Shell Canada Pierre River Mine Project
ACFN Technical Review Clarification Questions
(including questions received March 2009)

Sec No.	Topic	Q#	Comments/Questions	Shell Follow-up
1	Groundwater Key Concerns	1	Traditionally important plants dependent on groundwater flow for survival may be impacted. The ACFN could be impacted by the loss of groundwater-supported wetland areas which may contain traditionally important plants that are dependent on groundwater for survival. Traditionally important plants which are found in non-wetland areas may also be lost if they are dependent on groundwater that would be lowered by the proposed project. Such losses would be permanent, unless reclamation provides suitable areas where the plants could re-establish. Wetlands that develop after reclamation may have the potential to be impacted by process-affected groundwater from areas where tailings have been stored and may be less desirable areas for the collection of plants. **Request:** **Discuss the locations of traditionally important plants that may be in areas impacted by the project. Confirm Shell's awareness of their locations and, where necessary, mitigation measures for their protection.**	**Note same as Q1 – JPME:** Information on traditionally important plants is provided in: Appendix K of the Terrestrial Vegetation, Wetlands and Forest Resources ESR. Section 3.4 of the Traditional Land Use ESR and includes an assessment of the project-related effects to groundwater levels and quality. Effects to Traditional Plant Potential is described in: Section 2.7 of the EIA Update (Table 2.7-14). Mitigation measures are described in the Application and EIA, of which reclamation is the primary mitigation to re-establish areas with the capacity to support traditional plants.
		2	Access to traditionally important groundwater sources may be impacted. ACFN individuals could be impacted by the loss of groundwater sources (waterwells, dugouts, muskegs or springs) used when visiting traditional lands located in the proposed mine site or the immediate surrounding area. Groundwater sources in the mining area will be permanently impacted and / or be unsuitable for further use. Groundwater sources located in the surrounding area may be permanently or temporarily impacted and may or may not be unsuitable for further use after closure and reclamation. **Request:** **Discuss the locations of traditionally important groundwater sources that may be in areas impacted by the project. Confirm Shell's awareness of their locations and, where necessary, mitigation measures for their protection.**	**Note same as Q2 – JPME:** See Figures 6.3-32, 6.3-35 and 6.3-28 and Figures 6.3-82, 6.3-85 and 6.3-88 of predicted dewatering effects in surficial deposits for the JMPE and PRM areas, respectively. Regarding Shell's awareness, Figure 3.1-2 of the TLU ESR provides RFMA holder areas in relation to the Project area. One ACFN member holds a single trapline, RFMA #1714 that will be directly affected by the Project. Shell does not know of any other specific groundwater sources used traditionally by ACFN members.
		3	Reporting of groundwater incidents not confirmed. It is unclear whether the ACFN	**Note same response as Q3 – JPME:**

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			will be advised of any unexpected changes in groundwater quantity and / or quality. **Request:** **Confirm that the ACFN community will be advised of any groundwater incidents reported to the authorities. Confirm that Shell will meet with the ACFN to discuss the incident, the subsequent investigation, any follow-up action, and their results.**	Shell is willing to discuss tthis request as part of future negotiations towards an agreement.
		4	Computer-predicted impacts, or lack of impacts, are subject to some uncertainty. Groundwater monitoring must demonstrate that project activities are proceeding without unreasonable impacts on the groundwater resources in the area. **Request:** **Prepare a table summarizing computer-predicted and professional judgment impacts on groundwater and outline the groundwater level and / or quality monitoring to be undertaken to verify these predictions. As monitoring data becomes available add them to the table and share the updated table with the ACFN. Reassess deviations from the predicted impacts, update the table, and reassess mitigation measures. Provide the ACFN with the results of any reassessment of mitigation measures.**	**Note same as Q4 – JPME:** The Aquatics Monitoring Program is found in Volume 4B, Appendix 4-9, Section 2.1. Reassessment of mitigation measures may be part of future negotiations
2	Surface Water Quality Key Concerns	5	Unclear source of impacts on LSA water quality. Shell shows (Table 6.5-16) that relative to the Base Case, the Application Case will result in increases in naphthenic acids (both labile and refractory), and chronic toxicity in the Pierre River. However, these increases are not ascribed to the Pierre River Mine Project. Similarly, increases in several key water quality constituents in Eymundson Creek and Big Creek are only partially ascribed to the project, or not at all. The potential changes to these Local Study Area (LSA) streams as a result of CNRL's Horizon Mine are included in the Base Case, so it is unclear what other sources of inputs would be present in the Application Case to cause these water quality changes. **Request:** **If the Pierre River Mine Project is not responsible for the increases in naphthenic acids and chronic toxicity in Pierre River and other key water quality**	Information on constituents predicted to increase in the Pierre River due to seepage arising from the Project is found in Volume 4, Section 6.5.6.3, Page 6-441. However, the magnitude of the increases were so small they were listed in the table as "no increase". The detection limit for total naphthenic acids is generally 1 mg/L and the predicted peak increase for labile naphthenic acids was only 0.09 mg/L. A chronic toxicity of less than 1 TUc means that the water is non-toxic and peak increase in chronic toxicity was only 0.032 mg/L. In Eymundson and Big Creeks, all increases presented in Table 6.5-17 and 6.5-18 are due to muskeg and overburden water releases or water diversions associated with the Project.

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			constituents in Eymundson and Big Creek, clearly state the source of these increases from the Base Case to the Application case within the Local Study Area (LSA).	
		6	Few constituents included in the LSA water quality assessment. While key constituents (acute and chronic toxicity, tainting potential, naphthenic acids and Total Dissolved Solids (TDS)) for the Pierre River were assessed and presented, no other water quality parameters appear to have been included, or at least, were not included in Table 6.5-16. Shell notes that all other Local Study Area (LSA) constituents were within the Base Case range, but no other data is provided. Shell also states that only those constituents modelled for the Horizon Project EIA could be assessed in this EIA, but that appeared to only include mercury. It is unclear why metals, nutrients, PAHs (other than naphthenic acids) and other important water quality parameters were not assessed and/or included in Table 6.5-16. A few additional parameters are included in the assessment tables for Eymundson Creek and Big Creek (including some metals and PAHs), but a full suite of water quality parameters is still missing. **Request:** **Justify the lack of assessment for general water quality parameters including metals, nutrients and other PAHs within the LSA streams. If these parameters were modelled, include the results in Table 6.5-16. Reassess the overall low to negligible impact rating, if necessary, to include the results of all water quality parameters.**	The full suite of parameters listed in Volume 4, Section 6.5.2.7 was modelled at all water quality nodes with the exception of a few parameters that were unavailable for the CNRL Diversion Channel. More information on the key constituents that were assessed is available in: - Volume 4, Section 6.5.5.3; - Volume 4, Section 6.5 (Tables); - Volume 4, Appendix 4-7
		7	Uncertainty analysis was not completed for LSA project impacts. The Pierre River Mine Project EIA relied upon the uncertainty analysis conducted for the Jackpine Mine Expansion Project. No independent uncertainty analysis was conducted for the Pierre River Mine Local Study Area (LSA) data or predictions. Considering different datasets were used and that some of the Pierre River Mine predictions relied upon information provided and modelled by another project (CNRL Horizon), it would seem prudent to conduct an uncertainty analysis specific to this project. **Request:**	Shell is willing to discuss this request as part of future negotiations towards an agreement.

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			Provide an uncertainty analysis that is specific for the LSA impacts of the Pierre River Mine Project.	
		8	Inappropriate impact ratings for temperature changes to Eymundson Creek. The release of waters from a pit lake in 2049 will result in relatively large changes in temperature in Eymundson Creek during the spring, summer and fall. For example, the mean monthly temperature for May will decrease almost 3°C, from 5.8°C in the pre-development scenario to 3.1°C. The mean monthly temperature for September will increase almost 6°C from 3.6°C to 9.4°C. Despite these large differences, the impact rating is considered negligible, which appears inappropriate. While Shell states that thermal equilibrium will quickly be achieved, no mention on the actual extent of the impact is provided. Only mitigations for impacts of the polishing pond releases, which will result in relatively small changes (a maximum change of 0.3°C) are discussed. No mitigation for pit lake discharges are mentioned, despite this being the major impact on temperature. In addition, the ramifications of these large temperature effects on other water quality parameters (e.g. dissolved oxygen) are not mentioned. **Request:** **Reassess the impact rating for temperature changes to Eymundson Creek that better reflect the predicted data. Describe the extent of the changes in temperature along the length of the river. Discuss the effects of these temperature changes on other water quality constituents, particularly dissolved oxygen.**	At closure, the Pierre South Pit Lake will discharge through the closure diversion channel to the Athabasca River. Although Water Quality results indicate a change in the temperature regime for the 2049 time snapshot for Eymundson Creek, this is representative of temperatures in the pit lake outlet diversion channel to pre-development temperatures in Eymundson Creek. As a result of the pit lake outflows, the closure diversion channel, being a lake fed system, may show a delayed warming in the summer and delayed cooling in the fall and winter compared to Eymundson Creek. However, as discussed in the Surface Water Quality assessment, effects from the changes in temperature would be localized and receiving watercourses would quickly attain thermal equilibrium based on prevailing climatic conditions. This request appears to be a statement of disagreement with Shell's methodology and conclusions, as opposed to a request for clarification that would allow ACFN to complete its Technical Review of the EIA. As such, this may be more appropriately discussed following completion of ACFN's technical review of the EIA
		9	Only guideline exceedances are considered - not increases in the values. Shell concludes that for the Pierre River, Eymundson and Big creeks, the impacts on water quality are low to negligible. Shell outlines (Table 1.3-4) the impact description criteria when a constituent has a guideline available, and when there is no guideline. The implications of these ratings differ substantially, such that when a parameter has a guideline associated with it, only guideline exceedances are considered to be significant. Any absolute increases in the actual values are completely discounted.	To assess the impact on aquatic life due to changes in water quality, the most stringent guideline was adopted from amongst the following for each constituent: Alberta Environment, the Canadian Council of Ministers of the Environment and the U.S. Environmental Protection Agency. As stated in the Canadian Environmental Quality Guidelines (CCME 1999), "Guidelines are numerical limits or narrative statements based on the most

