Topic: Public consultation, TEK and Community-Based monitoring		
Q #	**Question**	**Response**
1	Please provide exact details of various discussions and meetings held with local communities and how the resolution of the concerns and issues was incorporated into project development impact mitigation and proposed monitoring.	• Since the announcement of the JPME and PRM projects, Shell has met regularly with the MCFN and other First Nations to identify potential impacts, issues and concerns. The following types of meetings have been held: open houses, quarterly GIR meetings, Advisory Committee meetings, technical review meetings and reports, NNLP meetings, site visits, etc. • All of these formal meetings have notes that are sent out in Draft for review by stakeholders and then finalized. MCFN will have copies of all of these detailed notes. A summary of these meetings and discussions is provided in the bi-monthly reports provided to both MCFN and AENV. • These forums have been used to identify issues and concerns of the MCFN and other aboriginal stakeholders. Examples of this include; the opportunity to discuss and comment on the EIA ToR; incorporation of TEK and TLU into the EIA; inclusion of wildlife corridors (100 m buffer zone along Muskeg River) to ensure genetic connectivity; adjustment of the corridor monitoring plan to expand and provide more information; adjustment of the water drainage plan to balance the need for ore recovery with the need to maintain the lower reaches of the Muskeg River and Kearl Lake. • Going forward, stakeholders will have the ability to comment on the proposed monitoring plans. • There is also additional time to present information as part of the regulatory process to ensure that all issues and concerns are identified. In addition, Shell is willing to discuss further mitigation and compensation measures as part of a negotiated agreement.

2	Please provide information on future plans to maintain the community consultation process following completion of the EIA review to ensure that the TR holders will have an appropriate forum for expressing their views on the ongoing development, operation, and reclamation of the Project. We recommend that the Mikisew Cree propose suitable CBM of various project-related activities on the land. Communities could offer TEK to Shell as well as solidify a strong partnership in sustainably managing and assessing the TR on the land.	• Shell's MRM development has been in operation since 2003. Through this time, we have continued to build relationships with communities and consult regularly.
		• We have:
		  • been active members and funders of the MCFN GIR,
		  • met regularly with our Advisory Group since its inception,
		  • held regular open houses and meetings with leadership,
		  • consulted and continue to consult with land users (trappers, and other rights holders) and First Nations and Métis groups, as required by provincial regulators for our ongoing developments, permits and approvals,
		  • signed agreements with the MCFN, committing Shell to continued consultation and mitigation efforts.
		• Shell will continue to consult with MCFN and provide opportunities for TR holders to express views on operation, development and reclamation.

3	It is important to know whether aboriginal populations were given the opportunity to participate in the planning or design stages and in establishing the biodiversity indicators and assessments for this application. Please provide these details.	• Species-level biodiversity indicators (i.e., KIRs for the Fish and Fish Habitat, Terrestrial Vegetation, Wetlands and Forest Resources and Wildlife and Wildlife Habitat assessments) were based on documentation (e.g., FMFN 1994) that identified many of the species as being of value and importance to local Aboriginal communities. Reference: FMFN (Fort McKay First Nations). 1994. There Is Still Survival Out There: A Traditional Land Use and Occupancy Study of the Fort McKay First Nations. Arctic Institute of North America and Canada Alberta Partnership Agreement in Forestry. Fort McMurray, AB. 129 pp.

