Fish & Fish Habitat	Mr. Dak de Kerckhove, M.Sc.
Air Quality	Dr. Brian Zelt
Human & Wildlife Health	Mr. Chris Waldron
Vegetation & Reclamation	Dr. Sheri Gutsell
Wildlife & Biodiversity	Dr. Petr Komers Mr. Adam Ford, M.Sc. Ms. Abbie Stewart, M.Sc., P. Biol. Ms. Sarah Hechtenthal, M.Sc., P. Biol. Mr. Brian Kopach, M.Sc.
Soils & Terrain	Dr. Masil Kahn, AIT
Report Writing & Integration	Dr. Sheri Gutsell Ms. Shannon Gavin, M.Sc., P. Biol. & Ms. Nina Modeland, B.Sc., B.A.
Senior Review	Dr. Petr Komers

Executive Summary

The Athabasca Chipewyan First Nation Industry Relations Corporation (hereafter ACFN or the First Nation) have requested that Management and Solutions in Environmental Science (MSES) review Shell Canada Ltd.'s (Shell) responses to the Joint Review Panel's (JRP) October 2012 Supplemental Information Requests (SIRs) for the Pierre River Mine Project (PRM). In this technical review, MSES evaluated whether Shell's responses provided sufficient information to address the information requests and we highlight any outstanding gaps in the information to the JRP. The review focused on the following disciplines: surface water quality, fisheries, wildlife and habitat, vegetation and wetlands, air quality, human, wildlife, and aquatic health, and soils and terrain. Overarching points that have been identified as being key information gaps and concerns throughout the documents are listed here and are discussed in further detail in the body of the report.

Shell has provided extensive responses and additional information in response to the JRP's SIRs. In MSES' review of Shell's responses, discipline experts examined whether the information provided was sufficient to answer the SIRs, identifying any information gaps or shortcomings that may deem the responses inadequate. Several information gaps and shortcomings were found. There were three overarching issues found across disciplines within Shell's responses to the JRP SIRs:

- 1) Lack of sufficient data to support predictions and assessment conclusions
- 2) Disproportionally large RSA, which causes a significant dilution effect for the PRM
- 3) Lack of peer-reviewed literature and over-reliance on professional judgement

These overarching issues are summarized below.

Lack of Sufficient Data to Support Predictions and Assessment Conclusions

Shell was asked to assess the effects and determine the environmental consequences of the PRM project on Key Indicator Resources (KIRs) separately from the Jackpine Mine Expansion (JME). For most disciplines Shell lacked sufficient baseline data to accurately assess project effects and determine environmental consequences. This is despite the emphasis that the JRP Report for the JME (2013) placed on collecting additional and sufficient baseline data for improved model validation and more accurate impact predictions. Examples of these deficiencies are listed below:

Wildlife - The wildlife review concluded that Shell lacked sufficient data on the abundance and distribution of wildlife in the Local Study Area (LSA) and Regional Study Area (RSA) to validate its predictions on the abundance, abundance-habitat relationship, and distribution of wildlife KIRs in the LSA and RSA. This lack of data was highlighted in the JRP Report for JME (2012), which stated that Shell should collect additional baseline data on the distribution and abundance of wildlife species to better validate its predictions. Consequently, the wildlife review concluded that the predicted impacts of the PRM on the abundance of wildlife KIRs cannot be determined from information provided by Shell.

Water Quality - The water quality review found that the data tables presented by Shell show that they lack sufficient observed data for these parameters, which is required to properly calibrate and validate the water quality model used to assess the effects of the PRM on water quality and determine

environmental consequences. This goes against the emphasis that the JMR-JRP Report (2013) placed on properly validated water quality models. The lack of data for the PRM LSA and Athabasca River water quality models significantly diminishes confidence in Shell's predictions about Project impacts on surface water quality.

Aquatic Health - The aquatic health review found that the use of so few data points to model stream sediment quality for 50+ years is a significant source of error in aquatic health impact predictions. The aerial deposition assessment was fundamentally lacking the data that were required to properly configure and calibrate the model used to predict sediment concentrations of polycyclic aromatic hydrocarbon (PAHs) in LSA watercourses. Consequently, the aquatic health reviewer concluded that this aerial deposition modeling exercise was highly preliminary and the results are unusable as part of a decision-making process.

Soils and Terrain - The soils and terrain review found that details were lacking on the number and locations of soil samples collected from the PRM LSA and RSA for obtaining representative analytical data from major soil series. Shell did not indicate whether they followed Cumulative Environmental Management Association (CEMA 2006) guidelines for soil sampling intensity. Owing to the lack of information, it is not clear whether Shell's data is adequate to make meaningful predictions of project impacts to soils and determine the environmental consequences on soils within the PRM.

Air Quality - A similar conclusion was reached in the re-assessment of air quality effects in the PRM. The air quality reviewer found that the air quality re-assessment for PRM provides only a review of the findings and not the input data, modelling methods, and sample calculations.

Disproportionally Large RSA Causes a Significant Dilution Effect for the PRM

One of the concerns noted in the JME Panel Report (2013) was that the large size of the RSA adopted by Shell causes a "dilution effect" when assessing the potential impacts of the project on KIRs. This problem was carried over and exacerbated in Shell's assessment of project impacts within the PRM because in assessing PRM impacts on KIRs independent of the JME, the RSA size remained the same for a number of the KIRs, including soils and terrain, vegetation and wetlands, human and wildlife health, and wildlife and habitat. This is despite the fact that the area within the PRM LSA is less than half that of the PRM and JME LSAs combined. As the ratio of RSA size to LSA size increases, the predicted impacts of the project at the RSA scale will decrease, irrespective of the severity of impacts at the LSA scale. In the context of assessing potential effects of the PRM on the RSA, this causes a significant dilution effect. In order to assess effects of the PRM on the RSA, the RSA size should have been reduced proportionately. Only then could more meaningful assessments have been made regarding potential effects of the PRM on some KIRs in the RSA.

Lack of Peer-Reviewed Literature and Over-Reliance on Professional Judgement

In many of the discipline reviews, a common shortcoming noted was the lack of scientific support, particularly peer-reviewed literature or empirical evidence, and an over-reliance on professional judgements. The JRP specifically requested that Shell provide peer-reviewed literature or other scientific basis to support the methods chosen for determining the significance of effects within the PRM (JRP SIR

#6, page 3-21). However, for its environmental consequence rating scheme, Shell did not provide any peer-reviewed research to show that the rating scheme has been proven effective elsewhere in developing informed decisions. In its wildlife habitat assessment, Shell concludes that there will be a reduction in environmental consequence as wildlife habitat redevelops and wildlife populations return into the reclaimed landscape from neighbouring source populations. However, no peer-reviewed literature has been provided to validate the assumption that suitable wildlife habitat, i.e., vegetation/wetland species and communities, will actually become re-established within reclamation sites and that wildlife populations will subsequently return to these sites. Shell was asked to quantify the effects of the Project and other cumulative effects on wood bison within their current core range as identified through Traditional Ecological Knowledge. Shell still maintains that bison are primarily limited by disease; yet they have not provided any recent peer-reviewed literature to support these beliefs. Shell does not believe that ecological thresholds for bison are surpassed, but Shell merely provides a verbal argument with no empirical evidence or peer-reviewed literature to support their beliefs. The JRP requested that Shell provide an evaluation of Project and cumulative effects for COSEWIC-listed species, with specific reference to little brown myotis and northern myotis. In its assessment, Shell states that no hibernacula have been identified in the Oil Sands Region and that none are likely to occur in the RSA. However, they did not provide any additional information in support of this assumption that no hibernacula are likely to occur in the RSA. Additional support such as peer-reviewed literature or survey information from the RSA is needed to support impact predictions for Project and cumulative effects.

TABLE OF CONTENTS

PAGE

1.0	INTRODUCTION	10
1.1	Project Background.....	10
2.0	OUTSTANDING GAPS IN SHELL RESPONSES	12
2.1	General Comments.....	12
2.2	Specific Comments.....	14
2.2.1	SIR # 5.....	14
2.2.2	SIR # 6.....	37
2.2.3	SIR #7	38
2.2.4	SIR #8	41
2.2.5	SIR #9	50
2.2.6	SIR #19.....	53
2.2.7	SIR # 27.....	53
2.2.8	SIR # 32.....	54
2.2.9	SIR #34.....	56
2.2.10	SIR #35.....	58
2.2.11	SIR #39.....	60
2.2.12	SIR #40.....	61
2.2.13	SIR #41	62
2.2.14	SIR #42.....	64
2.2.15	SIR #43.....	65
2.2.16	SIR #45.....	67
2.2.17	SIR #48.....	68
2.2.18	SIR #50.....	68
2.2.19	SIR #60.....	70
2.2.20	SIR #67.....	72
2.2.21	SIR #73.....	72
2.2.22	SIR #74.....	76
2.2.23	SIR #75.....	76
3.0	LITERATURE CITED	80

LIST OF FIGURES

Figure 2.2.5-1: Shell's Planned Development Case North part of RSA shown including the approved Teck 2013/14 winter drilling exploration program.	52
--------------------------------------------------------------------------------------------------------------------------------------------------------	----

LIST OF TABLES

Table 2.2.13-1: Comparing Shell's beliefs about bison with the weight of existing evidence.....	61
-------------------------------------------------------------------------------------------------	----

Acronyms/Abbreviations

%	percent
<	less-than
>	more-than
AAAQO	Alberta's Ambient Air Quality Objective
ACFN	Athabasca Chipewyan First Nation Industry Relations Corporation
AER	Alberta Energy Regulator
Al	aluminum
bbl/cd	barrels per calendar day
BCr	Big Creek
CAC	Criteria Air Contaminant
CASRN	Chemical Abstracts Service Registry Number
CEA	Cumulative Effects Assessment
CEA Act	Cumulative Effects Assessment Act
CEAA	Canadian Environmental Assessment Agency
CEAR	Canadian Environmental Assessment Registry
CEB	chronic effects benchmarks
CEMA	Cumulative Environmental Management Association
CO	Carbon monoxide
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
DFO	Fisheries and Oceans Canada
DOC	Dissolved Organic Carbon
EDTA	external tailings disposal area
EIA	Environmental Impact Assessment
EC	Environment Canada
EPEA	Environmental Protection And Enhancement Act
EPL	End Pit Lake
ESRD	Environment and Sustainable Resource Development (now, Alberta Environment and Sustainable Resource Development)
ET	Ecological Threshold
ETDA	External Tailings Disposal Area
ECr	Eymundson Creek
Fe	iron
First Nation	Athabasca Chipewyan First Nation Industry Relations Corporation
GoA	Government of Alberta
GoC	Government of Canada
GPS	Global Positioning System
ha	Hectares

HC	Health Canada
HHRA	Human Health Risk Assessment
HPV	High Production Volume
HS	Habitat Suitability
HIS	Habitat Suitability Index
JME	Jackpine Mine Expansion Project
JRP	Joint Review Panel
keq H ⁺ /ha/yr	kiloequivalent of hydrogen ions per hectare per year
KHLP	Keeyask Hydropower Limited Partnership
KIR	Key Indicator Resource
km	kilometer
LARP	Lower Athabasca Regional Plan
LNA	labile naphthenic acid
LSA	Local Study Area
m	meter
MFE	Ministry for the Environment
MSES	Management And Solutions In Environmental Science
NA	Naphthenic acid
ng/g	nanogram per gram
NO _x	Mono-Nitrogen Oxides
NO ₂	Nitrogen dioxide
OSEC	Oil Sands Environmental Coalition
OSPW	Oil Sands Process-Affected Water
OSVRC	Oil Sands Vegetation Reclamation Committee
P	phosphorus
PAC	Polycyclic Aromatic Compound
PAD	Peace-Athabasca Delta
PAH	Polycyclic Aromatic Hydrocarbon
PDC	Planned Developments Case
PIC	Pre-Industrial Case
pg/g	picogram per gram
PM	Particulate Matter
PM _{2.5}	Particulate Matter Less than 2.5 Micrometers in Diameter
PR	Pierre River
PRM	Pierre River Mine Project
PTE	Potentially Toxic Element
PVA	population viability analysis
RAPP	Research on Avian Protection Project

RCLa	South Redclay Lake
RLBH	Ronald Lake Bison Herd
RMC	resource management criteria
RoW	Right-Of-Way
RNA	refractory naphthenic acids
RSA	Regional Study Area
RSF	resource selection function
SAGD	Steam Assisted Gravity Drainage
SAR	Species at Risk
SARA	Species at Risk Act
SCE	Sister Chromatid Exchanges
SIR	Supplemental Information Request
Shell	Shell Canada Ltd.'s
SO ₂	Sulfur dioxide
SOPC	Substances of Potential Concern
TASA	Terrestrial Resources Air Emissions Effects Study Area
Teck	Teck Resources Limited
TEK	Traditional Ecological Knowledge
TOR	Terms of Reference
TLU	Traditional Land Use
ug/m ³	micrograms per cubic meter
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
VOC	volatile organic compounds
WBNP	Wood Buffalo National Park
WET	whole effluent toxicity
WHRA	Wildlife Health Risk Assessment
WSAR	West Side Athabasca River
yr	year
ZOI	zone of influence

1.0 Introduction

The Athabasca Chipewyan First Nation Industry Relations Corporation (hereafter ACFN or the First Nation) have requested that Management and Solutions in Environmental Science (MSES) review Shell Canada Ltd.'s (Shell) response (dated October 31, 2013, Canadian Environmental Assessment Registry (CEAR) #191) to the Supplemental Information Request (SIR) issued by the Joint Review Panel (JRP) established for the Pierre River Mine Project (dated October 25, 2012, CEAR #170) (PRM). Shell's response consists of a number of documents and appendices, which we collectively refer to as Shell's 2013 Response. Although the 2013 Response documents includes appendices, Shell often refers the reader to the original 2007 Environmental Impact Assessment (EIA) for additional details on methods or analysis, therefore, to complete a comprehensive review of Shell's response to the JRP SIR, we reviewed this information when necessary. This technical review is a component of a broader submission by the ACFN pursuant to the November 7, 2013 JRP invitation for comments (CEAR #192).

In this technical review, MSES evaluated whether Shell's responses provide sufficient information to address JRP SIRs and we highlight any outstanding gaps in the information provided by Shell to the JRP. Comments follow the numbering system for SIRs used by Shell in their Response document. Several of the SIRs were reviewed by multiple discipline experts and are consolidated under the appropriate SIR number.

The following format was used:

Issue: Summarizes the main issue expressed in the comments.

SIR Reference: Refers the reader to the specific JRP SIR reference from the 2013 Shell Response document.

Document References: Refers the reader to specific documents from Shell's 2013 Response, as well as to the 2007 EIA.

JRP JME Panel Reference (if applicable): Refers to specific paragraphs of the Report of the Joint Review Panel for Shell Canada Energy Jackpine Mine Expansion Project (JRP JME 2013)

Gaps and/or Shortcomings in Shell's Response: Includes reviewer comments highlighting information gaps in Shell's response to the JRP's SIR. Direct quotes from Shell's 2013 Response are in *italics* while quotes from other sources (including the 2007 EIA) and literature are not italicized.

Request(s): Bolded comments represent requests or questions directed to Shell.

1.1 Project Background

Shell submitted the Applications and supporting Environmental Impact Assessment (EIA) for the Jackpine Mine Expansion Project (JME) and Pierre River Mine Project (PRM) in December 2007. In March 2011, a draft agreement to establish a Joint Review Panel (JRP) was released for the PRM. The PRM will be located on the west side of the Athabasca River approximately 100 kilometers (km) north of Fort McMurray and 500 km northeast of Edmonton. The proposed development includes an open-pit mine, ore handling facility, bitumen extraction facilities, tailings processing facilities, support infrastructure, water and tailings management plans and the construction of a bridge across the Athabasca River. The estimated production of oil from this project is 200,000 barrels per calendar day (bbl/cd). In June 2012, the JRP requested public comments on the sufficiency of the information available on the Canadian Environmental Assessment Agency (CEAA) registry to meet the JRP Terms of Reference (TOR). After

reviewing the Public comments that were filed, along with Shell's responses to those comments, the JRP issued 77 SIRs on October 25, 2012.

In June 2013, Shell informed the JRP that they had entered into an agreement with Teck Resources Limited (Teck) to exchange Shell leases 309, 310, 351, 475, 476, 607, 608, 609 and the northeastern portion of lease 352 for Teck's lease 14 which is located between Shell's lease 9 and 17 immediately adjacent to the PRM area. Although Teck now owns the mineral rights to leases that are proposed for PRM infrastructure, (e.g. external tailings facilities, fish compensation areas), Shell states that the construction, operation and abandonment of these facilities is assured under this Agreement and that they have no plans to modify the PRM Application.

2.0 Outstanding Gaps in Shell Responses

2.1 General Comments

Shell has provided extensive responses and additional information in response to the JRP's SIRs. In MSES' review of Shell's responses, discipline experts examined whether the information provided was sufficient to answer the SIRs, identifying any information gaps or shortcomings that may deem the responses inadequate. Several information gaps and shortcomings were found. There were three overarching issues found across disciplines within Shell's responses to the JRP SIRs:

- 1) Lack of sufficient data to support predictions and assessment conclusions
- 2) Disproportionally large RSA, which causes a significant dilution effect for the PRM
- 3) Lack of peer-reviewed literature and over-reliance on professional judgement

These overarching issues are summarized below.

Lack of Sufficient Data to Support Predictions and Assessment Conclusions

Shell was asked to assess the effects and determine the environmental consequences of the PRM project on Key Indicator Resources (KIRs) separately from the Jackpine Mine Expansion (JME). For most disciplines Shell lacked sufficient baseline data to accurately assess project effects and determine environmental consequences. This is despite the emphasis that the JRP Report for the JME (2013) placed on collecting additional and sufficient baseline data for improved model validation and more accurate impact predictions. Examples of these deficiencies are listed below:

Wildlife - The wildlife review concluded that Shell lacked sufficient data on the abundance and distribution of wildlife in the Local Study Area (LSA) and Regional Study Area (RSA) to validate its predictions on the abundance, abundance-habitat relationship, and distribution of wildlife KIRs in the LSA and RSA. This lack of data was highlighted in the JRP Report for JME (2012), which stated that Shell should collect additional baseline data on the distribution and abundance of wildlife species to better validate its predictions. Consequently, the wildlife review concluded that the predicted impacts of the PRM on the abundance of wildlife KIRs cannot be determined from information provided by Shell.

Water Quality - The water quality review found that the data tables presented by Shell show that they lack sufficient observed data for these parameters, which is required to properly calibrate and validate the water quality model used to assess the effects of the PRM on water quality and determine environmental consequences. This goes against the emphasis that the JMR-JRP Report (2013) placed on properly validated water quality models. The lack of data for the PRM LSA and Athabasca River water quality models significantly diminishes confidence in Shell's predictions about Project impacts on surface water quality.

Aquatic Health - The aquatic health review found that the use of so few data points to model stream sediment quality for 50+ years is a significant source of error in aquatic health impact predictions. The aerial deposition assessment was fundamentally lacking the data that were required to properly

configure and calibrate the model used to predict sediment concentrations of polycyclic aromatic hydrocarbon (PAHs) in LSA watercourses. Consequently, the aquatic health reviewer concluded that this aerial deposition modeling exercise was highly preliminary and the results are unusable as part of a decision-making process.

Soils and Terrain - The soils and terrain review found that details were lacking on the number and locations of soil samples collected from the PRM LSA and RSA for obtaining representative analytical data from major soil series. Shell did not indicate whether they followed Cumulative Environmental Management Association (CEMA 2006) guidelines for soil sampling intensity. Owing to the lack of information, it is not clear whether Shell's data is adequate to make meaningful predictions of project impacts to soils and determine the environmental consequences on soils within the PRM.

Air Quality - A similar conclusion was reached in the re-assessment of air quality effects in the PRM. The air quality reviewer found that the air quality re-assessment for PRM provides only a review of the findings and not the input data, modelling methods, and sample calculations.

Disproportionally Large RSA Causes a Significant Dilution Effect for the PRM

One of the concerns noted in the JME Panel Report (2013) was that the large size of the RSA adopted by Shell causes a "dilution effect" when assessing the potential impacts of the project on KIRs. This problem was carried over and exacerbated in Shell's assessment of project impacts within the PRM because in assessing PRM impacts on KIRs independent of the JME, the RSA size remained the same for a number of the KIRs, including soils and terrain, vegetation and wetlands, human and wildlife health, and wildlife and habitat. This is despite the fact that the area within the PRM LSA is less than half that of the PRM and JME LSAs combined. As the ratio of RSA size to LSA size increases, the predicted impacts of the project at the RSA scale will decrease, irrespective of the severity of impacts at the LSA scale. In the context of assessing potential effects of the PRM on the RSA, this causes a significant dilution effect. In order to assess effects of the PRM on the RSA, the RSA size should have been reduced proportionately. Only then could more meaningful assessments have been made regarding potential effects of the PRM on some KIRs in the RSA.

Lack of Peer-Reviewed Literature and Over-Reliance on Professional Judgement

In many of the discipline reviews, a common shortcoming noted was the lack of scientific support, particularly peer-reviewed literature or empirical evidence, and an over-reliance on professional judgements. The JRP specifically requested that Shell provide peer-reviewed literature or other scientific basis to support the methods chosen for determining the significance of effects within the PRM (JRP SIR #6, page 3-21). However, for its environmental consequence rating scheme, Shell did not provide any peer-reviewed research to show that the rating scheme has been proven effective elsewhere in developing informed decisions. In its wildlife habitat assessment, Shell concludes that there will be a reduction in environmental consequence as wildlife habitat redevelops and wildlife populations return into the reclaimed landscape from neighbouring source populations. However, no peer-reviewed literature has been provided to validate the assumption that suitable wildlife habitat, i.e., vegetation/wetland species and communities, will actually become re-established within reclamation sites and that wildlife populations will subsequently return to these sites. Shell was asked to quantify the

effects of the Project and other cumulative effects on wood bison within their current core range as identified through Traditional Ecological Knowledge. Shell still maintains that bison are primarily limited by disease; yet they have not provided any recent peer-reviewed literature to support these beliefs. Shell does not believe that ecological thresholds for bison are surpassed, but Shell merely provides a verbal argument with no empirical evidence or peer-reviewed literature to support their beliefs. The JRP requested that Shell provide an evaluation of Project and cumulative effects for COSEWIC-listed species, with specific reference to little brown myotis and northern myotis. In its assessment, Shell states that no hibernacula have been identified in the Oil Sands Region and that none are likely to occur in the RSA. However, they did not provide any additional information in support of this assumption that no hibernacula are likely to occur in the RSA. Additional support such as peer-reviewed literature or survey information from the RSA is needed to support impact predictions for Project and cumulative effects.

2.2 Specific Comments

2.2.1 SIR # 5

I) Issue: Assessment of PRM Effects Requires Clarification

SIR Reference: JRP SIR #5 (Wildlife)

Document Reference(s): Shell 2013 : SIR # 5, page 3-13, page 3-20; Appendix I, page 149, SIR #37 p. 3-139 to 3-140.

JRP JME Panel Reference (if applicable):

[614] Shell stated that it used professional judgment to determine significance of effects on terrestrial resources, including wildlife habitat. Shell said that it based its EIA methodology on the TOR for the Project, guidance from the Agency, methodologies recommended by the CEMA, and standard environmental assessment practices.

[615] OSEC and ACFN did not agree with Shell's means of assessing significance of effects on terrestrial resources, and in particular, argued that Shell relied too heavily on the professional judgment of Golder and did not use clear thresholds to make significance determinations about effects on terrestrial resources. OSEC argued that if the proponent's professional judgment was unsupported by evidence, it should be disregarded by the Panel. ACFN said that Shell did not clearly indicate what factors it considered in making the professional judgments that led to significance determination or how judgments may have been peer reviewed or verified by different parties or processes. ACFN further stated that clear thresholds should be used for determining significance in order to balance and improve significance evaluations.

[624] The Panel believes that Shell's rationale for deciding what constitutes a significant effect is unclear and largely based on professional judgment, not on existing thresholds from guidance documents and scientific literature....

[631]... The Panel further believes that Shell's determination of significance of effects on wildlife habitat is unclear due to the overuse of professional judgment, its failure to use existing thresholds, and the lack of ecological context....

Gaps and/or Shortcomings in Shell's Response:

The SIR requested that Shell re-assess impacts on all KIRs from the PRM alone (not the PRM and JME combined). Shell states that, for example,

“The removal of the effects of JME results in changes to the environmental consequences for the effects of the PRM on habitat at Closure for some KIRs. Specifically, the effects of the PRM at Closure were assessed as follows:

- *from a positive and high environmental consequence ... to a negative and high*
- *from a negative and low environmental consequence ... to negative and high*
- *from a positive and high environmental consequence ... to negative and low”* (Shell 2013, SIR #5, page 3-20)

It seems counterintuitive that the adverse consequence of effects would increase if you remove a source of effects. Therefore, the process by which Shell reached their conclusions regarding Project effect requires clarification. In their response, Shell explains that habitat suitability model predictions are “*based on a moment in time*” and do not reflect the “*natural disturbance and succession processes*” that are expected to occur on the landscape and produce young forest (Shell 2013, Appendix I, page 149). Shell expects these natural disturbances to result in positive changes for moose and fisher site capability. As such, Shell indicates they have reduced the environmental consequences for change to habitat after Closure to negative and low at the LSA scale (Shell 2013, Appendix I, page 149; SIR 37, p. 3-139 to 3-140).

Shell does not indicate what the environmental consequences were considered to be before the reduction based on some unspecified amount of natural disturbance. It seems that Shell has taken professional liberties to reduce the “*environmental consequence*” subjectively. Shell does not quantify how they expect natural processes to alter their model predictions for moose, fisher, and other species. The response by Shell does not provide enough information to understand how residual impact classification was determined for moose and fisher habitat.

Request(s):

- a) **Please provide the classification for environmental consequence for the LSA based on habitat suitability model and resource selection function (RSF) output prior to considering the influence of natural disturbances.**
 - b) **If impact classification is to be reduced due to natural disturbance processes, please quantify the change in model output expected due to this natural disturbance (for example, this could be included as a variable in the modelling procedure).**
 - c) **Update the impact classification for abundance, habitat, and movement to reflect natural disturbances in the LSA.**
 - d) **Please provide a clear rationale for the increase in environmental consequences when the effects from the PRM alone are considered, as compared to the original assessment which included the effects of both the PRM and the JME.**
- 2) **Issue:** Rationale for why risks remained the same or slightly increased when JME project removed from assessment not provided
- SIR Reference:** JRP SIR #5 (Human & Wildlife Health)

Document Reference(s): Shell 2013: SIR 5, page 3-13; SIR #71, page 3-259; Appendices I and 3.1 .

JRP JME Panel Reference (if applicable): n/a

Gaps and/or Shortcomings in Shell's Response:

The SIR requested that Shell assess the effects for all KIRs considering only the PRM and not combined with the JME. Although Shell provides this data, they do not sufficiently address the SIR because they do not provide any rationale as to why some human health parameters would remain the same or increase when the JME project was removed from the assessment. For example, see Table 2.2-7 (Shell 2013, Appendix I, page 10) which shows that the annual average nitrogen dioxide (NO₂) concentration for the Local Study Area (LSA) was 26.2 micrograms per cubic meter (ug/m³) in the original report and is 43.3 ug/m³ in the revised PRM-only assessment. In addition, the annual average NO₂ concentration for the Regional Study Area (RSA) was 51.6 ug/m³ in the original report and is 52.4 ug/m³ in the revised PRM-only assessment (Shell 2013, Appendix I, Table 2.2-7, page 10). Increases in emissions/ambient air concentrations were also predicted for other analytes in the PRM-only assessment (e.g., carbon monoxide, particulate matter less than 2.5 micrometers in diameter (PM_{2.5}), and sulphide).

Shell's fundamental conclusion of the Human Health Risk Assessment (HHRA) and Wildlife Health Risk Assessment (WHRA) remain unchanged, "...the PRM is not expected to contribute appreciably to the health risks in the region." (Shell 2013, SIR #71, page 3-259). However, this is based on the flawed comparison of the Base Case (which incorporates risks associated with industrial development in the Oil Sands Region) to the Application Case.

Requests:

Please provide a rationale for why some human health parameters would remain the same or increase when the JME project was removed from the assessment.

- 3) **Issue:** Failure to define how habitat suitability (HS) models estimate abundance therefore, no clear indication of what the specific HS classes represent.

SIR Reference: JRP SIR #5 (Wildlife)

Document Reference(s): Shell 2013: SIR#5, page 3.13, page 3-19; Appendix 3-7, Shell 2007: Appendix 5-4.

JRP JME Panel Reference (if applicable):

[597] – "In order to predict habitat availability in the RSA for wildlife under PIC, base case, application case, and PDC scenarios, Shell used habitat suitability index (HSI) models that relied on Landsat imagery for 11 key indicator resources (KIRs) and species at risk. Shell provided results from models that varied by species, depending on the amount of data available on species-specific habitat relationships. Shell explained that it developed the model for each species based on published data, expert knowledge, and professional judgment, all of which it used to interpret habitat relationships as index scores. Shell reported that there was a lack of field data for all 11 species, so it could not validate model predictions. Instead, Shell stated that it used professional judgment to check model output for conformation with the current state of knowledge about ecology and habitat preference for each species. EC stated that Shell should collect additional baseline data on the distribution and abundance of wildlife species to better validate its predictions." (JRP-JME 2013, page 99).

Gaps and/or Shortcomings in Shell's Response:

The SIR stated that Shell re-assess impacts on all KIRs from the PRM alone (not the PRM and JME combined). In their response, Shell concludes that *"After reclamation, the environmental consequences of the PRM on wildlife abundance will be negligible in magnitude and environmental consequence at the RSA and LSA scales for all affected species."* (Shell 2013, SIR #5 page 3-19).

This response suggests that Shell measured or estimated wildlife abundance in predicting the impacts of the PRM on the environment; however, no such data are presented for KIRs. Recognizing this data deficiency, Shell states *"Where abundance information is lacking for particular KIRs and habitat loss in the Oil Sands Region is potentially affecting abundance, to be precautionary the HS modelling results were used to estimate the effects of the PRM on abundance."* (Shell 2013, Appendix 3.7, page 1). Thus, HS models are being used by Shell to estimate the impacts of the PRM on wildlife abundance; of these 19 wildlife KIR HS models, five were developed from field studies and 14 were developed from expert opinion.

Neither the field data nor expert opinion-derived HS models quantify wildlife abundance. The current state of knowledge on wildlife abundance addresses the number of individuals present in a given area, often expressed as a count or density (individual per unit area). Because counting every individual in a wildlife population is unrealistic in most field studies, scientists use survey methods to estimate abundance and include levels of uncertainty in that estimate (Boitani and Fuller 2000). In assessing the impacts of the PRM, Shell does not count any individual organism from a KIR species, does not estimate the abundance of any KIR population, and does not explain the relationship between HS classes and abundance.