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			Within the EIA, several of the metals within Big Creek are predicted to double or triple, but because the guideline isn't exceeded, or the guideline is exceeded already under the Base Case, there is no impact. While guideline exceedances will certainly be the key criterion, absolute value increases should also be considered, because they represent a change from existing conditions. While guidelines have been developed as representative end points of change in survival, growth, reproduction, behaviour etc., substantial changes in water quality may still impact aquatic organisms, even if guidelines are not exceeded, particularly within natural systems and not a controlled laboratory. **Request:** **Provide additional discussion on the impacts of absolute increases in parameters with and without guidelines, regardless of whether guideline exceedances occurred.**	current, scientifically defensible toxicological data available for the parameter of interest. Guideline values are meant to protect all forms of aquatic life and all aspects of the aquatic life cycles, including the most sensitive life stage of the most sensitive species over the long term." Guideline values are generally derived by determining, through toxicological testing, the lowest concentration that would result in no adverse effects on the health of aquatic organisms, then dividing the concentration by ten as a margin of safety. Therefore, guidelines are considered highly protective, and further assessment for constituents that are predicted to increase but remain below guideline values is not required.
		10	Information provided in the water quality impact tables insufficient. Although the ratings criteria used the percentage increase to determine the magnitude of change for water quality constituents, no percentage increase values are provided in the text or tables. As a result, it is very difficult and inconvenient to check the results tables against the ratings criteria to determine how the ratings have been applied and whether they have been applied correctly. **Request:** **Provide the percentage change, rather than just the absolute change, in the results tables for the water quality assessment to allow comparison with the ratings criteria.**	**Note same as Q7 – JPME:** Shell believes that there is sufficient information for ACFN to calculate the percentage change. The existing tables provide sufficient information for a reviewer to calculate percentage change.
		11	Ratings system for constituents with guidelines unclear. Where water quality guideline exceedances are found to result from the project, it is unclear whether the ratings criteria use the higher acute guideline or the lower chronic guideline, or both, to determine the ratings impact. For example, Table 6.5-18 Table 6.5-18 shows that median chromium concentrations in Big Creek from 2015 to 2049 would triple from 0.0021 mg/L (Base Case) to 0.0062 mg/L (Application Case). The acute guideline for chromium is 0.016 mg/L, while the chronic	**Note same as Q8 – JPME:** The terms "slightly", "marginal" or "substantial" are not used to rate water quality guideline exceedances; the criteria listed in Volume 4, Section 6.5.5.3, Page 6-399 are applied without any subjective rating. Assessing guideline exceedances are as follows: If a constituent increases 10% above pre-development and Base Case

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			guideline is 0.001 mg/L. Clearly, these exceedances would occur over a chronic time period, therefore, the 0.001 mg/L guideline should be applied. The question becomes whether this increase (a difference of 0.0041 mg/L) is considered to be negligible, low, moderate or high. The ratings criteria are vague and give subjective criteria (low is when the release contributes slightly to existing background values over guidelines, medium is a marginal contribution and high is a substantial contribution). It is unclear what the definitions of "slightly", "marginal" and "substantial" are. **Request:** **Provide additional rationale and clear ratings classifications for the ratings system when guidelines are present. State whether the rating is provided against changes to the acute guideline, chronic guideline or both. Define "slightly", "marginal" and "substantial" exceedances.**	conditions, and it exceeds a guideline (regardless of whether the exceedences is due to the Project), the effects of the increase are assessed in the Aquatic Health component (Volume 4, Section 6.6). Concentrations of all constituents are also assessed in the Human Health (Volume 3, Section 5.3) and Wildlife Health (Volume 3, Section 5.4) components for effects on these receptors. The lowest applicable guideline is always applied to each constituent. Therefore, if a constituent has both a chronic and acute guideline, the chronic guideline is applied.
		12	Pit lakes will have relatively small littoral zone. Shell states that the littoral zones of the pit lakes will be adequate to provide biological activity and support a viable ecosystem. The littoral zones will be up to 15% of the total area. This is relatively small compared to other reclamation waterbodies, in which generally 20 to 30% of the area of the lake is comprised of littoral zone. Since the littoral zone is the most productive part of a lentic system, its relative area should be maximized, not minimized. **Request:** **Discuss the adequacy of a maximum 15% littoral zone area for these end pit lakes in light of the more standard 20 to 30% area. Redesign pit lakes if necessary.**	**Note same as Q9 – JPME:** The littoral zone of pit lakes is expected to be 10 to 30% of the total lake surface area (see Closure Drainage Plan - Jackpine Mine Expansion, Appendix 4-3; Pierre River Mine, Appendix 4-4). The pit lake designs are conceptual; the exact areas of littoral zones will be determined during the detailed design stage of pit lake development.
		13	Unclear if discharge to surface waters will exceed water quality guidelines. Shell states that the pit lakes will discharge to surface waters from this project only when water quality is of sufficient quality and when discharge water quality limits are met. It is unclear what is considered sufficient quality and what these discharge limits will be. It is reasonable to hope that the limits will be the same as the current water quality guidelines, however, this is not likely the intent, since at closure, when discharge will begin, natural concentrations (for many	**Note same as Q10 – JPME:** Shell will construct and manage pit lakes and the Treatment Lake such that they will meet discharge criteria as currently being developed by CEMA and ultimately to be enforced by AENV.

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			constituents) and guidelines (for PAH group 2, and iron) may be exceeded in the pit lakes. Additionally, Shell does not clarify whether the Treatment Lake will discharge to the Athabasca River only if discharge water quality limits are met. **Request:** **Define what is considered to be sufficient quality for the water of the pit lakes and what the discharge limits will be. Discuss the rationale behind discharging water from pit lakes that exceeds water quality guidelines. Provide a statement that the Treatment Lake will only discharge to the Athabasca River when discharge limits are met.**	
		14	Sediment quality of pit lakes or Treatment Lake has not been modelled or discussed in any detail. Shell does not provide the sediment quality of the Mature Fine Tailings (MFT) to be added to the bottom of the pit lakes. In addition, Shell does not characterize the sediment quality of the pit lakes, and assumes that they would be similar to those of the Jackpine Mine Expansion Project . However, the MFT are likely to be different for each mine site, and therefore, the sediment quality of the pit lakes for each mine site is unlikely to be the same. Shell does not include a discussion or any data regarding the sediment quality of the Treatment Lake. **Request:** **Provide the sediment quality data for the MFT for the pit lakes and for the Treatment Lake.**	**Note same as Q11 – JPME:** The solid composition of the MFT that will be added to the pit lakes for the Project is expected to be comparable to the MFT for existing oil sands operations, as summarized in the EIA, Volume 4, Table 6.5-15. The solid composition of the MFT will be similar for the PRM and JPME, because both will use similar extraction processes.
		15	No explanation given for declines in the concentrations of several water quality constituents in the Athabasca River as a result of the project. As shown in Table 6.5-22, several water quality parameters (including naphthenic acids) are predicted to decrease at Nodes A2 and A3 as a result of the project. No explanation for this is given. Considering that the project's discharges to the Athabasca River (from seepage and pit lakes) are predicted to have higher concentrations of some constituents than natural levels (including naphthenic acids), it is unclear how these results could occur. In addition, for Node A3, a slight increase is predicted for refractory naphthenic acids, although decreases are predicted for both the labile	This was identified as an erratum and has been corrected in the PRM Project Update. While the corrected Base Case results are slightly different than those presented in Table 6.5-22 of the EIA, the updated results do not change any of the conclusions of the EIA.

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			and total naphthenic acids, and the total does not add up correctly. **Request:** **Discuss the reasons behind decreased values in some of the water quality parameters of the Athabasca River as a result of the project when compared to the Base Case. Resolve the discrepancy in the naphthenic acid values for Node A3.**	
		16	The effects of construction of the bridge over the Athabasca River and the intake within the Athabasca River on water quality are not discussed. The construction of a bridge over the Athabasca River, and the construction and use of a new water intake in the Athabasca River are listed as potential impacts of the project on the Athabasca River. However, in the assessment section and discussion of water quality of the Athabasca River, this bridge and intake are not mentioned. Mitigation for the construction or ongoing use of the bridge or intake is also not included. **Request:** **Discuss the potential impacts and recommended mitigations regarding the construction and use of the bridge and intake for the Athabasca River.**	See Section 6.7.7.3 for potential impacts related to the Athabasca River water intake and bridge.
3	Aquatic Health and Fish/Fish Habitat Key Concerns	17	Benchmark exceedances dismissed. The results of the aquatic health and fish tissue analysis found that several constituents (total dissolved solids, aluminum, chromium, iron, manganese, and strontium) will exceed the toxicological benchmarks. However, these findings are rated as having a negligible impact on aquatic health; which is justified in several ways, including: the benchmarks don't really represent an impacted state, baseline levels are already high, or the benchmarks are overestimated due to the conservative assumptions used to complete the assessment. If the benchmarks can be so easily disregarded, then perhaps a more stringent method of determining benchmarks should be employed, so that meaningful results can be determined. There is little value in assessing impacts, and then disregarding the results because the methods were flawed. **Request:** **Provide appropriate and meaningful**	**Note same as Q13 – JPME:** This request appears to be a statement of disagreement with Shell's methodology and conclusions, as opposed to a request for clarification that would allow ACFN to complete its Technical Review of the EIA. As such, this may be more appropriately discussed following completion of ACFN's technical review of the EIA

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			benchmarks, such that compliance and non-compliance can be better assessed. If this is not possible, discuss the utility of these benchmarks and how they may be improved in the future.	
		18	Assessment on aquatic health for benchmark exceedances lacking. Several metals are found to exceed their benchmarks within the Local Study Area (LSA) and the pit lakes, including total dissolved solids, aluminum, chromium, strontium, manganese, and iron. While the impacts are rated in terms of duration, frequency, location etc., no information on the actual impacts of these exceedances is included. It would be helpful to know the potential impacts of the metals, individually and synergistically, on the survival, growth, reproduction and behaviour of aquatic life. **Request:** **Provide a discussion of the potential effects of these benchmark exceedances on aquatic health.**	**Note same as Q14 – JPME:** The findings of the assessment were that none of the parameters would pose long-term impacts to aquatic health. The lowest chronic effects benchmark from the literature review was selected as to be protective of all relevant endpoints (i.e., the lowest number of survival, growth, reproduction and behaviour). If the endpoint was a No Observable Effects Concentration (NOEC), it would be protective of all relevant endpoints. All exceedences of benchmarks (either water concentration or fish tissue) were flagged for further assessment. These parameters were then discussed in terms of uncertainty and reversibility.
		19	Inconsistent extents of littoral zone in the pit lake. In the water quality assessment, Shell noted that the littoral zone of the pit lake would be up to 15% of the total area. In the aquatic health assessment, Shell noted that the littoral zone would be between 10 to 30% of the area. **Request:** **Provide the correct littoral zone area for the pit lakes.**	**Note same as Q15 – JPME:** The littoral zone of pit lakes is expected to be 10 to 30% of the total lake surface area (see Closure Drainage Plan - Jackpine Mine Expansion, Appendix 4-3; Pierre River Mine, Appendix 4-4). The pit lake designs are conceptual; the exact areas of littoral zones will be determined during the detailed design stage of pit lake development.
		20	Fish habitat impacts due to thermal changes in Eymundson Creek unclear. The release of waters from a pit lake in 2049 will result in relatively large changes in temperature in Eymundson Creek during the spring, summer and fall. For example, the mean monthly temperature for May will decrease almost 3°C, from 5.8°C in the pre-development scenario to 3.1°C. The mean monthly temperature for September will increase almost 6°C from 3.6°C to 9.4°C. Despite these large differences, the impact rating on fish habitat is considered negligible. While Shell states that thermal equilibrium will quickly be achieved, no mention on the actual extent of the impact is	Parts of Eymundson Creek and its tributaries will be diverted north around the Pierre River Mine development area in 2016. Because of the operational diversions of Eymundson Creek, full compensation for the estimated loss of fish habitat in lower Eymundson Creek is included in the Conceptual Compensation Plan (see Volume 4, Appendix 4-6). As a result, the overall adverse impacts of predicted changes in water quality on fish habitat resulting from Pierre River Mine are considered to be negligible (Section 6.7.6.3).