Topic: Public consultation, TEK and Community-Based monitoring		
Q #	**Question**	**Response**
4;6	Q4: The assessment of TR was not done specifically for the local area. How does this accurately convey TR in the local communities and the extent of their TR if Shell has not assessed this locally? Q6: How can Shell assess the impacts of the Project on TR accurately if there are gaps in the information?	• Interviews were conducted with directly-affected local trapline holders. Early in the EIA process, FMFN, ACFN, and MCFN indicated they wanted to arrange their own studies. • Past EIAs were reviewed for relevant information relating to traditional resources and land use. • MCFN information relating to area of traditional lands, and concerns relating to loss of land for activities, and potential effects of development on air, water, wildlife, and fish were considered in the EIA. • FMFN and ACFN provided additional information on their traditional resources and activities which were consistent with what was considered in the EIA. • Shell believes the TLU assessment and EIA assessment is accurate based upon the available information, and our experience in the Oil Sands Region. • PCO4 identified the process to collect TLU and traditional resources information for the assessment. Shell is willing to discuss this with MCFN and consider any additional information they may have that identifies further gaps.
5	We recommend that the Mikisew Cree request that a complete assessment of TLU, including the Mikisew Cree and other FNs, be conducted by Shell.	• Shell is still open to gathering TEK/TLU information from MCFN, as proposed initially in 2007.
6		• Answer combined with 4 above
7	The proponent has committed to continuing the dialogue with the aboriginal populations to learn their viewpoints at suitable times. However, at the EIA stage, the proponent and stakeholders should have discussed issues so that they can be duly incorporated within the EIA. Why weren't these discussions completed prior to Shell applying to the regulatory authorities?	• The EIA process commences with the Terms of Reference being established by AENV (after having received comments from interested stakeholders including First Nations), and continues through to the conclusion of public hearings before the joint federal – provincial review panel. • This EIA process has been ongoing since 2007, throughout which time Shell and MCFN have continually been engaged in discussing issues. In particular, in late April and early May, 2007, Shell met with MCFN (and other Aboriginal Groups) and Crown agencies to discuss various aspects of the EIA, including methodologies and First Nation concerns and questions. • As a direct result of this consultation, Shell made the offer to First Nations to collect TEK/TLU for the projects. • ACFN and FMFN have since provided this information. Consultation regarding issues of concern and potential impacts to MCFN are an ongoing process, as opposed to a discrete event. • This process includes the dialogue and consultations taking place as part of this technical review exercise, discussions on impacts and possible mitigation or accommodation, and MCFN participation in all aspects of the regulatory process, including public hearings at which MCFN will have further opportunity to provide evidence to regulators regarding suggested approval conditions.

Topic: Public consultation, TEK and Community-Based monitoring		
Q #	**Question**	**Response**

8	Can Shell provide examples of successful reclamation in terms of traditional resource use? If not, how can the Mikisew Cree be assured that reclamation will be successful, especially when there are gaps in the understanding of the TLU in the local area? We recommend that the Mikisew Cree request a detailed assessment about future developments on the land so that they can make appropriate decisions for future partnerships with industry.	• Reclamation will be successful based on the holistic approach Shell has towards reclamation.
		• Reclamation planning considers:
		  • Stakeholder consultations and other end land use requirements.
		  • Current guidelines and best practices.
		  • The types of land forms to be reclaimed (overburden dumps, tailings sand, dyke walls, tailings areas).
		  • The final slopes, aspects, moisture regimes and elevations provided by the closure drainage plan.
		  • The types and volumes of reclamation material available in a given year.
		  • Ecosite types typical of the region.
		  • Achieving equivalent Land Capability Classes to baseline conditions.
		  • The concepts provided in the plan will not change, but the details will change with adaptive management.

8	Continued	• Adaptive Management
		  • Establishing end land use objectives and continually reviewing and fine-tuning them.
		  • Early project planning (landform design, corrective initiatives, optimizing material availability, landscape level design e.g. watersheds, boundary areas, buffers and corridors).
		  • Field and operational experience, especially learnings from conservation (soil and plant propagules) progressive reclamation and compensation work, 30-year regional research.
		  • Regional cooperative research
		  • Development of guidelines and monitoring programs with operators and stakeholders.
		• Reclamation Success
		  • Reclamation ‘success’ achieved elsewhere in Alberta – e.g., Foothills coal mining.
		  • Success for oil sands reclamation is on a positive developmental trajectory based on industry results over past 30+ years.
		  • ‘Successful reclamation’ includes creating functioning ecosystems typical of the boreal forest. When this is achieved, targets are expected to be met. Targets and benchmarks are being developed to measure how ecosystems are functioning, and when they can be considered for certification
		  • Traditional species typical of the boreal forest will be on the closure landscape, as they were at baseline conditions.
		  • Shell consults with the Reclamation Advisory Committee which receives input from First Nation stakeholders.
		• Targets
		  • Government requires industry to provide reclamation bonding to ensure reclamation and Reclamation Certification takes place.
		  • Regulators are responsible for setting the regional targets that industry is required to follow for Reclamation Certification – these targets and benchmarks will be provided at the landscape level and other levels as appropriate.
		  • These targets and benchmarks will be provided on a landscape level.
		  • The level of detail in the CC&R Plan is appropriate for the scale of an EIA.

Topic: Public consultation, TEK and Community-Based monitoring		
Q #	**Question**	**Response**
9	More details are needed so that a gap analysis may be performed and future courses of action can be clearly demonstrated.	• Table 15-1 Public Consultation Activities – November 2006 to June 28, 2007 (Volume 1 of the EIA) provides a summary of consultation regarding the JPME and PRM projects for the regulators. • Detailed notes have been collected from major engagements with MCFN and consistent with Shell's Consultation process, draft notes have been shared with appropriate stakeholders with the offer to make edits, as appropriate. • All notes and other correspondence have been provided to the MCFN.
10	Please provide some details as to what the compensation measures might entail? To pass on TEK to future generations, FNs require the TR and land to showcase their cultural traditions. How will Shell ensure FN needs to maintain their Treaty Rights?	• Shell's EIA has predicted no likely significant adverse environmental impacts to the biophysical components that MCFN rely upon (either directly or indirectly) for the exercise of Treaty and Aboriginal Rights. However, Shell welcomes ongoing discussions to understand how MCFN views the project impacts to their TLU dependence. Shell is open to continuing discussions with MCFN regarding areas in which Shell can potentially assist MCFN in developing initiatives in furtherance of the ongoing exercise of Aboriginal and Treaty Rights.