Field data: In their field studies, Shell collected the following data: track counts (lynx, moose, marten, and fisher), nest abundance (barred owl), and callback surveys (black-throated green warbler) at the LSA scale. Track count data were also collected at the RSA scale. Expert opinion was used to create the remaining 14 HS models at the LSA scale, of which the woodland caribou HS model was validated using movement data collected with VHF and Global Positioning System (GPS) telemetry. For the species in which field data were used to create HS models, Shell used RSFs to predict the relative probability that a habitat feature will be used by a species, given the availability of that feature. In so doing, Shell interprets 'use' to be equivalent to wildlife abundance. However, given the field data collected, the correct interpretation of 'use' under these RSFs is the relative probability of tracks, nests or call-backs occurring in a particular habitat; these probabilities are not the same as measurements of abundance. There is no reason to believe that HS indices measure wildlife abundance unless and until such indices are validated with data on wildlife abundance (Boitani and Fuller 2000).

Model validation: Shell validated the RSFs using k-fold cross-validation, a technique which measures the predictive ability of the RSF model by partitioning the original data. Notwithstanding the poor-predictive ability of many models (validation sets with a Spearman Rank Correlation <0.5 included 2 of 4 for moose, 1 of 3 for lynx, and 0 of 3 for marten/fisher at the LSA scale; and 3 of 4 for moose, 1 of 3 for lynx, and 2 of 3 for marten/fisher at the RSA scale (Shell 2007, Appendix 5-4, page 16, Tables 5 and 6)), cross-validation does not measure the ability of these models to predict abundance. Rather, the k-fold cross-validation measures

predictive ability of the original data, such as tracks. Though some may argue that these field data are indices of abundances (e.g., more tracks means greater abundance), such an assertion requires a measurement of the strength, shape, and uncertainty of the association between the index measure and actual abundance.

Habitat suitability classes: In Shell's failure to define how HS models estimate abundance, there is no clear indication of what the specific HS classes represent from a wildlife population perspective. For example, does a 10% change in High Suitability Class habitat correspond to a 10% or a 50% change in population size? Likewise, does a 10% change in High Suitability Class habitat have the same impact on abundance as a 10% change in Low Suitability Class habitat? Moreover, in the case of the 5 KIRs for which field data were used to create a HS model, HS classes are not defined by the RSF. Shell does not define how the HS classes change with the probability of tracks, nests, or call-backs occurring in a given area. For example, are High suitability habitats and Moderate- High suitability habitats both selected (i.e., RSF predicts use > availability) by moose, or is one or more of these classes avoided (i.e., RSF predicts use < availability)? The absence of a quantifiable, biological definition of HS classes does not support the conclusions reached by Shell regarding the impacts of the PRM on wildlife KIRs.

Request(s):

Please provide more details on the abundance, abundance-habitat relationship, and distribution of wildlife KIRs in the LSA and RSA.

- 4) **Issue:** Reliance on acute and chronic toxicity, labile naphthenic acid (LNA), and tainting potential results from water quality models in determining the aquatic impacts of the PRM, despite a significant lack of input/observed data for these parameters.

SIR Reference: JRP SIR #5 (Water quality)

Document Reference(s): Shell 2013: SIR 5, page 3-13; Appendix I. Shell 2007: Volume 4B-Appendix 4-2

JRP JME Panel Reference (if applicable):

[493, page 82] "The Panel recommends that ESRD include in any EPEA approval a requirement that Shell recalibrate surface water quality models every five years with best available information and re-run simulations to validate predicted effects on the environment and ensure compliance with regulatory water quality guidelines."

Gaps and/or Shortcomings in Shell's Response:

The response provided by Shell to SIR #5 (water quality) states that "*acute and chronic toxicity and tainting potential levels are predicted to be lower than guideline values, and labile naphthenic acids are predicted to be less than 1 mg/L under the 2013 PRM Application Case at all assessment nodes.*" In addition, Shell states that "*The conclusion of negligible changes to water quality concentrations in the Athabasca River in the 2013 PRM Application Case is consistent with the EIA conclusions.*" (Shell 2013, SIR#5, page 3-15).

The focus on predicted acute and chronic toxicity, labile naphthenic acids (LNA), and tainting potential in assessing PRM impacts is understandable, since these parameters are very relevant in determining the impacts to aquatic and human health that may derive from impacted freshwaters. However, the data tables presented by Shell in Appendix I show that Shell's assessment suffers from a significant lack of observed data for these parameters, which is required to properly calibrate and validate the water quality model used for the PRM LSA.

Much of the information regarding model calibration and validation was not in the Shell 2013 Appendix I, but rather Shell referred the reader to the 2007 EIA instead. Specifically:

- From Shell 2013 Appendix I
 - Shell has no observed data for acute or chronic toxicity for any of the modelled water quality nodes in the PRM area, including at:
 - Pierre River (PR),
 - Eymundson Creek (ECr),
 - Big Creek (BCr),
 - South Redclay Lake (RCLa),
 - Athabasca River at the mouth of Redclay Creek,
 - Athabasca River at Embarras
 - Shell has no observed tainting potential data for any of the modelled water quality nodes in the PRM area, including at:
 - PR,
 - ECr,
 - BCr,
 - RCLa,
 - Athabasca River at the mouth of Redclay Creek,
 - Athabasca River at Embarras
 - Shell has only total naphthenic acid (NA) (no labile or refractory NA) data for:
 - PR,
 - ECr,
 - BCr,
 - Shell has no NA data at all for:
 - RCLa,
 - Shell has no labile NA data for:
 - Athabasca River at the mouth of Redclay Creek,
 - Athabasca River at Embarras
- From Shell 2007 EIA Vol 4B - Appendix 4-2, page 108-122
 - Shell has no tainting potential data for any of the input flows used in the PRM water quality modelling, including:
 - muskeg and overburden water,
 - reclaimed overburden runoff (regional, Shell/Albian),
 - reclaimed overburden (Syncrude),
 - PRM area surficial or basal aquifer,
 - process-affected seepage (regional/Syncrude),
 - non-segregating tailings flux and process-affected water (regional/Syncrude),

- mature fine tailings flux water,
- mature fine tailings seepage,
- Ft. McMurray sewage effluent
- Shell has no observed acute or chronic toxicity data from:
 - reclaimed overburden runoff (regional, Shell/Albian),
 - PRM area surficial aquifer,
 - Ft. McMurray sewage effluent
- Shell has no chronic toxicity data from:
 - mature fine tailings flux water,
 - mature fine tailings seepage
- Shell has no LNA data for:
 - muskeg and overburden water,
 - reclaimed overburden runoff (regional, Shell/Albian),
 - reclaimed overburden (Syncrude),
 - PRM area surficial or basal aquifer,
 - Ft. McMurray sewage effluent.

In the explanation provided by Shell for the water quality model calibration routine used in the PRM LSA small streams, Shell states that *“The water quality calibration determined the substance concentration or loading rate from each natural land segment type to match characteristics of observed substance concentrations within the applicable watersheds. The main calibration parameters consisted of coefficients of seasonal probability distributions of substance concentrations from each type of natural land segment. The calibration parameters were adjusted until predicted seasonal probability distributions of substance concentrations in streams or lakes mimicked the distributions of the observed data.”* (Shell 2007, Vol 4B, App 4-2, page 59). Since the calibration is dependent on the use of observed data sets from the applicable watersheds, it can therefore be assumed that the water quality models used by Shell were not properly calibrated for parameters that lacked an observed data set. This includes, in the cases noted above, acute and chronic toxicity, LNA, and tainting potential, and therefore calls into question Shell’s reliance on these parameters to assess the PRM impacts on water quality in the LSA.

Shell goes on to state that *“There were insufficient data for validating the calibrated water quality component [of the small streams model]. However, validation is not critical for ensuring accurate representation of observed seasonal distributions of background water quality. Furthermore, prediction of Projects effects involved using conservative assumptions and super-imposing mine-related substance releases on background concentrations characterized during calibration. Therefore, the absence of validation of the water quality model did not affect confidence that predicted project effects would not be higher than those presented in the EIA.”* (Shell 2007, Vol 4B, App 4-2, page 59). Shell provides no reference to support its statement that validation of the water quality model is not critical for ensuring accurate representation of observed water quality by the model, a statement which appears erroneous and refutes the emphasis that the JRP-JME Panel placed on properly validated water quality models (JRP-JME 2013, paragraph [493], page 82). In addition, Shell states that

super-imposing mine-related substance releases compensates for the lack of validation, but as noted above, observed data for these inputs appears to be lacking as well.

Significantly, Shell describes the protocol it used in the EIA to deal with lack of observed water quality data as follows: *“For cases in which no observed data existed for a particular water quality constituent, professional judgement was used to derive distributions that provided conservative predictions.”* Therefore, it would appear that Shell has created data sets for water quality parameters for which there are no observed data points, including, presumably, the above-mentioned missing data sets for acute and chronic toxicity, tainting potential, and LNA. This reviewer has been unable to locate a listing of these “derived” data distributions from the available documentation.

This apparent lack of data for the PRM LSA and Athabasca River water quality models should have significantly decreased the confidence that Shell has in its predicted Project impacts on surface water quality.

Request(s):

- a) **Please compile a centralized and detailed table listing the water quality parameters with no or insufficient observed data sets required for modeling for every node included in the small streams water quality models, the pit lake models, and Athabasca River models.**
 - b) **Also, include a listing of datasets with no or insufficient data for mine-related substance releases and any other input source used in any of the water quality data. If no observed data is available, indicate where Shell has created a data distribution via professional judgement or using iterative resampling of an insufficient data set, and thoroughly describe these created data (including basic statistical properties, and intended time series and seasonality of data).**
 - c) **List every parameter in each water quality modeling exercise that was not calibrated and/or validated against an observed data set.**
 - d) **Due to the high degree of uncertainty in model outcomes that results from data deficiency, retain every parameter for which no or insufficient data exists on the list of Substances of Potential Concern (SOPC) for the aquatic impacts assessment until such time as the required data is obtained and a calibrated and validated water quality model can be run. This is particularly important for acute and chronic toxicity, LNA's, and tainting potential, on which Shell relies so heavily for its aquatic impacts assessment.**
- 5) **Issue:** Modeling acute and chronic toxicity as a substance concentration, resulting in predictions which fail to integrate synergistic and complex substance interactions as whole effluent toxicity (WET) tests are meant to. In addition, applying an aerobic decay rate to these acute and chronic toxicity levels within the water quality models, while providing no primary literature reference as justification for doing so.
- SIR Reference:** JRP SIR #5 (Water quality)
- Document Reference(s):** Shell 2013: SIR 5, page 3-13. Shell 2007: Volume 4B, Appendix 4-2.
- JRP JME Panel Reference (if applicable):** n/a

Gaps and/or Shortcomings in Shell's Response:

Shell holds that because whole effluent toxicity (WET) is a measure of toxicity in whole effluent, it incorporates all of the synergistic interactions between the effluent constituent substances. However, this is not the case in the PRM water quality modeling exercise. In order to numerically model toxicity, the observed acute and chronic toxicity data from water courses and water bodies, and in mine-related input flows were converted to a numeric toxicity unit and treated as a substance constituent in the model equations. In this case, there was no demonstrated understanding of the effects of constituent substances on predicted toxicity in the modeled water bodies. The integration of synergistic and complex effects of multiple substances in water, which is the great advantage of WET measurements, was lost as soon as the data were treated as a simple substance concentration.

In addition to the loss of WET information in water quality models, Shell's 2007 EIA modelled decay rates are presented for acute and chronic toxicity in lakes (2.4/yr), wetlands (0.0065/yr), and under anaerobic conditions (set equivalent to labile naphthenic acids) (Shell 2007, Vol 4B, App 4-2, Table 42). Acute and chronic toxicity are not substances which can decay, either aerobically or anaerobically. From Table 42 (Shell 2007, Vol 4B, App 4-2), the derivation of the lake decay rate appears to stem from MacKinnon (1997) which does not appear in the reference section and is also used to support anaerobic LNA decay rates. The wetland toxicity rates are derived from a previous EIA by Shell completed in 1997. It appears from these references that Shell is equating acute and chronic toxicity exclusively to LNA concentration in the corresponding water quality models. This reliance on a single water quality parameter to define the persistence of predicted toxicity negates any advantage in using acute and chronic toxicity as a meaningful measure of aquatic impacts because it incorporates none of the synergistic and complex toxicity effects that organisms are subjected to in whole effluent toxicity testing. Therefore, acute and chronic toxicity predictions from this modeling exercise are a simple reiteration of LNA results.

The assumption that LNA concentrations are the sole driver of toxicity in process-affected water is erroneous, as is the assumption that refractory naphthenic acids (RNA) are "non-toxic" (Shell 2007, page 6-441). This is an inaccurate assessment of RNA toxicity. For example, after exposure to Oil Sands Process-Affected Water (OSPW) in simulated wetland microcosms, there is a residual chronic toxological response in tested bacteria (EC20 Microtox toxicity was unchanged compared to initial conditions) (Toor et al. 2013a, 2013b). Shell has developed no chronic effects benchmarks (CEBs) for RNAs and does not consider modeled RNA concentrations in the impact assessment. This omission is therefore a source of error in the PRM assessment.

In light of the above comments concerning acute and whole toxicity, namely the lack of observed input data for the modelled water bodies, the lack of understanding of the synergistic and complex interactions responsible for observed WET levels and the use of an aerobic decay factor for acute and chronic toxicities, the uncertainty inherent in predicted water course and water body toxicities is considerable. Far from being a source of confidence in the assessment of project impacts on aquatic health, acute and chronic toxicity predictions appear to be a significant source of model error.

The confidence in specific toxicity assessments based on measured WET analyses does not transfer to predicted acute and chronic toxicity levels that were calculated and modelled as simple substance concentrations. Shell's toxicity modeling lacked both input data and a mechanistic representation of how toxicity resulting from multiple component substances might evolve over 50+ years. In this and future assessments, do not equate the level of confidence in the former with that of the latter. Furthermore, do not rely primarily on acute and chronic toxicity, labile naphthenic acid concentration, and/or tainting potential in model results to estimate future Project impacts if input data and a mechanistic understanding of toxicity drivers is lacking.

Request(s):

Provide justification with primary literature citations for modeling aerobic decay of acute and chronic toxicity in water bodies. If no justification is available, do not model acute and chronic toxicity as aerobically decayed in any of the models discussed in this review.

- 6) **Issue:** Modeling of sediment quality with limited data, and the lack of sedimentation processes in small streams models

SIR Reference: JRP SIR #5 (Aquatic health), JRP SIR #8

Document Reference(s): Shell 2013: SIR 5, page 3-13; SIR #8 page 3-47; Appendix 2; Shell 2007: Volume 4B-Appendix 4-2.

JRP JME Panel Reference (if applicable): n/a

Gaps and/or Shortcomings in Shell's Response:

The small streams models used by Shell to determine impacts to aquatic health appears to use very little sediment data to determine sediment impacts (Shell 2007, EIA Vol 4B, Appendix 4-7). From Table 2.1.1.3-1, there was one observed data point for the Pierre River, from Table 2.2.1.3-1 two observed data points in Eymundson Creek, and from Table 2.3.1.3-1 four observed data points from Big Creek. The use of so few data points to model stream sediment quality for 50+ years is a significant source of error in aquatic health impact predictions.

In addition to the apparent lack of data, Shell does not model sedimentation processes in the PRM small streams or EPLs. From Shell's EIA, the small streams model assumptions include: "Once released, substances entering a receiving water remain in the water column (i.e., settling and sediment partitioning do not occur)." (Shell 2007, EIA Vol 4B, Appendix 4-2, page 67). And the pit lake model assumptions include: "Settling of total suspended solids and sediment-attached substances (e.g., polycyclic aromatic hydrocarbons (PAHs)) is expected to occur in the pit lake. However, settling and geochemical processes such as precipitation or sorption were not included in the model. Parameters entering the lake were conservatively assumed to remain in the water column." (Shell 2007, EIA Vol 4B-Appendix 4-2, page 80).

Shell reiterates what they consider as a conservative assumption in the response to JRP SIR 5: "An additional layer of conservatism in the modelled predictions is the assumption that only natural sources of particulate metals will settle and be removed from the water column in the small streams of the LSA. Given that none of the mine-related water sources currently exist for the PRM, the level of detail required to accurately model their fate processes cannot be estimated with certainty. Therefore,

the conservative approach is to assume that these particulate metals will remain in suspension and contribute to the loads in all downstream nodes. This approach has been shown to generate conservative predictions.” (Shell 2013, Appendix I, page 76). Shell states that the support for this conservative approach comes from a comparison of modeled constituents in the Muskeg River with concentrations measured five years later, after the Muskeg River Mine Expansion was operational, “*Specifically, aluminum was slightly over-predicted, cadmium was over-predicted by an order of magnitude, and strontium was over-predicted by a factor of two over the entire frequency curve.*” (Shell 2013, Appendix I, page 76). Instead of evidence supporting the no-sedimentation assumption as conservative, these results indicate either that the Muskeg River water quality model did a poor job of predicting these concentrations or that the deficit in concentrations represents the fraction of each substance that remained in the Muskeg River, quite likely after being sedimented to the river bed.

The importance of Shell's omission on the outcome of the PRM impacts assessment is particularly apparent in the interpretation of cumulative impacts presented in Appendix 2 (Shell 2013). Some substances of potential concern (SOPCs), namely cadmium, manganese, and iron, were identified after modelling water quality in the LSA, EPLs, and the Athabasca River. Although they were predicted to exceed water quality guidelines and Shell's CEBs, these SOPCs were considered to have limited potential for negative impacts because they were often in particulate form and were therefore less bioavailable compared to dissolved fractions. Thus, Shell considers the lack of contaminant sedimentation processes in its sediment quality models to be conservative in terms of predicting water quality, but discounts exceedances of those same substances in the water column because they are in particulate form. By this logic, which was implemented in the methods Shell used to model the behaviour of these substances, particulate contaminants do not appear to be capable of impacting aquatic health predictions for this assessment, either via water or sediment quality. The risks posed by contaminants in particulate form are therefore effectively discounted, with no specific scientific evidence provided to support this modelling decision.

The lack of sedimentation processes in the Shell PRM water quality models represents an unknown and unquantified process which increases the error inherent in the model. Assuming that substances remain in the water column ignores the long-term risk posed by toxic or otherwise harmful substances that are deposited into the sediments of streams and lakes. These can be re-suspended at a later time (particularly if EPLs stratify and are regularly holomictic), can impact benthic biota, or can act as reservoirs that become long-term sources to the water column, for example.

Request(s):

- a) Provide a centralized list of observed sediment quality data sets and list those nodes which lacked any/had insufficient observed data sets for sediment quality modelling.**
- b) List every parameter in each sediment quality modeling exercise that was not calibrated and/or validated against an observed data set.**
- c) More generally, consistently distinguish between modelling decisions that are truly conservative estimates and those that reflect a fundamental lack of knowledge and/or understanding of the modelled systems. Omitting an**

important process increases the uncertainty inherent in the model, and subsequently increases uncertainty in the modelled results used for decision-making.

- 7) Issue:** Shell assumes that the LSA 2013 Base Case surface water quality is equivalent to the pre-industrial case (PIC).

SIR Reference: JRP SIR 5 and SIR 8 (Aquatic health)

Document Reference(s): Shell 2013: SIR 5, page 3-13, SIR 8 page 3-47; Appendix 1, Appendix 2, Appendix 3-5.

JRP JME Panel Reference (if applicable): n/a

Gaps and/or Shortcomings in Shell's Response:

Shell assumes that the 2013 Base Case LSA surface water quality is equal to pre-industrial conditions (PIC) (Shell 2013, Appendix 1, page 55; Appendix 2, page 11). To justify this assumption, Shell states that there are no approved or existing developments in the LSA, and therefore no development-related impacts. However, this assumption is erroneous because it does not account for previous impacts to LSA water bodies in the form of aerial deposition of polycyclic aromatic hydrocarbons (PAH) and metals to the LSA snowpack and subsequently to water bodies. This is an important contaminant delivery pathway to water bodies in the Athabasca Oil Sands region, especially during snowmelt (Kelly et al. 2009, 2010). Polycyclic aromatic compound (PAC) concentrations in the Athabasca River and its tributaries related to recent development were high enough to be potentially toxic to fish embryos, and metals concentrations exceeded guidelines in snow meltwater and surface waters near developments (Kelly et al. 2009, 2010).

As part of its assessment of Project-related and cumulative effects, Shell modeled fluxes of select PAH and metals concentrations released to the snowpack in the LSA via aerial deposition (Shell 2013, Appendix 3-5). Results from this modeling exercise are not included in the water quality assessment completed in response to JRP SIR 8 because the aerial deposition modeling is preliminary (Shell 2013, Appendix 2, page 85).

Indeed, the modelling exercise appears very preliminary and also fails to properly model sediment concentrations of PAHs in LSA watercourses. Several problems are apparent with the aerial deposition modeling:

- The PAC model was calibrated with a dataset from Isadore's Lake which was insufficient for this purpose (dataset included only one surface water observation and eight sediment observations used to calculate the 2013 Base Case)
- Five of the 10 modeled 2013 Base Case PACs in Isadore's Lake were unacceptably under- or over-predicted. Shell states that the most likely causes for this error would be "*either under- or over-predicted air emissions, or incorrect rates and coefficients within the CoZMo-POP model. Future model refinement will require additional snowpack data*" (Shell 2013, Appendix 3.5, page 16).
- This poor performance was possibly due to the use of generic parameter estimates used by the modeller where actual observed and derived parameters were unavailable for Isadore's Lake. An unspecified number of generic parameters were used in the modeling

exercise and were further “adjusted” in an unspecified way during calibration with no apparent justification (Shell 2013, Appendix 3.5, page 10).

- The model excluded closed-circuited areas in the LSA (those areas that are hydrologically isolated, mainly man-made runoff control systems that are part of the Project and which are meant to retain process-affected water on the mine site) as receiving water for aerial deposition. Because the area of these closed-circuited areas will increase with Project development, the proportion of lakes and rivers which receive aerial deposition directly is decreased and this results in an inaccurate decrease in the modeled PAC and metal concentrations in the LSA surface waters (Shell 2013, Appendix 3-5, page 17). It does not appear that impacts of aerial deposition are incorporated into these closed-circuit waters for use in EPL modeling.
- Shell roughly assumes a linear increase in PAC and metals inputs via aerial deposition over the last 40 years of oil sands development, but Kurek et al. (2013) found evidence of an exponential increase in PAH concentrations in lake sediments near oil sands development.
- For the LSA sediments, modelled PAC concentrations appeared completely erroneous. For existing conditions, the highest modelled PAC concentration was 33.9 picogram per gram (pg/g) for pyrene (Shell 2013, Appendix 3-5, Table 3.1-3, page 19). The highest modeled pyrene concentration in the 2013 PDC was 689 pg/g (Shell 2013, Appendix 3-5, Table 3.1-3, page 19). In comparison, observed pyrene concentrations in Isadore's Lake, for which the model was calibrated, were 5,500 pg/g – 14,000 pg/g (Shell 2013, Appendix 3-5, Table 3.1-1, page 17). Measured sediment concentrations for pyrene in water bodies near the Muskeg River were discussed as varying between 1,000-110,000 pg/g (Shell 2013, Appendix 3-5, page 18). And Namur Lake, the “pristine” site used by Kurek et al. (2013) had total PAH concentrations ranging from 1,000 – 4,000 nanogram per gram (ng/g, dry weight). Thus, the modelled LSA concentrations are likely completely inaccurate. The modeller defends the LSA results by suggesting that the water bodies measured near the Muskeg River are contaminated by PACs deposited by forest fires, wind-blown dust from active surface-mining areas, and erosion and transport of bitumen-rich sediments by flowing waters. This is a dubious defense because the researchers cited by the modeler (Kurek et al. 2013) actually conclude that:
 - “The historic timings of PAH increases measured from our lake sediments, including the temporal shifts in characteristic PAH ratios suggesting more petrogenic sources.”
 - “The results of a spatial PAH deposition survey provide compelling science-based evidence that local industrial activities are important contributors of PAHs to aquatic ecosystems in the Athabasca Oil Sands Region.”
 - “Lakes to the east of the Athabasca River record particularly striking contaminant increases, consistent with the prevailing winds blowing across local upgrading facilities and surface-mining areas.”
 - “Atmospheric depositions of PAHs from upgrader emissions and or unweathered bitumen in the form of dust particles from surface mining areas are now likely a major source of PAHs entering regional aquatic ecosystems. Industry's role as a decades-long contributor of PAHs to Oil Sands Lake ecosystems is now clearly evident.”

Thus, the researchers cited by Shell do not actually support the claim that the PAH concentrations measured in the Muskeg River area were caused by forest fires. In addition, the claim that the measured PAHs resulted from instream erosion of bitumen deposits has not been shown by Shell to be more true in the Muskeg River area than in the LSA. Finally, if wind-blown mine dust is a significant source of PACs to aquatic ecosystems, it should be considered as a part of this assessment. Furthermore, the use of Isadore's Lake - with equally high PAC concentrations - as a calibration system for this modelling exercise would be questionable if the modeled LSA PAC concentrations are considered accurate. This aerial deposition assessment was fundamentally lacking the data that were required to properly configure and calibrate the CoZMo-POP model, and to verify the model results with measured concentrations from the modeled LSA water bodies. As stated by Shell, this modeling exercise was highly preliminary and the results are unusable as part of a decision-making process.

Request(s):

Properly assess current conditions as required in the LSA by carrying out a comprehensive sampling survey immediately, specifically including snow sampling within the LSA catchments, and assessing current fluxes from snow to water bodies.

- 8) **Issue:** Incomplete and inaccurate re-assessment of PRM effects on KIRs for Vegetation, Wetland, and Forest Resources

SIR Reference: JRP SIR 5 (Vegetation)

Document Reference(s): Shell 2013: SIR 5, page 3-13; Appendix 1, Sec 4.3. pages 103-139.

JRP JME Panel Reference (if applicable): n/a

Gaps and/or Shortcomings in Shell's Response:

Shell was asked to re-assess the effects of the Pierre River Mine on Vegetation, Wetland, and Forest Resources independently of JME and determine the environmental consequences for each KIR. This was not completed for riparian communities in the RSA, which Shell explained was because the data used to analyze the RSA is too coarse to analyze riparian communities. Given that riparian zones are defined as "*those vegetation types with the potential to support a riparian ecosystem and occur within 100 m of a watercourse,*" it is not clear why these areas could not be delineated within the RSA. Riparian communities cover a relatively large proportion (11%) of the LSA, and likely cover a similarly large proportion of the RSA. Without delineating the riparian zones within the RSA, a potentially large portion of the RSA has not been re-assessed.

In its categorizations of vegetation/wetland types in the LSA (Shell 2013, App 1, Table 4.3-1, page 106-7), Shell has two vegetation types called, "*burned uplands*" and "*burned wetlands*." These areas of upland and wetland vegetation have been burned recently (i.e. young forests) and cover 7,410 ha (32% of the LSA). Both types are included within the category "*Miscellaneous Vegetation Types*." Placing these two burned vegetation/wetland types within the category Miscellaneous Vegetation Types is erroneous because areas that are recently burned are simply young forests. After forest fires most plant species re-establish within the first few years. If Shell cannot identify what specific vegetation/wetland types these burned areas contain (although they should be able to with some field sampling) they should at least include these as broader vegetation/wetland types within the categories "*Ecosite Types*" and "*Wetland Types*." By including these within the appropriate category, the total changes to both upland and wetland vegetation

could then be calculated. When burned uplands are included within the upland Ecosite Types, the net increase in upland area at closure is significantly lower because about half of the burned uplands will be lost (uplands increase by 1,993 ha at closure when burned uplands included, compared to increase of 4,526 ha at closure when burned uplands not included). Similarly, when burned wetlands are included within the Wetland Types, the net losses in wetlands significantly increases (wetland losses are 4,279 ha at closure when burned wetland included, compared to losses of 2,663 ha when burned wetland not included). Interestingly, when Shell determined the environmental consequences of the project on wetlands, it did include burned wetlands with Wetland types; however it did not include burned uplands with Upland Vegetation. Given the significant changes in upland area lost when burned uplands are included in calculations of the area affected, the inclusion of burned uplands changes the predicted residual impact classifications for upland vegetation.

Shell should have been able to determine the specific upland and wetland vegetation types within each of the burned areas by sampling within these areas and using the pre-burn vegetation maps or satellite images for these areas. In not classifying these areas as to the particular ecosite phases and wetland types within these areas, the actual losses of each KIR resulting from the project are underestimated. This is a particularly important point because the area classified as burn in the LSA is large (7,410 ha) and covers a large proportion (32%) of the LSA. Specifically, the KIRs affected by not classifying these areas include areas with the potential to contain rare plants, traditional use plants, lichen jack pine communities, riparian communities, and productive forests. Underestimating the effects to KIRs clearly has implications for the predicted residual impact classifications as well.

Shell includes two vegetation types within the category Miscellaneous Vegetation Types that are called Reclaimed Shrubland Type 1 and Reclaimed Shrubland Type 2 (Shell 2013, App I, Table 4.3-1, pg 106-7). Neither of these vegetation types is present within the undisturbed landscape. They are simply reclaimed sites that will not resemble a native ecosite phase or wetland. It is not clear why Shell is planning to create these novel site types instead of trying to reclaim these areas to a native ecosite phase or wetland type that was present prior to disturbance.

In Shell's assessment of project impacts and environmental consequences, the "Closure" scenarios include reclamation of the PRM development area. This means that Shell believes that direct or indirect losses due to construction and operations can be partly mitigated by the reclamation of vegetation types. In the EIA, the Closure, Conservation and Reclamation Plan (Shell 2007, EIA, Volume 2, Section 20.1) describes the vegetation/wetland types that Shell believes it can reclaim after PRM is complete. These vegetation/wetland types are also shown in Table 4.3-1 (Appendix I, page 106) and the results for each KIRs after reclamation are provided in assessment Tables for each KIR (Appendix I, Tables 4.3-2, 4.3-4, 4.3-5, 4.3-7 to -16). The amount of area within each vegetation/wetland type or KIR category that Shell believes it can reclaim can be calculated by comparing the values in the column "Loss/Alteration due to PRM Direct and Indirect Effects" with those in the column "Closure." For example, in the assessment of traditional plant potential in the LSA, 3,316 ha of vegetation/wetland types considered to be have high traditional plant potential will be lost from the direct and indirect effects of the project during construction and operations (Table 4.3-14). However, at closure

there will be a net *increase* of 489 ha of high traditional plant potential areas. This means that Shell will reclaim 3,805 ha of vegetation/wetland types that are considered to have high traditional plant potential. Areas of high traditional plant potential by definition contain relatively large numbers of plant species that Aboriginal groups use. Therefore, reclamation of these areas must mean that Shell will re-establish (by planting or other methods) all or most of the plant species found within these areas. Unfortunately, there is no evidence to show that Shell is able to re-establish large numbers of species within reclamation sites and their planting prescriptions do not include all or most of the traditional use plant species (see SIR 67 for Shell's list of traditional use plant species). As MSES showed at the JME hearing, Shell's planting prescriptions contain only a relatively small proportion of the species found in native ecosite phases (e.g. they will plant only about 20 plant species to reclaim d1 ecosite phases, when these ecosite phases contain about 120 species). Shell believes that many plant species will naturally re-establish within reclamation sites. However, there is ample evidence in the oil sands region to show that this does not occur. Several studies have shown that relatively few native plant species re-establish on their own and furthermore, the species that do establish naturally are predominantly non-native (e.g. Appendix F in Oil Sands Vegetation Reclamation Committee (OSVRC) 1998, Geographic Dynamics Corp 2006, MacKenzie and Naeth 2010, Shaughnessy 2010). Given the ineffectiveness of reclamation in returning a wide variety of plant species to the disturbed landscape, it is likely that many of Shell's predictions about the closure landscape and environmental consequences of the project on some KIRs in the LSA are inaccurate (see Table 4.3-18). The KIRs that may have inaccurate predictions include terrestrial vegetation, lichen jack pine communities, riparian communities, and high traditional use plant potential.