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			provided. Only mitigations for impacts of the polishing pond releases, which will result in relatively small changes (a maximum change of 0.3°C) are discussed. No mitigation for pit lake discharges are mentioned, despite this being the major impact on temperature. **Request:** **Provide more information on the extent of the thermal changes to Eymundson Creek and the potential impacts on fish habitat, including stress and/or avoidance behaviours.**	
		21	Effects on fish habitat are not extrapolated to fish abundance. While the assessment discusses the impacts on fish habitat as a result of several impact pathways and linkages, these potential changes are not extrapolated to the implications for fish abundance or populations. For example, there is no discussion of the implications on fish abundance as a result of the elimination of many of the Local Study Area (LSA) watercourses and waterbodies, and replacement by diversion channels. Because some of these channels will be temporary, they will not be built to the same specifications as closure diversion channels would. Presumably there would be some impact on fish abundance within the LSA until permanent, self-sustaining channels were constructed and capable of supporting fish populations. Similar concerns exist for impacts of decreased fish passage and accessibility on fish abundance. **Request:** **Discuss the potential impacts of changes to fish habitat on fish abundance and local and on regional fish populations, where appropriate.**	**Note same as Q16 – JPME:** Potential changes to fish habitat are described in the Conceptual Compensation Plan (see Volume 4, Appendix 4-6), Also, information would be provided in the No Net Loss Plan, once completed., This could be a subject for discussion as part of the NNL Compensation consultation process. ACFN withdrew from the JPME and PRM NNL consultation process in a letter to DFO dated May 12, 2009. Shell encourages the ACFN to reconsider its decision to withdraw from consultation on NNL plans for this project.
		22	No determination of productive capacity of fish habitat. Compensation for fish habitat losses is based on the productive capacity of fish habitat. However, the productive capacity of fish habitat has not been determined for any of the habitat losses proposed as a result of the project. Shell states that this will be completed as part of the detailed No Net Loss Plan. Until the productive capacity of all the existing and compensation habitats have been calculated, it is impossible to determine whether the compensation efforts proposed are comparable, appropriate, and adequate for the project.	**Note same as Q17 – JPME:** The adequacy of the estimated compensation requirements for the JME & PRM Project, as presented in the Conceptual Compensation Plan, will be confirmed in the future when detailed analyses are conducted (as part of the preparation of the detailed No Net Loss Plan). This could be a subject for discussion as part of the NNL Compensation consultation process. ACFN withdrew from the JPME and

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			Shell states that a lake with an area of 4 km^2 is sufficient to provide adequate compensation. The lengths of the compensation channels would be 13 and 15 km. Generally, this project would require at least a 2:1 habitat compensation ratio, but no information is provided to document that the proposed habitat would meet this ratio. Despite this, Shell states that a net gain in the productive capacity of available fish habitat would occur with no predicted adverse impacts on fish habitat. Without the detailed habitat unit information, it is impossible to determine whether the goal of no net loss of productive capacity will be achieved. In addition, without species-specific habitat losses, it is not possible to determine if the project would exacerbate the stresses and population declines already experienced by several fish species in the region. **Request:** **Provide details on the productive capacity of the habitat losses and compensation habitat. Provide all information necessary to prove that the compensation habitat will provide at least a 2:1 compensation ratio. Provide species-specific habitat losses, and discuss these impacts on fish species currently experiencing stress and population declines in the region. Also, provide the ACFN with a copy for review and comment of the draft No Net Loss Plan when available.**	PRM NNL consultation process in a letter to DFO dated May 12, 2009. Shell encourages the ACFN to reconsider its decision to withdraw from consultation on NNL plans for this project.
		23	Lack of compensation riverine habitat. The Conceptual Compensation Plan (CCP) does not identify the proportion of riverine or lacustrine habitat units lost or created as a result of the project. Presumably, the majority of fish habitat losses are from riverine habitat, however, the CCP can be assumed to consist primarily of lacustrine habitat (the Redclay Compensation Lake). More effort to creating riverine habitat may be warranted. While opportunities for compensation in the form of newly created riverine habitat or enhancement of existing habitat may be limited in the region, this is not discussed in the CCP. No explanation is given for why more riverine habitat cannot be recreated locally or enhanced regionally in order to replace lost habitat with like habitat.	**Note same as Q18 – JPME:** Section 5.3.2 of the Conceptual Compensation Plan discusses the current plan for riverine habitat development as part of the compensation plan. This could be a subject for discussion as part of the NNL Compensation consultation process. ACFN withdrew from the JPME and PRM NNL consultation process in a letter to DFO dated May 12, 2009. Shell encourages the ACFN to reconsider its decision to withdraw from consultation on NNL plans for this project.

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			Request: **Discuss the lack of riverine habitat and the regional implications from this plan and other fisheries habitat compensation plans – which focus almost entirely on lacustrine habitat compensation.**	
		24	Information on the timing of compensation lacking. Shell states that the compensation lake will be constructed early in the project and that the compensation channels will generally be constructed later in the project, but no dates are provided. As a result, it is unclear how the compensation habitats will be developed in a timely manner to provide available fish habitat. While construction of the compensation lake may occur at the same timeline as the beginning of the existing habitat losses, this is not the same as providing habitat actually capable of supporting fish. There will be a timelag between construction and development of productive fish habitat (and actual use by fish). This timescales differences and the potential impacts on local fish populations are not clearly outlined in the Conceptual Compensation Plan (CCP). Regional impacts are also not discussed, although this same time lag issue exists for all mine developments. **Request:** **Provide details regarding the timing of the construction of compensation habitat, and when they will be capable of supporting fish and other aquatic organisms as part of a sustainable and diverse ecosystem. Discuss the local and regional implications of this and other compensation plans that will not provide compensation habitat at the same time as habitat losses.**	**Note same as Q19 – JPME:** The specifics or timing are being worked on in developing the No Net Loss Plan. Information will be provided in the No Net Loss Plan, once completed. This could be a subject for discussion as part of the NNL Compensation consultation process. ACFN withdrew from the JPME and PRM NNL consultation process in a letter to DFO dated May 12, 2009. Shell encourages the ACFN to reconsider its decision to withdraw from consultation on NNL plans for this project.
4	Hydrology	25	Loss of several mainstem sections of pristine creeks. The Pierre River Mine Project will remove portions of watersheds and the lower reaches of several watercourses that have never been directly impacted by any development. Reporting their hydrology data separately and in several tables made it difficult to evaluate the overall impact of the project on hydrology. **Request:** **Provide a single, concise table of the water balance changes caused by of the loss of portions of the watersheds and**	The project effects on the combined stream flows from the LSA to the Athabasca River are presented in Volume 4A, Section 6.4.6, Table 6.4-23.

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			the lower sections of mainstem creeks for the life of the project. Describe the significance and assess qualitative relevance of the anticipated changes through time.	
		26	Watercourse flows to the Athabasca River not clearly represented. The general assumption that outflows from reservoirs represent flows in lost watercourses is misleading. For example, the outflow of Redclay Lake has been arbitrarily assigned as the mouth of Big Creek. Big Creek flows near the "mouth" are predicted to change less than 5% even though the site is not a river mouth, but rather this large reservoir's outflow. In reality, the mouths of Big Creek, Unnamed Creek 7 and Redclay Creek will all contribute flows into and out of Redclay Lake. Secondly, all flows of Unnamed Creek 1, Asphalt Creek and Eymundson Creek will go to Pierre River Mine Project pit lakes at closure. The outflow of Pierre South Pit Lake in the far future is compared only to pre-development Eymundson Creek flows at the mouth. This approach combines the flows of all creeks and results in little change in the outflow of the pit lake at some point in the "far future". Again, the lower reaches of these watercourses will no longer exist (as riverine systems) because they are replaced with pit lakes. **Request:** **Re-calculate inflows to Redclay Lake based on each of the inflowing tributaries on a timescale that captures major changes and provides a relevant scenario for changing inflows to the Athabasca River.** **Re-calculate inflows to Pierre South Pit Lake based on each of the inflowing tributaries on a timescale that captures major changes and provides a relevant scenario for changing inflows to the Athabasca River.**	This request appears to be a statement of disagreement with Shell's methodology and conclusions, as opposed to a request for clarification that would allow ACFN to complete its Technical Review of the EIA. As such, this may be more appropriately discussed following completion of ACFN's technical review of the EIA
		27	Cumulative Impacts to the Athabasca Delta not assessed. Shell assesses changes in water depths and flows in the Athabasca River, but does not assess the effect of cumulative changes in water depths on the Athabasca Delta. Changes in depth and flow affect the delta and reduce flushing of side channels and perched water bodies. Changes to the delta directly affect area residents.	Please refer to PRM SIR #34.