Topic: Traditional Land Use and Socio-Economics		
Q #	**Question**	**Response**
1	If these projects are approved without addressing the likely impacts on the Mikisew Cree and other FNs, in light of their Treaty Rights and what is needed for the meaningful exercise of those rights, it will limit FN input into mitigation, compensation, and Project design. How can these effects be minimized if a proper assessment has not been made to measure the Project impacts?	• Shell has been engaged in in-depth consultation with MCFN on the potential Project impacts to the exercise of Treaty Rights since early 2007. This consultation is an ongoing process, both directly and indirectly (through information provision) involving federal and provincial Crown agencies. The goal of this ongoing consultation process, which is an integral part of Shell's legislatively mandated regulatory and EIA process, is precisely to allow the regulatory decision makers to have a full understanding of potential Project impacts to MCFN Treaty Rights, and to consider these impacts (accommodating MCFN where appropriate) through imposing conditions on operating approvals and subsequent obligations on Shell where necessary. The EIAs and SEIAs for these Projects consider the likely environmental impacts to various biophysical and socio-economic receptors and indicators. The exercise of most, if not all, of MCFN's Treaty rights relate directly or indirectly to the availability of, and impacts to these receptors and indicators. Accordingly, the regulators, through the thousands of Supplemental Information Requests, technical review, and consideration of all other evidence filed as part of the regulatory hearing process, will be able to determine the likely extent, and degree of impact on Aboriginal Rights.
2;6	Q2. Given the current state of this Application, a separate consultation process should be established, including setting out how any results from that process would be integrated into the regulatory review and decision making process. Q6. In order for a proper impact assessment to be undertaken, we recommend that a full consultation process be completed. Useful conclusions cannot be made based on the methods contained in the current application.	• Shell believes that the applications are meeting the regulatory requirements and following the required process - Shell may need to agree to disagree on this point. Shell is currently engaged in a process of consultation - including this technical review. If MCFN does not agree with the regulatory process or consultation in support of this process,Shell would be happy to be part of further discussions with MCFN and the Crown.
3	What are the implications of this project for the continued and future traditional land use of the FN? We note, in particular, that the Application does not consider the impacts of the "taking up" of lands (either through direct footprints or zones of disturbance or through fragmentation) within the Traditional Territory of the Mikisew Cree and how this will impact the Mikisew's ability to exercise their Treaty Rights. Without understanding the impacts of the grants of tenure, and developments of various kinds on those lands, and what is required for the Mikisew to meaningfully exercise their rights in the future, it is difficult to understand the direct, indirect, and cumulative impacts of the Application on the Mikisew Cree's rights.	• Fragmentation impacts due to approved and future projects were rated as moderate in magnitude for moose and fisher/marten, and low in magnitude for black bears and Canada lynx in the RSA. After closure and reclamation, effects on habitat were rated as negligible. • Depending upon the timing of approved and future projects, removal of the upper reaches of the Muskeg River for development of the JEMA will create barriers to movement in the upper Muskeg River basin that cannot be mitigated until after reclamation. (continued next page)