Shell defines riparian communities as those “*vegetation assemblages adjacent to streams and water bodies whose structure and function are influenced by, or dependent upon, this aquatic association*” (Appendix 2, Section 4.3.1.4, page 113). With respect to the indirect effects of surficial aquifer drawdown on riparian communities in the LSA, Shell states that “*Riparian communities are adapted to fluctuating water levels (Luke et al. 2007) and are not expected to have permanent effects at Closure for most wetlands types, when surficial aquifer levels will have returned to near 2013 Base Case levels. The Closure landscape includes riparian communities unaffected by development and new reclaimed riparian communities around South Redclay Lake, pit lakes, littoral zones and shrubland reclamation types near streams and waterbodies.*” Unfortunately, Shell does not provide any scientific evidence that surficial aquifer levels will return to 2013 Base Case levels or that the new reclaimed communities around South Redclay Lake, pit lakes, littoral zones, and Shrubland reclamation types will have a structure and function that is influenced by, or dependent upon, their association with an aquatic environment. Shell indicates that “*Combined direct and indirect effects will cause a net decrease of 1,566 ha (63% of resource) in riparian communities in the LSA during PRM construction and operations.*” But that the “*reclaimed landscape will have 2,384 ha (96% of resource) of riparian communities, a net decrease of 103 ha (4% of resource)...*” Therefore, PRM is predicted to have a “*low environmental consequence for riparian communities in the LSA.*” Shell believes that through the return of surficial aquifer levels and their newly created riparian zones, they will be able to recreate most of the riparian zones lost through direct and indirect effects of the project (i.e. 1463 ha of riparian communities to be returned). Unless Shell can provide supporting evidence for returning aquifer levels and creating riparian zones, their predictions of the Closure landscape and low environmental consequence in the LSA is questionable.

For six of the ten KIRs, Shell predicted a negligible environmental consequence in the RSA (one KIR was predicted to be low and three were not applicable). Predictions are based on a comparison of the amount of area to be disturbed by the project as a proportion of the area within the RSA. Given the vast area of the RSA (2,277,386 ha), it is difficult to imagine a disturbance large enough to result in a prediction of moderate or high environmental consequence. For some of the KIRs with a predicted negligible environmental consequence, the area to be disturbed by the project will be significant, particularly wetland vegetation where 9,906 ha will be disturbed. This is a general problem with assessing the environmental consequences within the RSA.

Request(s):

- a) **Please re-assess the effects of the project on riparian areas in the RSA.**
- b) **Please re-assess the environmental consequences of the project on Upland Vegetation, including “burned uplands” with the within the category “Ecosite Types.”**
- c) **Please explain why Shell is planning to create the novel sites called Shrubland 1 and Shrubland 2 instead of trying to reclaim these areas to a native ecosite phase or wetland type that was present prior to disturbance.**
- d) **Please provide supporting evidence that Shell can return surficial aquifer levels to 2013 Base Case levels or that the new reclaimed communities around South Redclay Lake, pit lakes, littoral zones, and Shrubland reclamation types will have a structure and function that is influenced by, or dependent upon, their association with an aquatic environment.**
- e) **Please provide the rationale of not reducing the RSA size proportionately when re-assessing effects to vegetation.**

9) Issue: RSA size dilutes PRM effects on RSA

SIR Reference: JRP SIR # 5 and 8 (Soils & Terrain)

Document Reference(s): Shell 2013: SIR 5, page 3-13, SIR 8 page 3-47; Appendix I; Appendix 2. Shell 2007: Volume 5.

JRP JME Panel Reference (if applicable): n/a

Gaps and/or Shortcomings in Shell's Response:

The PRM LSA (23,129 ha) is less than 50% of the PRM and JME LSAs (50,640 ha). However, in assessing PRM impacts on KIRs independent of the JME, the RSA size remained the same, which in the context of assessing potential effects of the PRM on the RSA, made the whole exercise meaningless. Compared to the combined effects of the PRM and JME on the RSA, the PRM effects became significantly diluted and predictable. In order to assess effects of the PRM on the RSA, the RSA size should have been reduced proportionately. Only then can valid assessments regarding potential effects of the PRM on Soils and Terrain and other KIRs in the RSA be made.

Request:

Provide the rationale of not reducing the RSA size proportionately.

10) Issue: Topography Changes in the PRM LSA.

SIR Reference: JRP SIR #5 and 8 (Soils & Terrain)

Document References: Shell 2013: SIR 5, page 3-13; SIR 8 page 3-47, Appendix 1; Appendix 2. Shell 2007: Volume 5, Section 7.5.1.2, pages 7-49 to 7-53, Table 7.5-3.

JRP JME Panel Reference (if applicable): n/a

Gaps and/or Shortcomings in Shell's Response:

In the 2007 EIA Volume 5, Shell has presented potential changes in terrain slope for the PRM and JME LSA's together. However, in response to JRP SIR 5, potential impacts of the PRM independent from JME on terrain and slope in the PRM LSA have not been presented and discussed anywhere in Shell's response sections. Similarly, potential changes in terrain slope due to the 2013 PRM Application Case in comparison to the Pre-Industrial Case were not assessed.

In the absence of vegetative cover or the conversion of organic soils to mineral soils, changes in slope steepness will be one of the important factors in assessing potential risks associated with soil erosion (wind and water) during the project life and beyond. It is also important to note that among the soil series in the PRM LSA, Mildred (MIL) soils are the dominant ones (29% of LSA- Shell 2013, Appendix 1 Table 4.2-3) which are developed on glaciofluvial terrain (coarse textured) and considered susceptible to erosion. Similarly, 70% of the total organic soils of PRM LSA (Shell 2013, Appendix 1 Table 4.2-3) will be disturbed/ altered and reclaimed as mineral soils, which in comparison to organic soils, will be susceptible to erosion.

Requests:

- a) **Provide predicted changes in terrain slope in the PRM LSA only and assess and analyse the sensitivity of soils in the PRM LSA to erosion (erosion classes).**
- b) **Provide predicted changes in the terrain slope in the RSA caused by the 2013 PRM Application Case compared to Pre-Industrial Case.**
- c) **Shell should provide impact assessment of erosion (water and wind) on KIRs (water bodies and ecosystems) due to altered soils and increased minerals soils while the project is still active and after the reclamation.**

11) Issue: Changes in Moisture Regime in the PRM LSA.

SIR Reference: JRP SIR #5 (Soils & Terrain)

Document References: Shell 2013: SIR 5, page 3-13; Appendix 1; Appendix 2. Shell 2007: EIA Volume 5, Section 7.5.1.2, Pages 7-49 to 7-53, Table 7.5-4.

JRP JME Panel Reference (if applicable): n/a

Gaps and/or Shortcomings in Shell's Response:

Topographical changes (changes in slope steepness and drainage patterns) result in changes in soil moisture regime, which is considered one of the important factors in land capability assessment and the success of re-vegetation during the reclamation process. In the EIA Volume 5 (Shell 2007, page 7-52), Shell states "*changes in slope may affect moisture regime and these change are examined in the context of the project LSAs*" and has presented potential changes in soil moisture regime for the LSAs (PRM and JME). However, effects of the PRM on changes in soil moisture regimes in the PRM LSA have not been assessed and analysed anywhere in Shell's response.

Requests:

Provide predicted changes in soil moisture regime in the PRM LSA only and discuss how it will affect the land capability classification.

I2) Issue: Acid Forming Compounds/Soil Acidification.

SIR Reference: JRP SIR #5 and 8 (Soils & Terrain)

Document Reference(s): Shell 2013: SIR 5, page 3-13; SIR 8 page 3-47, Appendix I, Section 2.5.1.2, Table 2.5-5, Figure 2.5-2, pages 36 to 37.

JRP JME Panel Reference (if applicable): n/a

Gaps and/or Shortcomings in Shell's Response:

Shell states "Within the TASA, 66,198 ha of soils (3% of the undisturbed TASA) had a soil net PAI greater than 0.17 keq H⁺/ha/yr—" which according to CEMA (2004), are considered acid sensitive soils (Shell 2013, Appendix I, page 36). It is important to note that of the 22,314 ha of the PRM LSA, 76% are mineral soils and 29% of them are Mildred (MIL) soil series (Appendix I, Table 4.2-3), which are considered the most sensitive to acidifying inputs (Abboud et al. 2002). Similarly, 70% of organic soils in the PRM LSA will be reclaimed into mineral soils (Shell 2013 Appendix I, Table 4.2-5). Considering this, it is important to assess what percentage of the soils in the PRM LSA are acid sensitive and how these disturbed and altered soils in the PRM LSA will respond to existing or elevated levels of PAI during the life of the project and beyond.

Request:

a) Provide a summary of acidification sensitivity of soils in the PRM LSA, specifically what percentage of PRM LSA soils has a net PAI above 0.17 kiloequivalent of hydrogen ions per hectare per year (keq H⁺/ha/yr).

b) Shell should provide details of how 'disturbed' and 'altered soils' of the PRM LSA will respond to PAI (existing or elevated levels) while the Project is still active.

I3) Issue: Soil Measured and Predicted Metal Concentrations.

SIR Reference: JRP SIR #5 and 8 (Soils & Terrain)

Document References: Shell 2013: SIR 5, page 3-13; SIR 8 page 3-47, Appendix I; Appendix 2. Shell 2007: Appendix 3-2.

JRP JME Panel Reference (if applicable): n/a

Gaps and/or Shortcomings in Shell's Response: In the Volume 5 (Shell 2007), a statistical summary of the measured soil metal concentrations (background concentrations) were presented in Table 212 which this reviewer assumes is derived from the combined background soil metal concentrations of the PRM and JME LSAs. Similarly, in Table 214 (Shell 2007), Shell presented predicted maximum annual metal depositions onto soils of the PRM and JME LSAs for the Application Case and Planned Development Case. Predicted metals annual deposition onto soils due to PRM independent of JME are not presented and discussed anywhere in Shell's responses to the JRP SIRs 5 and 8.

Request:

Provide a summary of the background soil total metal concentrations and predicted annual soil metal deposition onto soils in the PRM LSA only.

I4) Issue: Soil Contamination Due to Potentially Toxic Elements.

SIR Reference: JRP SIR #5 and 8 (Soils & Terrain)

Document Reference(s): Shell 2013: SIR 5, page 3-13, SIR 8 page 3-47; Appendix I and 2.

JRP JME Panel Reference (if applicable): n/a

Gaps and/or Shortcomings in Shell's Response:

There is a concern of potentially toxic element (PTE) emissions from oil sands activities and its deposition in the vicinity of oil sands operations (Kelly et al. 2010). In the JRP decision report for JME, Shell was quoted as follows, “studies have shown that 99 per cent of mercury emitted to the environment was retained by the watershed and did not contribute to changes in mercury concentrations in water” (JRP-JME 2013, [268], page 47). Although it appears that Shell is trying to justify that there is no concern to water quality from PTEs in this statement, the fact that contaminants were “retained by the watershed” implies that these contaminants will accumulate overtime in surface soils. It is worth noting that once PTEs (metals) enter soils they remain for extremely long periods (Brookes, 1995). Similarly, most of these PTEs present in mixtures and interactive effects on soil flora and fauna at lower than expected levels cannot be ignored (Chander and Brookes, 1991). Climatic changes or changes in soil properties such as acidification and loss of organic matter increases bioavailability of metals. Shell has not assessed PRM impacts on soil quality in terms of contamination due to spills, leaks, or aerial deposition of potentially toxic elements.

Requests:

- a) **Provide impacts on soil quality in terms of PTEs deposition/ accumulation due to the Project operational activities.**
- b) **Provide impact of changes in properties (disturbed soils and alteration of organic soils to mineral soils) in the Project LSA on bio-availability of PTEs.**

I5) Issue: Representative/Adequate Soil Analytical Data.

SIR Reference: JRP SIR #5 and 8 (Soils & Terrain)

Document References: Shell 2013: SIR 5, page 3-13, SIR 8 page 3-47; Appendix I; Appendix 2.

JRP JME Panel Reference (if applicable): n/a

Gaps and/or Shortcomings in Shell's Response:

Obtaining representative soil samples is a well-known challenge due to soils spatial and temporal variability. Considering the fact that the PRM LSA and the RSA have a range of soil series, terrain and disturbed soils, generating representative soil analytical data for assessing soil sensitivities to PAI or erosion, for example, will require significant efforts in understanding the distribution of soil types and terrain. Factors such as where to sample, when to sample, at what depths to sample and number of samples to be collected will be very crucial for assessing reliable impacts of the project. To address this issue (to some extent), sampling intensity according to CEMA (2006) guidelines is to sample 3 profiles of each major soil series and 1 profile of each minor identified in the LSA. Shell has not mentioned in the report if CEMA (2006) guidelines for soil sampling intensity were followed and how many samples were collected from major soil series in the PRM LSA and RSA.

Request:

Provide the basis of soil sampling selection in the PRM LSA and RSA and details of how many soil samples were collected from the PRM LSA and the RSA for obtaining representative analytical data.

I6) Issue: Missing provision of details to assess air quality assessment (e.g. input data, modelling methods, sample calculations)

SIR Reference: SIR 5 (Air Quality)

Document Reference(s): Shell 2013: SIR 5, page 3-13; Appendix 1; Appendix 3.1; Appendix 3.2; Appendix 3.5.

JRP JME Panel Reference (if applicable): n/a

Gaps and/or Shortcomings in Shell's Response:

Shell provided a response to SIR 5 by re-assessing the air quality impacts by redefining the 'Project' as the PRM and moving the JME emissions into the Baseline assessment. In general the emissions from the PRM are about 50% of the combined PRM and JME total. The re-assessment of the air quality has included many changes in emissions and modelling since the original submission five-years ago. However, there are no details of the methods and model inputs provided in the reports which would allow us to evaluate the accuracy of Shell's response.

The air quality report(s) provide only a review of the findings and not the input data, modelling methods, sample calculations. The following list outlines the missing information:

- a) **Ambient Air Quality Monitoring Data Review:** the air quality assessment should provide an updated review of the criteria air contaminant (CAC), volatile organic compounds (VOC), PAH and/or deposition monitoring data
- b) **Existing Emissions Assessment:** the air quality assessment is missing a modelling assessment of the existing emissions for all ambient air monitored data species
- c) **Model Validation/Verification Review:** The air quality assessment should provide a comparison of up-to-date relevant ambient air monitoring data to the existing emission case modelling results to show the validity of the modelling with respect to assumptions for: meteorology; terrain; model switch settings; source characterizations and emissions characterizations. The review should provide a discussion of why the validated modelling predictions are higher or lower than existing ambient monitoring and quantitative and qualitative arguments why modelling the combined assessment assumptions are robust and protective of the environment and human health. It has been more than five years since the previous modelling assessment in which time models and modelling methods have changed. Therefore, a review of the model(s) configuration and performance is necessary ensure confidence in the output(s) and conclusion(s).
- d) **Regional Emissions Inventory:** The emissions inventory provided is a listing of calculated emissions but lacks any information on the sources of the emissions (energy ratings, stack heights, diameters, emission factors) on which the emissions and modelling were based. Without this vital information the listing of the emissions can neither be cross-referenced nor verified. The details of regional community emissions which were based upon updated census information are also missing.
- e) **Greenhouse Gas Emissions:** the air quality assessment is missing an assessment of the greenhouse gas emissions for the Project, emissions intensity, and review of similar projects justifying the Project emissions and efficiency against similar industry peers. The assessment should include sample calculations.
- f) **Emergency Flaring:** The air quality assessment did not include a review of emergency flaring scenarios, air quality dispersion modelling for each scenario, discussion of expected frequency of occurrence of each scenario.
- g) **Mobile Fleet Characterization:** The mobile fleet of off-road vehicles represents a large fraction of the mono-nitrogen oxides (NOx) and carbon monoxide (CO) emissions in the region as well as other emissions such as PAH and VOC. The air quality assessment report

does not contain a listing of the operator, fleet description (including models, engine year, engine power rating, emissions controls), nor details on the emissions factors used to prepare the emissions totals.

- h) Pond Emissions and Mine Face: The air quality assessment includes some information (e.g., Appendix 3-2, Section 3.2) on the general nature of the VOC emissions from ponds. However, similar to the mobile fleet, the ponds represent one of the major sources of VOC emission in the region and the details of the emission calculations are not provided and cannot be confirmed, compared to other projects or validated.
- i) Impact of Project on the Regional Ozone: The air quality assessment does not include a quantitative nor qualitative discussion of the impact the Project will have on the regional ozone formation or destruction.
- j) Impact of the Project on the Regional Visibility and Haze: A cumulative impact of significant and wide varying regional emissions is the deterioration of regional visibility and formation of haze. The air quality assessment does not include an assessment of the contributions of the Project emissions and the Project impact on these environmental variables.

Request(s):

Please provide the information outlined in a) through j) in the above comments for the air quality assessment.

I 7) Issue: Did not provide a Project alone assessment

SIR Reference: SIR 5 (Air Quality)

Document Reference(s): Shell 2013: SIR 5, page 3-13; Appendix 1; Appendix 3.1; Appendix 3.2; Appendix 3.5

JRP JME Panel Reference (if applicable): n/a

Gaps and/or Shortcomings in Shell's Response:

Shell did not provide a Project alone assessment (rather they moved the effects of JME to baseline and then assessed PRM effects on top of the other emissions) to determine the extent of potential impacts of the Pierre River Mine project. The emissions for the PRM have increased since the EIA in 2007 yet Shell did not compare the proposed new emissions to the previous assessment or discuss why emissions have changed.

The assessment was only performed in terms of cumulative regional emissions. Given the uncertainty around regional emissions (e.g. wide range of emissions reported), it is important that a well-documented emission inventory be required as an appendix to every assessment and also why it is necessary that air quality predictions should be well under the respective Alberta's Ambient Air Quality Objective (AAAQO) to ensure robust conclusions and environmental protection.

Request(s):

- a) **Please, provide a "Project alone" assessment to define the scope of contribution of the PRM to existing air quality issues.**
- b) **Please compare the proposed new emissions to the previous assessment and discuss why emissions have changed.**

I 8) Issue: Air quality impacts are not shown

SIR Reference: SIR 5 (Air Quality)

Document Reference(s): Shell 2013: SIR 5, page 3-13; Appendix 1; Appendix 3.1; Appendix 3.2; Appendix 3.5

JRP JME Panel Reference (if applicable): n/a

Gaps and/or Shortcomings in Shell's Response:

The SIR requested that Shell provide the environmental consequences or air quality impacts of the PRM. Air quality impacts are not shown: 1) to be less than objectives at the fenceline; and, 2) to not increase already high concentrations at residential locations. For instance, Appendix 3.2: Table 5.5-2 (Shell 2013), shows TRS concentrations are predicted to exceed odour levels at the fenceline for the PRM; Table 5.6-1 shows benzene concentrations are predicted exceed Alberta's Ambient Air Quality Objective (AAQO) at the fenceline; Table 5.6-2 is missing odour panel based assessment of VOC odour threshold for pond emissions mixture; Table 5.7-1 shows exceedance of the particulate matter 2.5 (PM_{2.5}) objective at the fenceline (there is no safe threshold for PM_{2.5} but only socio-political threshold levels). Table 5.7-1 shows that several cabins, Fort McKay, and Fort McMurray will incrementally increase in PM_{2.5} concentration when they are already over the objective. The purpose of cumulative assessment is to prevent the objectives from being exceeded, regardless of amount, and not allow a succession of incremental increases because they are relatively small.

Request(s):

Provide justification for increasing air quality impacts beyond fenceline.

19) Issue: Aerial deposition modelling preliminary in nature

SIR Reference: SIR 5 (Air Quality)

Document Reference(s): Shell 2013: SIR 5, page 3-13; Appendix 3.5.

JRP JME Panel Reference (if applicable): n/a

Gaps and/or Shortcomings in Shell's Response:

The aerial deposition model configuration description is qualitative and requires quantitative details with peer review. No time series predictions for the model output were provided with the observed data to validate the model performance and numerous modelling assumptions.

Request(s):

Provide time series predictions for the model output with the observed data to validate the model.

20) Issue: Exclusion of developed area

SIR Reference: SIR 5 (Air Quality)

Document Reference(s): Shell 2013: SIR 5, page 3-13; Appendix 3.2.

JRP JME Panel Reference (if applicable): n/a

Gaps and/or Shortcomings in Shell's Response:

The exclusion of developed areas from air quality predicted impact is tolerable for active mine areas where there is significant surface disturbance and activities to deter wildlife and human presence. For Steam Assisted Gravity Drainage (SAGD) operations, this is not the case and only the fenceline of the central processing is exempt from air quality impacts and application of the AAQOs. For SAGD developments, the majority of the lease areas are open to wildlife and public access and therefore the AAQO apply and industrial odours should not exist. For example, in Appendix 3.2, Figure 4.2-6 (Shell 2013), the RSA map shows many 'developed areas'

(thin yellow bordered areas) which are presumably lease areas for projects, and not necessarily active surface mine areas. Whereas, the thick yellow border in the LSA (the PRM mine areas) show active mine areas which are presumably void of environment and have restricted public access, so the AAAQO do not apply.

Request(s):

Confirm the usage of term 'developed area' and exclusions areas for air quality impacts in comparison to AAAQOs. If the SAGD lease areas have been excluded, re-interpret the air quality summaries to include these areas for comparison to AAAQOs.

2.2.2 SIR # 6

Issue: No peer reviewed support for significance determination methodology provided

SIR Reference: JRP SIR #6 (Wildlife)

Document Reference(s): Shell 2013: SIR 6, page 3-21; Appendix I, page 10.

JRP JME Panel Reference (if applicable):

[9] The Panel finds that the Project would likely have significant adverse environmental effects on wetlands, traditional plant potential areas, wetland-reliant species at risk, migratory birds that are wetland-reliant or species at risk, and biodiversity. There is also a lack of proposed mitigation measures that have been proven to be effective. The Panel also concludes that the Project, in combination with other existing, approved, and planned projects, would likely have significant adverse cumulative environmental effects on wetlands; traditional plant potential areas; old-growth forests; wetland-reliant species at risk and migratory birds; old-growth forest reliant species at risk and migratory birds; caribou; biodiversity; and Aboriginal traditional land use (TLU), rights, and culture. Further, there is a lack of proposed mitigation measures that have proven to be effective with respect to identified significant adverse cumulative environmental effects.

[22] The Panel has concerns with some of the methods used by Shell to assess effects on terrestrial resources and Aboriginal TLU, rights, and culture. These concerns are that the LSA consists of only the Project and existing Phase I footprints, that there is a lack of ecological context, and that the large size of the RSA adopted by Shell causes a "dilution effect." The Panel also found it difficult to assess the significance of effects because of the coarse-scale Landsat imagery Shell used to estimate land cover type, because of the lack of use of thresholds to determine significance, and because of Shell's consequent reliance on professional judgement.

[23] The Panel concludes that it could not rely on Shell's assessment of the significance of project and cumulative effects on terrestrial resources. The Panel reviewed the evidence using a 20 per cent loss threshold and considered other factors relating to the reliability of Shell's determination of the significance of effects.

Gaps and/or Shortcomings in Shell's Response:

In SIR 6, the JRP specifically requested that Shell "*provide information such as peer reviewed literature or other scientific basis*" (Shell 2013, page 3-21) in support of the methods chosen for significance determination. Shell has not done this as no peer reviewed research is presented to

show that its rating scheme has been proven effective elsewhere in developing informed decisions.

Shell refers to Hegmann et al. (1999) and to an internet site by the Canadian Environmental Assessment Agency: *"The determination of whether an environmental impact is significant will be considered only after taking into account any mitigation measures."* (CEAA 2010, internet site), an approach re-stated in Hegmann et al. (1999)." (Shell 2013, page 3-23). This is an outdated guide (the document on CEAA's site is dated 1994) the utility of which does not appear to be useful for decision making, given that it is the peer-reviewed literature, in fact, that shows the lack of precise working definitions of cumulative effects analyses (e.g. Gunn and Noble 2011). Shell claims that significance is determined based on residual effects (i.e. after mitigation is in place), whether project specific or cumulative regional effects are considered. The problem with Shell's approach is that it assumes that mitigation will be effective, and that effects will be reversible. The Panel appears to seek clarity on how these assumptions can be substantiated by scientific studies. Unfortunately, Shell does not provide any scientific evidence, nor does Shell cite peer-reviewed literature as it continues to rely on outdated grey literature. Shell does not clarify why any given criterion rating received any given points.

In response to the JRP's request to provide a rationale for why Shell believes its methods are reasonable, Shell virtually replies that it is confident the methods are reasonable. Shell continues to rely on the same methods and rationale that led to the dissatisfaction of the Panel with the JME application. Without submitting the required scientific evidence, Shell simply concludes: *"Shell is confident that the method applied to evaluate impacts is reasonable, as it has been developed through consideration of guiding principles from the Canadian Environmental Assessment Agency and application of professional judgement, it has been applied and tested repeatedly in circumstances similar to those for this Project, and has the benefits of consistency and transparency"*. (Shell 2013, page 3-26). The statement that the method has been tested is false. No test exists that would demonstrate how the scale of the criteria ratings relate to the magnitude, duration, reversibility, and other criteria used by Shell. Rather, the ratings are entirely arbitrary.

Particular to reversibility, it is surprising that Shell continues to adhere to its belief that impacts to wildlife can be reversed in light of the JRP-JME (2013) finding that *"There is also a lack of proposed mitigation measures that have been proven to be effective."* (JRP-JME 2013, recommendation [9]).

Request(s):

Please provide scientifically peer reviewed literature or research to show that the rating scheme has been proven effective elsewhere in developing informed decisions.

2.2.3 SIR #7

I) Issue: Impact Rating Prior to Reclamation Not Done.

SIR Reference: JRP SIR #7 (Wildlife)

Document Reference(s): Shell 2013: SIR 7, page 3-28; Appendix I, page 149.

JRP JME Panel Reference (if applicable):

[10] The Panel understands that the provincial and federal governments will need to make separate decisions about the Project, taking into account the Panel's report. The Panel acknowledges that Shell is planning to reclaim the Project footprint to equivalent land capability. The Panel believes that reclamation is useful but that it will not mitigate all of the significant effects because some habitat types cannot be reclaimed (e.g., peatlands), and reclamation will not occur or be complete for many years.

[26] ... The Panel also believes that reclamation will not sufficiently mitigate the effects on species at risk and migratory birds that rely on old-growth forest because of the substantial amount of time needed to re-establish habitat...

[30]... The Panel believes that there appears to be a high potential for significant loss of biodiversity based on overall wildlife habitat loss, unproven methods for reclamation of peatlands and old-growth forest, and the long time lag between disturbance and reclamation...

[652] ... the Panel used the following approach to determine the significance of project effects on wetland habitat in the LSA: ...The effects are largely irreversible—given that there is no evidence that peatlands can be successfully reclaimed...

Gaps and/or Shortcomings in Shell's Response:

This SIR specifically asks for an impact assessment prior to reclamation. Yet, Shell provides an assessment that includes their assumption that impacts will be reversed and Shell rates the magnitude of the impacts as residual impacts in Tables 7-1 to 7-4 (Shell 2013, page 3-28 to 3-36). This is flawed because reclamation is the predominant driver for the reversibility concept. Therefore, if the assessment is meant to be prior to reclamation, then there is no reversibility possible (using Shell's rating criteria, the rating for reversibility should be +3). Shell has not provided the information that the JRP was seeking.

Similarly, it is unclear how the assessment in Appendix 1, Table 4.4-1 to 4.4-4 (Shell 2013), reflects the conditions prior to reclamation ("*Case prior to reclamation for wildlife abundance, wildlife habitat and wildlife movement are presented in Tables 7-2, 7-3 and 7-4, and also discussed in Appendix 1, Section 4.4 and summarized in Tables 4.4-1, 4.4-2 and 4.4-4, respectively.*" page 3-28), given that Shell uses the rating for reversibility in the tables and discusses the conditions at closure, i.e. "*Closure and reclamation is considered as 80 years after the completion of mining*" (Shell 2013 Appendix 1, page 149).

Request(s):

Please provide the assessment of effects prior to reclamation, as requested by the Panel. Alternatively, clarify how or why the rating of -3 for reversibility is applied in an assessment scenario that does not include reclamation.

- 2) **Issue:** The relationship between impact description criteria and wildlife KIR population abundance not defined.

SIR References: JRP SIR #7 and #8 (Wildlife)

Document Reference(s): Shell 2013: SIR 7, page 3-28; Table 7-2 to 7-9, page 3-30 to 3-42; SIR 8 page 3-47; Appendix 2, Section 4.3.4. Shell 2007: EIA, page 1-33.

JRP JME Panel Reference (if applicable): n/a

Gaps and/or Shortcomings in Shell's Response:

The impact description and numerical scores of the project are defined in Table 1.3-4 (Shell 2007, page 1-33). Different weights are assigned to the criteria (range): Magnitude (0-15), Extent (0-2), Duration (0-2), Reversibility (-3 to 3), and Frequency (0 to 2). These rankings disproportionately weight project impacts over other criteria and constrain magnitude to a maximum of 15 points when proportionate habitat loss is much higher (see MSES comment in this report, Section 2.2.1 SIR #5, issue 3). The geographic extent has no effect at the local scale, irrespective of the size of the local scale measure or the ratio of RSA:LSA (see MSES comments in this report, Section 2.2.4 SIR #8, issue 2). The size of the LSA, from 1 km² or > 100 km², does not contribute to the impact of the project. If the project impacts an area greater than the RSA it receives a score of 2; however, this would require an assessment extending to an area outside of the RSA, which was not evaluated in the EIA (Shell 2007). The duration criteria is not based on wildlife population dynamics (e.g., generation times), nor on project lifespan. For example, a long-term project (>20 years) can disrupt over 10 generations of breeding for songbirds, whereas the same project may only impact a large mammal population for 1-2 generations.

In all cases, the relationship between these measures of impact and the actual dynamics of wildlife populations is never defined. At best, only habitat was measured. The existing conditions of wildlife abundance and movement were not quantified. Habitat was quantified in the sense of the HS models, but see MSES comments in this report (Section 2.2.1 SIR#5, issue 3,) regarding limitations of the HS models.

Lastly, critically absent from this equation is an assessment of uncertainty. Shell pools the assessment of environmental significance using data from field studies, peer reviewed literature, unpublished reports and expert opinion from the 2013 updates and the 2007 EIA. Adjusting significance proportionate to the uncertainty of the data used is one way to minimize the risk associated with reliance on qualitative, opinion-based approaches to measuring project impacts.