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			Request: **Extend the Regional Study Area (RSA) for surface water hydrology from Embarras Portage to the inflow of Lake Athabasca (i.e. encompass the Athabasca delta).**	
		28	Water withdrawal plans not detailed. In January 2009, industry was directed under the Water Management Framework (WMF) to reduce water withdrawals when the Athabasca River entered the "yellow zone". **Request:** **Describe Shell's plans for water storage and use when restrictions are imposed in the future (including beyond 30 days planned storage).** **Discuss Shell's commitment to abide by the lower Athabasca River WMF restrictions, notably during low flow periods.**	Shell will comply with the Water Management Framework for the Lower Athabasca River.
		29	Open water areas created during operations. During operations, Shell indicates that a 2.5 km^2 water reservoir will be created as part of the diversion system to maintain Redclay Lake. Redclay Lake alone may be 5 km2, yet the summary section for open water areas only accounts for 1.2 km2 in new open water areas created by 2039 during Pierre River Mine Project operations (refer to Table 6.4-19). **Request:** **Re-calculate open water areas in Table 6.4-19 to account for all new open water areas created during project operations.**	This request appears to be a statement of disagreement with Shell's methodology and conclusions, as opposed to a request for clarification that would allow ACFN to complete its Technical Review of the EIA. As such, this may be more appropriately discussed following completion of ACFN's technical review of the EIA
		30	Compensation lake water requirement is unaccounted. The plan for filling the compensation lake with water from the Athabasca River is not presented in the EIA, nor is it clear whether this water is a component of the 55 M m3/yr requested for the early phase of the project. **Request:** **Clarify whether water from the Athabasca River required to fill Redclay Lake is included in the requested 55 M m3/yr. If not, provide details of the timing and quantity of water withdrawals for this purpose.**	The requested 55 M m^3/yr water from the Athabasca River includes that needed to fill the proposed Redclay Compensation Lake. This could be a subject for discussion as part of the NNL Compensation consultation process. ACFN withdrew from the JPME and PRM NNL consultation process in a letter to DFO dated May 12, 2009. Shell encourages the ACFN to reconsider its decision to withdraw from consultation on NNL plans for this project.
		31	No discussion of length of time required to fill pit lakes. At closure (2049), runoff from Eymundson Creek, Asphalt Creek and Unnamed Creek1 will be directed to Pierre River Mine Project pit lakes. Athabasca River water will be used to shorten the time	The pit lakes will be filled with Athabasca River water during the closure management period (2039 to 2049). During this period, the operational drainage system will be functional and streams will not be

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			required to fill the pit lakes because the streams may not provide enough water in a timely fashion. This would suggest that flows from the tributaries to the Athabasca River will be nil for the period of time required to fill the lakes. Yet by combining 2049 with "far future" in Table 6.4-21, Shell indicates that mean open water flows in these creeks will only be reduced by 23%. **Request:** **Provide a realistic and more detailed description of the water sources and length of time required to fill the pit lakes.**	diverted to fill the pit lakes. The operational drainage system is to be decommissioned at the end of the closure management period when the water quality in the pit lakes is acceptable for release. The streams will then be diverted to the pit lakes as shown in the closure drainage plan figure (Figure 6.4-18).
		32	Modelling uncertainty for Pierre South Pit Lake outflows. Shell applied uncertainty analyses to mean annual flows, 10-year flood peaks and mean ice cover flows, but not to mean open water flows. **Request:** **Complete modelling an uncertainty analysis for open water flows from the pit lakes to be created for this project.**	Please refer to Table 32-1 located at the end of this document for mean open water flows. Also, Table 6.4-25 (Volume 4A, Section 6.4.6, page 6-327) contains results of the modelling uncertainty analysis for the outflow from PRM South Pit Lake for mean annual, 10-year flood peak and mean ice-cover flows.
		33	No mitigation planned to prevent new channel erosion. Shell does not plan to use settling ponds or other suitable erosion prevention in newly constructed drainage channels to minimize the potential for excessive sediments to be introduced to the Athabasca River. Shell indicates that flows are expected to be low and the size of settling ponds required would be impractical. Since flows will be tripled in the Pierre River/CNRL combined diversion (C11b), a plan to prevent erosion and scouring is required (beyond "selected overburden" and "in situ material" described in Appendix 4-4, Fig. 11). Sediment erosion is likely to occur in all new diversions during the conditioning period, and in the Pierre River/CNRL diversion at many times of the year on an ongoing basis. **Requests:** **Given the severe incident of sediment washout in the neighbouring Tar River in 2008, discuss Shell's commitment to providing a mitigation strategy to prevent excessive erosion in the Pierre River/CNRL (C11/C11b) combined drainage channel.** **Provide a mitigation strategy to prevent**	Closure channels will be designed based on geomorphic relationships for the Oil Sands Region as stated in the Closure Drainage Plan (Volume 4B, Appendix 4-4, Section 2.3, pages 10 to 13). These relationships express channel parameters as a function of discharge. This allows closure channels to be designed to mimic natural channels, which exhibit sediment equilibrium in normal conditions. Therefore, no accelerated or excessive erosion is anticipated in the closure channels. During the conditioning period, which might take a few years, a number of mitigation measures can be implemented to minimize erosion including: • Design channel taking into account the anticipated flow conditions during the conditioning period. • Gradual release of flow into newly constructed channels during low periods, rather than during floods • Delay the commissioning of a new channel until vegetation

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			erosion in all new channels that drain to fish-bearing waters in the event of storm flows or other high runoff. Discuss Shell's commitment to provide the ACFN with the opportunity to review any erosion-protection plans.	is established on the banks • Protect channel bed if necessary with coarse material, mats, woody debris mixed with topsoil or deformable soil reinforcement (soil layers strengthened with fabric and vegetation). Re: the request to include ACFN in development of erosion protection plans, this may be discussed as part of future negotiations towards an agreement..
		34	Monitoring program and research plans not described. In Section 6.4.2 of the EIA, Shell states that it would develop a surface water hydrologic monitoring program. The details of this program are not described in the EIA, as required by TOR 5.6.6(iii) and 6.0. Reliance on regional committees such as RAMP is insufficient for monitoring and research due to the lack of project specificity, and lack of control over the long-term plans of outside organizations. **Request:** **Describe Shell's surface water hydrologic monitoring and research plans for all phases of the Pierre River Mine Project. Discuss Shell's commitment to provide the ACFN with the opportunity to review and make recommendations about these monitoring and research plans.**	The hydrologic monitoring program is described in Volume 4B, Appendix 4-9, Section 3.0. Re: Request to review monitoring and research plans this may be discussed as part of future negotiations towards an agreement..
5	Air Quality Key Concerns	35	Base Case requires more clarification. The Base Case requires additional information to allow for better understanding of the projects, air emissions and timelines associated with this case. **Request:** **With respect to the Base Case, identify the following: 1) Projects that are presently operating, and the air emission rates for each; 2) Projects that are under construction, when they are expected to begin operating, and at what proposed air emission rates; and 3) Projects that are approved but awaiting decision to proceed (eg. corporate sanctioning, etc.), and at what proposed air emission rate. An estimate of the relative timing of these elements is also requested.**	**Note same as Q30 – JPME:** As discussed in EIA Volume 3, Section 1.3.3, the Base Case includes all existing and approved activities because it is possible for the approved projects to ultimately contribute to the airshed loadings. Volume 3, Appendix 3-5 and Volume 3, Section 3.3.1 identify the existing and approved developments included in the Base Case as well as their approved air emission rates. Appendix 3-5 also includes a summary of the status of each operation: existing, approved or planned. The approved emission rates represent the peak rates that could occur. The status and timelines of these

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				projects change frequently; therefore, it is difficult to provide the exact start-up times for each project. Proposed air emission rates associated with projects under construction would be identical to those presented in Volume 3, Appendix 3-5 and Volume 3, Section 3.3.1.
		36	Removal of developed areas from the assessment is misleading. As has typically been done in previous EIAs for the oil sands region, the disturbed areas are excluded from consideration of air impact analysis, minimizing the change in increased ambient concentrations and subsequent deposition as the size of the disturbed area increases. This practice leads to an assumption that industrial disturbed areas in Alberta are no longer required to meet air quality standards and guidelines. Urban regions, which could be considered 'disturbed areas', are expected to meet the air quality guidelines within their boundaries. In addition, Shell states (Table 2.2-2) that the eight highest modeled concentrations of various compounds (e.g. SO_2, NO_2, benzene, VOCs) are removed from outside of the disturbed area. It is not clear if these eight highest concentrations are contained within the disturbed areas removed from consideration or if a further eight of the highest values outside of the disturbed areas have also been removed. **Request:** **Clarify whether the eight highest modeled concentrations of various compounds are contained within the disturbed (developed) areas removed from consideration of impact analysis. If they are from outside the disturbed area, then the air quality assessment should be re-assessed including these eight values.**	**Note same as Q31 – JPME:** The EIA approach to assessing ambient air quality impacts is consistent with the Draft Alberta Air Quality Model Guideline (AENV 2009). The guideline states that the Alberta Ambient Air Quality Objectives (AAAQOs) are often applied to areas where there is public access (i.e., beyond the plant boundary). The plant boundary is determined by the facility fence line or the perimeter of disturbed area that defines where public access is restricted. Developed areas were excluded from the air quality predictions because concentrations within developed areas are also considered subject to occupational health and safety guidelines, not environmental guidelines such as the AAAQOs. The draft Alberta Air Quality Model Guideline also states that the highest eight 1-hour predicted average concentrations for each receptor in each single year should be disregarded. Therefore, the eight highest modelled concentrations were removed at each receptor for the air quality assessment. As part of a second step in the analysis, the receptors within the developed areas were then excluded from the impact analysis.
		37	Acute inhalation health risks may not be protective of the most sensitive individuals. Shell states in Section 2.4 that the acute health risks due to air emissions are to be compared with health-based guidelines considered "protective of the most sensitive individuals". However maximum concentrations are compared with the Canada-Wide Standards, a standard that is not only health-based but also includes	**Note same as Q32 – JPME:** This request appears to be a statement of disagreement with Shell's methodology and conclusions, as opposed to a request for clarification that would allow ACFN to complete its Technical