Topic: Traditional Land Use and Socio-Economics		
Q #	**Question**	**Response**

3	Continued	• Planned and approved projects north and south of the PRMA LSA on both banks of the Athabasca River may slow wildlife movement, although passageways provided by Shell under the Athabasca River bridge should mitigate the effects of the Project.
		• Prior to reclamation, planned and approved projects north and south of the PRMA LSA on both banks of the Athabasca River are predicted to adversely affect wildlife movement rates along the Athabasca River within the RSA. This effect will be reduced if all the projects do not proceed on a similar schedule.
		• The potential effects of the Project on traditional use plants (high potential) is considered negative and low. The environmental consequence for both the LSAs and the RSA was considered negligible.
		• Fish and Fish Habitat assessment considered fish habitat, fish abundance, and habitat diversity in the Muskeg River, Kearl Lake, PRMA waterbodies and courses, and the Athabasca River. The residual impacts on each of these were classified as having no environmental consequence.
		• The TLU Assessment calculated the amount of land that will be lost for TLU under the Application and Planned Development cases (EIA Volume 6, Section 8.3.6.1).
		• Based upon the available information on Mikisew Cree traditional activities, the loss of land for TLU under the Application and Planned Development cases will not significantly affect the amount of area available for Mikisew Cree traditional activities.
		• TEK/TLU information has been collected from trappers (Aboriginal and non-Aboriginal) and other First Nations (e.g. ACFN and FMFN)
		• MCFN TLU information available to us for use in the EIA included:
		  • The MCFN traditional territory identified in the Suncor Voyageur hearing (2006).
		  • The “Fort Chipewyan Community Profile and Attitudes and Perceptions 1995-1996” survey identified Fort Chipewyan Concerns, including MCFN.
		  • During studies for the CNRL Horizon Project EIA (2002). MCFN participants indicated most of their TLU activity was in the Fort Chipewyan area and Wood Buffalo National Park and provided other information.
		• In the CNRL Horizon Project EIA (2002), MCFN members identified various concerns related to the potential for increased development.

Topic: Traditional Land Use and Socio-Economics		
Q #	**Question**	**Response**
4	What will be the Project impacts on other areas of fishing activity and the community food supply?	• Fish and Fish Habitat assessment considered fish habitat, fish abundance, and habitat diversity in the Muskeg River, Kearl Lake, PRMA waterbodies and courses, and the Athabasca River. The residual impacts on each of these were classified as having no environmental consequence. • There is a predicted decline in wildlife KIRs in the LSAs during operations phase due to habitat loss. Wildlife movement along the Muskeg River will require moving from the riparian river area and into the Fort Hills. Movements along the Athabasca River will be affected but effects will be reduced by mitigation. In the JEMA, predicted impacts on wildlife movement during operations are predicted to be high, and negligible or low after closure and reclamation. Effects of the Project on regional population viability are considered negligible. After closure and reclamation, the effects of fragmentation and habitat loss are predicted to be reversed.

5	Has the Applicant studied the cultural TLU of the FNs enough to be able to model and assess the impacts of the project on TLU tipping points?	• Additional information from FNs would be required to determine relevant tipping points for various TLU activities or resources. The FMFN and the ACFN conducted TLU studies for the Project and did not discuss tipping points in their reports.
		• Shell is prepared to meet with the MCFN to discuss their TLU activities in detail to help determine tipping points for MCFN TLU activities.
		• TEK/TLU information has been collected from trappers (Aboriginal and non-Aboriginal) and other First Nations (e.g. ACFN and FMFN)
		• MCFN TLU information available to us for use in the EIA included:
		  • The MCFN traditional territory identified in the Suncor Voyageur hearing (2006).
		  • The “Fort Chipewyan Community Profile and Attitudes and Perceptions 1995-1996” survey identified Fort Chipewyan Concerns, including MCFN.
		  • During studies for the CNRL Horizon Project EIA (2002). MCFN participants indicated most of their TLU activity was in the Fort Chipewyan area and Wood Buffalo National Park and provided other information.
		  • In the CNRL Horizon Project EIA (2002), MCFN members identified various concerns related to the potential for increased development.

6		• Answer combined with # 2 above

Topic: Traditional Land Use and Socio-Economics		
Q #	**Question**	**Response**
7	Why is there no mention of any participation in reclamation consultation with the Mikisew Cree?	• Shell has continued to consult with all stakeholders as part of the overall project application, which includes conceptual reclamation plans. During the Fort Chipewyan Open House and the concurrent Elders meeting in April 2009, Shell provided models of the reclamation process (based on stakeholder suggestions and feedback), which identified these plans. It is important to note that based on the stage of project development, the Closure and Reclamation plan is conceptual. The C&R plan is dependent on a number of factors, production rates and efficiency, the final regulator-approved mine plan, the actual extent of the resource, etc. A final plan will be developed in consultation with the regulators, but not for a number of years until closer to the time of reclamation. As noted above, Shell will continue to provide opportunities for MCFN to provide input into ongoing reclamation planning.
8	We recommend that the GoA and Industry work together with the FN to acquire and develop lands in the Fort McMurray region to allow the FN to construct and make appropriate housing available for the Mikisew members. Industry should work with the FN to build appropriate aboriginal housing in satellite communities on a joint venture basis with the FN.	• Shell provides camp accommodation for its construction workforce, and we provide our labour forecasts to the Oil Sands Developers Group (OSDG) and RMWB so that they may plan for long-term and affordable housing accordingly. We do not have a core competency in building housing.
9	We recommend that a full socio-economic study be conducted in association with a proper consultation process to identify the problems and causes of educational shortfalls. This will allow a thorough and coordinated mitigation plan to be developed.	• Shell has completed a thorough socio-economic impact assessment of the JPME and PRM projects that meets the requirements of the TOR. Shell works closely with community schools in Fort McKay and Fort Chipewyan and is willing to discuss measures to address education shortfalls as part of Shell's ongoing community involvement.
10	We recommend that a full consultation process be initiated to assist all parties in identifying mitigation measures that directly address the socio-economic problems of the area, including information from a FNs perspective.	• Shell completed a socio-economic impact assessment that predicted no likely significant adverse socio-economic impacts. Shell is involved in an ongoing consultation process with MCFN and relevant Crown agencies, and will continue to work with MCFN to identify areas where Shell can potentially provide assistance and community support.
11	Given the higher rates of cancer and other problems reported in one of the rural communities, how will providing better care for Shell employees assist in reducing the ongoing impacts on rural health services in the area? Mitigation proposals should directly address the issue of attracting and keeping qualified staff at rural medical centers.	• As part of its planning process, Shell is exploring ways of maximizing benefit to local communities from the establishment of its on-site medical facilities, including: • As a signatory to the Wood Buffalo Mutual Aid Agreement, placing on-site medical facility staff and equipment resources at the disposal of the local hospital in the event of major medical emergencies such as a pandemic or a major industrial accident in the region. • Recruiting health care professionals, including physicians, for on-site medical facilities from outside the Wood Buffalo region, such as from Edmonton and Calgary.