Request:

- a) **Please use biologically-defined criteria to weight the criteria used in determining project significance. Such criteria relate to the known lifespan, home range sizes, breeding periods, population size, distribution, and growth rates of wildlife KIRs relative to the magnitude, extent, duration reversibility, and frequency of the project.**
- b) **Please address how uncertainty in the data available is being used to create a conservative assessment of project significance.**

3) Issue: Inconsistent interpretation of Project impacts.

SIR Reference: SIR #7 (Wildlife)

Document Reference(s): Shell 2013: SIR 7, page 3-28 to page 3-33; Appendix 3.7, Table 1.3-1.

JRP JME Panel Reference (if applicable): n/a

Gaps and/or Shortcomings in Shell's Response:

In Table 7-2, Shell indicates that the environmental consequence for all wildlife KIRs, for all potential impacts to wildlife abundance and wildlife movement, is low or negligible during construction and operations at the LSA and RSA scale (except caribou abundance at the RSA scale) (Shell 2013, page 3-30). Table 7-3 describes the environmental consequence for wildlife

habitat, all of which are high at the LSA scale (Shell 2013, page 3-33). Indeed, net habitat loss from the 2013 Base Case due to the PRM is an average of 75% for the 19 wildlife KIRs (Shell 2013 Appendix 3-7, Table 1.3-1).

Shell states “Where abundance information is lacking for particular KIRs and habitat loss in the Oil Sands Region is potentially affecting abundance, to be precautionary the HS modelling results were used to estimate the effects of the PRM on abundance.” (Shell 2013, Appendix 3.7, page 1). No data on abundance or the predicted effects of the PRM on abundance are presented in the SIR 7 response. Rather, abundance was interpreted as a function of habitat suitability for all KIRs. Wildlife movement is also a function of habitat quality (Fahrig 2007). Thus, the pervasive impacts of the PRM on wildlife habitat at the LSA scale identified by Shell are incongruous with the predicted low and negligible impacts on wildlife abundance and movement.

Request:

Please clarify how the environmental significance of the PRM on wildlife abundance, movement and habitat was measured.

- 4) **Issue:** Environmental consequences prior to reclamation not complete for all vegetation KIRs in the RSA

SIR Reference: JRP SIR 7 (Vegetation)

Document Reference(s): Shell 2013: SIR 7, page 3-28; Appendix 1, Section 4.3; Appendix 2, Section 3.4.

JRP JME Panel Reference (if applicable): n/a

Gaps and/or Shortcomings in Shell's Response:

Shell was asked to provide the environmental consequences prior to reclamation for each KIR. This request was not completed for riparian vegetation within the RSA.

Request(s):

Please re-assess the environmental consequences prior to reclamation for riparian areas in the RSA.

2.2.4 SIR #8

- 1) **Issue:** Cumulative Effects Assessment Approach Leads to Wrong Conclusions

SIR Reference: JRP SIR #8 (Wildlife)

Document Reference(s): Shell 2013: SIR 8, page 3-47, 3-48, 3-56, and 3-58; Appendix 2, page 319.

JRP JME Panel Reference (if applicable):

[10] The Panel understands that the provincial and federal governments will need to make separate decisions about the Project, taking into account the Panel's report. The Panel acknowledges that Shell is planning to reclaim the Project footprint to equivalent land capability. The Panel believes that reclamation is useful but that it will not mitigate all of the significant effects because some habitat types cannot be reclaimed (e.g., peatlands), and reclamation will not occur or be complete for many years.

[613] ...Shell referred to the concept of critical habitat thresholds as reported in the scientific literature, indicating that habitat loss of up to 70 to 90 per cent may be required before a critical habitat threshold is reached. Shell explained that any change of more than 20 per cent in the measurement end point was considered a high-magnitude change. However, EC stated that Shell described a 40 per cent loss of habitat for caribou as being a low magnitude effect. OSEC argued that the critical threshold approach, which could take a species to the brink of extinction before corrective measures were initiated, was inconsistent with *CEAA, 2012* and *Species at Risk Act (SARA)*, both of which require that the precautionary approach be taken. EC stated that the 70 to 90 per cent threshold is not precautionary, and that thresholds can vary depending on several factors, including the specific species and the study area. EC also stated that there was much uncertainty around thresholds and that habitat loss in the range of 20 to 40 per cent can be enough to change a population trajectory.

[652]the Panel used the following approach to determine the significance of project effects on wetland habitat in the LSA:...The effects are largely irreversible—given that there is no evidence that peatlands can be successfully reclaimed...

[691] EC stated that there has already been high habitat loss for some species, such as Canada warbler, in the RSA, and thus there was no evidence that there would be surplus habitat within the RSA to support the influx of additional birds. EC stated that the success of reclamation and re-colonization of reclaimed habitats by species at risk and many migratory birds is uncertain and, for old-growth-dependent species, will take considerable time to achieve....

[692] EC, OSEC, and ACFN stated that even if species that rely on old-growth forests were able to recolonize those areas after reclamation, there would be a considerable time lag of essentially 100 years...

[710] ... The Panel further recognizes that the extended time lag for reclamation of old-growth forests may preclude re-colonization by preindustrial flora and fauna as some of the species that are currently declining may be extirpated before habitat can be restored.

[923]... EC stated that the success of reclamation and re-colonization of reclaimed habitats by species at risk and many migratory birds is uncertain and, for old-growth-dependent species (e.g., blackthroated green warbler and Canada warbler), will take considerable time to achieve.

[968] EC stated that there was a great deal of uncertainty about whether species will recolonize some upland habitats in the long term.

[990] ... The Panel also believes that there is a level of uncertainty related to reclamation success, including the degree and rate at which species will recolonize and use the reclaimed landscape.

Gaps and/or Shortcomings in Shell's Response:

The SIR requested that Shell compare information for the PIC to the Application Case and to the PDC. In their response to SIR 8, Shell states that *"There will be a reduction in environmental consequence as wildlife habitat redevelops and wildlife populations return into the reclaimed landscape*

from neighbouring source populations” for the 2013 Planned Development Case Summary (Shell 2013, page 3-56). No support has been provided for the assumption that suitable wildlife habitat will, in fact, redevelop or that wildlife populations will return to redeveloped habitat.

Tables 8-1 and 8-2 (Shell 2013 SIR 8 pg 3-59, 3-61) summarize significance determinations for KIR for cumulative effects from the PIC to the 2013 PRM Application Case and from the PIC to the 2013 PDC. For those KIRs predicted to be significantly impacted before reclamation, it is very likely that it is not possible for a “reduction in environmental consequence” to occur because, by definition, significance based ecological thresholds indicates that populations have lost or are expected to lose the ability to sustain themselves or maintain ecological function (Shell 2013 SIR #8, page 3-58). Therefore, even if Shell provided some evidence that wildlife habitat will develop and that wildlife use this habitat, those wildlife KIRs significantly impacted based on ecological thresholds will likely not return. It is, therefore, important to carefully consider Shell’s approach to the determination of ecological thresholds.

Ecological Thresholds are Misunderstood or Misrepresented

Shell believes that a 20% Resource Management Threshold is not meaningful because “many studies identify much higher losses (i.e., between 40% and 90%) before abrupt and non-linear, negative changes in ecological or population function occur (Andren 1994; Monkkonen and Reunanen 1999; Rompre et al. 2010; Swift and Hannon 2010).” (Shell 2013 Appendix 2, page 319).

The International Boreal Conservation Science Panel (2013, page 9) reviewed evidence from conservation science indicating that: “Maintaining the full complement of species, communities and ecosystem services in the Canadian boreal forest requires that at least half of the area be protected from industrial disturbance.” Specific to caribou, Environment Canada (2012) applies a threshold of a maximum of 35% of the landscape disturbed for caribou to remain viable.

Even though Shell appears to be aware that some species may cease to be viable at 40% of landcover disturbance, Shell does not quantitatively show which species may lose viability at this threshold. Shell did not calculate the population viability threshold for any KIR in its RSA because it did not have regional population numbers for them. In Appendix 3.1, Sec. 2.1.1.2.2 (Shell 2013), Shell discusses the danger that self-sustaining populations do not always suffice to achieve conservation objectives. In other words, Shell concedes that, in fact, reaching the brink of the viability threshold may already be too late for conservation to be successful. In light of the possibility that some KIRs may cease to be viable at 40% disturbance, Shell’s observation appears to agree with the findings of conservation science studies, as cited by the International Boreal Conservation Science Panel (2013). This is because population viability thresholds may, in fact, indicate when a disturbance went too far, rather than indicating the limit to which it can go. A maximum 50% threshold as suggested by the International Boreal Conservation Science Panel (2013) seems to be a reasonable general guideline that would indicate a threshold at which ecosystems already started to lose some of its components and processes. To avoid reaching that threshold, strict management actions would need to be implemented before 50% is reached.

The wood bison is a case in point. Shell does not believe that ecological thresholds for bison are surpassed, but Shell merely provides a verbal argument with no empirical evidence. If Shell had conducted population viability analyses for the wood bison, it would find that the wood bison population may already be at the brink of losing viability and that any further reduction of carrying capacity in the region (reduced forage sources or increased mortality) would likely push the bison population to extinction.

Most Impacts from PIC to Base Case are already >20%

Shell shows that under the Resource Management Criteria before reclamation almost all KIRs would experience significant impacts in the PDC (Shell 2013, SIR 8 Table 8-3 pg 3-64). For the scenarios “*After Reclamation*”, Shell believes that several KIRs would not be significantly affected because Shell assumes effective reclamation to pre-disturbance conditions. Old growth forests are an exception and so are species biodiversity and landscape level biodiversity for which Shell assessed significant impacts. Given that many forms of wetlands cannot be reclaimed (Rooney et al. 2012), wetlands would also be expected to experience significant impacts “*After Reclamation*” (although Shell still asserts that impacts to wetlands can be reversed). Consequently, wildlife species relying on the vegetation types that cannot be reclaimed would also experience significant impacts. It is unclear why Shell omitted the determination of significance after reclamation for the wildlife KIRs of the cumulative impact assessment in Table 8-3 (Shell 2013, SIR 8 Table 8-3 pg 3-64).

We note that the cumulative impact assessment using “*Ecological Thresholds*” is unconvincing as it lacks credible evidence and interpretation by Shell regarding how ecological thresholds should be applied in environmental management decisions. Even if Shell had shown some empirically measured thresholds, environmental managers would still need to know how far the conditions are from the thresholds and how fast the thresholds are being approached. This is because conservation timeframes and schedules are driven by the rates at which thresholds are approached or exceeded (Margules and Pressey 2000, Foote et al. 2012, Komers and Stanojevic 2013), but neither the rates of disturbance, nor actual viability thresholds have been calculated by Shell.

Request(s):

- a) **Please provide additional support (e.g. peer-reviewed literature, oil sands monitoring results) that would support the assumption that wildlife habitat will redevelop and that wildlife will return and use redeveloped habitat.**
- b) **Please provide potential mitigation measures (adaptive management) that could be implemented to ensure that wildlife return to the RSA (i.e., how does Shell propose to manage significant impacts to wildlife?).**
- c) **Please provide empirical evidence for the application of any given “ecological threshold”; alternatively, omit the use of “ecological thresholds” as benchmarks for significance determination.**
- d) **If Shell believes that different KIRs have different ecological thresholds, then please provide empirical evidence for the RSA to show what the threshold may be for any given KIR. However, be clear to explain how KIRs with higher thresholds may respond to the extirpation of KIRs that suffer from a lower**

- threshold, noting how, with each extirpation, the regional ecosystem composition and processes may change.
- e) **Using the rates of disturbance from PIC to Base Case, calculate the amount of disturbance in the RSA that will be reached for each KIR at the end of life of the project.**
 - f) **Please relate the calculations of the amount of habitat to the fragmentation of habitat, showing for each development case whether or not the remaining habitat is interconnected and intact.**
- 2) **Issue:** Unjustified delineation of the Regional Study Area (RSA) boundary.

SIR Reference: SIR #8 (Wildlife)

Document Reference(s): Shell 2013: SIR 8, page 3-47; Shell 2007: Section 1.5.4, page 8, Figure 1.3-1

JRP JME Panel Reference (if applicable):

[22] - The Panel has concerns with some of the methods used by Shell to assess effects on terrestrial resources and Aboriginal TLU, rights, and culture. These concerns are that the local study area (LSA) consists of only the Project and existing Phase I footprints, that there is a lack of ecological context, and that the large size of the regional study area (RSA) adopted by Shell causes a “dilution effect.” The Panel also found it difficult to assess the significance of effects because of the coarse-scale Landsat imagery Shell used to estimate land cover type, because of the lack of use of thresholds to determine significance, and because of Shell’s consequent reliance on professional judgement. (JRP-JME 2013, page 5)

Gaps and/or Shortcomings in Shell’s Response:

The size of the RSA mediates the predicted effects of the PRM through a so-called ‘dilution’ effect. The dilution effect occurs when LSA impacts are measured in proportion to impacts at the regional scale. As the ratio of RSA size to LSA size increases, the predicted impacts of the project at the RSA will decrease, irrespective of the severity of impacts at the LSA scale.

Shell (2013, Appendix 3.1, page 6) recognizes the value in an ecologically defined RSA. In the case of the PRM, the RSA accounts for wide-ranging wildlife such as moose and caribou. Indeed, a scientifically-defensible and ecological justification for the RSA boundary is one that conforms to measured ecological processes, such as migratory patterns of key indicator resources. Alternatively, the RSA is based on a fixed and stated buffer around the LSA. However, the relationship between these considerations and the RSA boundary is not clear. For example, Figure 1.3-1 (Shell 2007) shows that the RSA boundary arbitrarily changes from river courses, to heights of land and then again to other undefined features. Moreover, some of the wildlife KIRs are neotropical migrants who range much farther than moose or caribou. The RSA was inconsistent in accounting for wide-ranging species, biophysical landforms or a fixed extent from the LSA.

Given Shell’s adherence to ‘ecological thresholds’ over arbitrary ‘resource management criteria’ (Shell 2013, Appendix 3.1, Section 2.11, page 42-49), defined relationships between ecological processes represented by the RSA, and the chosen RSA boundaries are absent from both the EIA (Shell 2007) and Shell’s Response to the JRP (Shell 2013). Consequently, the predicted

impacts of the PRM on wildlife KIRs at the RSA cannot be determined from information provided by Shell.

Request:

Please describe the data and analytical procedure used to define the RSA boundary presented in Figure 1.3-1 (Shell 2007) and how this boundary is based on the ecological processes identified in Shell (2013, Appendix 3.1, page 6).

3) Issue: Lack justification for evaluation of significance

SIR Reference: SIR #8 (Wildlife)

Document Reference(s): Shell 2013: SIR 8, page 3-47; Appendix 3.1

JRP JME Panel Reference (if applicable):

[625] – “The Panel believes that when addressing uncertainty, conclusions should be made conservatively, employing the precautionary principle where appropriate.” (JRP-JME 2013, page 105)

[626] - “Although the Panel used the 20 per cent loss threshold as a general guide when making decisions about significance, the Panel recognizes that the overly large size of the RSA makes it difficult to base such decisions solely on the numerical and other predictions for the RSA provided by Shell given its methods.” (JRP-JME 2013, page 105)

Gaps and/or Shortcomings in Shell's Response:

Uncertainty in data used to evaluate significance of the PRM can be mitigated using a conservative or pre-cautionary approach (JRP-JME 2013). Shell defines two approaches to the evaluation of significance with respect to the environmental impacts of the PRM. Ecological thresholds (ET) are defined by population persistence (i.e. ‘self-sustaining’), a population ‘effect’ or a population ‘function’ (Shell 2013, Appendix 3-1, page 43). Conversely, resource management criteria (RMC) are defined a priori, and in the case of the PRM, Joslyn North Mine Project and the Jackpine Mine Expansion Project, the JRP has adopted a loss of 20% as significant for any adverse impacts to species at risk. Loss refers to a reduction in species abundance or availability of habitat.

Shell argues that the ET are a more appropriate and meaningful assessment of significance if data are available. However, as described in MSES comments under Section 2.2.1, SIR#5, issue 3 (this report), the relationship between habitat suitability models and KIR abundance is unknown, as are the relative importance of factors limiting wildlife population growth (e.g., disease, habitat loss, predation). These factors form the basis of the ET rationale, which Shell describes as the point of ‘population failure’. To define such a point would, at minimum, require data on the direction and rate of population change for each wildlife KIR. Currently, Shell has not provided a singular estimate of wildlife population abundance, an estimated error for that estimate, or rates of historical and predicted population change. Shell (2013, Appendix 3.1, Section 1.11.2.5) describes how the HS models address uncertainty, yet there was no validation of the models by abundance or other metrics that actually track population viability (e.g., births, deaths, immigration, emigration). Moreover, Shell further argues that use of resource management criteria can create ‘spurious relationships’ of significance (Shell 2013, Appendix 3.1, Table 2.11-1, page 46) yet does not define or justify this statement.

Based on the absence of information provided to define points of population failure, and the pervasive use of opinion in the absence of empirical data, the Resource Management Criteria defined by Shell and the JRP appear to be a more conservative, pre-cautionary assessment of significance (Shell 2013, Appendix 2, Table 4.3-42 page 320).

Request:

Please quantify the criteria and data used to define ecological thresholds in the measurement of environmental significance for wildlife KIRs. Please provide a rationale as to what defines a 'spurious' relationship of significance and how this rationale is precautionary.

- 4) **Issue:** Human Health Risk Assessment (HHRA) and Wildlife Health Risk Assessment (WHRA) appear not to include the Pre-Industrial Case (PIC)

SIR Reference: SIR 8 (Human & Wildlife Health)

Document Reference(s): Shell 2013: SIR 8, page 3-47; Appendices 2, 3.1, and 3.7.

JRP JME Panel Reference (if applicable): n/a.

Gaps and/or Shortcomings in Shell's Response:

With respect to the Human Health Risk Assessment (HHRA) and Wildlife Health Risk Assessment (WHRA), Shell's response does not adequately address SIR 8. The HHRA and WHRA were not revised to include the PIC. Further, the revised HHRA and WHRA do not present a comparison or breakdown of the risks for the combined PRM/JME assessment versus the risks for the PRM only so it is difficult to assess how the HHRA and WHRA have changed.

Requests:

Please revise the HHRA and WHRA to include the risks associated with the PIC. Also, provide a comparison of the results of the HHRA and WHRA for PRM with the original risks presented in the EIA for PRM/JME so that reviewers can assess how, where, and why the risks have changed.

- 5) **Issue:** Changes in Moisture Regime

SIR Reference: JRP SIR 8 (Soils & Terrain)

Document References: Shell 2013: SIR 8, page 3-47, Appendix 1 and 2; and Shell 2007: Volume 5, Section 7.5.1.2, Pages 7-49 to 7-53, Table 7.5-4.

Gaps and/or Shortcomings in Shell's Response:

Potential changes in soil moisture regime due to the 2013 PRM Application Case in comparison to the PIC have not been assessed in Shell's response to the JRP SIR 8. See similar MSES comments under SIR#5 (e.g. Section 2.2.1, SIR#5 issue 9 to 13, this report).

Requests:

Provide predicted changes in soil moisture regime in the RSA due to 2013 PRM Application Case compared to the PIC.

- 6) **Issue:** Incomplete and inaccurate classification of baseline data in PIC, incomplete cumulative effects assessment for PDC, and unsubstantiated predictions of an increase in terrestrial uplands from Base Case to Far Future, reversible impacts to non-treed wetlands, and Far Future increases in high rare plant potential habitat

SIR Reference: JRP SIR 8 (Vegetation)

Document Reference(s): Shell 2013: SIR 8, page 3-47; Appendix 2

JRP JME Panel Reference (if applicable): n/a

Gaps and/or Shortcomings in Shell's Response:

Shell was asked to complete an update of the cumulative effects assessment for the Pierre River Mine separate from the Jack Pine Mine, including comparisons of the Application and PDC with the PIC and Planned Developments updated to June 2012. They were asked to assess the cumulative effects for all KIRs affected by the project. They did not re-assess the cumulative effects for riparian areas in the RSA.

Shell was asked to include a Pre-Industrial Case (PIC) in its cumulative effects assessment. To accomplish this, they used satellite imagery to develop a 1955 regional land cover classification map (Appendix 2, Section 2.4.2.1, page 26). The classification resulted in 13 Regional Land Cover Classes (RLCCs), which are assumed to have existed prior to industrial oil sands developments in the RSA. Each class fell into one of the following four broad groups: terrestrial, wetlands, miscellaneous cover classes, and disturbances. The miscellaneous land cover classes include recently burned areas, which covered 420,169 ha in 1955 (18.5% of the RSA). As discussed above (Sec 2.2.1, SIR 5, issue 8, page 27), burned areas are simply young forests and they should be classified as to their ecosite phase or wetland type. Based on the description of the data used to generate the land cover map, it seems that Shell should at least be able to determine whether the areas classified as burn were either wetlands or uplands. And, given that they have current data for the RSA where the same forested areas are about 60 years old, it seems reasonable to assume that Shell is able to further classify these areas as to their specific ecosite phase or wetland type. By simply leaving these areas classified as burn, a large portion of the RSA is excluded from any meaningful assessment.

Shell completed the 2013 Planned Development Case for those vegetation KIRs that had a low, moderate, or high and negative environmental consequence in the LSA in the 2013 PRM Application Case assessment at Closure, and were applicable at the RSA scale. The only KIRs that met these criteria are wetlands, old-growth forests, and high rare plant potential. However, as discussed above (Sec 2.2.1, SIR 5, issue 8, page 27), Shell's predictions of some of the environmental consequences of the project in the LSA are likely inaccurate because they are based on the unsupported beliefs that Shell will be able to re-establish a wide variety of plant species and new functioning riparian zones after project completion. Also, Shell does not assess the effects of the project on riparian communities in the RSA, and therefore this KIR is considered to be not applicable, despite the fact that the environmental consequence for this KIR is predicted to be negative and high in the LSA. The KIRs that may have inaccurate environmental consequences include terrestrial vegetation, lichen jack pine communities, riparian communities, and high traditional use plant potential. The environmental consequences for these KIRs need to be re-evaluated based on evidence of the plant species that Shell has shown it can re-establish within reclamation sites and based on evidence regarding the re-establishment of riparian zones. Only then can Shell more accurately complete the cumulative effects assessment as requested in SIR 8.

Shell updated the assessment of cumulative effects for the PIC to Application Case and for the PIC to Planned Developments Case (PDC). *"The combined developments in the 2013 PDC will result in the direct and indirect loss or alteration to the 2013 Base Case terrestrial and wetlands*

resources (Table 3.4-5). A total of 144,451 ha or 6% of the RSA will be disturbed in the 2013 PDC relative to the 2013 Base Case" (Appendix 2, Section 3.4.2.1, page 118). However, from the 2013 Base Case to Far Future Shell predicts that "there will be an overall increase of 188,255 ha of terrestrial vegetation." This prediction of an overall increase in terrestrial vegetation is based on an assumption of successful reclamation of ecosite phases and wetland types in the PRM development area in the far future scenarios. As discussed above (SIR 5, issue 8), Shell's assumption of successful reclamation whereby a large variety of plant species are re-established within reclamation sites is not supported either by their re-vegetation plan or evidence in the scientific literature (e.g. Appendix F in OSVRC 1998, Geographic Dynamics Corp 2006, MacKenzie and Naeth 2010, Shaughnessy 2010). Before Shell can predict that there will be an overall increase in terrestrial vegetation from Base Case to Far Future, they would need to provide evidence that a high diversity of plant species and plant communities can be re-established through reclamation.

Shell states that "At Far Future, wetlands (including peatlands and patterned fens) have been assigned a negative and low environmental consequence ranking. Although the peatlands (i.e., fens) in the RSA cannot be reclaimed with current technologies, non-treed wetlands can be reclaimed (Appendix 2, Section 3.4.2.1, page 121)." This is the basis for their conclusion that impacts to wetlands are reversible/irreversible. However, it is not clear specifically which non-treed wetlands Shell believes can be reclaimed as they do not discuss either the wetland types or the species that can be reclaimed. Before they can draw the conclusion of reversible/irreversible impacts to wetlands, Shell would need to provide evidence that a variety of wetland plant species present within a particular wetland community can be re-established within reclamation sites, either by planting, seeding, from cuttings, or other methods.

Shell states that "An estimated 45,969 ha of high rare plant potential ...will be lost from 2013 Base Case to the 2013 PDC in the RSA. Post reclamation, high rare plant potential habitat is predicted to increase by 14,398 ha over the 2013 Base Case (Appendix 2, Section 3.4.2.1, page 121). This predicted increase in high rare plant potential in the Far Future is mainly a result of non-treed wetlands reclamation and natural wetlands regeneration on existing and future linear disturbances.... At Far Future, the high rare plant potential environmental consequence ranking is positive and low within the RSA." The prediction of Far Future increases in high rare plant potential habitat is based on the belief that Shell can reclaim non-treed wetlands, where many rare plant species presumably reside. However, as mentioned above, it is not clear specifically which non-treed wetlands Shell believes can be reclaimed as they do not discuss either the wetland types or the species that can be reclaimed. If Shell has no evidence that the rare plant species and other species associated with high rare plant habitat (i.e. wetland communities) can be re-established in reclamation sites, either by planting, seeding, from cuttings, or other methods, then their predicted environmental consequences for high rare plant potential in Far Future are questionable.

Request(s):

- a) Please re-assess the environmental consequences prior to reclamation for riparian areas in the RSA.**
- b) Please explain why Shell could not use current data for the RSA to determine whether the areas classified as burn in the Pre-Industrial Case were either wetlands or uplands.**

- c) **Please provide evidence that a high diversity of plant species and plant communities can be re-established through reclamation to justify the prediction that there will be an overall increase in terrestrial vegetation from Base Case to Far Future**
- d) **Please provide evidence to support the conclusion of reversible impacts to non-treed wetlands. If no evidence can be provided, please reassess effects to non-treed wetlands based on available data.**
- e) **Please provide evidence to support the prediction of Far Future increases in high rare plant potential habitat. If no evidence can be provided, please revise these predictions based on available data.**
- f) **Please re-assess the cumulative effects consequences prior to reclamation for riparian areas in the RSA.**

7) Issue: Lack of details provided

SIR Reference: SIR 8 (Air Quality)

Document Reference(s): Shell 2013: SIR 8, page 3-47; Appendix 2.

JRP JME Panel Reference (if applicable): n/a

Gaps and/or Shortcomings in Shell's Response:

Shell's response is inadequate because few details regarding methods and model inputs are provided in the Appendices that would allow one to fully assess Shell's response to the JRP's SIR. For further discussion as to information gaps in the air quality assessment, please see Section 2.2.1 SIR#5 issue 16 (this report).

Request(s):

See Section 2.2.1 SIR #5 issue 16 (this report).

2.2.5 SIR #9

1) Issue: Adequacy of Impact Predictions from Future Projects

SIR Reference: JRP SIR #9 (Wildlife)

Document Reference(s): Shell 2013: SIR 9, page 3-67.

JRP JME Panel Reference (if applicable):

[10] The Panel understands that the provincial and federal governments will need to make separate decisions about the Project, taking into account the Panel's report. The Panel acknowledges that Shell is planning to reclaim the Project footprint to equivalent land capability. The Panel believes that reclamation is useful but that it will not mitigate all of the significant effects because some habitat types cannot be reclaimed (e.g., peatlands), and reclamation will not occur or be complete for many years.

[613] ...Shell referred to the concept of critical habitat thresholds as reported in the scientific literature, indicating that habitat loss of up to 70 to 90 per cent may be required before a critical habitat threshold is reached. Shell explained that any change of more than 20 per cent in the measurement end point was considered a high-magnitude change. However, EC stated that Shell described a 40 per cent loss of habitat for caribou as being a low magnitude effect. OSEC argued that the critical threshold approach, which could take a species to the brink of extinction before

corrective measures were initiated, was inconsistent with *CEAA, 2012* and *Species at Risk Act* (SARA), both of which require that the precautionary approach be taken. EC stated that the 70 to 90 per cent threshold is not precautionary, and that thresholds can vary depending on several factors, including the specific species and the study area. EC also stated that there was much uncertainty around thresholds and that habitat loss in the range of 20 to 40 per cent can be enough to change a population trajectory.

[652]the Panel used the following approach to determine the significance of project effects on wetland habitat in the LSA: The effects are largely irreversible—given that there is no evidence that peatlands can be successfully reclaimed...

[691] EC stated that there has already been high habitat loss for some species, such as Canada warbler, in the RSA, and thus there was no evidence that there would be surplus habitat within the RSA to support the influx of additional birds. EC stated that the success of reclamation and re-colonization of reclaimed habitats by species at risk and many migratory birds is uncertain and, for old-growth-dependent species, will take considerable time to achieve....

[692] EC, OSEC, and ACFN stated that even if species that rely on old-growth forests were able to recolonize those areas after reclamation, there would be a considerable time lag of essentially 100 years...

[710] ... The Panel further recognizes that the extended time lag for reclamation of old-growth forests may preclude re-colonization by preindustrial flora and fauna as some of the species that are currently declining may be extirpated before habitat can be restored.

[923]... EC stated that the success of reclamation and re-colonization of reclaimed habitats by species at risk and many migratory birds is uncertain and, for old-growth-dependent species (e.g., blackthroated green warbler and Canada warbler), will take considerable time to achieve.

[968] EC stated that there was a great deal of uncertainty about whether species will recolonize some upland habitats in the long term.

[990] ... The Panel also believes that there is a level of uncertainty related to reclamation success, including the degree and rate at which species will recolonize and use the reclaimed landscape.

Gaps and/or Shortcomings in Shell's Response:

The SIR requests that Shell provide a better approach to cumulative effects assessment. A large part of our comments and outstanding requests were identified in Section 2.2.4, SIR 8, issue 1 (this report). However, the major shortcomings can be summarized here:

- The project list used in the cumulative effects assessment underestimates future disturbances. For example, the Teck winter drilling exploration program will add to regional disturbance, but is not captured (see Figure 2.2.5-I below). There will likely be many exploration and infrastructure projects during Shell's project life that are not captured by Shell's project list. For that reason, learning from historic trends is a more useful approach to cumulative effects analyses.

- The application of zones of influence surrounding disturbance is unclear (see MSES comments under Section 2.2.10, SIR#35, issue 1, this report).
- Reclamation success and reversibility of impacts is still assumed, but no evidence has been provided by Shell to demonstrate where in the Oil Sands region pre-disturbance conditions have been re-established.