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			economic considerations. **Request:** **Reassess and present the results and a discussion of the acute inhalation health risks using a health-based air quality standard that is considered protective of the most sensitive individuals.**	Review of the EIA. As such, this may be more appropriately discussed following completion of ACFN's technical review of the EIA
		38	Magnitude classification levels not reflective of air guidelines and standards. The evaluation of magnitude classification still permits air emissions to increase beyond the Alberta Ambient Air Quality Objectives (AAAQO) by deeming the impact in question as only moderately of concern. When meeting the AAAQO, a magnitude classification of 'high' would demonstrate the commitment to staying below the objective. *To better identify which issues are approaching the environmental limits used by Shell, they should reassess the environmental consequences rating using the higher magnitude ratings.* **Request:** **Reassess the 'environmental consequences' classification using the Alberta Ambient Air Quality Objectives (AAAQO) or the Canada-Wide Standards as the limit between 'moderate' and 'high' rankings.**	**Note same as Q33 – JPME:** This request appears to be a statement of disagreement with Shell's methodology and conclusions, as opposed to a request for clarification that would allow ACFN to complete its Technical Review of the EIA. As such, this may be more appropriately discussed following completion of ACFN's technical review of the EIA
		39	Assessment of secondary pollutants and their impacts deficient. There is a poor understanding of the true impacts (visibility, odour, and acidification) of secondary pollutants ($PM_{2.5}$ and ozone). **Request:** **Describe the current steps underway to support research and monitoring that will enhance the evaluation of impacts related to secondary pollutants in the region.**	**Note same as Q34 – JPME:** Shell continues to be an active member of the Wood Buffalo Environmental Association (WBEA). The WBEA air monitoring network includes continuous monitoring of both $PM_{2.5}$ and ozone. $PM_{2.5}$ is currently monitored at nine stations in the region, including Fort McKay, Fort McMurray – Patricia McInnes, Fort McMurray – Athabasca Valley, Fort Chipewyan, Millennium, Syncrude UE1, Anzac, CNRL Horizon and Albian Muskeg River. Ozone is currently monitored at six stations in the region, including: Fort McKay, Fort McMurray – Patricia McInnes, Fort McMurray – Athabasca Valley, Fort Chipewyan, Syncrude UE1 and Anzac. The WBEA network conducts passive monitoring for ozone at several locations throughout the region. The WBEA Terrestrial Environmental Effects Monitoring Committee is

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				enhancing monitoring of particulate matter by quantifying trace species associated with particulate matter. This will help to improve the knowledge of $PM_{2.5}$ in the region. Shell continues to be an active member of the Cumulative Environmental Management Association (CEMA), NO_X-SO_2 Management Working Group (NSMWG). The NSMWG has an ozone task group, and this group has produced an ozone management framework (NSMWG 2006). Management tools associated with the framework include monitoring, modelling, and emissions management. As discussed above, there is extensive monitoring of ozone in the Wood Buffalo region. Ozone modelling is also ongoing, with a recent report by Environment Canada providing modelled results for a base case and future scenario in Alberta (Environment Canada 2007). In Alberta, ambient concentrations of fine particulate matter and ozone are managed by the Clean Air Strategic Alliance "Guidance Document for the Management of Fine Particulate Matter and Ozone" (CASA 2003). This guidance document outlines action levels, including the action levels that lead to the development of a management plan in a region.
		40	Climate change impact classification lacking. Shell states that an impact assessment was completed for greenhouse gas emissions; however no impact classification is provided. Shell also states that it is not possible to directly compare emissions intensities from this project with other projects that have both integrated mine and upgrading activities. However, Shell's contribution to greenhouse gases is broader than just the mine sites in the oil sands region - Shell should include their upgrading activities in the Industrial Heartland Region near Edmonton. **Request:** **Include all related Shell operations when evaluating greenhouse gas emissions, which would allow comparisons to be**	**Note same as Q35 – JPME:** Shell can provide CD copies of its Scotford Upgrader EIA to ACFN for their review of GHG emissions.

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			made between other oil sands operators in the region.	
6	Wildlife Components Key Concerns	41	Temporal and spatial boundaries inappropriate. The temporal and spatial boundaries used in the EIA do not permit a meaningful assessment of the long-term effects of the proposed projects on wildlife populations in the project area. The assessment does not include a pre-disturbance baseline. Inappropriate criteria are used for selecting the Regional Study Area. **Request:** **Identify changes to wildlife Key Indicator Resources (KIRs) resulting from past (existing) development. Determine the natural range of variation (NRV) for each KIR. Relate the predicted project and cumulative impacts to the NRV for each KIR.**	**Note same as Q36 – JPME:** The impact assessment scenarios used in the EIA were defined in compliance with the Final Terms of Reference for the EIA Report issued by Alberta Environment (AENV 2007). These scenarios included: • Base Case, which includes existing environmental conditions, existing and approved Projects or activities; • Application Case, which includes the Base Case plus the Project; and • Planned Development Case, which includes past studies, existing and anticipated future environmental conditions, existing and approved projects or activities, plus planned projects or activities. Predicted impacts to the wildlife KIRs are located in Volume 5, Sections 7.5.3, 7.5.4, 7.5.5 and 7.6.3. Modelling approaches are provided in Appendix 5-4.
		42	Waterfowl species not selected as KIRs. Although this mine will be situated adjacent to regionally or provincially significant waterfowl habitats (e.g. McClelland Lake, Kearl Lake, Athabasca River) and ducks and geese are consumed by First Nations members, no waterfowl species were selected as Key Indicator Resources (KIRs). **Request:** **Explain the rationale for excluding waterfowls as a KIR, and expand the assessment to include mallard or another appropriate wildlife species.**	**Note same as Q37 – JPME:** The KIRs chosen for the EIA (Volume 5, Table 7.2-2, Page 7-22) were the result of extensive discussions with regulators that were aimed to keep the EIA focussed, while ensuring that the assessment of impacts on wildlife due to the Project would remain comprehensive. These KIRs are species that represent the main habitat types within the LSAs (i.e., lowland, upland, riparian, wetlands, waterbodies and watercourses) and from which effects to other species with similar habitat requirements can be inferred. Because beavers have similar habitat requirement as ducks and geese, effects of the Project are comparable. The beaver was chosen as a KIR due to its traditional,

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				economic and ecological importance and an assessment of effects to beaver was conducted. Impacts to beaver abundance were predicted to be negligible at both the local and regional scales (Volume 5, Table 7.5-35, Page 7-105). Impacts to high-quality beaver habitat were predicted to be high at the local scale and negligible at the regional scale (Volume 5, Table 7.5-37, Page 7-115).
		43	Baseline surveys have gaps. Gaps in baseline surveys (such as breeding birds and bats) prevent full understanding of wildlife resources that might be at risk. **Request:** **Conduct additional sampling of breeding birds and owls. Conduct additional sampling of bats in the northern half of the LSA and along the Athabasca River. Complete waterfowl and beaver / muskrat surveys in the northern half of the LSA.**	**Note same as Q38 – JPME:** This request appears to be a statement of disagreement with Shell's methodology and conclusions, as opposed to a request for clarification that would allow ACFN to complete its Technical Review of the EIA. As such, this may be more appropriately discussed following completion of ACFN's technical review of the EIA
		44	PVA and TEK information conflicting. The results of the Population Viability Analysis (PVA), which predict growth in moose and black bear populations under all development scenarios, disagree with Traditional Ecological Knowledge (TEK): trappers and other First Nations people consistently report declining moose numbers in the region. The PVA results also conflict with the results of modeling conducted in conjunction with the development of a Terrestrial Ecosystem Management Framework for the Regional Municipality of Wood Buffalo (for CEMA). This modeling concludes that several terrestrial ecosystem indicators, including moose, black bear, and fisher, are already below their natural range of variation (NRV) and will continue to decline given expected rates of landscape modification. **Request:** **Rationalize differences in model predictions. Review assumptions and data requirements for PVA analysis and rerun population models based on this.**	**Note same as Q39 – JPME:** This request appears to be a statement of disagreement with Shell's methodology and conclusions, as opposed to a request for clarification that would allow ACFN to complete its Technical Review of the EIA. As such, this may be more appropriately discussed following completion of ACFN's technical review of the EIA

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		45	Validity of habitat models questionable. The Resource Selection Function (RSF) models developed to assess regional changes in habitat supply and habitat suitability of reclaimed lands at closure was found to be ineffective when validated against field data. This may affect the validity of all impact predictions based on these models. *RSF may have advantages over Habitat Suitability Index (HIS) models for some species. Further work to refine / develop accurate models is strongly recommended.* **Request:** **Identify and discuss the implications of using an apparently invalid model to assess cumulative effects and the value of reclaimed lands for wildlife. Consider expanding the assessment for moose to include calving/post-calving habitat as well as winter habitat.**	**Note same as Q40 – JPME:** Local study area (LSA) scale models were used to assess changes in habitat quality from Base Case to closure. The LSA-scale RSF models for moose, fisher/marten, and Canada lynx performed adequately (Volume 5, Appendix 5-4, Section 1.2.1). Therefore, valid models were used to assess cumulative effects and the value of reclaimed lands for wildlife at the LSA scale. As a result of model performance at this scale, Shell is confident in the project-related predictions.
		46	Loss of riparian habitat may be underestimated. Shell predicts a relatively large net loss of wetland and old-growth habitat. The predicted loss of riparian habitat is likely underestimated. **Request:** **Consider additional mitigation and compensation measures to offset permanent habitat losses. Reassess riparian habitat losses based on accepted scientific criteria rather than arbitrary 100m limits.**	**Note same as Q41 – JPME:** This appears to be a statement of disagreement with Shell's methodology and conclusions, as opposed to a request for clarification which would allow ACFN to complete its Technical Review of the EIA. This request may be more appropriately discussed following completion of the EIA technical review.
		47	Wildlife movement along the Athabasca River will be restricted. The proposed project will restrict wildlife movement along the Athabasca River, which is recognized as a major regional wildlife movement corridor. **Request:** **Discuss the rationale for selecting the proposed setback of 250 m from the Athabasca River, and what the implications (pros and cons) would be of increasing this to at least 500 m to protect vital riparian habitats and maintain wildlife movements.**	Please refer to PRM SIRs #310 and 458 (c).
		48	Research and data directly applicable to wildlife is lacking. The lack of research and toxicity reference data directly applicable to wildlife (as opposed to laboratory animals) may affect the validity of the wildlife health assessment. It is also unclear to what extent Shell considered potential long-term, residual effects of wildlife exposure to	**Note same as Q43 – JPME:** In the Planned Development Case, all animals were assumed to be using pit lake water as their primary source of drinking water (see Volume 3, Section 5.4.3.2, for a full discussion on the potential impacts