Topic: Traditional Land Use and Socio-Economics		
Q #	**Question**	**Response**
12	Are the rural communities adequately serviced in the emergency, health, and education fields?	• Shell recognizes that there are ongoing challenges in delivering and accessing emergency, health and education services for rural residents in the region and indeed the province. • Shell is not in a position to offer a judgment on the adequacy of publicly provided emergency, health and education services in rural communities in the region. Shell, through its socio-economic impact assessment (SEIA), has identified a number of concerns and challenges with service delivery in the region and is committed to working with the appropriate public and private-sector agencies with a mandate to address these issues. Shell does this by providing financial and in-kind contributions to a number of local community programs and services, as well as information and planning support to both public and private-sector agencies. Shell is also committed to continuing its work with other developers to define and address regional issues through the OSDG.
13	Please include a proper study of the transportation rights in the consultation process.	• Shell is not clear regarding what is meant by "transportation rights", however Shell's EIA has assessed all relevant project impacts on the exercise of Aboriginal and Treaty Rights with a finding of no significant impacts to the exercise of those rights predicted.
14	Please provide a discussion of the socio-economic setting which would allow mitigation proposals to be made and carried out in a meaningful fashion. The causes of income disparity should be studied and the role of this Project and others should be discussed in that study context.	• High unemployment rates in rural communities in the region have a direct and detrimental impact on income levels and contribute directly to income disparities. • Through its developments in the region, Shell is providing employment and business opportunities for Aboriginal peoples and businesses, thus offering prospects for improvements in income. • Shell is committed to working with the IRCs and employment coordinators to identify and remove barriers to education and employment opportunities for Aboriginal peoples in the region, thus offering prospects for improvements in income. • Shell already works with the GIR, through previous negotiated agreements, to determine how best to accommodate and mitigate the adverse social and cultural effects of development. Shell also supports a number of cultural retention and other initiatives, which aim at helping Aboriginal communities maintain their social cohesion and unique characteristics. • As community initiatives come forward, Shell will assist and contribute where appropriate.
15	The analysis of the effects of development on family structure and income, especially in the rural areas, should be undertaken.	• Shell recognizes that an observable association exists between family structure and income. However, the causes of income disparity can be complex and may have many causes.
16	We recommend that an analysis be conducted of the implications of water on each of the socio-economic issues outlined in the review. These issues do not appear to be discussed in the EIA or the Socio-economic Impact Assessment.	• Transportation on the Athabasca River is not affected by PRM/JPME projects. Water quality and quantity impacts are described in the EIA Volume 4A.