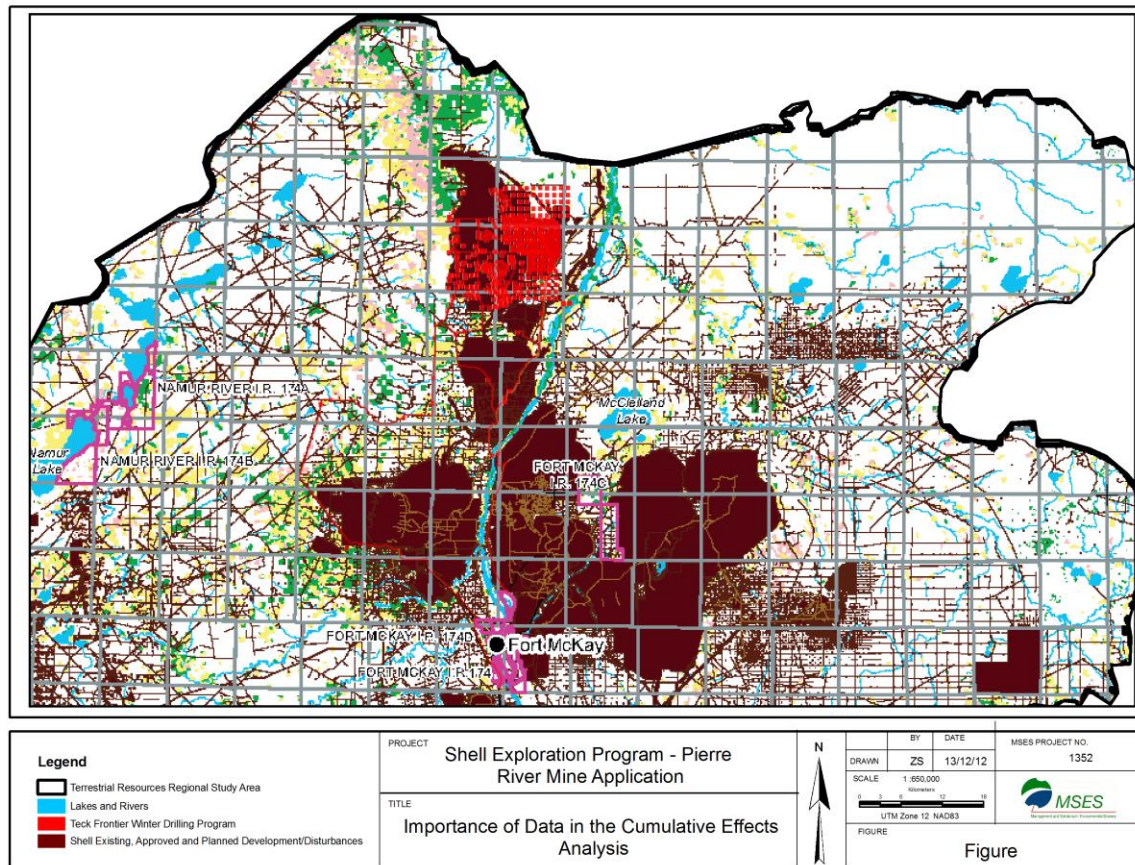


Figure 2.2.5-1: Shell's Planned Development Case North part of RSA shown including the approved Teck 2013/14 winter drilling exploration program. The footprint of Teck's program is not drawn to scale, but it indicates the locations that have not been captured by Shell's Existing Approved and Planned Disturbance.

Request(s):

- Please use historic trends of industrial disturbance to project future disturbances.

b) Please provide empirical evidence to support Shell's assumption that the future projects will be able to re-establish the conditions that existed prior to disturbance.

2) Issue: Inaccurate predictions of negligible environmental consequences for many vegetation KIRs, particularly in the RSA

SIR Reference: JRP SIR #9 (Vegetation)

Document Reference(s): Shell 2013, Appendix 2.

JRP JME Panel Reference (if applicable): n/a

Gaps and/or Shortcomings in Shell's Response:

Concerns raised above in SIR 8, issue 6 (Sec 2.2.4, page 47) related to Shell's cumulative effects assessment apply to this SIR in that this reviewer does not agree with Shell's predicted negligible environmental consequences for many vegetation KIRs, particularly in the RSA (also see Sec 2.2.1, SIR 5, issue 8, page 27).

Request(s):

Please see concerns in SIR 5, issue 8 and SIR 8, issue 6 related to Shell's cumulative effects assessment.

2.2.6 SIR #19

Issue: Lack of details provided regarding NO_x emissions

Document Reference(s): Shell 2013: SIR 19, page 3-84; Appendix 3.2.

JRP JME Panel Reference (if applicable): n/a

Gaps and/or Shortcomings in Shell's Response:

The sulfur dioxide (SO₂) emissions from the Pierre River Mine have been reassessed and because of the change to natural gas fired heaters/boilers the SO₂ emissions have reduced significantly, to near negligible levels. The NO_x emissions have not reduced, but few details are provided about how the emissions were calculated. A major failing of the air quality dispersion modelling is the characterization of NO_x sources and the prediction of the nitrogen dioxide (NO₂) concentrations. Because the NO_x emissions are important for human/environmental health as well as deposition modelling, the air dispersion modelling must be verified with existing emissions and existing monitoring data.

Request(s):

a) Please provide details as to how the NO_x emissions were calculated.

b) Using an Existing Emissions case, regional monitoring data or collection of new monitoring near mobile fleets, provide a NO_x source characterization and modelling methodology that provides an acceptable level of agreement between modelling and monitoring.

2.2.7 SIR # 27

Issue: Insufficient examination of the Lower Athabasca Regional Plan (LARP) surface water quality guidelines as they relate to modeled surface water quality in the Athabasca River.

SIR Reference: JRP SIR #27 (Water Quality)

Document Reference(s): Shell 2013: SIR 27, page 3-112; Appendix 2.

JRP JME Panel Reference (if applicable): n/a

Gaps and/or Shortcomings in Shell's Response:

Shell responded to the JRP SIR 27 by comparing predicted Athabasca River water quality at Embarras with the water quality limits prescribed by Lower Athabasca Regional Plan (LARP), and found that none of the predicted concentrations exceeded the LARP limits. This is true, but the SIR asked Shell to *"describe any implications related to implementation of the Lower Athabasca Surface Water Quality Framework thresholds on PRM water quality modeling, including potential required changes to Shell's proposed monitoring program. Explain how these thresholds might affect Shell's current results and predictions of water quality impacts from the Project."*

Upon closer inspection, of the 21 substances considered by Shell in the comparison Table 3.3-15 (Shell 2013 Appendix 2, page 98), 12 will exceed LARP's peak surface water quality triggers under the 2013 PDC and in many cases the 2013 PRM Application Case scenarios. A quick scan of the water quality predictions for the Athabasca River at the mouth of Redclay Creek (Shell 2013 Appendix 2 Table 3.3-13, page 94-95) shows that of the 50 substances modeled for the 2013 PDC case (and in some cases in the PIC case), 23 have modeled peak concentrations that exceed the LARP peak surface water quality triggers (Shell provides only the limited predictions of Athabasca River water quality at Embarras that are included in Table 3.3-15). In addition, there are 61 substances with triggers and/or limits listed in LARP, but Shell's modeling includes only 27 substances from the LARP list.

Requests:

- a) **Shell has avoided the discussion of implications posed by LARP by focusing on a select portion of the LARP surface water quality plan. Please provide the full discussion that was requested in JRP SIR 27, including how Shell's current results and predictions of water quality impacts in the Athabasca River from the Project will change considering the potential predicted LARP trigger exceedances.**
- b) **Please explain how Shell will fully assess future impacts to the Athabasca River if it has not modeled many of the substances that are listed with triggers and/or limits in the LARP.**

2.2.8 SIR # 32

- I) **Issue:** No quantitative information regarding how mitigation will reduce methyl mercury levels

SIR Reference: SIR 32a (Human & Wildlife Health)

Document Reference(s): Shell 2013: SIR 32, page 3-125; Appendix 1; Appendix 2.

JRP JME Panel Reference (if applicable): n/a.

Gaps and/or Shortcomings in Shell's Response:

SIR 32a requested that Shell provide *"...evidence of the success of the proposed mitigation options in reducing methyl mercury levels below HC guideline levels."* (Shell 2013, SIR 32 page 3-125) Shell did not provide any quantitative information regarding how their proposed approach would reduce methyl mercury levels below Health Canada (HC) guideline levels. For example, Shell proposes to use *"...selective intensive harvesting to manage methyl mercury concentrations in the fish population of the South Redclay Lake."* (Shell 2013, SIR 32, page 3-125). They simply state that *"This technique*

is supported by experimental studies that have demonstrated reductions in methyl mercury after intensive fishing events (Surette et al. 2006; Verta 1990)." (Shell 2013, SIR 32, page 3-125). They do not identify the amount of reductions (or the time required) that have been achieved in the experimental studies and also whether or not the range of concentrations treated in the experimental studies are consistent with concentrations predicted in South Redclay Lake

Requests:

Please present a quantitative assessment of how the proposed (including timeline, methyl mercury concentrations, and quantity of fish harvested) mitigation approach will reduce methyl mercury concentrations below HC guideline levels.

- 2) **Issue:** No quantitative information on how contingencies will reduce methyl mercury levels

SIR Reference: SIR 32b (Human & Wildlife Health)

Document Reference(s): Shell 2013: SIR 32, page 3-125; Appendix 1; Appendix 2.

JRP JME Panel Reference (if applicable): n/a.

Gaps and/or Shortcomings in Shell's Response:

SIR 32b asked Shell to "Describe contingencies in the event that mercury levels remain high for an extended period beyond the 1-2 years peak Shell had indicated." (Shell 2013, page 3-125). Shell did not provide any quantitative information that provided evidence how their proposed contingencies (i.e., signage to warn against fish consumption, increasing frequency of intensive harvests, and installing a drop structure at the outlet of South Redclay Lake) would reduce methyl mercury levels below HC guideline levels.

Requests:

Please provide quantitative information regarding how the proposed contingencies (i.e., signage to warn against fish consumption, increasing frequency of intensive harvests, and installing a drop structure at the outlet of South Redclay Lake) will reduce methyl mercury levels below HC guideline levels.

- 3) **Issue:** Shell's assessment of cumulative effects of high mercury levels on fish does not include fish from South Redclay Lake

SIR Reference: SIR 32c (Human & Wildlife Health)

Document Reference(s): Shell 2013: SIR 32, page 3-125; Appendix 1; Appendix 2.

JRP JME Panel Reference (if applicable): n/a.

Gaps and/or Shortcomings in Shell's Response:

SIR 32c requested Shell "Assess cumulative effects of high mercury levels on fish health in association with other water quality constituent increases through the life of the Project." (Shell 2013, SIR 32 page 3-125). Shell did not include fish from South Redclay Lake in their assessment which is predicted to be significantly impacted by mercury. Consequently, Shell's response does not adequately address SIR 32c.

Request:

Please include fish from South Redclay Lake in the assessment of high mercury levels on fish health.

2.2.9 SIR #34

Issue: Inappropriate choice of waterfowl KIR, inadequate rationale provided in context of TEK, and lack of cumulative effects analysis on waterfowl migration and use of PAD

SIR Reference: JRP SIR #34a, b, c, d (Wildlife)

Document Reference(s): Shell 2013: SIR 34, page 3-129 to 3-137.

Key JME Panel References:

[921] Shell said that it used the horned grebe as a surrogate species for waterfowl given that the grebe shares a substantial number of ecological requirements and life stages with ducks and geese. ACFN and EC stated that Shell should have used a species of waterfowl as a KIR. ACFN challenged Shell's use of the horned grebe as being representative of waterfowl and stated that other species such as the lesser scaup would be more appropriate. ACFN stated that the horned grebe belongs to the order Podicipediformes which are not considered to be classified within the waterfowl group. EC stated that the nesting habitat requirements of ducks and geese differ from that of the horned grebe. Shell predicted a loss of 97 per cent of horned grebe habitat due to construction and operations and a 58 per cent loss of high quality-habitat at closure.

[925] Aboriginal groups stated that the migration pathways for many waterfowl appear to have changed in that they are no longer flying over the oil sands region or using the PAD in the same way. EC confirmed that it has observed the shifting patterns in migration pathways but that further study is required.

[947] Shell acknowledged that ACFN participants in a 2005 CEMA-sponsored workshop provided some TEK describing the decline of migratory birds in the PAD. ACFN suggested that the decline in migratory bird abundance and changes in migration routes are affecting the spring hunt in the oil sands region and specifically in the PAD. ACFN said that waterfowl serve as a signpost for the health of the PAD and the Athabasca River.

[948] Shell stated that its assessment of baseline conditions indicated no decline in the number of migratory birds in the PAD. Shell mentioned that it did not integrate ACFN's TEK in its EIA because it did not match the baseline data.

[950] EC stated that the migration routes of birds may be changing and this change could affect the availability of these birds in the PAD. According to EC, the oil sands industry may or may not be contributing to change in the migration routes and to decline of migratory birds in the PAD, as the reasons for the changes in the migration routes are not clear.

[958] The Panel is concerned about substantial predicted declines in horned grebe, a KIR chosen by Shell to represent waterfowl. The Panel agrees with EC that the reasons for changes in the migration routes of waterfowl are not yet understood and that more study is required.

[961] The Panel recommends that the Governments of Canada and Alberta, in collaboration with interested Aboriginal groups and stakeholders, initiate a joint effort to determine whether the waterfowl population in the oil sands region has declined and whether migration routes have changed. If results demonstrate that there has been a decline, or if routes have changed, the

Panel recommends that the Governments of Canada and Alberta work together to determine the causes.

Gaps and/or Shortcomings in Shell's Response:

Comments on 34a and 34b: Shell was asked to clarify and provide rationale for why they had not used a waterfowl KIR as previously requested by First Nations. Shell states that horned grebe was considered a surrogate KIR species for waterfowl in general. Although an ecological rationale for the choice is provided by Shell in the SIR response, Shell's response does not address the points highlighted in the JRP SIR that explicitly state how waterfowl are harvested by First Nations people and that ACFN members have reported changes in waterfowl abundance concurrent with oil sands development. There is no rationale or clarity provided as to how horned grebes are good waterfowl surrogate in the cultural concept of First Nation use.

Shell's ecological rationale for horned grebe as a surrogate for waterfowl is related to sharing similar ecological requirements and life history traits but Shell does not address the uncertainty around this assumption. If this rationale were true, one would expect that field surveys would detect horned grebe in the LSA but according to baseline waterfowl surveys conducted in 2005, 2006 and 2012, no horned grebe were observed while numerous other waterfowl species were detected. Therefore, Shell's assertions that "*horned grebe is an effective surrogate for waterfowl in the assessment*" has not been validated by the baseline data collected and the absence of horned grebes from the waterfowl surveys is not addressed by Shell in their response. Furthermore, in the JRP hearing for the JME, Environment Canada (EC) agreed with the ACFN that nesting habitats of ducks and geese do differ from the horned grebe (see JRP-JME 2013, [921]) and may not be an appropriate surrogate for waterfowl.

Comments on 34c and 34d: Shell did not provide an answer to SIR 34c. Shell was asked to explain how they incorporated TEK about decline of waterfowl populations in the PAD into its EIA. Their response simply refers the reader to SIR #34d where they list four reported concerns from the 2012 Firelight Group report, but no detailed discussion about how this information was used to inform their assessment. Shell states that traditional harvesting information provided is outside of the RSA and therefore, this data appears to be not considered further based on this statement. In addition, there is no further discussion to address the First Nation concern of "*observed change in migratory patterns*" (Shell 2013, SIR 34 pg 3-132). Therefore, a response from Shell regarding this concern remains outstanding. Shell states that the PRM will not impede migration because birds are able to fly "*around or over development*" (Shell 2013 SIR 34 page 3-134). However, there is no evidence to substantiate this claim. In fact, there is increasing concern by government and stakeholders that very little is known about whether migration routes of waterfowl are changing as a result of oil sands development and it is now recognised (including in the JRP-JME 2013 decision report) that there is great need for further information to be collected. The PRM updates provided Shell with an opportunity to improve upon their assessment by integrating First Nations information but Shell does not appear to have capitalized on this opportunity.

Specific to 34d, which asks Shell to assess the cumulative impacts of the project on waterfowl species in the PAD, Shell makes a highly speculative, unfounded, and misleading statement based on United States Fish and Wildlife Service (USFWS) data that "*waterfowl populations in northern*

Alberta have been resilient to Oil Sands development”(Shell 2013 SIR 34 pg 3-134). However, USFWS data does not focus on the Oil Sands or PAD regions specifically. Indeed Shell goes on to state that the USFWS data may be ineffective at detecting waterfowl population declines in the PAD. Shell also points out that these data do not include geese which are an important waterfowl species for the First Nations. Therefore, Shell’s response in SIR #34d requires further clarification as several statements contradict each other.

Ironically, the USFWS data that Shell uses in their argument for waterfowl populations in northern Alberta does not include data on Shell’s chosen KIR – the horned grebe (not deemed a waterfowl species by USFWS). If Shell had used their own waterfowl KIR for this analysis there would have been different results. Firstly, the total population of horned grebes in North America is largely unknown (Bird Life International 2012) and so resiliency of a population would have been difficult to determine. Secondly, horned grebes have shown significant long-term and short-term declines in North America (Stedman 2000), including declines observed in the Alberta boreal region (Stedman 2000; FAN 2007). Declines are likely the result of the loss and degradation of wetland breeding habitat due to contamination (COSEWIC 2009). Additionally, it was pointed out during the JME hearing that there is still very little known about the overall population trends for waterfowl as a result of oil sands activities and the JRP made a recommendation that Governments of Canada and Alberta, in collaboration with interested Aboriginal groups and other stakeholders, initiate a joint effort to determine whether the waterfowl population in the oil sands region has declined (see JRP-JME 2013, [961]).

Request(s):

- a) **Please provide survey data that would substantiate Shell’s assertions that the horned grebe is a suitable surrogate for waterfowl because they have similar ecological requirements and life history traits which would suggest they would be present within the LSA.**
- b) **Please discuss how the use of horned grebes instead of waterfowl as a KIR addresses the cultural concept of First Nation use.**
- c) **Please provide comprehensive responses to SIR #34c and d that are supported by appropriate and relevant data sources and incorporate and address available TEK information. If an information gap exists and there is currently not enough data available to appropriately respond to the SIR, then please state this clearly and discuss how this information gap affects the confidence in the impact assessment.**

2.2.10 SIR #35

- I) Issue:** Future habitat suitability at the RSA and LSA scale.

SIR Reference: 35a, 40a, 40b (Wildlife)

Document Reference(s): Shell 2013: SIR 35, page 3-137, SIR 40 pages 3-148 to 3-149; Appendix 3-7.

JRP JME Panel Reference (if applicable): n/a

Gaps and/or Shortcomings in Shell’s Response:

Zones of influence (ZOI) and 'indirect' habitat loss are considered in the impact assessment tables for habitat loss/wildlife abundance (Shell 2013, Appendix 3-7); however, the distance and effect size (i.e., the disturbance coefficient) is not shown, except for woodland caribou.

The ZOI distances presented by Shell (Shell 2013 Appendix 3-7 Table 1.2-3) are 150-400% shorter than published findings. The woodland caribou ZOI shown (Shell 2013, Appendix 3-7) is based on Dyer (1999). Shell (2013) used a value of 250 m for its assessment of 'Facilities and Developments' based on caribou avoidance of new wellpads. In the published version of this thesis (Dyer et al. 2001), caribou are shown to avoid new wellpads up to 1000 m during calving season. Similarly, Shell (2013) used a value of 100 m for its assessment of 'Utility corridors' based on caribou avoidance of seismic lines. Dyer et al. (2001) reports that in late winter caribou avoid seismic lines up to 250 m. Calving and late-winter are resource-limiting periods for caribou (Parker et al. 2005) and so represent the best season to assess impacts of the PRM. As an example of a more conservative approach to zones of influence, the Keeyask Hydropower Limited Partnership (KHLP), for the Keeyask Generation Project, used a 500 m buffer on all linear features (roads, transmission lines, railways, and conventional cutlines) as per the Environment Canada Woodland Caribou Recovery Strategy (2012). This is double the maximum zone of influence used by Shell for woodland caribou.

In the response to SIR 40 b), Shell states that "*Habitat suitability in the future can only be represented prior to reclamation at the RSA scale because spatial data describing the reclamation plans of planned developments are not available.*" (Shell 2013, page 3-149). This comment indicates that there are significant knowledge gaps in the predicted distribution and composition of future landcover at the RSA scale. This knowledge gap undermines the conclusion made by Shell that the availability and fragmentation of habitat at the RSA scale will offset or mitigate disturbance at the LSA scale. For example, Shell (2013, page 3-55) states "*as many wildlife KIRs are not likely to be directly limited by habitat in the RSA, this conservative assumption is likely to result in overestimations of actual effects to abundance.*" This argument is not supported by the information presented because: 1) the probability of successful reclamation is unknown (e.g., JRP-JME 2013, p6 [30]), 2) the location and amount of reclaimed habitat is unknown, and 3) the effect of habitat loss on the abundance of wildlife KIR is unknown (see MSES wildlife comments Section 2.21 SIR 5 Issues 1 and 3).

Request:

- a) **Please provide information on the size and effect of zones of influence and indirect habitat loss for each disturbance type and for each wildlife KIR.**
- b) **Please provide a rationale as to why a non-conservative ZOI was used for woodland caribou.**

- 2) **Issue:** Omission of waterfowl KIR in the habitat suitability mapping for the updated cumulative effects assessment

SIR Reference: JRP SIR #35 (Wildlife)

Document Reference(s): Shell 2013: SIR 35, 3-137 to 3-138.

Key JME Panel References: n/a

Gaps and/or Shortcomings in Shell's Response:

This SIR requested updated habitat suitability maps for each wildlife KIR in the RSA during pre-industrial baseline, at present and future. However, Shell's waterfowl KIR, the horned grebe, does not appear in the list of wildlife KIRs to be included in the mapping. Therefore, critical cumulative effects habitat mapping has not been completed for all wildlife KIRs.

Request:

Please provide an updated habitat suitability map for horned grebe in the RSA for pre-industrial baseline, at present and in the future.

2.2.11 SIR #39

- 1) **Issue:** Re-Establishment of Forage Resources does Not Equal the Re-Establishment of Habitat.

SIR Reference: JRP SIR #39 (Wildlife)

Document Reference(s): Shell 2013: SIR 39, page 3-145, page 3-147.

JRP JME Panel Reference (if applicable):

[26] ... The Panel also believes that reclamation will not sufficiently mitigate the effects on species at risk and migratory birds that rely on old-growth forest because of the substantial amount of time needed to re-establish habitat...

Gaps and/or Shortcomings in Shell's Response:

Regarding SIR 39, Shell notes that: *"In addition to potential health effects, effects to lichen abundance could potentially affect woodland caribou by decreasing the availability of an important source of forage. However, habitat loss is not believed to be a limiting factor for woodland caribou, and caribou populations likely remain below the carrying capacity set by forage availability, even in fragmented landscapes (Wittmer et al. 2005). Instead, most evidence indicates that the primary effect of development on caribou derives from the changes in large mammal predator-prey systems that accompany the creation of early seral vegetation communities by large-scale clearing (e.g., forest harvesting, seismic lines; James and Stuart-Smith 2000; Latham et al. 2011; Wittmer et al. 2005). Therefore, any effect to lichen abundance due to development in the Regional Study Area is unlikely to affect the abundance of woodland caribou."* (2013, page 3-147).

This statement demonstrates Shell's recognition that the source of forage does not equal habitat. This recognition underlines the inadequacy of Shell's assumptions that by reclaiming patches of land, the impacts could be reversed. Landscape fragmentation and habitat configuration as well as predator-prey dynamics play an important role, even if the forage resources could be re-established to their original condition. For that reason, Shell's conclusions about environmental consequence "after reclamation", whether it is on the LSA or the RSA scale, or whether it is based on Resource Management Criteria or Ecological Thresholds (see for example MSES comments under Section 2.2.4 SIR 8, issue 1 and 3, this report), remain unsupported by evidence.

Request(s):

Please explain, for every wildlife KIR, how reclamation will reverse the impacts of fragmentation and altered predator-prey dynamics.

- 2) **Issue:** No assessment of the impact of airborne contaminants in both the gaseous and particulate phase on lichens

SIR Reference: SIR 39 (Human & Wildlife Health)

Document Reference(s): Shell 2013: SIR 39, page 3-145.

JRP JME Panel Reference (if applicable): n/a.

Gaps and/or Shortcomings in Shell's Response:

Shell's response does not adequately address SIR 39. The SIR requested *"Given the potential for direct and indirect impacts from sulfur dioxide on sensitive lichen species and that lichens are a high food value to caribou, update the WHRA to include boreal caribou as a wildlife receptor."* Shell did not include boreal caribou as a wildlife receptor as requested. Rather, Shell's response appears to dispute the SIR's assertion that *"...lichens are of high food value to caribou and are sensitive to air emissions, they are good indicators of potential effects of air emissions on wildlife habitat."* Shell claims *"...most evidence indicates that the primary effect of development on caribou derives from the changes in large mammal predator-prey systems that accompany the creation of early seral vegetation communities by large-scale clearing (e.g., forest harvesting, seismic lines; James and Stuart-Smith 2000; Latham et al. 2011; Wittmer et al. 2005). Therefore, any effect to lichen abundance due to development in the Regional Study Area is unlikely to affect the abundance of woodland caribou."*

The data gap is whether or not lichens are adversely impacted by airborne contaminants. The JRP's SIR asserts that lichens are sensitive to airborne pollution and are good indicators of the effects of airborne emissions on wildlife. In other words, if the lichen population is reduced due to exposure to airborne contaminants, then there may also be adverse effects higher up the food chain (e.g., boreal caribou, which preferentially consume lichens, may be adversely impacted due to their decreased availability). Shell needs to address two primary data gaps:

- Are lichens potentially adversely affected (e.g., population/abundance) by airborne contaminants in the gaseous and particulate phases and what concentrations?
- Are lichens a significant component of the diet of boreal caribou (or other receptors) such that a decrease in population/abundance would adversely affect direct and indirect consumers?

Requests:

Please provide an assessment of the impact of airborne contaminants in both the gaseous and particulate phase on lichens and revise the assessment to include boreal caribou in the WHRA.

2.2.12 SIR #40

Issue: Details lacking regarding zones of influence

SIR Reference: JRP SIR #40 (Wildlife)

Document Reference(s): Shell 2013: SIR 40, page 3-148; Appendix 5.

JRP JME Panel Reference (if applicable): N/A

Gaps and/or Shortcomings in Shell's Response:

Shell provides maps depicting habitat suitability (or core security for wolverine) for SAR assessed in the EIA. Although Shell says they considered zones of influence (e.g. ZOI created for caribou as part of the resource selection function values used for the habitat suitability models), it does not appear that any details as to how the ZOIs were measured were included. Please see MSES comments under Section 2.2.10, SIR #35, issue 1 (this report) for further details.

Lastly, Shell's use of wolverine 'core security' habitat to define habitat suitability is stated to be based on distance to human disturbance. However, it does not appear that Shell provides the details such as distances or types of disturbances used to identify this core security habitat.

Request(s):

Please provide details as to the distances or types of disturbances used to identify wolverine core security habitat.

2.2.13 SIR #4I

Issue: Wood Bison

SIR Reference: JRP SIR #4I (Wildlife)

Document Reference(s): Shell 2013: SIR 4I, page 3-149 and 3-150.

JRP JME Panel Reference (if applicable):

[873] The Panel notes that the federal recovery strategy under SARA is over 10 years late. The Panel understands that without the recovery strategy in place, it is difficult to determine the importance of the Ronald Lake herd in contributing to the population objectives for the recovery of the species. Similarly, without the identification of critical habitat, it is difficult for the Panel to establish the importance of the area of the Redclay Compensation Lake for meeting the objectives of the recovery of the wood bison population, and hence the significance of environmental effects.

[875] The Panel recognizes that wood bison habitat of the Ronald Lake Herd would be affected by the compensation lake and that this might affect ACFN's ability to hunt wood bison. The Panel also acknowledges that ACFN provided little information about the abundance of wood bison in that herd or about the importance of habitat that will be affected by the compensation lake.

[877] Given this analysis and the lack of available information on the relative importance of the Ronald Lake herd to the overall recovery of wood bison, the Panel determines that the project effects on wood bison in the Ronald Lake herd are adverse but are unlikely to be significant, pending further information, to be identified in the anticipated recovery strategy, on population objectives and critical habitat of wood bison.

Gaps and/or Shortcomings in Shell's Response:

Shell was asked to quantify the effects of the Project and other cumulative effects on wood bison within their current core range as identified through Traditional Ecological Knowledge (TEK). Shell still maintains that bison are primarily limited by disease (Shell 2013, SIR 4I page 3-149). The First Nations submitted evidence in the hearings regarding the Teck winter drilling exploration program in August 2013 that the diseases play a relatively minor role in bison management (Bradley and Wilmshurst 2005, Jensen et al. 2004, Strong and Gates 2009). This is particularly true for the Ronald Lake Bison Herd which may not be infected at all, as Shell acknowledges: "*the herd appears to be either free of these diseases or infected at a rate that is lower than the sampling strategy was capable of detecting, and lower than the 30% to 50% rate of disease present in herds in and around Wood Buffalo National Park*" (Shell 2013 SIR 4I page 3-150). We provide further comments on Shell's beliefs in Table 2.2.13-1 (below).

Request(s):

Please respond to the SIR and provide a quantitative assessment of effects to wood bison using modern scientific techniques and recent peer-reviewed literature.

Table 2.2.13-1 Comparing Shell's beliefs about bison with the weight of existing evidence.

Shell's Belief	The Weight of Evidence
Bison in the Ronald Lake Bison Herd (RLBH) still increased in the presence of unregulated hunting and disease	There are no credible numbers on population growth or productivity to support this statement. The ESRD reports do not provide scientifically defensible data to make any conclusion on population trends.
88% of habitat still exists in the RSA but much of it is not used by bison	There is no evidence provided showing that "unused" habitat is in fact usable for bison. Bison habitat use is a complex interaction between forage quality, forage abundance, habitat patch configuration and accessibility, social interactions, and predation risk (Courant and Fortin 2012, Harvey and Fortin 2013). None of these interactions have been analyzed by Shell to support Shell's assertion.
Bison interact with Wood Buffalo National Park (WBNP) population	There are no data to support this assertion. There is merely one data point in an ESRD report showing that a radio collared female crossed the park boundary, but whether or not this location even overlaps with the range of the park population, let alone whether the two populations interact is not known.
The cumulative effects of development in the RSA are not likely to exceed ecological thresholds and compromise resilience and adaptability of the Ronald Lake herd such that it would no longer be a self-sustaining and ecologically effective population.	This statement is not supported by any scientific analysis. If Shell conducted a population viability analysis using some of the demographic inputs presented in Brodie (2008), Shell would likely arrive at a different conclusion (see Section 2.2.4, SIR 8, issue 1, this report).
Effects to disturbance may be assessed qualitatively	Shell's qualitative assessment does not address any of the information shortfalls pointed out above. The qualitative assessment also does not address SIR 41 which specifically asks for a <u>quantification</u> of effects.
Impact magnitude is low	Given that the disturbance is >20% and given that an ecological threshold of

	population persistence will be exceeded through further disturbance (see Section 2.2.4, SIR 8, issue 1, this report), impacts to wood bison in the RSA are significant.
--	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------

2.2.14 SIR #42

I) **Issue:** Effects of the Redclay Lake on Species At Risk (SAR)

SIR Reference: JRP SIR #42 (Wildlife)

Document Reference(s): Shell 2013: SIR 42, page 3-157, page 3-157

JRP JME Panel Reference (if applicable):

[504] Shell stated that the South Redclay Lake compensation location would parallel the Athabasca River and would not impede wildlife movement along the river. Shell also concluded that it would reclaim areas used for compensation lake infrastructure, such as access roads, berms, stockpiles, laydown areas, borrow sites, and dams. Shell therefore predicted a negligible residual effect on wildlife populations in the region.