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			contaminants in process-affected wetlands and pit lakes when conducting the wildlife health assessment. **Request:** **Explain the possible risks associated with extrapolating toxicity data from lab animals to wildlife. Identify risks to wildlife resulting from long-term exposure to process-affected water.**	to wildlife associated with all applicable routes of exposure). Assessing wildlife exposure to contaminants is difficult as there is no way to control their environment, or determine what is causing the effect. As such, toxicity data for laboratory animals was used to assess potential impacts to wildlife (See Volume 3, Appendix 3-12, Section 1.3.1). Because the health effects data gathered from laboratory animals was extrapolated to the wildlife receptors, uncertainty factors were used to accommodate the possible differences in physiology and sensitivity to the chemicals. Use of uncertainty factors to account for extrapolation between species is common practice in risk assessment Also, risk to wildlife health resulting from long-term exposure to process-affected water was addressed in the Wildlife Health Risk Assessment.
		49	Cumulative effects of tailings ponds not assessed. Because of the proximity of this mine project to regionally or provincially significant migratory staging areas (McClelland Lake, Kearl Lake, Athabasca River), risks of exposure of migrating waterbirds to tailings might be increased. Cumulative effects of tailings ponds in the oil sands region on wildlife (including migratory birds) have not been assessed. **Request:** **Conduct a detailed cumulative effects assessment dealing with exposure of migratory birds to the expanding network of tailings ponds in the oil sands region.**	**Note same as Q44 – JPME:** This request appears to be a statement of disagreement with Shell's methodology and conclusions, as opposed to a request for clarification that would allow ACFN to complete its Technical Review of the EIA. As such, this may be more appropriately discussed following completion of ACFN's technical review of the EIA
		50	Risks or levels of uncertainty associated with habitat modeling not identified. The wildlife impact predictions are based on the assumption that reclaimed lands will have the same wildlife habitat value as the undisturbed ecosite phases they are modeled after. No evidence is presented to support this assumption and reclamation progress in the region does not support this. The assessment fails to identify the risks or levels of uncertainty that are associated with these habitat model predictions. **Request:**	**Note same as Q45 – JPME:** This request appears to be a statement of disagreement with Shell's methodology and conclusions, as opposed to a request for clarification that would allow ACFN to complete its Technical Review of the EIA. As such, this may be more appropriately discussed following completion of ACFN's technical review of the EIA.

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			Provide a detailed review of monitoring research that supports the assumption that reclaimed lands will have the same wildlife habitat value as the undisturbed ecosite phases after which they are modeled. Use sensitivity analysis or another appropriate technique to identify levels of uncertainty associated with the models and variables that might affect the accuracy of theses predictions.	
		51	Information on bison herd near project area insufficient. In the Environmental Setting Report, Shell indicates that bison from the Redclay Creek bison herd occur in the LSA. ACFN elders confirm that bison are known to occur in this area. However, sufficient information is not included in the EIA to provide the ACFN with an understanding of the likely effects of the proposed Pierre River Mine Project on bison in this area. **Request:** **Using survey information, TEK and habitat assessment or modeling, provide additional information on the home range of this bison herd, its population status, seasonal movement patterns and habitat usage, and the predicted effects of mine development on these bison.**	This request appears to be a statement of disagreement with Shell's methodology and conclusions, as opposed to a request for clarification that would allow ACFN to complete its Technical Review of the EIA. As such, this may be more appropriately discussed following completion of ACFN's technical review of the EIA
7	Vegetation, Wetlands & Forest Resources Key Concerns	52	Unclear change in frequency of KIRs between LSA and RSA. Three key indicator resources (KIRs) - wetlands, old growth forests, and high rare plant potential - that are assessed as having low frequency in the Local Study Area (LSA) were then rated as having a high frequency in the Regional Study Area (RSA). Shell's explanation for the change in rating is "as clearing to vegetation will occur into the future, the frequency is considered to be high". However, frequency refers to the number of occasions with respect to the same KIR, so the time lag should be irrelevant. **Request:** **Explain why the frequency rating for wetlands, old growth forests, and high rare plant potential is low in the LSA and high in the RSA.**	**Note same as Q46 – JPME:** The difference in frequency rating referred to above is due to the difference between the Application Case and Planned Development Case (PDC), and is not the result of scale issues between the LSA versus the RSA. The difference in frequency rating is due to timing or rate of clearing in each case. In the Application Case, the only source of change to the environment is a single development (the Project) that will be cleared, and it is assumed that the entire area is cleared at once. Thus, the frequency rating is low for both the LSA and RSA at the Application Case. For the PDC, each planned or approved project is assumed to be 100% cleared as an individual event, thus the clearing of all developments are considered to be different events on the specific resource in the PDC. Therefore, a frequency rating of high is assumed for the PDC.
		53	Measure of vegetation loss misleading.	**Note same as Q47 – JPME:**

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			Shell states "The project will result in the removal of 1,233 ha of old growth forest, representing a loss of 2% of the LSA [(combined Local Study Area for both Jackpine Mine Expansion Project and the Pierre River Mine Project)]" (EIA Section 7.5, pg. 7-74). However Table 7.5-18 (EIA Section 7.5) indicates that 40% of the old growth forest in the LSA will be removed. The latter is a more meaningful measure. **Request:** **Explain why "Magnitude of Impact" in the local study area for loss of old growth forest is not ranked as high (>20%), and therefore the environmental consequence also not ranked as high (+17) in Table 7.5-34 (EIA Section 7.5). Explain why using a 2% loss of the local study area is more biologically relevant than using a 40% loss of the resource.**	Magnitude of impacts is rated in terms of a geographic area in order to provide a scale of reference. Consider the following two scenarios: Scenario 1 – 1 ha of Old Growth Forest (OGF) in 1,000 ha study area; 100% of it removed by a project. Scenario 2 – 900 ha of OGF in a 1,000 ha study area; 100% of it removed by a project. If the impact assessment was based on the percent of OGF affected, the result for both scenarios would be 100%. This determination would not provide information relating to the contribution of OGF to the overall ecosystem function in the study area. In Scenario 1, the contribution of OGF to the study area is 0.1% as compared to 90% in Scenario 2. It follows that the impact in Scenario 2 should be rated higher than the magnitude of effect in Scenario 1. This perspective is achieved by assessing the impact relative to the study area. While environmental consequence is not scored on percent of the resource, the change in amount of the resource is provided as an added perspective for the reader.
		54	Impacts to wetlands unclear. Impacts to wetlands are ranked as having a low environmental consequence. Six percent of the treed fens and 4% of the treed bog / poor fens will be lost in the regional study area (of Jackpine Mine Expansion and Pierre River projects combined), and there will be an increase of 16% in non-treed wetlands after reclamation. The environmental consequence assumes that non-treed wetlands are ecologically equivalent to peatlands, which is not supported in the report. **Request:** **Support the assumption that reclaimed non-treed wetlands are ecologically equivalent to peatlands. Explain why the increase in non-treed wetlands was used to offset the decrease in peatlands.**	**Note same as Q49 – JPME:** Although non-treed wetlands are not identical to peatlands, the two wetland types are similar in many respects. As the identified KIR was all wetlands, the results were reported correctly. The assumption is that non-treed wetlands and peatlands reasonably fit into the same "wetland" category. Although they are not considered to ecologically equivalent to peatlands in all respects, they are also not entirely ecologically distinct either. They have similar ecological functions with respect to many environmental components – examples include certain aspects of surface water hydrology, water quality, vegetation, wildlife habitat, traditional land use and biodiversity.

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				The shift from peatlands to non-peat forming wetlands and wet area types is fully assessed in the respective EIA components.
		55	Re-vegetation strategy unclear. Shell indicates that one third of the topsoil will be used for direct placement and that the other two thirds of the topsoil will be stored in reclamation material sites where the seeds, propagules and mycorrhyizae are not likely to survive in sufficient quantities to enhance site re-vegetation (EIA update, Appendix 11, Section 3.3.2, Table 27). Shell's Target Ecosite Phase Planting Prescription specifies the planting of only native trees and shrubs, with the exception of two shrublands where forbs and shrubs will be planted. The success of reclamation is based on several factors: site conditions, weather conditions during the establishment years, and the seed source available in the establishment years. Reclamation sites that are relatively small and surrounded by vegetation communities which high species richness are likely to reclaim to rich / diverse communities. Reclamation sites that are large, such as mines, have areas that are distant from seed sources. The centres of these large reclamation areas then to have low species richness - unless forbs are seeded. **Request:** **Estimate the area that will have topsoil placed directly upon it, rather than stored in the reclamation material sites. Explain how biodiversity will be enhanced in the areas where direct placement is not possible. Explain how species richness will be enhanced with the direct placement of one third of the topsoil and lack of seeding forbs (other than in two shrublands).**	**Note same as Q50 – JPME:** The Reclamation Goals and Principles stated in Section 1.2 of the Closure, Conservation and Reclamation (CC&R) plans for both the JPME EIA Update (May 2008) and PRM (Appendix 5-2) clarify the revegetation strategy. For information on enhancing biodiversity, see Volume 5, Section 7.1.
		56	Information on weeds and non-native invasive species lacking. Shell does not discuss the likelihood of weeds and non-native species hindering successful restoration or reclamation. Non-native species are common throughout the regional study area, along roads and pipelines, and in borrow pits and wellpads. Although not documented in this EIA, non-native invasive grasses such as smooth brome, timothy, Kentucky bluegrass and curled dock, occur throughout the boreal	**Note same as Q51 – JPME:** Please refer to PRM SIR # 350, 381 and 511.