Topic: Traditional Land Use and Socio-Economics

Q #	Question	Response
17;18;21	Q17.How do these initiatives impact the members of the Mikisew Cree? What infrastructure projects will assist the MCFN FN to address the impacts of these developments Q18.Do any of these projects and initiatives address the impacts on the Mikisew Cree? **Context**: GOA funding announcements in 2007-2008 to alleviate S-E pressures in the region Q21.How do Shell's mitigation proposals assist the Mikisew Cree in dealing with the impacts of the projects/	• Government socio-economic spending initiatives are meant to alleviate the pressures of rapid growth in the region and enhance the quality of life of local residents. Funding is intended to ease traffic congestion, improve health, education, child care and emergency services, as well as support policing and other community infrastructure. In so far as members of the Mikisew Cree First Nation who live in Fort McMurray or use regional services (e.g. health services, road network, policing) these initiatives will be of direct benefit to them. • As a specific example, a number of traffic improvements have been made to Hwy 63 north of Fort McMurray, including twinning from south of Suncor to north of Mildred Lake, construction of the Suncor Voyageur interchange, and improvements to the Fort McKay turnoff. These improvements will help to reduce congestion and improve safety along Hwy 63 providing a direct benefit to residents of Fort Chipewyan who use Hwy 63 during the winter months to go to Fort McMurray for medical, shopping and recreational needs.
		• SEIA methodology addresses impacts based on the study area defined as the Regional Municipality of Wood Buffalo (RMWB). As residents of the RMWB, the projects and initiatives put forward by the provincial government benefit residents through providing access to funding for the municipal government to develop much needed infrastructure and services in the region. The municipal government has the mandate to prioritize and execute these projects and services on behalf of their constituents. Fort Chipewyan has a seat on municipal council that enables the community to be represented. • Shell's mitigation includes, on-site medical facilities, provision of employment and business opportunities, work with GIRs on how best to accommodate and mitigate adverse social and cultural effects of development, support for cultural retention and other initiatives, financial contributions to organizations in the RMWB, and payment of municipal property taxes.
18		• Answer combined with #17 above
19	What are the total expenditures on these initiatives and what percentage of these expenditures will assist the Mikisew Cree?	• Mayor Melissa Blake in her November 2009 State of the Region address to the Fort McMurray Chamber of Commerce has expressed that the total of new funding for the RMWB from the provincial and federal governments is over $2.25 billion (since the Radke Report of 2006). Government spend by community is not known.
20	How does the major capacity and infrastructure Projects address the Mikisew Cree concerns?	• This consultation process is intended to further identify and discuss the socio-economic concerns of the MCFN and how these are/are not addressed through existing initiatives. We will be in a better position to respond to this question once we've more thoroughly identified and discussed the Mikisew Cree's specific socio-economic concerns.
21		• Answer combined with # 17 above
22	We recommend that the Proponent conduct a proper study of regional cumulative impacts rather than a narrow, project-specific effects assessment.	• Cumulative effects are addressed in the EIA/SEIA and meet the conditions of the Terms of Reference.

Topic: Traditional Land Use and Socio-Economics		
Q #	**Question**	**Response**
23	Although access to traditional hunting, trapping, fishing, and gathering areas is an important consideration, what is missing entirely from the EIA is an analysis of what is needed to sustain those rights today and into the future. We recommend that Shell provide this analysis.	• Shell's EIAs have concluded that there are not likely to be any significant adverse environmental impacts to the biophysical components that MCFN rely on, either directly or indirectly, to exercise Aboriginal rights. However, Shell is open to continuing discussions with MCFN regarding areas in which Shell can potentially assist MCFN in developing initiatives in furtherance of the ongoing exercise of Aboriginal and Treaty Rights.