[506] Given that Shell showed that existing terrestrial habitat at the Redclay Compensation Lake location has a high biodiversity potential, EC requested that Shell provide a comparison of relative values for species at risk in species-at-risk habitat at the Redclay Compensation Lake location and at alternative compensation lake locations. EC stated that such information would provide direction on how to best avoid or lessen project effects on species at risk as required by the *Species at Risk Act* (SARA). Shell disagreed with EC's request and stated that because the Redclay Compensation Lake is a mitigation measure that is being proposed to meet the requirements of the *Fisheries Act*, issues surrounding species at risk should be taken up with DFO and EC, as it is DFO that will finalize the location of the compensation lake.

[771] EC recognized that there are limited opportunities to directly avoid effects on species at risk and migratory bird habitat in the Project area given the location of oil sands deposits. As such, it recommended additional mitigation and suggested that for components of the Project not within the mineable footprint (e.g., the Redclay Compensation Lake and Kearl Lake levee), Shell should evaluate all options to avoid or minimize effects on species at risk and migratory bird habitat.

[875] The Panel recognizes that wood bison habitat of the Ronald Lake Herd would be affected by the compensation lake and that this might affect ACFN's ability to hunt wood bison. The Panel also acknowledges that ACFN provided little information about the abundance of wood bison in that herd or about the importance of habitat that will be affected by the compensation lake.

[884]... The loss of bison habitat in the RSA is **likely**—the habitat of the Redclay Compensation Lake will be lost along with the footprints of numerous other oil sands developments on the west side of the Athabasca.... The duration is **long-term**—given that Shell will not reclaim the habitat lost from the Redclay Compensation Lake. Beyond that, bison are slow growing and long lived, and it may take a long time for animals to return to other reclaimed areas after closure...

Gaps and/or Shortcomings in Shell's Response:

In response to SIR 42 Shell states: "Most habitat for wildlife SAR within the LSA will be lost or effectively unavailable during construction of the South Redclay Lake and the PRM. However, because the South Redclay Lake footprint represents 0.03% of the RSA, habitat loss due to construction of the compensation lake will result in a negligible environmental consequence for regional populations of wildlife SAR." (2013, page 3-157)

The assumption that only 0.03% of the RSA would be affected by the compensation lake relies on the flawed implication that the SAR use the RSA homogeneously. This is not the case; particularly for migratory species. Most migratory species use the Athabasca River corridor and may never venture into the eastern and western portion of the RSA. As these species use the vicinity of the compensation lake at base case (prior to the lake being built), they stand to lose a lot more than 0.03% of their habitat.

Request(s):

Please re-assess the regional impacts of the Redclay Lake on SAR using a regional study area that reflects the distribution of migrating SAR, including the whooping crane.

- 2) **Issue:** Comparisons between the magnitude of effects on species at risk with the other compensation options was not fully responded to

SIR Reference: JRP SIR #42 (Fish & Fish Habitat)

Document Reference(s): Shell 2013, SIR 42, pages 3-156 to 3-159.

JRP JME Panel Reference (if applicable): n/a

Gaps and/or Shortcomings in Shell's Response:

The JRP notes that the Redclay Compensation Lake could have the potential to impact species at risk, and requests further detail on these effects, as well as comparison with the other compensation lake options.

Shell provides with a list of species at risk associated with the compensation lake and the impact of the project within the LSA and RSA, as well as references a fuller response to effects of the project on species at risk in response to SIR 43. Comparisons between the magnitude of effects on species at risk with the other compensation options was not fully responded to, because Shell stated that the other options were deemed unfeasible prior to reaching that level of assessment.

Request(s):

Please provide comparisons between the magnitude of effects on species at risk with the other compensation options.

2.2.15 SIR #43

- 1) **Issue:** Inadequate Support for Effectiveness of Proposed Mitigation Measures and Adaptive Management

SIR Reference: JRP SIR #43 (Wildlife)

Document Reference(s): Shell 2013: SIR 43, Tables 43-2 and 43-3, page 3-161 and 3-162.

JRP JME Panel Reference (if applicable):

[31] The Panel is concerned about the lack of mitigation measures proposed for loss of wildlife habitat in the LSA that have been shown to be effective, particularly for wetland and old-growth habitat used by species at risk and migratory birds.

Gaps and/or Shortcomings in Shell's Response:

In Table 43-2 (Shell 2013, SIR 43 page 3-162), Shell lists mitigation measures that would avoid or minimize impacts to SAR. Amongst other mechanisms, Shell believes that bird deterrent systems are effective: *"whooping crane, horned grebe, red knot, yellow rail; Deploying and maintaining bird deterrent systems (EIA, Volume 5, Section 7.1.3, page 7-11); The use of bird deterrents (e.g., human effigies, scare cannons) are proven effective at deterring waterfowl and shore birds from coming into contact with tailings ponds, thus reducing migratory bird mortality."* [emphasis added] (Shell 2013, pg 3-162, Table 43-2). Please see our comments on SIR #75 (Section 2.2.22, Issue 1) for a discussion of the ineffectiveness of bird deterrent systems.

Several mitigation measures are believed to "reduce" vehicle wildlife collisions. This is misleading as these measures will only reduce collisions relative to conditions that would exist without such measures, but the collisions resulting from project traffic will still result in a net increase of collisions. How will the mortality from these collisions be prevented, as requested in SIR 43a.ii? Analogous questions can be asked for all mitigations proposed in Shell's tables 43-2 and 43-3 (Shell 2013 page 3-162 and 3-164) including the reduction of sensory disturbance and the change in habitat availability and wildlife movement. Shell does not provide any credible evidence that the mitigations listed will either prevent or compensate the adverse impacts on species at risk.

Shell claims that Table 43-3 shows adaptive measures, but it does not in any way. For example, a commitment to regional research initiatives is not a response to the SIR. There are numerous Recommendations from the JRP-JME (2013) decision that should be discussed here including the following:

- [9] The Panel finds...There is also a lack of proposed mitigation measures that have been proven to be effective....
- [11]... the Panel is concerned about the lack of mitigation that has proven to be effective for the loss of these habitats and believes that without additional mitigation, significant adverse effects will occur.
- [456] / Recommendation 11 -The Panel recommends that ESRD include in any *EPEA [Environmental Protection And Enhancement Act]* approval a requirement for Shell to report on adverse effects identified through monitoring and the corresponding mitigation measures implemented by Shell in accordance with its adaptive management plans.
- [552] / Recommendation 20: The Panel recommends that the Government of Canada provide specific benchmarks or thresholds for assessing significant effects on individual target fish species and on population diversity and abundance. The Panel also recommends that the Government of Canada ensure that Shell incorporates these benchmarks or thresholds into its proposed adaptive management strategy.
- [1838] ... The Panel encourages the use of adaptive management at both the project and regional levels if monitoring indicates thresholds are being approached or exceeded....

Shell should be in a position at this point in time to provide tangible examples of what it achieved as a result of the actions taken to address the JRP-JME recommendations.

Request(s):

- a) **Please provide credible and quantifiable evidence that the mitigations listed will either prevent or compensate the adverse impacts on species at risk.**
- b) **Please provide a concrete framework for how adaptive management will prevent or compensate the adverse impacts on species at risk if the proposed mitigation measures are not as effective as predicted.**

2) Issue: Inconsistent dates provided in response

SIR Reference: JRP SIR #43 (Wildlife)

Document Reference(s): Shell 2013: SIR 43, page 3-160 to 3-165

Key JME Panel References: n/a

Gaps and/or Shortcomings in Shell's Response:

Shell's response to this SIR requires further clarification because there are several different dates listed in Table 43-2 (Shell 2013 SIR 43 page 3-162) for avoiding clearing activities (e.g. April 1 – August 30 vs. April 20 – August 25th). EC recommends April 1 – August 31th as the most conservative and appropriate choice.

Request:

Please clarify the time frame for avoiding clearing activities to mitigate Project impacts to wildlife.

2.2.16 SIR #45

Issue: Inadequate Description of Supporting Baseline Data for Little Brown Myotis and Northern Myotis

SIR Reference: JRP SIR #45 (Wildlife)

Document Reference(s): Shell 2013: SIR 45, page 3-167; Appendix 1, page 142; and Appendix 2, Sections 3.4.3, 4.3.4, 5.3.3.

JRP JME Panel Reference (if applicable): n/a

Gaps and/or Shortcomings in Shell's Response:

The SIR requested that Shell provide an evaluation of Project and cumulative effects for Committee on the Status of Endangered Wildlife in Canada (COSEWIC) listed species with specific reference to little brown myotis and northern myotis. In its assessment, Shell states that “no hibernacula have been identified in the Oil Sands Region” (Shell 2013, Appendix 1, page 142) and indicates that “no hibernacula are likely to occur in the RSA” (Shell 2013, Appendix 2, Sections 3.4.3, 4.3.4, 5.3.3). No additional information was provided in support of the assumption that no hibernacula are likely to occur in the RSA. As such, conclusions reliant on this assumption may not be accurate. Further support for the position that no hibernacula are likely to occur in the RSA is needed to support impact predictions for Project and cumulative effects.

Request(s):

Please provide additional support (e.g. peer-reviewed literature, survey information from RSA) that would support the assumption that no hibernacula are present in the RSA.

2.2.17 SIR #48

- I) **Issue:** Unsubstantiated predictions regarding the reclamation of wetland vegetation

SIR Reference: JRP SIR 48 (Vegetation)

Document Reference(s): Shell 2013, Appendix 2, Section 3.4.2, Table 3.4-5

JRP JME Panel Reference (if applicable): n/a

Gaps and/or Shortcomings in Shell's Response:

The same comments apply to this SIR as for SIR 8, issue 6 (Sec 2.2.4, page 47) regarding the reclamation of wetland vegetation.

Request(s):

Please provide evidence to support the conclusion of reversible impacts to non-treed wetlands. If no evidence can be provided, please reassess effects to non-treed wetlands based on available data.

2.2.18 SIR #50

- I) **Issue:** Irreversible Impacts to Peatlands

SIR Reference: JRP SIR #50 (Vegetation)

Document Reference(s): Shell 2013: SIR 50, page 3-181, 3-182; and Appendix 3.1, Table 2.4-3, Table 5.3-6.

JRP JME Panel Reference (if applicable):

[10] The Panel understands that the provincial and federal governments will need to make separate decisions about the Project, taking into account the Panel's report. The Panel acknowledges that Shell is planning to reclaim the Project footprint to equivalent land capability. The Panel believes that reclamation is useful but that it will not mitigate all of the significant effects because some habitat types cannot be reclaimed (e.g., peatlands), and reclamation will not occur or be complete for many years.

[26] ... The Panel also believes that reclamation will not sufficiently mitigate the effects on species at risk and migratory birds that rely on old-growth forest because of the substantial amount of time needed to re-establish habitat...

[30]... The Panel believes that there appears to be a high potential for significant loss of biodiversity based on overall wildlife habitat loss, unproven methods for reclamation of peatlands and old-growth forest, and the long time lag between disturbance and reclamation...

[621] The Panel notes that Shell originally chose the RSA to encompass both the PRM and the Project, but that Shell did not change the RSA size even after it assessed PRM and the Project separately. The Panel believes Shell's RSA size is inappropriate for the Project alone. The large proportional difference in the ratio of the LSA to RSA causes a "dilution effect", whereby the effects of the Project essentially get lost in the very large RSA, making it difficult to determine the significance of effects (e.g., loss of wildlife habitat) of the Project on the RSA. The Panel also finds that this dilution factor is problematic when using Shell's determination of significant

project effects, and therefore the Panel was unable to rely on Shell's determinations of significance.

[652]the Panel used the following approach to determine the significance of project effects on wetland habitat in the LSA: ...The effects are largely irreversible—given that there is no evidence that peatlands can be successfully reclaimed...

Gaps and/or Shortcomings in Shell's Response:

Shell states that *“Wetland loss due to the PRM is predicted to be less than 1% of the resource in the RSA and therefore a negligible regional impact which is unlikely to have a long-term impact to the Boreal Forest Ecosystem.”* (2013, page 3-182). This is an unhelpful statement as the impact from the PRM alone in the RSA is not relevant for the SIR which asked Shell to: *“Assess the future loss of peatlands throughout the RSA”* (emphasis added) (Shell 2009, Volume 2, Section 23.1, page 23-27). Discussing the PRM effects alone is particularly unhelpful given the large size chosen for the RSA. The long-term impacts to boreal forest ecosystems have to be evaluated at a regional level and in light of the progressive rate of disturbance in the region (Foote et al. 2012, Komers and Stanojevic 2013). Shell's CEA shows that there are nearly 50 projects in the RSA (Shell 2013, Appendix 3.1, Table 2.4-3.). Disturbance to wetlands is estimated to be 19% at the PDC (Shell 2013, Appendix 2, Table 5.3-6), which is likely an underestimation as the CEA did not take into account indirect effects on wetlands through surficial groundwater drawdown in any given project.

Shell underestimates the impacts on wetlands because Shell asserts that *“Surficial groundwater levels are expected to return to pre-disturbance levels after dewatering activities for each pit are completed and the pit backfilled (EIA, Volume 4A, Section 6.3.6.2, page 6-208). It is not expected that the loss of peatlands will affect this process. The closure wetlands will naturally adjust to the changes in groundwater levels as they return to pre-disturbance levels.”* (Shell 2013, SIR 50 page 3-182). The pre-disturbance water levels relate to the pre-disturbance landscape with its peat distribution, local topography, etc. Following dewatering and backfilling, Shell intends to create a constructed landscape with different topography and presumably constructed wetlands. The groundwater regime will adjust to the post development landscape and constructed wetlands; these will certainly not be similar to pre-disturbance levels as the landscape will be entirely different. Therefore, Shell's claim is not true.

It is evident that if surficial water drawdown was incorporated in the cumulative effects assessment, then the PDC disturbance would be substantially more than 19%. In addition, the PDC does not include many other projects that will occur during the lifetime of the PRM. Given the amount and the rate of disturbance, the RSA may soon approach the potentially serious changes in the boreal Forest Ecosystems discussed by the International Boreal Conservation Science Panel (2013).

Request(s):

Please assess the loss of peatlands in the RSA, showing the amount and the rate of disturbance under the consideration of permanent changes to surficial groundwater levels and surface water quality.

2) Issue: Insufficient examination of the impacts of wetland loss on surface water quality in the LSA

SIR Reference: JRP SIR #50 (Water Quality)

Document Reference(s): Shell 2013: SIR 50, page 3-181; Shell 2007: Volume 4A, Section 6.5.6.3.

JRP JME Panel Reference (if applicable): n/a

Gaps and/or Shortcomings in Shell's Response:

Shell responded to SIR 50 (b) by acknowledging that the loss of peatlands in the LSA is likely to alter water quality by decreasing the quantity of fulvic and humic acids in water, and system filtration capacity. Shell goes on to state that the anticipated effects to the quality of water in receiving streams at Closure are discussed in Section 6.5.6.3 of the EIA (Shell 2007 Volume 4A). No meaningful or focused examination of the loss of peatlands on surface water quality is provided in the aforementioned section.

The lack of information provided by Shell includes:

- No discussion or examination of how pit lakes will maintain water quality to the receiving environment in the same way that wetlands would do, other than perhaps by sedimentation, which is not actually a long-term method of improving water quality and is instead a pathway to aquatic sediment contamination.
- How a reduction in wetland cover of 67% within the LSA is to be compensated for by constructed wetlands in terms of water quality, including not just filtration capacity but also in the wetlands role as an important influence on surface water dissolved organic carbon (DOC), aluminum (Al), iron (Fe) and phosphorus (P) (Wetzel 2001; page 261 (P), 293 (Fe), page 310 (Al)) concentrations (among other substances). The occurrence of wetlands in a catchment influences the humic (brown-water) conditions in any receiving water course or water body (Mitchell & Prepas 1990), with very important implications for water chemistry and aquatic primary and secondary productivity.
- Specific targets for organic acid production and filtration potential in the constructed wetlands that will result in pre-industrial surface water quality in the LSA.

Request:

Please provide a thorough and relevant discussion of the anticipated impacts to surface waters that will result from the reduction in LSA wetlands. Please provide a detailed mitigation plan that will satisfy the requirements listed in this comment.

2.2.19 SIR #60

1) Issue: Does not specifically address concerns of Aboriginal groups in the study area

SIR Reference: SIR 60a (Human & Wildlife Health)

Document Reference(s): Shell 2013: SIR 60a, page 3-196.

JRP JME Panel Reference (if applicable):

[1069] The Panel notes there is a gap in knowledge about contamination of country foods.

Gaps and/or Shortcomings in Shell's Response:

Shell's response does not adequately address SIR 60a. The SIR requested that Shell "Describe how traditional practices of Aboriginal groups in the area may be impacted by changes or perceived changes

in the levels of toxic substances in traditional food items, including fish, wild game and other country foods. In addition, describe how any avoidance of such food items may affect Aboriginal health" (Shell 2013, page 3-197). Shell's response focused primarily on how Canada's Aboriginal communities have "...been moving from a country food diet to one that more closely resembles that of the general population" (Shell 2013, page 3-197). In addition, "...studies conducted in other jurisdictions indicate how a move away from traditional country foods towards a market diet that is high in energy, saturated fats and simple sugars, coupled with reduced physical activity, causes a rise in the prevalence of obesity and subsequently diabetes" (Shell 2013, page 3-197). Shell did not discuss specific concerns of Aboriginal groups in the Study Area or how traditional practices have been impacted other than reiterating general concerns over changes in toxic substances in traditional food items.

Requests:

Please include the specific concerns of Aboriginal groups in the study area and how their traditional practices have been impacted and may have affected Aboriginal health.

- 2) **Issue:** Did not include PIC in the assessment of health risks on Aboriginal people

SIR Reference: SIR 60b (Human & Wildlife Health)

Document Reference(s): Shell 2013: SIR 60b, page 3-196, Appendix 3.3

JRP JME Panel Reference (if applicable): n/a

Gaps and/or Shortcomings in Shell's Response:

Shell's response does not adequately address SIR 60b. The SIR requested that Shell "Assess the effects on the health of the Aboriginal peoples due to the cumulative impacts on their traditional lifestyle caused by the proposed project in combination with past, existing and future development using a pre-industrial baseline" (Shell 2013, page 3-197). Shell did not provide an assessment of the health risks for Aboriginal peoples using a PIC in Appendix 3.3 (Shell 2013). Shell only provided a comparison of an Industrialized Base Case to the PRM Application Case and PRM Development Case.

Request:

Please revise the HHRA and WHRA to include the risks associated with the PIC.

- 3) **Issue:** No specific monitoring or mitigation strategies described

SIR Reference: SIR 60c (Human & Wildlife Health)

Document Reference(s): Shell 2013: SIR 60c, page 3-196.

JRP JME Panel Reference (if applicable):

Gaps and/or Shortcomings in Shell's Response:

Shell's response does not adequately address SIR 60c. The SIR requested that Shell "Identify possible monitoring and mitigation strategies for the direct and cumulative impacts of the Project on the health of Aboriginal peoples" (Shell 2013, page 3-197). The only mitigation strategies that Shell presented were "maintaining, whenever possible, traditional user access to the area encompassed by the PRM, maintaining active wildlife movement corridors, and maintaining to the extent practical access to traditional trails" (Shell 2013, page 3-198). These strategies focus on "access" and do not address the cumulative impact of the Project on the health of Aboriginal peoples.

Requests:

Please present specific monitoring programs and mitigation strategies that Shell plans to implement as part of the Project. Please provide evidence that these strategies are effective at mitigating cumulative Project impacts to Aboriginal health.

2.2.20 SIR #67

Issue: Records of Traditional Plant Species Observed in Field Surveys with Maps

SIR Reference: JRP SIR 67 (Vegetation)

Document Reference(s): Shell 2013: SIR 67, page 3-228. Shell 2007: Environmental Setting, Terrestrial Vegetation, Wetlands and Forest Resources Environmental Setting for the Jackpine Mine Expansion & Pierre River Mine Project, Section 3.3.1.4, page 3-14.

JRP JME Panel Reference (if applicable): n/a

Gaps and/or Shortcomings in Shell's Response:

Shell was asked to provide a summary of the data collected with respect to traditional plants recorded on the vegetation plot forms including plant species and abundance, if available, and to provide maps showing where Shell found the traditional plant species. If Shell noted the occurrence of traditional use plants when they were doing field surveys, they must have had a list of traditional use species prior to surveys. It is not clear what sources were used to obtain the list of traditional use plant species for that area. Also, maps were provided showing where traditional use plants were found, but only 21 of the 66 species found were included on the maps.

Request(s):

- a) Please indicate the data sources for Shell's list of traditional use plant species, including the Aboriginal groups from which the information was obtained.
- b) Would Shell consider this list exhaustive for all Aboriginal groups in the region?
- c) Please provide maps showing the locations of the other 45 traditional use plant species found in field surveys in the LSA.

2.2.21 SIR #73

- I) **Issue:** Impacts from Accidents and Malfunctions are Underestimated

SIR Reference: JRP SIR #73 (Wildlife)

Document Reference(s): Shell 2013: SIR 73, page 3-268.

JRP JME Panel Reference (if applicable):

[229] The Panel agrees that if a tailings dam failure occurred the effects would be catastrophic, long-term, beyond regional, and thus significant....

Gaps and/or Shortcomings in Shell's Response:

In response to SIR 73, Shell states that "*The effects of this scenario are adverse, major but very unlikely to extremely unlikely. Therefore, this scenario is not likely to result in any significant adverse environmental effect*" (Shell 2013, page 3-284). In the case of the failure of an External Tailings Disposal Area (ETDA) dyke, the magnitude of this effect on the environment would be massive and very significant. The significance of this event should not be downgraded because of low likelihood. Significance should be fully assessed as requested, irrespective of the probability.

Moreover, Shell states that all the impacts from accidents and malfunctions are reversible. This is not so. In the event of a bitumen spill into a watercourse or waterbody, a major concern is that a significant amount of the bitumen sinks to the bottom of the river, making recovery difficult (compared to lighter oils that float on the top of the water). Ultimately, in order to recover bitumen from a spill, recovery efforts will likely require dredging of affected waterbodies and watercourses, creating further ecological damage.

In order to adequately respond to SIR #73, Shell needs to discuss and analyze similar incidents that have actually occurred to date and report on the success or failure of mitigating the impacts of these events. The efficacy of bitumen recovery achieved in previous spills, such as the Enbridge pipeline spill into the Kalamazoo River in Michigan in 2010, and the lessons learned from these events should have been addressed by Shell and incorporated into the risk assessment. For example, although spot dredging in the Kalamazoo River was done, it is still expected that 162,000-168,000 gallons of oil will remain in the river after dredging (that is out of a total spill estimate of 843,000 gallons and a post-recovery estimate of 1.15 million gallons). It is hoped that some of that remaining oil will be caught in sediment traps, but 100% recovery is not achievable (Environmental Protection Agency (EPA) 2013). Therefore, Shell's claim that impacts of these sorts of events are reversible is inaccurate and not supported with appropriate examples or evidence; in fact evidence shows that 100% recovery of spilled bitumen is not possible. Shell should have also reported on the potential and additional ecological damage that will occur if dredging is required.

Additionally, any unrecovered bitumen that settles to the bottom of a watercourse in the case of a spill can continue to move along the bed of the watercourse. Therefore, any waterbody downstream of the affected river is at risk of contamination. In the Kalamazoo spill, the EPA reported that the bitumen did not remain in place when it sank; it continued to spread across the bottom of a lake from its original location at a delta into the lake, even under low flow conditions (EPA 2013).

There is also some concern about air quality immediately after the spill. The diluent is highly volatile, and it does evaporate quickly; however, the EPA (2013) required air quality monitoring by Enbridge for some time after the initial peak in volatiles. Therefore, Shell should also assess air quality impacts from potential spills.

Request(s):

- a) **Please assess the impacts of accidents and malfunctions prior to downgrading the impacts by the probability of the event; the impacts of these events need to be assessed as if they happened, the probability of the event can be an additional consideration.**
- b) **For each event provide examples, such as the Enbridge Kalamazoo River spill, and discuss whether Shell would respond similarly or differently from the response of the proponents in that event.**

2) Issue: Misleading information in responses

SIR Reference: JRP SIR #73 (Wildlife)

Document Reference(s): Shell 2013: SIR 73, page 3-268, 3-296, Table 73-2 page 3-272; Figures 75-1 and 75-2 pages 3-302 to 3-303, Table 73-5 page 3-297, Appendix I, p. 10.

JRP JME Panel Reference (if applicable):

[589] The Panel finds that more information is required by industry in general on the effects of tailings ponds and other PAW on birds when mortality is not immediate. There is little or no information on the potential long-term effects on reproductive success or behaviour as a result of exposure to tailings ponds along migration routes and any resulting health effects from consumption by local people. Therefore, the Panel recommends that the Government of Canada consider if more information is required on the potential long-term effects on migratory bird reproductive success or behaviour as a result of exposure to tailings ponds along migration routes. The Government of Alberta should also consider if more information is needed on potential resulting health effects of consumption of hunted birds by local people. The Governments of Canada and Alberta, along with key stakeholders, should determine if studies are required to examine these issues

Recommendation 25 -The Panel recommends that the Government of Canada consider if more information is required on the potential long-term effect to migratory bird reproductive success or behaviour as a result of exposure to tailings ponds along migration routes. The Government of Alberta should also consider if more information is needed on potential resulting health effects of consumption of hunted birds by local people. The Governments of Canada and Alberta, along with key stakeholders, should determine if studies are required to examine these issues. (Effects of Tailings Ponds on Migratory Birds, Effects on Aboriginal Traditional Land Use, Rights, and Culture)

[580] EC noted that whooping cranes are one of the most endangered species in North America. It said that approximately 48 per cent of the population may migrate over the oil sands region. Shell noted that whooping cranes are unlikely to land in tailings ponds because they prefer to land on land as opposed to open water and that no whooping cranes have been found in tailings ponds to date. EC stated that they have, however, been detected flying over and landing near the Project LSA. EC stated that if mortality occurs, it could have significant negative population-level consequences because of the small size of the whooping crane population. In a modelled population viability analysis, EC estimated that the minimum viable population size of whooping cranes over a span of 100 years is 40 breeding pairs. EC stated that in 2012 it recorded 66 pairs, which is less than the 75 pairs reported in 2011.

Gaps and/or Shortcomings in Shell's Response:

Shell states that in making their likelihood determination, they considered the relevant historical frequency of such events such as migratory birds landing on ETDAs and also used professional judgment, experience with similar projects, and industry knowledge. Therefore, when looking at Table 73-2 Scenario #8 :Migratory birds landing on ETDA and becoming oiled(Shell 2013 pg 3-272) the classification as "UNLIKELY" is not supported by previous data since there have been oiled birds recorded every single year of operations at Shell facilities (e.g. Muskeg River Mine and Jackpine Mine; see Figures 75-1 and 75-2, Shell 2013 pages 3-302 to 3-303). This determination is also in direct contrast to a statement made by Shell in response to SIR #73: *"The scenario of migratory birds landing on external tailings disposal areas and becoming oiled has occurred in recent oil sands history and it is likely this could happen over the PRM's life."* (2013, Page 3-

296). Shell needs to provide an explanation for these contradictory statements. The designation as “unlikely” is misleading and not in line with Shell’s determination criteria. A probability of occurrence of “likely,” which is defined as, “*Could occur several times over plant lifetime*” (Shell 2013 page 3-270) is more appropriate given Shell’s own determination criteria.

Similarly, for Scenario #8 (Shell 2013, Table 73-2, page 3-272) the magnitude of effects to populations of birds is deemed “*minor*” and to people is deemed “*no linkage*”. However, Shell does not provide evidence to substantiate these claims. Currently, there is an acknowledged critical information gap on the long-term effects on migratory birds of exposure to EDTAs (see JRP-JME 2013, [589]). As outlined in recommendation #25 of the JRP JME (2013) decision report, there is currently concern regarding the fact that no data exists to show that contaminated birds that manage to fly away after contact with EDTAs are not harmed in the long-term or are safe for human consumption: “The Panel recommends that the Government of Canada consider if more information is required on the potential long-term effect to migratory bird reproductive success or behaviour as a result of exposure to tailings ponds along migration routes. The Government of Alberta should also consider if more information is needed on potential resulting health effects of consumption of hunted birds by local people.” Because Shell’s linkage analysis dismissed any link between contaminated birds and impacts to people, any potential harmful effects of contaminated birds being consumed by First Nations are not discussed further by Shell (see Table 73-4 page 3-276).

Table 73-5 and page 3-297

For Scenario #8 the magnitude of effect to populations of Federally Listed Species At Risk is listed as “*slight*” for horned grebe, red knot, and yellow rail. It is listed as “*minor*” for whooping cranes. Data on population levels of these species should be included by Shell in their response in order to evaluate their determinations of magnitude of effect but has not been provided. Indeed, the potential risk to horned grebes associated with landing on EDTAs is difficult to quantify as the total numbers of birds migrating through the oil sands region is not known with any scientific rigour. This information gap also applied to red knots and yellow rails. Shell should provide substantive evidence for their choice of magnitude of effect for these species given that “*slight effect*” refers to slight damage that is contained within the premises. If a number of horned grebes are oiled in an EDTA, but manage to fly away, how does this fit within Shell’s criteria?

For whooping cranes specifically, population data does exist and it is known that whooping cranes do migrate over the oil sands and are one of the most endangered species in North America. EC has stated that whooping cranes have been detected flying over and landing in the oil sands region and that if mortality occurs, it could have “significant negative population-level consequences because of the small size of the whooping crane population” (see JRP-JME 2013, [580]). In light of this determination by EC, Shell should re-evaluate the “*minor*” magnitude of Scenario #8 occurring.

Risks and Mitigations (Shell 2013 Page 3-296)

Shell provides potentially misleading information about the rate of deterrent effectiveness of their chosen bird deterrent system (the BirdAvert system). Shell only provides the

manufacturer's expected rate in the following statement: "The manufacturer's test results during a spring and fall waterfowl migration found the expected rate of deterrent to be 96.9% to 99%." (Shell 2013 Page 3-296). However, Shell does not clearly indicate whether these expected results are the same as the actual rates from any studies conducted on-site at any of their existing mines. It is likely that the numbers provided in this SIR response are simply those stated on the manufacturer's website (see <http://www.birdavert.com/?q=node/8>). To date, Shell has not provided any evidence to indicate that they have actually quantitatively evaluated the effectiveness of the BirdAvert systems that are currently onsite at their operating mines.