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			forest and can cause problems for reclamation. Non-native invasive species and listed weeds can be introduced by construction and reclamation equipment, and in reclamation seed mixes. **Request:** **Explain how Shell intends to control the introduction and spread of invasive non-native species during construction and reclamation.**	
		57	Traditional Plant Potential assessment deficient. Shell identifies the Traditional Plant Potential, where plant species used as part of a traditional lifestyle are assigned to vegetation type and scored according to presence and cover. This method assumes that all of these plant species are equally important to all the regional Aboriginal communities, which is inaccurate. Additionally, ratroot, which is one of the most important traditional species, was not assigned any vegetation type. **Request:** **Re-assess the environmental impacts on plant species considered most valuable to the Aboriginal communities.**	**Note same as Q52 – JPME:** This request appears to be a statement of disagreement with Shell's methodology and conclusions, as opposed to a request for clarification that would allow ACFN to complete its Technical Review of the EIA. As such, this may be more appropriately discussed following completion of ACFN's technical review of the EIA. Shell funded ACFN to complete a TEK study for the EIA of the Projects.
		58	Calculation of species richness inaccurate. 'Total species richness', a biodiversity management indicator, includes both native and non-native vascular plant species, bryophytes, and lichens (EIA, Section 7.2.6, Table 7.2-3). The inclusion of non-native species as part of 'total species richness' undermines the aim of this indicator; species richness is used to identify natural areas that have a high diversity. By including non-native species, disturbed areas with a high diversity of weeds may be identified as worthy of protecting. **Request:** **Justify the inclusion of non-native species as a part of the 'total species richness' biodiversity indicator. Include a re-calculation of species richness, this time excluding non-native species.**	**Note same as Q53 – JPME:** As stated in Biodiversity Environmental Setting Report (Section 6.4.3, Page 6-25), Shell recognizes that non-native species can be detrimental to the natural balance of ecosystems. Relative to the total number of plant species, few non-native or exotic species occur in the Oil Sands Region and they tend to be associated with disturbed areas. Golder's vegetation database for the Oil Sands Region contains information on twenty-eight plant species that are provincially classified as exotic (ANHIC 2006). Excluding these species from the 'total species richness' calculation does not affect the overall biodiversity ranking of vegetation types because most non-native plant species were recorded in disturbed areas, which are automatically ranked low for biodiversity potential. Furthermore, this biodiversity indicator is based on relative plant

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				species richness rather than absolute richness values and no natural vegetation type had a disproportionate number of non-native plant species. In reviewing the rankings, excluding non-native plant species from the species richness calculation did not change the ranking score. The overall assessment of biodiversity for the Project is not affected by the exclusion of non-native plant species from the species richness index for biodiversity potential.
		59	Rare plants assumption unclear. Shell assumes that reclamation will compensate for the loss of rare plants by increasing the rare plant habitat. **Request:** **Provide evidence of the assertion that rare plants will re-colonize in reclaimed landscapes.**	**Note same as Q54 – JPME:** The reclaimed landscape is predicted to provide the potential for the natural re-colonization of rare plants. Direct placement of reclamation materials will be undertaken whenever practical to maximize potential viability of native seed banks and propagules, which has the potential to include rare plants. Direct placement will account for approximately 2,500 ha of the reclaimed area for JPME and approximately 1,100 ha for PRM. Natural invasion of native vegetation (including rare plants) will be encouraged in ecologically-receptive areas. The successful restoration of a river valley in Denmark provides one example of the natural invasion of two rare aquatic plant species in a reclaimed riverine landscape (Pedersen et al. 2007).
		60	Methodology for evaluation of rare plant potential inadequate. Shell includes an assessment of impacts to high rare plant potential, referring to areas that might have rare plants. It is difficult to accurately predict rare plant occurrences. Simply adding the number of species that could occur in an ecosite phase will overestimate the area in which rare plants are actually found. This method for evaluating rate plant potential has little science to support it. **Request:** **Provide support for the assertion that rare plant potential accurately predicts rare plant occurrences. Using Alberta Natural Heritage Information Centre (ANHIC) records, evaluate the impacts on actual rare plant occurrences.**	**Note same as Q55 – JPME:** Rare plant potential (RPP) does not predict rare plant occurrences, but identifies those ecosite phases and wetlands types that have been identified as more likely to contain rare plants based on extensive field work in the Oil Sands Region. RPP is derived from an assessment of over 3,000 vegetation plots collected by Golder in the Oil Sands Region. This includes Project-specific vegetation plots accounting for 145 detailed and rare plant vegetation plots, 81 aerial survey plots and 18 rare plant plots in the JPME LSA and 214 detailed and rare plant vegetation plots, 169 aerial survey

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				plots and 13 rare plant plots in the PRM LSA. Rare plant frequency of occurrence was calculated for each ecosite phase or wetlands type, resulting in a rare plant potential ranking calculated for each (refer to Terrestrial Vegetation, Wetlands and Forestry Resources ESR, Volume 3, Section 3.3.6.2, Page 3-45 for Method Summary). Information on existing rare plant occurrences and rare plant habitat was acquired from ANHIC for the JPME and PRM LSAs and the Project RSA. Rare plant occurrence and habitat data from ANHIC and rare plant occurrences documented during Project field work within the LSAs is presented in the ESR (Volume 3, Section 3.3.6.2, Page 3-45 for methods and Section 3.5.1.4, Page 3-86 and Section 3.6.1.4, Page 3-138 for occurrence data). Tables 7.5-26, 7.5-27 and 7.5-28 in the EIA (Volume 5, Section 7, Pages 7-82, 7-83 and 7-84) provide specific information on the vascular, bryophyte and lichen species to be affected by the Project. Rare plant data collected in the LSAs and acquired from ANHIC are integrated in to the rare plant assessment and subsequently used in the EIA (Volume 5, Section 7, Table 7.5-34, Page 7-94) to evaluate residual impacts in the LSA.
		61	Surveyors for rare plants not identified. The Alberta Native Plant Council Rare Plant Survey Guidelines recommend that surveyors for rare plants be identified in reports. **Request:** **Identify the botanists used for the rare plant surveys, as well as their qualifications. Clarify whether these botanists were on all the detailed inventory surveys as well as the rare plant surveys.**	**Note same as Q56 – JPME:** All surveys were completed by teams of two experienced surveyors that included one senior ecologist or botanist and junior ecologist or botanist, to ensure that plot data were accurately collected and that experience was passed on. Collected samples or photographs were subsequently returned to Golder, where senior botanists or sub-contracted experts were used to confirm rare plants and identify unknown species.
		62	Accuracy of map not discussed. Shell describes the methods used to map the local and regional study areas (ESR Section 3.3.1.7, pg. 3-16). There is no discussion of the accuracy of the maps, and therefore no	**Note same as Q58 – JPME:** The most recent AVI data was purchased from Alberta Pacific Forest Industries Inc. (AlPac) and

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			way to evaluate the accuracy of the assessment. **Request:** **Evaluate and discuss the accuracy of the AVI data used, the local study area map and the regional study area map.**	reviewed/approved by Alberta Sustainable Resource Development (ASRD) This data reflects the most up-to-date conditions on the ground and is further refined during the Local Study Area Mapping process. Although accuracy validation has not been conducted on this data set, accuracy is greater than that of the original AVI. For additional information on vegetation mapping in the LSA, refer to Volume 3, Section 3.3.2.2. For the RSA, an overall accuracy assessment of 80% was determined for the Landsat imagery classification.
		63	Impacts of combined air emissions on vegetation key indicator resources unclear. The increase in nitrogen causing eutrophication is a concern, as nitrogen accumulates in the environment causing long-term to permanent changes. Nitrogen is a naturally occurring nutrient, however many northern vegetation communities are adapted to low nitrogen levels. The addition of nitrogen to treed bogs and poor fens may result in a shift in species; potentially an increase in sedges and shrubs and a decrease in mosses and lichens (depending on the species). Plant species particularly adapted to low nutrient conditions, such as pitcher plant, which is both rare and collected by aboriginal users, may be out-competed in a more nutrient rich environment. Although the area potentially affected is small, the long term impacts may be noticeable to aboriginal users and wildlife. The combined effects of acid deposition, sulphur dioxide, nitrogen dioxide and eutrophication on treed / poor bogs may cause more permanent changes than anticipated. The interrelationships between these elements and northern Canadian ecosystems are not well understood, therefore the confidence level is reasonable but not high. **Request:** **Interpret the impacts of combined air emissions on the vegetation key indicator resources.**	**Note same as Q59 – JPME:** There is no accepted model to assess the effects of combined air emissions on Canadian boreal ecosystems. The models used to assess the potential effects of air emissions on vegetation are based on comparing reviewed vegetation sensitivities to applicable critical loads, objectives and guidelines. These standards have been adapted from recommendations by leading authorities (CASA, WHO and the provincial and federal governments). The scientific basis behind these standards results in a reasonable level of confidence to the assessment. For a review of the available knowledge of the effects of air emissions, see Appendix 3-13, Sections 2 and 3.
		64	Use of brackets unexplained. Table 3.6-1	Plots completed both in the Pierre

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			(ESR Section 3.6.1) includes values in brackets. The reason for the brackets is not explained. **Request:** **Explain what is indicated by the brackets in Table 3.6-1 (ESR Section 3.6.1).**	River Mine Lease and Jackpine Mine Expansion Lease were used in the assessment of each ecosite phase and wetlands type, but fell outside the Pierre River LSA. Table 3.6-1 should have included a foot note that read: *"The number in the brackets indicates the number of plots surveyed during the Project that are not within the Pierre River Mine LSA."*
	Reclamation	65	Reason for delay in reclaiming the project's ETDA unclear. The Pierre River Mine Project's External Tailings Disposal Area (ETDA) is predicted to be filled by 2029. Reclamation is planned for 2049 when the ETDA will be capped and reclaimed. The ETDA is located on undisturbed surface and is isolated from the mining area, unlike many other mines where the ETDA is surrounded, sometimes partially, by backfilled mine pits which help control some of the process-affected seepages entering undisturbed surficial materials and possibly discharging as baseflow to nearby surface water bodies. **Request:** **Clarify why the ETDA will be reclaimed 20 years after it has been filled. Identify what conditions prevent reclamation of the ETDA from being done earlier.**	Reclamation activities will start after the Mature Fine Tailings are removed from the ETDA and transferred to the pit lake. This process is expected to start in 2039, when the pit lake is ready to receive the tailings. Reclamation and closure activities are expected to occur over a period of ten years, from 2039 to 2049. These activities will include: • sand and overburden placement, to achieve the final closure drainage topography presented in Figure 4 in Appendix 5-2; • reclamation material placement on the contoured surface of the ETDA according to the soil prescriptions outlined in Tables 28 and Table 29 (Appendix 5-2); • revegetation according to the planting prescriptions outlined in Tables 28 and 29 to achieve the target ecosites presented in Figure 14 (Appendix 5-2); and • reclamation and revegetation monitoring to allow Shell to adaptively manage reclaimed areas to ensure ecosystems are on a trajectory towards achieving land capability classification targets.
9	Traditional Land Use Key Concerns	66	ACFN members were not consulted about impacts of the project on traditional lands. Only the six impacted trappers were interviewed, and their band membership is not made clear. Information regarding the ACFN's traditional territory in the project area is taken from published documents without permission or an information sharing agreement. **Request:**	**Note same as Q64 – JPME:** At ACFN's request, Shell funded a TLU/TEK Study conducted by the ACFN IRC. At the IRC's request, Shell did not include this study in the recent Project Update. Shell is consulting ACFN on the potential impacts of the project on the ACFN's traditional lands and