Wildlife		
Q #	**Question**	**Response**
1;2	Q1. Will recovery through progressive reclamation happen rapidly enough to avoid ecosystem shifts? Q2. The Mikisew Cree should request that ecosystem shifts be included as indicators for monitoring and triggers for adaptive management.	• Ecosystem shifts will occur as a result of the Project and were assessed in the EIA. • Ecosystem shifts are predicted to occur from: o vegetation clearing during project construction o reclamation to more upland, and less wetland habitat o temporary reduction in old-growth forest o water table drawdown • Ecosystem shifts to a drier landscape dominated by terrestrial uplands in the closure landscape will occur as a result of the Project and were assessed in the EIA.
2		• Answer combined with #1 above
3;19	Q3. Clarification is required to provide the Mikisew Cree with an understanding of what the baseline data represent and what the baseline data will be used for in the future. Q19. Are the results of current monitoring programs for the Jackpine Mine – Phase 1 and Muskeg River Mine being compared to EIA baseline conditions? To pre-disturbance conditions?	• Baseline wildlife data was collected from the autumn of 2005 through to the summer of 2007. • Baseline data is used as a comparison point: • for assessing effects of the project under the Application and Planned Development Cases • for monitoring project and regional development effects, during operations and after reclamation • Monitoring results will inform regional adaptive management programs for wildlife
4;5	Q4. No “end of closure” dates are provided. This information would shed light on the potential for TLU by the Mikisew Cree, such as wildlife harvesting, if wildlife recolonization of disturbed areas is successful. Can such information be provided? Q5. Can this information be provided so that it may be communicated to the Mikisew Cree community members? If not, why not?	• “End of closure” is not a single, definable date. Closure will continue as the ecosystem matures, and some species will re-establish sooner than others. • Reclamation activities for closure are estimated to take at least 10 years after the end of mine life. Once reclamation activities are completed, the period of closure of the mine will start. Closure is considered to begin in 2065 for JME and 2049 for PRM when the pit lakes will have water quality that is acceptable for release. Progressive reclamation on some areas of the mine will begin earlier, as shown in the CC&R plan. • Closure will continue as the ecosystem matures, and some species will re-establish sooner than others. • Long-term monitoring will measure progress.
5		• Answer combined with #4 above
6	If areas are disturbed or construction is carried out and operations commence at a faster rate than presented, why wouldn’t this affect EIA predictions for wildlife and wildlife habitat? Wouldn’t disturbance be more intense in the sense that the construction and operation schedule is compacted? How would the reclamation of disturbed areas, and subsequent wildlife recolonization, be impacted?	• Shell is not planning to advance their accelerated project Schedule (PRM Round 1 SIR 40a).. • Increased disturbance rates would not affect predictions or environmental consequences for wildlife or wildlife habitat because the Application Case assumes that all habitat is removed at the same time and final environmental consequences are determined after closure and reclamation. • Mobile species will be able to vacate regardless of the rate of habitat removal.
7	Upland birds and waterfowl were not included as KIRs. Please elaborate and explain.	• The assessment takes a focussed approach with Key Indicator Resources (KIRs) • KIRs collectively represent a broader suite of species: • waterfowl habitat represented by riparian and open water habitats • ruffed grouse habitat represented by fisher habitat

Wildlife		
Q #	**Question**	**Response**
8	Please explain why wildlife mortality does not appear to have been addressed as a "Key Question".	• Wildlife mortality is an important component of Key Question TR-3: • "What Effects Will the Project and the Existing and Approved Developments Have on Wildlife Abundance?" • In the LSAs, the conclusion for Key Question TR-3 was that the Project will result in negligible mortality for all KIRs except black-throated green warbler and yellow rail, which will experience a low environmental consequence. • At the RSA scale, the conclusion for Key Question TR-3 was that the Project will result in negligible mortality for all KIRs.

9a	a) How will the RSF results and HSI maps be used in Project planning and wildlife conservation?	• Habitat modelling results are used:
		  • to estimate habitat change due to the Project before and after reclamation.
		  • as a foundation for Population Viability Analyses (PVA) for moose and black bear.

9b	b) Will important wildlife areas be avoided?	• Riparian areas were identified as important for supporting important biodiversity functions such as providing wildlife movement corridors.
		• Shell will maintain:
		  • a minimum 250 m-wide wildlife corridor along either side of the Athabasca River.
		  • a 100 m-wide setback along either side of the Muskeg River from the Athabasca River to the Fort Hills.

9c,d, f	c) How well do HSIs agree with survey data? d) In addition, what are the recognised limitations of the RSF data and the possibility of false negatives? f) How does wildlife monitoring data collected from the Muskeg River Mine and Jackpine Mine – Phase 1 compare to RSF and HSI predictions?	• The structure and output of RSF and HSI models are consistent with survey data findings from the LSAs, Muskeg River Mine, Jackpine Mine – Phase 1 and expert ecological knowledge of the region. • RSFs and HSIs are the best available and most appropriate tools for estimating changes to quality habitat in the assessment. • Moose, Canada lynx and fisher RSF models were built with survey data from the Oil Sands Region, as discussed in EIA Volume 5, Appendix 5-4, Section 1.2.1.1, p.3.
9e	e) What degree of confidence does Shell have for these results given unproven reclamation and unclear regional development scenarios?	• The degree of confidence in predictions of habitat change from Base Case to Closure is moderate overall; degree of confidence in reclamation plans for terrestrial vegetation is high and degree of confidence in reclamation of lichen jack pine communities, riparian communities, re-establishment of wetlands is moderate. • Reclamation projections are realistic based on current ongoing research in the Oil Sands Region. • The best information available on planned regional developments was used.
10	What is the range of accuracy associated with the AVI data used in the various LSA Models?	• AVI data were adjusted and verified using data collected in vegetation surveys. • The level of confidence associated with AVI data used in the assessment is high.
11	*Shell has indicated that the AVI data were not available at the RSA scale. Does this mean that RSA-level models are inherently more inaccurate than the LSA models?*	• *This is a question of scale rather than accuracy, AVI - level details, such as stand age, are not available at the RSA scale.* • *The optimum scale for habitat modelling depends on the species.* • *Finer scales of habitat selection cannot be represented at a regional scale.*
12	*Can Shell explain why habitat fragmentation analyses were not conducted for the remaining wildlife KIRs?*	• *Fragmentation analyses were performed for moose, Canada lynx, fisher/marten and black bear as wide-ranging species sensitive to fragmentation.* • *Results showed that fragmentation would occur at the RSA scale.* • *Further analyses would not reveal meaningful additional information because the species likely to be most sensitive to habitat fragmentation were examined and additional species will reveal similar or lesser effects.*