Request(s):

- a) **Please provide clarification regarding classifying the event that migratory birds would land on ETDAs and become oiled is "unlikely" given that on previous Shell projects (e.g. Muskeg River Mine, Jackpine Mine) there is data indicating oiled birds have been recorded at these operations.**
- b) **Please provide further evidence to substantiate claims that oiling events from landing on ETDAs has a minor effect on bird populations and that there is no link between contaminated birds and human health. Particularly in light of the JRP JME (2013) acknowledgement that there is a critical information gap on the long-term effects on migratory birds of exposure to EDTAs.**
- c) **Provide data on population levels of horned grebe, red knot, and yellow rail in order to substantiate determinations of magnitude of effect in Table 73.5**
- d) **Provide the rationale for determining that an oiling event from landing on ETDAs would be a "minor" effect on whooping cranes.**
- e) **Please discuss whether the expected rate of deterrent effectiveness of the BirdAvert system provided are the same as the actual rates from any studies conducted on-site at any of their existing mines.**

2.2.22 SIR #74

Issue: The potential for accidents or malfunctions

SIR Reference: JRP SIR #74 (Wildlife)

Document Reference(s): Shell 2013: SIR 74, page 3-298

JRP JME Panel Reference (if applicable): n/a

Gaps and/or Shortcomings in Shell's Response:

The information provided by Shell appears to be sufficient to address SIR 74 parts a, b, and d. However, Shell's response to part c states "At this time Shell does not foresee any other accidents or malfunctions that would be specific to the Pierre River Mine, other than described in the response to JRP SIR 73" (Shell 2013, page 3-300). That response is not adequate for the reasons discussed in MSES comments in this report under SIR #73 (Section 2.2.20, Issue 1).

Request(s): Please refer to MSES comments under SIR#73 in this report (Section 2.2.20, Issue 1).

2.2.23 SIR #75

Issue: Incomplete response to questions regarding wildlife/tailings pond interactions, no evidence of use by Shell of most current and up-to-date recommended best practices for avian

protection, and no clear indication that Shell has evaluated the effectiveness of their deterrent systems.

SIR Reference: JRP SIR #75a, b (Wildlife)

Document Reference(s): Shell 2013: SIR 75, page 3-301 to 3-304, Figures 75-1 and 75-2 pages 3-302 and 3-303

JRP JME Panel Reference (if applicable):

[25] -The Panel recommends that the Government of Canada consider if more information is required on the potential long-term effect to migratory bird reproductive success or behaviour as a result of exposure to tailings ponds along migration routes. The Government of Alberta should also consider if more information is needed on potential resulting health effects of consumption of hunted birds by local people. The Governments of Canada and Alberta, along with key stakeholders, should determine if studies are required to examine these issues. (Effects of Tailings Ponds on Migratory Birds, Effects on Aboriginal Traditional Land Use, Rights, and Culture)

Gaps and/or Shortcomings in Shell's Response:

SIR #75a asked for historical data on instances of wildlife/tailings pond interactions in oil sands region. Shell provided an incomplete response to this SIR because they only provided data on mortalities which is not all inclusive of "interactions". Current evidence from the Research on Avian Protection Project (RAPP) and the Regional Bird Monitoring Program for the Oil Sands Region indicates that hundreds of thousands of migratory birds land on tailings ponds annually in the Alberta oil sands (St. Clair et al. 2013) which represents the critical form of "interaction" with tailings ponds that Shell omitted in their response to the SIR. It remains largely unknown what the impact of exposure to tailings ponds is on migratory birds and their populations (see JRP JME 2013 recommendation [25]) and, therefore, Shell's impact assessment on migratory birds may underestimate potential impacts.

Further, although Shell states that they are unable to provide information related to other oil sands operators, this information is readily available through RAPP and the Regional Bird Monitoring Program for the Oil Sands Region Reports (both 2011 and 2012 data are publicly available) and should have been summarized or even mentioned here for use by the Panel. Shell states that only 10 to 11 birds die annually on average at their facilities but there is no discussion of the accuracy of these numbers, nor cumulative incidental take of migratory birds in the oil sands. Shell's figures 75-1 and 75-2 (pages 3-302 and 3-303) show total annual incidental take of migratory birds up to 38 individuals, and recently in 2012, the Jackpine Mine Project had 18 oiled fatalities detected.

The report cited by Shell regarding the mass bird landing event of 2010 (St. Clair et al. 2011) does state that even with deterrents in place, birds may land due to inclement weather. But the report also stated that there are a number of controllable factors that may influence where birds land and that appropriate adaptive management protocols should have been able to anticipate a higher probability of birds landing during specific weather events. The report also included a comprehensive list of critical recommendations to ensure landing incidents do not happen again. Shell makes no mention of any recommendations or how they will attempt to comply with them.

75b) Shell was requested to describe the process used to upgrade their bird deterrent system and the process for evaluating effectiveness of the deterrent system in reducing avian mortality. The response provided is too vague to adequately inform the Panel on whether Shell is able to evaluate the effectiveness of their systems and/or adaptively manage the risks to migratory birds. For example, Shell does not describe how their seven step “*Adaptive Management Process*” works to evaluate effectiveness of the deterrent system. There is no discussion of methodology for surveys, data that has been collected to date to evaluate effectiveness of deterrents, effectiveness criteria, any quantitative analyses that have been conducted, etc... Without this information, Shell’s response is not deemed complete. Also, in terms of upgrading their systems regularly, Shell makes no reference to incorporating the most current data, literature, and industry information on bird deterrent practices. There is a growing body of research on this topic in Alberta, as well as dedicated research teams funded by industry (RAPP), that Shell does not appear to be making use of.

Shell states that “*the adaptive management process has guided operations to implement changes to the on-demand style of bird deterrents which allows for continuous improvement in deterring waterfowl and other bird species*” (Shell 2013 pg3-304). Yet, without any data provided for numbers of avian interactions with tailings ponds, it is impossible to evaluate this statement. In terms of mortality, to date there has been no significant improvement in numbers of oiled bird deaths at Shell sites (see Figures 75-1 and 75-2). At the Jackpine Mine site, oiled bird mortality increased from 11 birds detected in 2011 to 18 individuals detected in 2012.

Shell should provide methods, data, and analyses to the Panel to support their claims that they have comparatively evaluated their deterrent systems such as how they have compared “*effectiveness of different deterrent types across the facility*” and provide further details of the “*data management review*” process of the on-demand system and discuss how this process occurs.

Request(s):

- a) **Please provide historical data on instances of wildlife/tailings pond interactions in the oil sands region. This should not be limited to mortalities and should include events such as birds landing on tailings ponds.**
- b) **Please discuss the accuracy of Shell’s assertion that only 10 to 11 birds die annually taking into accounts Figures 75-1 and 75-2 by Shell, and that there were 18 fatalities detected at Jackpine Mine in 2012. Please provide information on cumulative incidental take of migratory birds in the oil sands.**
- c) **Will Shell comply with the adaptive management protocols and recommendations that will reduce the likeliness of landing incidents happening again? If so, how? If not, why?**
- d) **Please provide more information regarding the upgrade to Shell’s bird deterrent system and the process for evaluating effectiveness of the deterrent system in reducing avian mortality. At a minimum, include:**
 - i. **how Shell’s “*Adaptive Management Process*” works to evaluate effectiveness of the deterrent system; methodology for surveys;**
 - ii. **data that has been collected to date to evaluate effectiveness of deterrents;**
 - iii. **effectiveness criteria; and**

- iv. quantitative analyses that have been conducted.
- e) Shell should provide methods, data, and analyses to the Panel to support their claims that they have comparatively evaluated their deterrent systems such as how they have compared “*effectiveness of different deterrent types across the facility*”, and provide further details of the “*data management review*” process of the on-demand system and discuss how this process occurs.

3.0 Literature Cited

- Abboud, S. A., L. W. Turchenek and L. A. Halsey. 2002. Critical loads of acid deposition on soils in the Athabasca Oil Sands region, Alberta. Prepared for NOx-SO2 Management Working Group, Cumulative Environmental Management Association by Alberta Research Council, AMEC Earth & Environmental Limited and the University of Alberta.
- Alberta Energy. 2011. *What is oil sands*. Available at: www.energy.gov.ab.ca/OilSands/791.asp (accessed 20 December 2013).
- Bird Life International. 2012. Species factsheet: *Podiceps auritus*. Available at <http://www.birdlife.org>. Accessed: December 16, 2013.
- Boitani, Luigi, and Todd K. Fuller. 2000. "Research Techniques in Animal Ecology: Controversies and Consequences." Columbia University Press, NY.
- Bradley, M. and J. Wilmhurst (2005). "The fall and rise of bison populations in Wood Buffalo National Park: 1971 to 2003." *Can.J.Zool.* **83**: 1195-1205.
- Brodie, J.F. 2008. A review of American bison (*Bos bison*) demography and population dynamics. Wildlife Conservation Society, WCS Working Paper No. 35 (50 pp.)
- Brookes, P. C. 1995. The use of microbial parameters in monitoring soil pollution by heavy metals. *Biology and Fertility of Soils*; **19**: 269-279.
- CEAA (Canadian Environmental Assessment Agency). 2013. Operational Policy Statement. Assessing Cumulative Environmental Effects under the *Canadian Environmental Assessment Act*, 2012. Catalogue No. En106-116/2013E-PDF. ISBN: 978-1-100-22263-9
- CEAA (Canadian Environmental Assessment Agency). 2011. Operational Policy Statement; Follow-up Programs under the Canadian Environmental Assessment Act; Original: October 2002; Update: December 2011; Her Majesty the Queen in Right of Canada, 2011. Catalogue No.: En106-78/2011E; ISBN: 978-1-100-19750-0
- CEAA (Canadian Environmental Assessment Agency). 2010. Reference guide: determining whether a project is likely to cause significant adverse environmental effects. Available at: <https://www.ceaa-acee.gc.ca/default.asp?lang=En&n=D213D286-1>. Updated October 10, 2010. Accessed September 3, 2013.
- CEAA (Canadian Environmental Assessment Agency). 2009. Operational Policy Statement, Adaptive Management Measures under the Canadian Environmental Assessment Act. © Her Majesty the Queen in Right of Canada, 2009. Catalogue No.: 978-1-100-12062-1; ISBN: En106-83/2009E-PDF
- CEMA (Cumulative Environmental Management Association). 2004. Recommendations for the Acid Deposition Management Framework for the Oil Sands Region of North-Eastern Alberta.
- CEMA (Cumulative Environmental Management Association). 2006. Forest Capability Classification System for Forest Ecosystem in the Oil Sands Region of North-Eastern Alberta.

- Chander, K. and P. C. Brookes. 1991. Effects of heavy metals from past applications of sewage sludge on microbial biomass and organic matter accumulation in a sandy loam and silty loam UK soil. *Soil Biology and Biochemistry*; 23: 927-932.
- COSEWIC (Committee on the Status of Endangered Wildlife in Canada). 2009. COSEWIC Assessment and Status Report on the Horned Grebe *Podiceps auritus*, Western Population and Magdalen Islands Population, in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa, Ontario. Available from: www.sararegistry.gc.ca/status/status_e.cfm.
- Courant, S. and D. Fortin. 2012. Search efficiency of free-ranging plains bison for optimal food items. *Animal Behaviour* 84(4): 1039-1049.
- Dimitriu, P. A., C. E. Prescott, S. A. Quideau and S. J. Grayston. 2010. Impact of reclamation of surface-mined boreal forest soils on microbial community composition and function. *Soil Biology and Biochemistry*; 42: 2289-2297
- Dyer, S.J. 1999. Movement and Distribution of Woodland Caribou (*Rangifer tarandus caribou*) in Response to Industrial Development in Northeastern Alberta. Master of Science Thesis. University of Alberta. 106 pp.
- Dyer, S. J., J. P. O'Neill, S. M. Wasel, and S. Boutin. 2001. Avoidance of industrial development by woodland caribou. *Journal of Wildlife Management* 65:531-542.
- Environment Canada. 2012. Recovery Strategy for the Woodland Caribou (*Rangifer tarandus caribou*), Boreal population, in Canada. *Species at Risk Act Recovery Strategy Series*. Environment Canada, Ottawa, Ontario, Canada. pp. xi, 138.
- EPA (Environmental Protection Agency). 2013. EPA's response to the Enbridge oil spill. <http://www.epa.gov/region05/enbridgespill/> (accessed 20 December 2013)
- Fahrig, L. 2007. Non-optimal animal movement in human-altered landscapes. *Functional Ecology* 21:1003-1015.
- FAN (Federation of Alberta Naturalists). 2007. The Atlas of Breeding Birds of Alberta: A Second Look. Federation of Alberta Naturalists, Edmonton, Alberta.
- Fließbach, A., R. Martens and H. H. Reber. 1994. Soil microbial biomass and microbial activity in soil treated with heavy metal contaminated sewage sludge. *Soil Biology and Biochemistry*; 26: 1201-1205.
- Foote L. 2012. Threshold Considerations and Wetland Reclamation in Alberta's Mineable Oil Sands. *Ecology and Society* 17: 35.
- Geographic Dynamics Corp. 2006. Investigation of natural ingress of species into reclaimed areas. Prepared for the Cumulative Environmental Management Association-Wood Buffalo Region, Reclamation Working Group, Soil/Vegetation Subgroup, Fort McMurray, Alberta, Geographic Dynamics Corp. Edmonton, Alberta.
- GoA (Government of Alberta). 2013. Ronald Lake Bison (*Bison bison*); Winter 2012-2013 Activities Report (Draft).

- GoC (Government of Canada). 2003. *Species at Risk Act*, The Act. Accessed January 2014 at http://www.sararegistry.gc.ca/approach/act/default_e.cfm
- Operational Policy Statement. Assessing Cumulative Environmental Effects under the *Canadian Environmental Assessment Act*, 2012.
- GSX Canada Pipeline Project. 2003. Joint Review Panel Report, © Her Majesty the Queen in Right of Canada 2003 as represented by the National Energy Board, Cat. No. NE23-110/2003E, ISBN 0-662-34718-8
- Gunn, J., Noble, B.F. 2011. Conceptual and methodological challenges to integrating SEA and cumulative effects assessment. *Environmental Impact Assessment Review*. 31: 154–160
- Harvey, L. and D. Fortin. 2013. Spatial Heterogeneity in the Strength of Plant-Herbivore Interactions under Predation Risk: The Tale of Bison Foraging in Wolf Country. *PLOS One* 8(9).
- Hegmann, G., C. Cocklin, R. Creasey, S. Dupuis, A. Kennedy, L. Kingsley, W. Ross, H. Spaling, D. Stalker and AXYS Environmental Consulting Ltd. 1999. *Cumulative Effects Assessment Practitioners Guide*. Prepared by AXYS Environmental Consulting Ltd. and The CEA Working Group for the Canadian Environmental Assessment Agency. Hull, PQ. 134 pp. Available online at: http://www.ceaa.gc.ca/43952694-0363-4B1E-B2B3-47365FAF1ED7/Cumulative_Effects_Assessment_Practitioners_Guide.pdf
- International Boreal Conservation Science Panel. 2013. *Conserving the World's Last Great Forest Is Possible: Here's How*. Available at: <http://borealscience.org/wp-content/uploads/2013/07/conserving-last-great-forests1.pdf> (accessed 18 December 2013)
- Jensen, O.C, Nishi, J., Cool, N.L., Poll, D. and H.W. Reynolds (2004). "Assessing Suitable and Critical Habitat for Wood Bison (*Bison bison athabasca*) Using Geographic Information Systems (GIS) and Remote Sensing: Preliminary Results"; in T.D. Hooper, editor. *Proceedings of the Species at Risk 2004 Pathways to Recovery Conference*. 1 March 2–6, 2004, Victoria, B.C. Species at Risk 2004 Pathways to Recovery Conference Organizing Committee, Victoria, B.C.
- JRP (Joint Review Panel. 2013. *Report of the Joint Review Panel, Shell Canada Energy Jackpine Mine Expansion Project*. Application to amend approval 9756, Fort McMurray Area, July 9, 2013.
- Kelly, E.N., Schindler, D.W., Hodson, P.V., Short, J.W., Radmanovich, R. 2010. Oil sands development contributes elements toxic at low concentrations to the Athabasca River and its tributaries. *Proceedings of the National Academy of Sciences* 107 (37): 16178-16183.
- Kelly, E.N., Short, J.W., Schindler, D.W., Hodson, P.V., Ma, M., Kwan, A.K. and Fortin, B.L. 2009. Oil sands development contributes polycyclic aromatic compounds to the Athabasca River and its tributaries. *Proceedings of the National Academy of Sciences* 106 (52): 22346-22351.
- Komers, P.E. and Z. Stanojevic. 2013. "Rates of Disturbance vary by data resolution: implications for conservation schedules using the Alberta Boreal Forest as a case study". *Global Change Biology*. 19: doi: 10.1111/gcb.12266.
- Kurek, J., Kirk, J.L., Muir, D.C.G., Wang, X., Evans, M.S. and Smol, J.P. 2013. Legacy of a half century of Athabasca oil sands development recorded by lake ecosystems. *Proceedings of the National Academy of Sciences* 110 (5): 1761-1766.

- MacKenzie Gas Project 2009. Report of the Joint Review Panel for the MacKenzie Gas Project: Foundation for a Sustainable Northern Future, Vol. 2, © Her Majesty the Queen in Right of Canada December 2009, Cat. no.: 978-1-100-14373-6, ISBN En106-87/2009E-PDF
- MacKenzie, D.D. and Naeth, N.A. 2010. The role of the forest soil propagule bank in assisted natural recovery after oil sands mining. *Restoration Ecology* 18: 418-427.
- Margules, C.R., and Pressey, R.L. 2000. Systematic conservation planning. *Nature* 405: 243-253.
- Mitchell, P. and Prepas, E. 1990. Atlas of Alberta Lakes. The University of Alberta Press. Edmonton, Alberta.
- MFE (Ministry for the Environment). 2003. Good Practice Guide for Assessing and managing Odour in New Zealand. Air Quality Report 36. Ministry for the environment (New Zealand), Wellington. <http://www.mfe.govt.nz/publications/air/odour-guidelines-jun03/odour-guidelines-jun03.pdf>
- OSVRC (Oil Sands Vegetation Reclamation Committee). 1998. Guidelines for Reclamation to Forest Vegetation in the Athabasca Oil Sands Region. ISBN 0-7785-0411-5.
- Parker, K. L., P. S. Barboza, and T. R. Stephenson. 2005. Protein conservation in female caribou (*Rangifer tarandus*): Effects of decreasing diet quality during winter. *Journal of Mammalogy* 86:610-622.
- Potapov, P., A. Yaroshenko, S. Turubanova, M. Dubinin, L. Laestadius, C. Thies, D. Aksenov, A. Egorov, Y. Yesipova, I. Glushkov, M. Karpachevskiy, A. Kostikova, A. Manisha, E. Tsybikova, and I. Zhuravleva. 2008. Mapping the World's Intact Forest Landscapes by Remote Sensing. *Ecology & Society* 13(2): 1-16.
- RAPP (Research on Avian Protection Project). 2012. 2011 Annual Report of the Regional Bird Monitoring Program for the Oil Sands Region. 15 March 2012 Colleen Cassady St. Clair, Tom Habib, Sarina Loots, Jeff Ball, and Cindy McCallum. Department of Biological Sciences, University of Alberta, Edmonton, Alberta T6G 2E9.
- RAPP (Research on Avian Protection Project). 2013. 2012 Report of the Regional Bird Monitoring Program for the Oil Sands. Colleen Cassady St. Clair, Sarina Loots, Cindy McCallum, Donnette Thayer, Trish Fontaine, and Patrick Gilhooly. Department of Biological Sciences, University of Alberta. 27 May 2013
- Rooney RC, Bayley SE, Schindler DW. 2012. Oil sands mining and reclamation cause massive loss of peatland and stored carbon. *Proceedings of the National Academy of Sciences of the United States of America* 109: 4933-4937.
- Shaughnessy, B.E. 2010. Natural Recovery of Upland Boreal Forest Vegetation on a Hummocky Peat-Mineral Mix Substrate in the Athabasca Oil Sands Region, Alberta. MSc. Thesis. University of Alberta.
- Shell (Shell Canada Limited). 2013. Shell Canada Limited – Pierre River Mine – Joint Review Panel Supplemental Information Requests October 2013.
- Shell (Shell Canada Limited). 2007. Application for approval of the Jackpine Mine Expansion Project and Pierre River Mine Project, Environment Impact Assessment. Submitted to Alberta Energy and Utilities Board and Alberta Environment. Shell Canada Limited

- Shell (Shell Canada Limited). 2009. Application for Approval of the Jackpine Mine Expansion Project. Supplemental Information. Submitted by Shell Canada Limited, Submitted to: Alberta Energy Resource Conservation Board and Alberta Environment. December 2009.
- St. Clair, C.C., S. Loots, C. McCallum, D. Thayer, T. Fontaine, and P. Gilhooly. 2013. 2012 Report of the Regional Bird Monitoring Program for the Oil Sands Region. Department of Biological Sciences, University of Alberta, Edmonton, Alberta.
- St. Clair, C.C., T. Habib, S. Loots, J. Ball, and C. McCallum. 2012. 2011 Annual Report of the Regional Bird Monitoring Program for the Oil Sands Region. Department of Biological Sciences, University of Alberta, Edmonton, Alberta.
- St. Clair, C.C., T. Habib, and B. Shore. 2011. Spatial and temporal correlates of mass bird mortality in oil sands tailings ponds – A report prepared for Alberta Environment. Department of Biological Sciences, University of Alberta, Edmonton, Alberta.
- Stedman, Stephen J. 2000. Horned Grebe (*Podiceps auritus*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/505>
- Strong, W.L. and C.C. Gates (2009). "Wood bison population recovery and forage availability in northwestern Canada." *Journal of Environmental Management* **90**(1): 434-440.
- Toor, N.S., Han, X., Franz, E., MacKinnon, M.D., Martin, J.W. and Liber, K. 2013a. Selective biodegradation of naphthenic acids and a probable link between mixture profiles and aquatic toxicity. *Environmental Toxicology and Chemistry* **32** (10): 2201-2216.
- Toor, N.S., Franz, E.D., Fedorak, P.M., MacKinnon, M.D. and Liber, K. 2013b. Degradation and aquatic toxicity of naphthenic acids in oil sands process-affected waters using simulated wetlands. *Chemosphere* **90**: 449-458.
- USEPA (United States Environmental Protection Agency) 2012. Screening-Level Hazard Characterization. Reclaimed Substances: Naphthenic Acids Category. United States Environmental Protection Agency's Office of Pollution Prevention and Toxics. December 2012.
- United Nations (1992). Report of the United Nations Conference on Environment and Development (Rio de Janeiro, 3-14 June 1992). Retrieved from <http://www.un.org/documents/ga/conf151/aconf15126-1annex1.htm> on September 22, 2010.
- Wetzel, R.G. 2001. Limnology. Academic Press, San Diego, California.

Shell Energy Canada Pierre River Mine
Joint Review Panel
Round 1 Supplemental Information Requests

Hydrology Review of Shell Responses

Prepared for:

Athabasca Chipewyan First Nation
Industry Relations Corporation
- Fort McMurray, Alberta

Prepared by:

Martin Carver, PhD, PEng/PGeo, PAg
Project #405-03

January 16, 2014

Aqua Environmental Associates

<personal information removed>

Table of Contents

1.0	INTRODUCTION	3
	TERMS OF REFERENCE	3
	APPROACH AND LIMITATIONS.....	3
2.0	REVIEW OF JRP SIR ROUND 1 SHELL RESPONSES	3
	SIR 5A&B: DETERMINATION OF PRM PROJECT EFFECTS (HYDROLOGY COMPONENT; SHELL 2013 RESPONSE P 3-15, APP 1 AND APP 3.4)	3
	SIR 6: SIGNIFICANCE OF EFFECTS (SHELL 2013 RESPONSE P 3-21 TO 3-27APP 1 S.3).....	4
	<i>SIR 6a</i>	4
	<i>SIR 6b</i>	5
	<i>SIR 6c</i>	5
	SIR 8: CUMULATIVE EFFECTS (HYDROLOGY COMPONENT; SHELL 2013 RESPONSE P 3-48, 3-49, 3-50, 3-53, 3-54 AND APP 2).....	5
	SIR 25: KARST (SHELL 2013 RESPONSE, P 3-106 TO 3-110).....	6
	<i>SIR 25a</i>	6
	<i>SIR 25b</i>	7
	<i>SIR 25c</i>	7
	<i>SIR 25d</i>	8
	SIR 26 (SHELL 2013 RESPONSE P 3-110 TO 3-112, APP 4, S. 3) – WATER MANAGEMENT FRAMEWORK & CLIMATE CHANGE	8
	<i>SIR 26a</i>	8
	<i>SIR 26b</i>	9
	<i>SIR 26c</i>	10
	SIR 28: ATHABASCA RIVER NAVIGABILITY (SHELL 2013 RESPONSE, P 3-113 TO 3-117)	11
	SIR 29A-D: ADDITIONAL NAVIGATION CONCERNS (SHELL 2013 RESPONSE, P 3-117 TO 3-120)	12
	<i>SIR 29a</i>	12
	<i>SIR 29b</i>	13
	<i>SIR 29c</i>	13
	<i>SIR 29d</i>	13
	SIR 51B-C: EFFECTS OF THE ENVIRONMENT ON THE PROJECT (SIR 2013 RESPONSE, P 3-186 TO 3-188)	13
	<i>SIR 51b</i>	13
	<i>SIR 51c</i>	14
3.0	CONCLUSION	14
4.0	REFERENCES	15

List of Figures

Figure 1. The long-term mean hydrograph for the Athabasca River (at Fort McMurray) contrasted with the recent mean hydrograph (2005-2011) illustrating flow decline in the lower Athabasca River. Weekly flow data (m ³ /s) determined from Water Survey of Canada station #07DA001, Athabasca River at Fort McMurray.....	6
Figure 2. Global CO ₂ emissions since 1980 compared with emission scenarios used in IPCC models.....	10

1.0 INTRODUCTION

Terms of Reference

Shell Canada Energy (“Shell” or “the Proponent”) proposes to undertake the Pierre River Mine open-pit oilsands mine northwest of Fort McMurray. Shell Canada Energy (Shell) submitted the combined Environmental Impact Assessment (EIA) for the Jackpine Mine Expansion (JME) and Pierre River Mine (PRM) Project in December 2007. The project has subsequently been split into two applications and the Jackpine Mine Expansion Project has received approval. As part of the regulatory process for the PRM Application, the Joint Review Panel (JRP) for the PRM provided Round One Supplemental Information Requests (R1 SIRs) dated October 25, 2012 (CEAR 170). In response to the R1 SIRs, Shell submitted additional information (SIR responses accompanied by a number of appendices) on October 31, 2013 (CEAR 191).

The Athabasca Chipewyan First Nation has retained Aqua Environmental Associates to conduct a review of selected elements of the Shell’s responses to the R1. This report provides the findings of this review. This targeted SIR review found deficiencies in a collection of SIRs related to surface water hydrology and fluvial geomorphology, with an emphasis on water quantity. In this respect, comments are provided in this report pertaining to SIR numbers 5, 6, 8, 21, 25, 26, 28, 29, and 51 (or portions thereof). For each SIR response, a response is provided here giving a brief background to the issue, indicating whether the request has been met and clarifying details around any gaps in the response. Where there is an outstanding information requirement, an information request is provided.

Note that Shell’s responses to the R1 SIRs as found in their “Section 3 Supplemental Information Requests” document are referred to as “Shell 2013 Response” throughout this present review. Where information from a particular appendix is referred to here, the appendix number is cited. Shell’s information reviewed in relation to each SIR is indicated in the heading for the discussion on that SIR.

Approach and Limitations

Aqua Environmental Associates does not accept any responsibility for the accuracy of any of the observations, the analysis or the recommendations contained or referenced in the report when the report is used or relied upon for any other purpose other than the Environmental Impact Assessment process for Shell Canada Energy’s Pierre River Mine Oil Sands Mine project. Any such unauthorized use of this report is at the sole risk of the user.

2.0 REVIEW OF JRP SIR ROUND 1 SHELL RESPONSES

SIR 5a&b: Determination of PRM Project Effects (Hydrology Component; Shell 2013 Response p 3-15, App 1 and App 3.4)

This SIR asks for updated effects assessments to be determined using updated Planned Development Case information to June 2012. Shell has also updated the Base Case information to June 2012 to “allow a reasonable comparison between assessment case information” (Shell 2013 Response, p 3-14) within its response submission. Shell recalculates the potential changes in Athabasca River flow for the 2013 PRM Application Case, using the same methodology that was used in the original EIA. As a result, the outcomes are presented as seasonal flows and as stage estimates at node S24. As discussed below under SIR 28, these calculations should be carried out for peak flow, annual flow, and low flow (7Q10) as appropriate measures for the assessment. These are standard metrics used elsewhere in the EIA and are widely used in impact assessment evaluation. The seasonal changes are of a longer timeframe that masks changes to these metrics. The responses are also provided exclusively as measures of stage (metres), thus limiting how they can be interpreted. Shell concludes

subjectively that the flows and water levels in the 2013 PRM Application Case are “similar to those described in the EIA.” The context in which these changes will come about should be considered and a rationale provided for the interpretation.

Information Requests

- 1) Determine the quantitative effect of the Project on Athabasca River flows for the 2013 PRM Application Case in terms of the annual peak flow, mean annual flow, and 7Q10.
- 2) Interpret the changes in Athabasca River flow, associated with the 2013 PRM Application Case, in their appropriate context and provide supporting scientific rationale.
- 3) Provide an assessment on the PAD, and interpreted in the appropriate ecological context, of the Athabasca River flow changes expected to come about under the 2013 PRM Application Case.

SIR 6: Significance of Effects (Shell 2013 Response p 3-21 to 3-27App 1 S.3)

SIR 6a

The SIR asks Shell to explain how and why it weighted specific components in its numerical impact ranking system and provide supporting information from the peer-reviewed literature or other scientific basis. Shell does not provide the information requested. It refers back to Volume 3 (section 1.3.6) for the description of how it numerically ranks assessed effects however it provides little information in response to the “why” aspect of the question. It refers to earlier work associated with Suncor’s Project Millennium which was reviewed by DFO however in its SIR response it provides no information from the peer-reviewed literature as to why the rankings are structured as they are. Instead it refers to “Golder Associates Ltd’s professional judgment” however a corporation is not entitled to a professional judgment, because only professionals can provide such judgment. The SIR further alludes to receiving guidance from the Canadian Environmental Assessment Agency but the guidance referred to is only generalized guidance, not the information that is requested in the SIR. In addition, Shell’s response emphasizes that its rating system has been used in other oilsands projects, but again, Shell avoids providing the “why” that is requested in the SIR. Although Shell introduces a string of ecological concepts such as “weight of evidence” interpretations, a precautionary approach, and ecological resilience, its response avoids providing the targeted information, for each KIR, that is requested by the SIR.

Further deficiencies in Shell’s response to this SIR can be found by re-examining Shell’s response to SIR 5 (hydrology) in light of its comments in SIR 6. As reviewed above, Shell updates the hydrologic assessment for the PRM LSA. In that assessment, it continues its practice of dismissing the importance of effects through the use of unsubstantiated subjectivity, unattributed professional judgment, and interpretations not made in the appropriate (or, at times, in any) context. The impact rating system discussed in Shell’s response to SIR 6 is not applied to the updated hydrologic information.