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			Engage members of the ACFN in a traditional land use assessment of the project area. Invite ACFN Elders and youth to assess the project area before construction as per the ACFN request in the August 16, 2007 meeting.	Aboriginal and Treaty rights. Shell has funded the ACFN to conduct a technical review of the EIA and SEIA for the project which forms a part of this consultation.
		67	Direct loss of traditional territory. Shell states that a section of the ACFN's traditional territory will be disturbed and not reclaimed until the far future. No reclamation timeline is provided. **Request:** **Consult with the ACFN about the loss of their traditional territory. Work with the ACFN to find mutually beneficial solutions to this problem. Some possibilities are to help ACFN preserve other traditional areas in exchange, and fund traditional youth camps to continue the transmission of important traditional environmental knowledge.**	**Note same as Q65 – JPME:** Shell is consulting ACFN on the potential impacts of the project on the ACFN's traditional lands and Aboriginal and Treaty rights. Shell has funded the ACFN to conduct a technical review of the EIA and SEIA for the project which forms a part of this consultation. Shell is willing to discuss this request as part of future negotiations towards an agreement.
10	Human Health Risk Assessment Key Concerns	68	HHRA conclusion unclear. Shell concludes that overall, "the Project emissions alone, and in combination with other sources of [chemicals of potential concern] are not expected to result in a noticeable increase in health risks in the Oil Sand Region". The use of the term "noticeable increase in health risk" is unclear; it is uncertain what and who defines the perceptibility of a change in health risk, and whether these health risks are being monitored. **Request:** **Clarify the use of the term "noticeable increase in health risk", including what defines the perceptibility of changes in health risk, who identifies these changes, and whether these health risks are being monitored.**	**Note same as Q66 – JPME:** The term "noticeable" was intended for descriptive purposes and its use was based on professional judgment. It is used in the human health risk assessment to indicate that the Project's emissions are not expected to result in an appreciable increase in Base Case health risks. Any increase in chemical exposures (either by air concentration or daily dose) is associated with an increase in health risk. These changes are defined, in part, by increases in air concentrations, water concentrations, soil concentrations, or biotic tissue concentrations. The objective of the HHRA is to quantify these health risks and to determine whether or not changes in these risks could result in a measurable health effect. The HHRA concluded that, in spite of increases in certain health risks, the Project's emissions alone and in combination with other sources of chemicals of potential concern are not expected to result in measurable adverse health effects. The estimated health risks are a product of potential exposure to air, water, soils and biota in the region,

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				all of which are monitored as part of ongoing monitoring programs in the Wood Buffalo Region.
		69	Conservative assumptions not fully incorporated into the HHRA. Shell concludes that conservative assumptions were routinely used within the HHRA. However, there are instances where conservatism was not supported. For example, the exclusion of approximately 250 chemicals of potential concern from the risk assessment process was not mentioned in the discussion of conservative assumptions; potential synergistic effects of chemical mixtures were neither considered nor discussed in the HHRA; use of surrogates, etc. **Request:** **Clarify the uncertainties inherent in health risk assessments, and discuss when conservatism has not been supported in the HHRA.**	**Note same as Q67 – JPME:** Intrinsic to virtually all human health risk assessments is the need to apply conservative assumptions to accommodate the various uncertainties surrounding the predictions. These uncertainties apply both to the estimates of exposure and to the estimated safe levels of exposure (i.e., the exposure limits) that often require the extrapolation of health effects data across or within species. Conservatism is introduced into the risk assessment paradigm as a means of reducing the possibility of risks being overlooked or understated. The conservative assumptions applied to the HHRA were discussed in detail in Table 5.3-14 of Page 5-73. It is worth noting that the HHRA did not exclude 250 chemicals of potential concern (COPCs). The initial chemical inventory consisted of 393 chemicals (Table 5.3-1, p.5-27), the vast majority of which were retained as COPCs for the HHRA. As discussed, 35 chemicals were not retained from the initial inventory. Justification for this was stated on Page 5-35 of the HHRA.
		70	Realistic and comprehensive views of individual and community health not addressed. The HHRA includes only a narrow definition of health relating to pollutant exposure and does not address the definition of public health as shared by Health Canada and Alberta Health and Wellness. **Request:** **Discuss, considering a more comprehensive view, how this project could impact the ACFN individual and community health including direct and indirect impacts. Discuss mitigation measures to address these impacts.**	**Note same as Q68 – JPME:** Shell recognizes that there are many determinants of health other than those characterized in the human health risk assessment, as a person's health and well-being is influenced by many factors, such as: income and social status; diet; employment and working conditions; social support networks; level of education; social environments; physical environments; personal health practices; biology and genetics; access to health services; gender; culture and stress. Shell's approach to assessing the health risks associated with its proposed Project is in accordance with the Terms of Reference issued by Alberta Environment.

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11	Socio-economic and Public Consultation Key Concerns	71	Unresolved issues. Shell identifies key issues that have been identified by Fort Chipewyan, but does not classify them as "unresolved issues". **Request:** **Identify unresolved issues and continue to work with ACFN to resolve them.**	**Note same as Q69 – JPME:** Shell will continue to consult and work with ACFN with the objective of resolving issues.
		72	Agreements with ACFN lacking. Shell does not provide information about current agreements with the ACFN. **Request:** **Summarize and assess Shell's current agreements with ACFN. Clarify whether these agreements are being met.**	**Note same as Q70 – JPME:** ACFN is aware of the agreements it has with Shell. ACFN IRC and Shell meet regularly to review and discuss the status of implementation of these agreements.
		73	ACFN demographic statistics lacking. The SEIA lacks demographic statistics for Fort Chipewyan. **Request:** **Provide demographic statistics for Fort Chipewyan as baseline information.**	**Note same as Q71 – JPME:** Demographic information for Fort Chipewyan is found in Volume 5, Section 8.7.2.3 and 8.7.2.4 based on 2006-2007 data sources.
		74	Monitoring program lacking. No socio-economic monitoring programs are in place. **Request:** **Design and implement a monitoring program to assess Shell's socio-economic mitigation measures.**	**Note same as Q72 – JPME:** This request appears to be a statement of disagreement with Shell's methodology and conclusions, as opposed to a request for clarification that would allow ACFN to complete its Technical Review of the SEIA. As such, this may be more appropriately discussed following completion of ACFN's technical review of the SEIA
		75	Employment and training opportunities for ACFN lacking. Employment is a key concern for the ACFN. Foreign workers are being brought into the region, yet unemployment among on-reserve workers, including the ACFN, is extremely high. There is not much evidence of the success of Shell's initiatives, such as the AOSP Good Neighbour Policy and the Aboriginal Talent Pipeline. **Request:** **Provide more detailed information about the success and / or difficulties experienced by Shell with their employment / training initiatives in Fort Chipewyan and among ACFN members. Include the number of ACFN members presently employed or sub-contracted by**	**Note same as Q73 – JPME:** Training and employment programs delivered in-community since 2006 with ACFN participants include: the Drilling Rig Training Program, Class 7 Alberta Driver's License Training, Building Environmental Aboriginal Human Resources (BEAHR) Program, and Alberta Trapper's Association (ATA) Standard Wild Fur Management Program. Graduation rates have been over 75%. Shell does not track employment by First Nation, as we respect privacy laws and the right of individuals to not self-declare their ancestral heritage.

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		76	Housing concerns. A key concern for the ACFN is the current housing situation, which is not fully captured in the SEIA. Housing concerns are two-fold for the ACFN: 1) poor housing conditions in the community of Fort Chipewyan, and 2) the need for a fly-in fly-out workers program for Fort Chipewyan residents and ACFN members. **Request:** **Initiate discussions with the ACFN regarding housing concerns. Discuss the possibility of corporate support for a housing project facing the Aboriginal population in Fort Chipewyan. Discuss the possibility of extending the fly-in fly-out workers program to Fort Chipewyan.**	**Note same as Q74 – JPME:** Shell is willing to discuss this request as part of future negotiations towards an agreement.
		77	Education concerns. Education is a key concern for the ACFN Elders Council. Low student performance and high drop-out rates are a problem in Fort Chipewyan. There is a lack of information on how many ACFN students and adults will benefit from Shell's education initiatives. **Request:** **Discuss education concerns with the ACFN. Identify an education and / or training program that will address Fort Chipewyan's needs, and identify ways to assess the success of these initiatives. Provide statistics on the number of ACFN students and adults who currently receive training and scholarships.**	**Note same as Q75 – JPME:** Shell is willing to discuss this request as part of future negotiations towards an agreement.
		78	Social services concerns. Although Shell is supporting initiatives to address regional socio-economic problems, the SEIA does not include a discussion on the current problems facing the ACFN. For example, the ACFN Elders have expressed concern about the younger generation leaving the community to work in the oil patch, earning a lot of money and spending it recklessly, often to the detriment of their families. **Request:** **Discuss how regional industry is affecting their culture (e.g. drug use, financial problems, loss of culture and tradition). Discuss the possibility of Shell supporting community endeavours in Fort Chipewyan as a way to address socio-economic problems. Discuss Shell's Drug and Alcohol Use Policy. These issues should also be discussed**	**Note same as Q76 – JPME:** The concerns of Fort Chipewyan residents are provided for in Volume 5, Section 8.7.2.4 by community. Shell is willing to discuss this request as part of future negotiations towards an agreement.

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			directly with the ACFN, including the Elders Council.	
		79	Policing and emergency services concerns. The ACFN are concerned about the rising criminal activities in the region, including First Nation gangs. **Request:** **Discuss how Shell's proposed project would affect rising crime in Fort Chipewyan and what Shell could do to enhance policing and emergency services initiatives in Fort Chipewyan.**	**Note same as Q77 – JPME:** Shell's project mitigation on policing and emergency services in the region (both urban and rural) is found in Volume 5, Section 8.7.12. It should be noted that with an on-site operations camp for PRM, there will be lower population impacts on regional resources.

Table 32-1 Results of Modelling Uncertainty Analysis

Flow Statistics (m^3/s)	Test Case (Application Case Far Future)	Results of Uncertainty Analysis		
		Expected (Mean) Value	Lower 95% Confidence Limit	Upper 95% Confidence Limit
Mean Annual Flow	0.553	0.558	0.556	0.559
Mean Open Water Flow	0.831	0.832	0.830	0.834
10-Year Flood Peak Discharge	6.0	5.86	5.78	5.89
Mean Ice-Cover Flow	0.160	0.173	0.172	0.175