Information Request

- 1) For each KIR, and with reference to the peer-reviewed science literature, provide the science rationale for the impact ratings shown in Volume 3, section 1.3.6 of the EIS.
- 2) Explain why the impact rating system is not applied in Shell’s interpretation of the importance of hydrologic effects that it assesses as due to the PRM project.

SIR 6b

Shell again refers to its own professional judgment in defense of its choice of methods and expresses confidence in its approaches. However, again, a corporation is not entitled to “professional judgment” – only professionals (individuals or groupings of specified individuals) can provide this. In addition, an expression of corporate confidence and its repeated use of the same methodologies, do not provide a valid response to the SIR; they are merely unscientific subjective justifications for using a method repeatedly. If it is carrying out an EIA, Shell has a responsibility to be scientific which includes the elements of objectivity, peer-review, and clear and independent defense of subjectivity where it is used.

Information Request

1) In light of the fact that a corporation cannot provide “professional judgment”, for each KIR, provide the names and qualifications/experience of the professionals working for Shell who have provided the professional judgment that Shell refers to in its response to SIR 6a.

SIR 6c

This SIR specifically asks Shell to name the instances of where professional judgment has been applied. In its response, Shell only refers back to the information it provides in response to SIR 6a. This is insufficient and remains a gap in the SIR response, for the following reason. The SIR asks for the specific instances wherever its staff has used professional judgment. Neither the instances are provided nor are the actual professional judgments related in the material to which Shell refers.

1) Provide the instances where professional judgment has been used in Shell’s EIA and identify the specific details of each professional judgment. Support the response with reference to relevant peer-reviewed science.

SIR 8: Cumulative Effects (Hydrology Component; Shell 2013 Response p 3-48, 3-49, 3-50, 3-53, 3-54 and App 2)

Shell determines the cumulative effect on hydrology for two comparisons of stream flow changes:

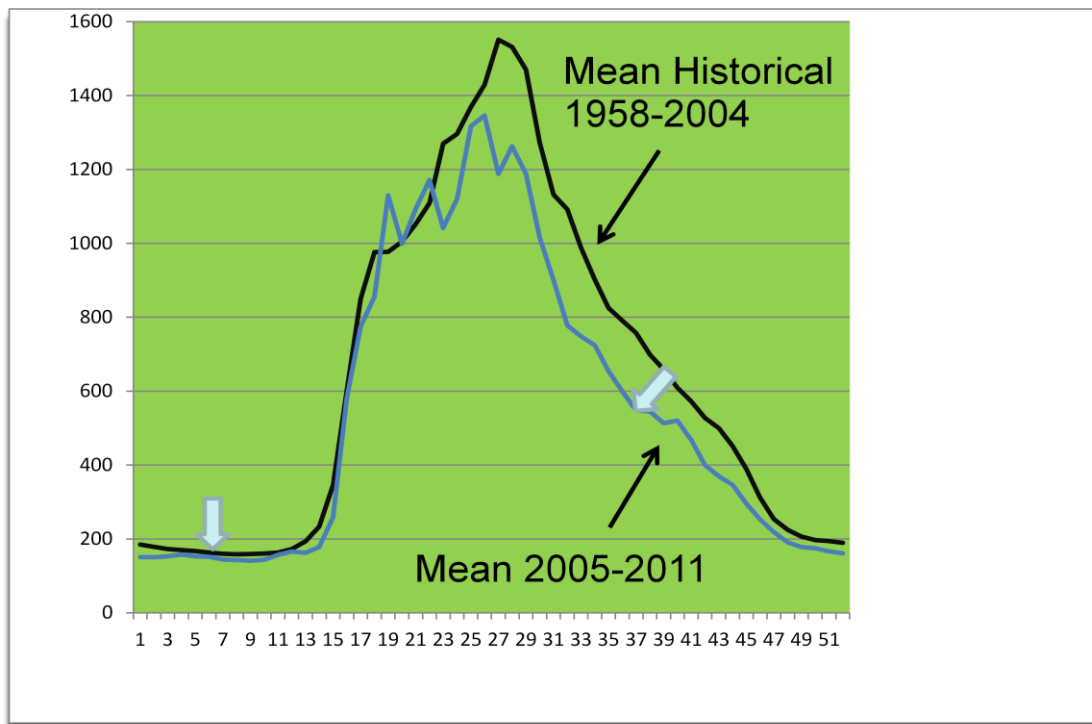
- The Pre-Industrial Case to the Application Case; and
- The Pre-Industrial Case to the Planned Development Case.

For each comparison, Appendix 2 provides the differences in terms of seasonal metrics (Athabasca River) and annual, seasonal, and 10-year low (7-day) and peak flow events (tributaries).

The summary statement Shell provides in the body of the SIR response reports the differences in terms of the equivalent decline in historic long-term *average* Athabasca River mean annual flow and seasonal flows for an average year (winter, spring, summer, fall). This reporting approach is deeply misleading for two reasons. First, the comparisons for the Athabasca River are based on only long-term flow statistics (mean annual flow; seasonal flow) which always indicate a lower concern level than the more appropriate annual instantaneous (peak flow) and 7-day (low flow) metrics. The use of seasonally- and annually-averaged metrics masks important shorter sub-seasonal periods during which flows are reduced. (Note that Shell is aware of the value of determining the 7Q10 metric as evidenced by its calculation of this metric for the tributary streams.) Second, Shell’s comparisons are made against long-term averages that no longer reflect the current hydrograph appropriately due to the extent of climate change that has happened during the period of instrumental record. See Figure 1 for illustration. Given the lack of hydrologic stationarity (Milly *et al.* 2008), the comparisons should be made against the contemporary hydrograph, which is a smaller hydrograph due to climate change influence. Until these changes are made in the determination and reporting of the declines, the results Shell presents will remain an inadequate basis for interpreting the significance of the hydrologic changes due to the Project.

Additionally, it does not appear that Shell took climate change into account in determining the differences into the future. Climate change is expected to reduce the low flow, the peak flow, and the mean annual flow of the Athabasca River through the course of the Project's life (Burn et al 2004; Burn 2009; Gill and Rood 2009; Lebel et al 2009). As a result, the comparison metrics should be recalculated to additionally include declines due to climate change.

Figure 1. The long-term mean hydrograph for the Athabasca River (at Fort McMurray) contrasted with the recent mean hydrograph (2005-2011) illustrating flow decline in the lower Athabasca River. Weekly flow data (m³/s) determined from Water Survey of Canada station #07DA001, Athabasca River at Fort McMurray.



Shell considers projected flow changes further in light of flooding in the Peace-Athabasca Delta (PAD; Appendix 3-4). Without justification, the degree of change is judged to be “negligible.” This is invalid because the degree of change needs to be assessed within the context in which it is happening (BC EAO 2011, p 12-13, referenced in Hicks 2011). With years of regulation of Peace River (Prowse and Conly 1998; Peters and Prowse 2001), the PAD is a stressed system and a relatively small amount of change can have an important impact to its viability and to the exercise of Treaty and Aboriginal rights.

Information Requests

- 1) Include projections of climate in the determinations carried out for the Planned Development Case.
- 2) Provide an assessment on the PAD, and interpreted in the appropriate ecological context, of the Athabasca River flow changes expected to come about under the Planned Development Case.

SIR 25: Karst (Shell 2013 Response, p 3-106 to 3-110)

SIR 25a

Shell's brief response offers little information and is limited to the following:

- Environmental implications – enhanced mitigation pathways for mine tailings and backfill or ETDA seepage outflows
- Social – “the occurrence of these events is not in the best interests of the miners” (Shell 2013 Response, p 3-108)

These thumbnail responses are virtually self-evident. Shell should expand on these in its response.

Information Request

- 1) Provide details about the environmental and social implications of the presence of units affected by karst processes below the mine footprint. Details to include characteristics such as the likelihood, severity, reversibility and cost of potential karst-related outcomes.

SIR 25b

The question asks about the potential for small and large volume water inflows to the mine pit due to karst-related features. Shell does not answer this question in its response. Instead, Shell provides a brief summary of data gathered supportive of an assessment of karst geohazard and offers two interpretations:

1. The potential that the Upper Waterways Formation is an aquitard (low permeability)
2. Sinkhole features were identified and mapped in Lease 9 (2011)

However, Shell does not discuss the “potential for small and large volume water inflows...as a result of karst or other geological processes/features” and instead indicates only that it will apply its geohazard protocol to these data sets. No indication is provided as to the outcome of the application of its geohazard protocol to the data sets it has now assembled.

Information Request

- 1) Describe the potential for karst-related mine-pit inflows throughout the PRM lease in light of the Shell’s available drilling and airborne-survey data referred to in the response provided.

SIR 25c

The SIR asks Shell to explain how it will prevent water inflows from underlying units including the Devonian. Shell’s response is incomplete because only a generalized scheme is provided. Shell says that (unspecified) oilsands companies have agreed to share data on regional aquifer flows and rock structures underlying oilsands deposits. In discussing how it plans to prevent water inflows from underlying units, Shell provides the following four generalized criteria used in the risk-management process (p 3-109):

- Absolute elevation of pit floor in relation to a lower allowable limit
- Changes in elevation of the Devonian surface
- Cover thickness between Devonian surface and lowest mine surface
- Anomalies observed during mining

This is insufficient because specifics on these risk criteria are not provided and Shell does not explain how they are interpreted and combined in Shell’s risk assessment protocol.

Shell provides only a generalized response strategy for those areas identified as a medium or high risk. The following is a summary of what Shell provides in its 2013 Response (p 3-108 to 3-109):

Medium Risk Areas

- Sample all observed water flows

- Provide anomaly observations by pit geologists
- Educate shovel operators

High

- Do not mine immediately
- Adjust base of feed to leave sufficient material in place as buffer on top of any potential vertical pathways
- Conduct a second risk assessment to determine whether mining could proceed at a later date

From the response, it appears that there is a two-stage risk assessment inherent to the protocol. However, only high-level details are provided in the response and the “guts” of the protocol are absent.

Information Requests

- 1) Provide the details of the primary risk assessment that will determine the risk of water inflows from underlying units.
- 2) Provide the details of the secondary risk assessment to be undertaken at sites initially identified as high risk in Shell’s geohazard protocol.

SIR 25d

The SIR asks Shell to discuss how it plans to manage inflow water should it occur. The response provides the names of potential techniques in relation to the degree of water (none, low, moderate, high) associated with the inflow. Details of each method are not provided.

Information Requests

- 1) Provide the methodology Shell intends to use to seal uncontrolled flows “based on the methodology developed for Cell 2A at Muskeg River Mine” (quotation is from Shell response to SIR 25d).
- 2) Provide details of the sealing techniques Shell names in its SIR response including reference to proven experience with applications at other locations.

SIR 26 (Shell 2013 Response p 3-110 to 3-112, App 4, S. 3) – Water Management Framework & Climate Change

In this SIR, Shell is asked to update the information provided concerning changes to the Athabasca River and to the regulator’s approach to managing water withdrawals from the Athabasca River. Given that Shell’s PRM plans depend to a great degree on this river, it is crucial that the most up-to-date information be made available to the JRP, and particularly in light of the pressures on the river both in terms of growing water withdrawals and shrinking flows due particularly to climate change. Shell’s response to each element of this SIR is incomplete and casts doubt on the Shell’s water-supply preparedness.

SIR 26a

A revised Water Management Framework Phase 2 proposal is currently undergoing stakeholder review and comment. Shell’s response provides no indication that the original Phase 2 (P2FC) recommendation has been superseded by a more recent Phase 2 approach that is currently under discussion by stakeholders.

Information Request

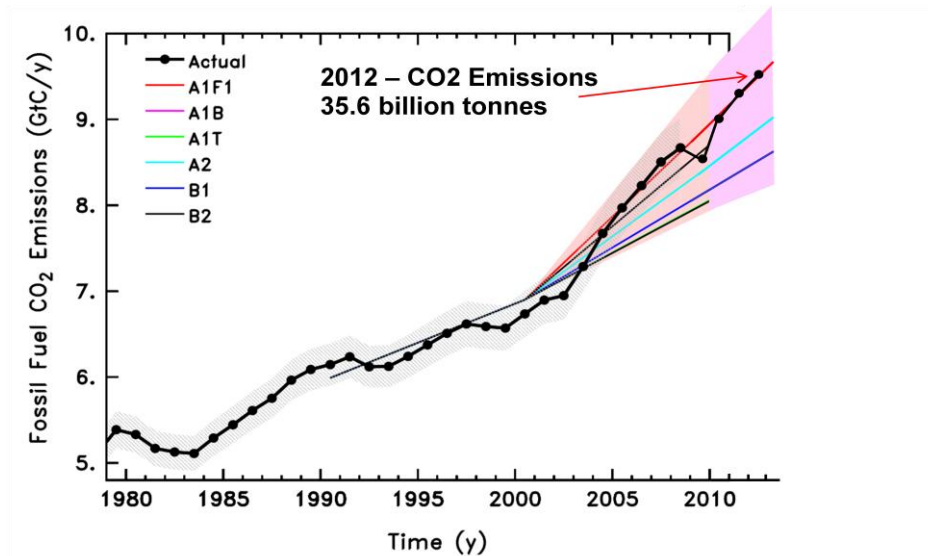
1) Supplement the response provided with an update that includes details of the revised Phase 2 WMF proposal.

SIR 26b

Shell has updated its information using the fourth Assessment Report (AR4) from the Intergovernmental Panel on Climate Change (provided in Shell's Appendix 4). There is a series of gaps and underestimates associated with the approach described in Appendix 4. Given the uncertainties that climate change creates for major projects spanning many decades, it is crucial that the best information possible be made available to the JRP concerning potential future climates and the uncertainties associated with those projections. To this end, five significant gaps are noted in Shell's SIR information concerning climate change, as follows:

- It is increasingly recognized that the projections from Global Climate Models (GCMs) are underestimating the climate change that is most likely to occur. This is because many feedback inputs important to the climate system are excluded from GCMs. GCMs currently include a wide range of what are called “fast feedbacks”, which include Plank response, changes in atmospheric lapse rate, water vapour, clouds, sea ice, snow cover, and natural (i.e. non-anthropogenic) aerosols (IPCC 2013, Ch9, p 9-133). According to Previdi et al. (2013), “there is mounting evidence to suggest that additional feedbacks should be included” in the models. Feedbacks that are underrepresented or not represented in the current models include permafrost melt (MacDougall et al 2012), ocean pH (Six et al 2013), ice sheet/vegetation albedo (Previdi et al 2013), forest combustion (Bowman et al 2009), methane hydrates (Previdi et al 2013), and microbial processes in global soil carbon (Wieder et al 2013). There is now mounting evidence that when these feedbacks are activated, the extent of climate change will be considerably greater than current GCM projections. Shell should make this information should be made available to the JRP.
- While the GCMs' underestimates are shaped by their conservative make-up, they are also shaped by the emissions scenarios that are used as inputs. Current global rate of emissions is increasing by over 3%/year, higher than all the IPCC emissions scenarios input into the GCMs. The IPCC characterizes emissions in different scenarios identified by A1Fi, B2, A1, etc. which represent different socioeconomic trajectories of production of greenhouse gases. These scenarios are subsequently used as inputs to GCMs. As shown in Figure 2, all IPCC emissions scenarios (used by Shell in its 2013 response) are tracking above the worst-case IPCC scenario and there is no sign of it abating. (See Peters et al. 2013 for a further updated discussion.) Again, Shell should communicate these important underestimates in future climates to the JRP in these SIR responses.
- The metrics calculated to characterize changes in the Athabasca River flow regime with climate change are seasonal and thus mask important changes at sub-seasonal periods. As discussed elsewhere in this review, the following metrics should also be calculated under future climates: 10-year peak flow and 7Q10 low flow.
- Shell's Appendix 4, Section 3.3.3, discusses the air temperature and precipitation associated with future climate but does not apply these findings to the tributary streams located within the LSA.
- The response is out of date because IPCC5 was released in 2013 (beginning in September 2013). The best information available should be used so that uncertainties are understood as much as possible.

Figure 2. Global CO₂ emissions since 1980 compared with emission scenarios used in IPCC models.



Information Requests

- 1) Revise the metrics used to describe the hydrologic change projected with climate change to include determination of the mean annual, 10-year peak flow and the 7Q10 low flow in all Athabasca River comparisons.
- 2) Provide an assessment on the PAD, and interpreted in the appropriate ecological context, of the Athabasca River flow changes expected to come about and including consideration of updated climate change model outputs.
- 3) Include a discussion in the reporting of the climate change results that highlights the associated uncertainties and discussing the likely underestimations of the outputs.
- 4) Determine the revised estimates of tributary stream flows due to climate change and associated with the Planned Development Case.
- 5) Provide updated assessment information consistent with the IPCC5 GCM outputs.

SIR 26c

In its response, Shell describes it is taking steps to avoid the potential for a conflict to arise in water demand in the face of dewatering and extraction activities in neighbouring mining operations. The two strategies it describes are hydrogeological monitoring and hydrogeological data sharing agreements. Shell states that “(g)iven the above prior measures” it does not need to develop associated contingency plans for groundwater (Shell 2013 Response, p 3-112). Should the need arise, Shell states that “(b)ased on hydrogeological monitoring data, an appropriate contingency option would be assessed” (Shell 2013 Response, p 3-112). Given that the SIR has asked for Shell to provide contingency options, it is not sufficient for Shell to defer the assessment of such options to an unspecified future date.

Information Request

- 1) Provide a contingency plan in the case of competing demand for groundwater between multiple operators.

SIR 28: Athabasca River Navigability (Shell 2013 Response, p 3-113 to 3-117)

These findings are jointly authored by Martin Carver (Aqua Environmental Associates) and Patt Larcombe (Symbion Consultants).

The SIR addresses the navigability of the Athabasca River from Pre-Industrial Case (PIC) through to the Application Case and the Planned Development Case (PDC) and specifically identifies the use of annual flows, peak flows, and the 7Q10 as example measures of “predictive methodology” to be used in the assessment. In its response, Shell provides projected levels of the Athabasca River in stage (m) using the rating curve available at node S24 and judges the changes to be negligible. The SIR is deficient in both the assessment of the effect and its subsequent interpretation and each is discussed below.

Effect Assessment

Shell’s response provides the assessment outcomes in terms of seasonal flows, thus masking the changes that are of concern in limiting navigability. The SIR identifies changes in peak flow, annual flow, and low flow (7Q10) as appropriate measures for the assessment. These standard metrics are widely used in impact assessment evaluation and are used elsewhere in Shell’s EIA. Shell’s responses are also provided exclusively as measures of stage (metres), thus limiting how they can be interpreted. Lastly, Shell provides a response for only node S24; however, the calculations should be completed and included in the SIR response for all nodes downstream of areas affected by the Project.

Effect Interpretation

A critical factor in Athabasca River open-water navigability is sufficient water depth to permit a boat loaded with ACFN harvesters, gear and harvested resources to safely move along the river. Candler *et al.* (2010, Section 6.2, p 87) reported; “The standard of transportation specified in interviews, and on which responses were based, was a fully loaded boat, as after a successful hunt, or outfitting a trapping cabin, with an outboard motor. This is the standard and preferred mode of transportation used by ACFN subsistence river users. Explanations for why outboard motors were the preferred mode of subsistence transport included the cost of gas, the cost of motor repairs and availability of parts, and reliability in the variety of conditions encountered in ACFN territory (including open lake, river, stream, and weedy lakes). Based on interview responses and later verification with the ACFN elder’s council, the safe navigational depth (including startup) for this kind of boat was confirmed to be approximately four feet (1.2m).”

Shell’s response to this SIR (pg 3-114) states that the maximum change in Athabasca River water level from the PIC to the 2013 Base Case is a decrease of 4 cm and concludes “a decrease of 4 cm is not expected to affect navigability of the Athabasca River.” No comment is provided to explain this subjective dismissal of effects importance. Further, this finding is contrary to ACFN repeated evidence that open-water boat navigation, particularly associated with fall season traditional use, on the river is currently (Base Case) difficult and at times virtually impossible. Shell goes on to predict decreases in river water level under the PIC to 2013 PRM Application Case (5 cm), PIC to 2013 PDC (6 cm), and in consideration of climate change (cumulative 19 cm), and that all of these declines will not affect navigability of the Athabasca River. Shell’s response does not provide objective evidence to support its conclusions regarding navigability. Instead, the interpretations of importance of effects to navigability require detailed consideration of navigation needs of the ACFN for subsistence transport, as introduced above. This aspect is ignored in the response. Instead, the response compares Shell’s assessed amount of change with its own subjective estimate of annual stage variation of the Athabasca River (“about 1.7 m”) and concludes, subjectively again, that the change in water levels of the Athabasca River are “not expected to affect navigability.” The assessed change must be interpreted within the appropriate context.

Information Requests

- 1) Determine the quantitative effect of the Project on navigation for each case (PIC, BC, AC, PDC), in terms of the annual peak flow, mean annual flow, and 7Q10.
- 2) Provide the quantitative results at nodes S24, S46, S48, and S50.
- 3) Based on the results of 1 and 2 above, and the information already contained in Tables 28-1, 28-2, 28-3, and 28-4, determine the frequency (# of days/season) for each open-water season and development case that the estimated declines in water level would reduce the water depth (expressed as cm from the bottom of main river channel to the surface of the water) below the ACFN reported navigation depth requirement of 120 cm.
- 4) Provide an appropriate contextual evaluation of the degree of navigation effect in relation to the documented needs of ACFN subsistence travelers.

SIR 29a-d: Additional Navigation Concerns (Shell 2013 Response, p 3-117 to 3-120)

These findings are jointly authored by Martin Carver (Aqua Environmental Associates) and Patt Larcombe (Symbion Consultants).

SIR 29a

The SIR asks Shell to “address” concerns held by ACFN concerning the loss of navigability of PRM LSA waterways (emphasizing Big Creek and Redclay Creek), and in consideration of cumulative effects that will prevent use of the PRM watersheds. Notwithstanding the apparent gaps in the assessment process reported on by Transport Canada (given that ACFN members navigate the lower reaches of Big Creek and Redclay Creek), Shell offers little to address the navigation loss, as requested in the SIR. The EIA (V6, p 6-321) points to possible hydraulic connection between Redclay Creek and the Redclay Compensation Lake that may drive flows lower. However, Shell dismisses the effect as “negligible” without justification. Nothing is provided in Shell’s response to address this concern, in fact it is not mentioned at all. Instead, Shell focuses on the characteristics of the new outlet channel that it proposes to create as discharge from the Redclay Compensation Lake, and presumably offered as an alternative to the downstream reach of Big Creek. Shell reports that the peak flow of this artificial outlet channel will be reduced from that of the present Big Creek mouth (indicating low flows will not change). Curiously, Shell translates this into an equivalent stage difference however that difference is dependent on the creek morphology created by Shell. Shell goes on to assert that if Redclay Creek and Big Creek are navigable to ACFN, then they will be navigable afterward. Despite the decline in depth Shell reports:

- Big Creek: 20cm (10-year peak flow); 1cm (mean annual flow) (Shell 2013 Response to SIR29a)
- Redclay Creek: “potential” unassessed downward effect on flows (EIA V6, p 6-321)

The above statements do not support the conclusions reached. The downward revision of flows in the outlet channel, and the corresponding reduced depth would diminish navigability. The downward pressure on flows in Redclay Creek could affect navigability and thus should be assessed. The loss of water from the Big Creek mouth will render that channel non-navigable to ACFN.

Information Requests

- 1) Provide evidence that a 20-cm reduction in water level associated with the 10-year flood event would not adversely affect navigation by means of canoe, of the new Redclay Creek outlet channel.
- 2) Provide an assessment of the reduction in flow of Redclay Creek expected to come about due to hydraulic connection with the Redclay Compensation Lake

3) Given the reductions in flow and likely reductions in navigability, address ACFN concerns for the decline in navigability of Big Creek, Redclay Creek, and the new outlet channel of the Redclay Compensation Lake.

SIR 29b

This SIR asks Shell to provide “historical information to get a complete pre-industrial comparison with current conditions and use of waterways.” Shell does not provide information other than reporting that ACFN (and MCFN) report that Big Creek and Redclay Creek are “navigable at adequate flow levels.” This is a gap in the SIR response. Candler et al (2010) provide additional information which should be included in the response.

Information Request

1) Describe ACFN use of PRM Local Study Area waterways as indicated in historical accounts and as requested by the SIR.

SIR 29c

The SIR asks Shell to address concerns expressed by ACFN about the flow splitting structure on the Redclay outlet. The concern was identified due to the lack of information about the construction and operation of the device. Shell provides no comment on this concern, simply noting the device is to be constructed and operated by Teck Resources.

Information Request

1) Provide Shell’s understanding of Teck Resources’ proposed splitting device and any agreement with it as to the operation of the flow splitting device to meet flow demands on the PRM lease.

SIR 29d

Shell’s response does not adequately address changes in flow expected to come about on the Athabasca River. In addition, it does not indicate the location of “important Aboriginal sites within the RSA.” The response provided refers to in-stream flow needs (by reach) without any reference to what they are determined to be.

Information Request

1) Based on metrics requested under SIR 28, link expected changes in Athabasca River navigability to locations of importance to ACFN land users.

SIR 51b-c: Effects of the Environment on the Project (SIR 2013 Response, p 3-186 to 3-188)

SIR 51b

The SIR asks for information on how regional flooding may affect the Project, particularly with respect to the Pierre and Athabasca Rivers. Shell’s response provides some details of measures taken to assure that infrastructure is not vulnerable to Pierre River floods up to 100-year event. There are two problems with this approach. First, the duration of the project is long enough that a planning focus on the 100-year event is insufficient to maintain a low risk level – the 200-year event is likely necessary. Second, flood preparedness is likely to be insufficient without floodplain delineations that consider changes in climate extremes that are expected to accompany climate change.

Information Requests

- 1) Redo the floodplain delineations for the Athabasca River based on the 1:200 year event and in consideration of changes expected with climate change over the course of the Project life, and explicitly in terms of changes to extreme climatic and hydrologic events.
- 2) Determine the projected 1:200 year flood flows for the Pierre River, and in consideration of climate change and explicitly in terms of changes to extreme events. Discuss implications for sizing of planned diversion channels.

SIR 51c

The SIR asks for information on the vulnerability of the Project to drought, techniques used to determine future flows in the Athabasca River, and a discussion of long-term cumulative water implications for the Athabasca River. Shell's response provides three "primary mitigations" around the Project's water supply needs. The first refers to the determination of a mine water balance based on a 100-year "dry conditions" event, though details are absent in the response as to how this was carried out. The second refers to Shell's intent to develop an as-yet-to-be-determined storage capacity to get through droughty periods. Shell does not state the extent of storage that it projects will be needed, instead it appears to be relying exclusively on what the Phase 2 rules will allow it to withdraw. Third, Shell has designed its withdrawal infrastructure so as to be able to remove water at an accelerated pace during the freshet.

Shell's response does not provide the information that was requested in the SIR. The response clearly indicates that Shell considers drought to be of concern, however in the response: a) no indication is provided as to the regional potential for drought; b) no indication is provided on how future flows were determined and related to Project water requirements; and c) a discussion is not provided of "long-term cumulative implications for water management of the Athabasca River."

Information Requests

- 1) Describe how climate information has been used to determine water requirements of the Project.
- 2) Identify the storage needs for the Project under the Phase One Water Management Framework.
- 3) Provide a discussion of the long-term cumulative implications for water management of the lower Athabasca River.

3.0 CONCLUSION

This review report has identified gaps and deficiencies associated with Shell's responses to the Pierre River Mine JRP R1 SIRs. This report has also provided a collection of information requests that, if addressed by Shell, would assist in completing sufficient answers to the JRP's R1 SIRs.

4.0 REFERENCES

- Candler, C and the Firelight Group Research Cooperative with the Athabasca Chipewyan First Nation (ACFN). Integrated Knowledge and Land Use Report and Assessment for Shell Canada's Proposed Jackpine Mine Expansion and Pierre River Mine April 20, 2011 (Updated September 15, 2012).
- Bowman DMJS et al. 2009. Fire in the Earth System. *Science* 324:481-484.
- BC Environmental Assessment Office (BCEAO) 2011. *Assessment Report Template*, unpublished policy document (in Hicks 2011).
- Burn D 2009. *Trend analysis for the Athabasca River* (App. 3 in Lebel et al. 2009). Unpl. Rpt. Civil and Environmental Engineering, University of Waterloo. Waterloo, ON. 11 p.
- Burn DH OI Abdul Aziz and Alain Petroniro 2004. A comparison of trends in hydrological variables for two watersheds in the Mackenzie River basin. *Canadian Water Resources Journal*, 29(4):283-298.
- Gill K and S Rood 2009. *Trend detection in historic streamflows along Segment 5 of the Athabasca River, Alberta* (App. 3 in Lebel et al. 2009). Unpl. Rpt. prepared for P2FC Climate sub-group. Environmental Science Program, University of Lethbridge. Lethbridge, AB. 11 p.
- Hicks TD 2011. *Exploring the Use of Argument in Impact Assessment: A Case for Impact Significance Arguments*. Master of Arts in Environment and Management, Royal Roads University, Victoria BC, 108 p.
- Lebel M, E Kerkhoven, R Bothe, J Hornung and D Ohlson 2009. *Climate Change Sensitivity Analysis*. Unpubl. Report prepared for Phase 2 Framework Committee. 53 p.
- Milly PCD, J Betancourt, M Falkenmark, RM Hirsch, ZW Kundzewicz, DP Lettenmaier, RJ Stouffer 2008. Stationarity is dead: whither water management? *Science* 319:573-574.
- Peters GP, RM Andrew, T Boden, JG Canadell, P Ciais, C Le Quéré, G Marland, MR Raupach, and C Wilson 2013. The challenge to keep global warming below 2°C. *Nature Climate Change* 3:4–6.
- Peters DL and TD Prowse 2001. Regulation effects on the lower Peace River, Canada. *Hydrological Processes* 15:3181–3194.
- Previdi M, BG Liepert, D Peteet, J Hansen, DJ Beerling, AJ Broccoli, S Frolking, JN Galloway, M Heimann, C LeQuere, S Levitus and V Ramaswamy 2013. Climate sensitivity in the Anthropocene. *Quarterly Journal of the Royal Meteorological Society* 139:1121–1131.
- Prowse TD and FM Conly 1998. Effects of climatic variability and flow regulation on ice-jam flooding of a northern delta. *Hydrological Processes* 12, 1589–1610.
- Six KD, S Kloster, T Ilyina, SD Archer, K Zhang and E Maier-Reimer 2013. Global warming amplified by reduced sulphur fluxes as a result of ocean acidification *Nature Climate Change* 3:975-978.
- Wieder WR, GB Bonan and ST Allison 2013. Global soil carbon projections are improved by modelling Rampal P, J Weiss, C Dubois, and J-M Campin 2011. IPCC climate models do not capture Arctic sea ice drift acceleration: Consequences in terms of projected sea ice thinning and decline. *Journal of Geophysical Research* 116:17 p.