Wildlife		
Q #	**Question**	**Response**
13	*What do the combined results of HS and RSF modelling, Habitat Fragmentation Analyses, and Linkage Zone Analysis mean for each wildlife KIR at the LSA and RSA levels?*	• *Modelling and analysis results inform the assessment of environmental consequences for each wildlife KIR in the EIA.* • *Results from different modelling approaches were not combined in the EIA as the results are not directly comparable.* • *However, if the results are combined for this assessment, based on the results of the modelling and professional judgement, the environmental consequence for wildlife resources after closure and reclamation would be the same as in the EIA.*
14	*Rationale behind some aspects of the rating system remain unclear. In addition, it is not clear how, or if, these impact assessment criteria will be evaluated through future monitoring programs. Please explain.*	• *The impact analyses and classification system is described in detail in* Volume 5, Section 1.3.6 of *the EIA.* • *The impact analysis and classification system will not be evaluated because future monitoring programs will focus on actual potential project effects.*
15	*Please provide site-specific mitigation measures.*	• *Mitigations discussed in the EIA are general examples that Shell will use at its sites; site specific mitigations are not possible before mine plans have been finalized (e.g., Jackpine Mine - Phase 1 Mitigation and Monitoring Plan was completed and monitoring was implemented).* • *No RSA-scale effects are predicted that require mitigation, beyond corridors for connectivity.* • *Site-specific mitigation measures will be included in future detailed designs.*
16	*How were future increased levels of noise in these corridors considered in the relative effectiveness of these areas to act as wildlife movement corridors (see Figures 4.6-1 to 4.6-4 in Volume 3)?*	• *The effect of sensory disturbance (e.g., noise, light, human activity) on wildlife was considered in the EIA as a component of indirect habitat loss.* • *Many wildlife species are expected to habituate to noise and utilize the corridors.* • *Almost all wildlife species have been documented in existing wildlife corridors.* • *Sufficient numbers of wildlife are predicted to use the corridor to maintain genetic connectivity.*
17	*There is no apparent consideration of re-establishing wildlife distribution and abundance to pre-disturbance (pre-development) conditions. Why not?*	• *The goal of reclamation is not pre-disturbance conditions, but "equivalent land capability".* • *After reclamation, populations within the LSA are expected to recover.* • *Reclamation will increase habitat for some species relative to pre-development, and decrease it for others.*

18	*Have various corridor options (widths and lengths) been considered for wildlife movement or will the corridor design simply be a function of minimizing resource sterilization? Can preliminary corridor design criteria be provided?*	• *Corridor widths were selected to balance environmental protection with resource recovery.*
		• *Selected corridor widths were based on precedence in the region from other development projects.*
		  • *A 100 m setback from water bodies is an ASRD requirement.*
		  • *A 250 m-wide corridor on either bank of the Athabasca River was selected.*

19		• *Answer combined with # 3 above*
20	*Have the Mikisew Cree been meaningfully consulted regarding this proposed monitoring of corridor effectiveness?*	• *The wildlife monitoring plan is conceptual and part of the current regulatory applications for JPME and PRM. This technical review was one way that Shell was able to consult on its plan. It should be noted that Shell's wildlife movement monitoring has increased due to consultation with First Nations stakeholders.*
21	*Please provide additional wildlife passage information in the context of the proposed Athabasca River Bridge.*	• *The bridge will be high and long to provide for wildlife passage underneath.* • *Lighting will be designed to reduce light pollution in the adjacent wildlife corridor.* • *The approach to the bridge will be fenced and treed to facilitate movement through safe passageways.*

Wildlife		
Q #	**Question**	**Response**
22	*Shell has indicated that the effects on yellow rail habitat will be high in magnitude, resulting in a high environmental consequence for yellow rail at the LSA level. How is this outcome considered acceptable? What feedback has Shell received from Environment Canada and ASRD regarding this potential impact?*	• *Yellow rails are distributed sporadically across suitable habitat, and our current understanding of the species habitat requirements indicate that the species is not likely to be habitat-limited. Therefore, the regional yellow rail population is not predicted to decline in abundance as a result of habitat loss.* • *Although not an assumption used in the assessment, some reclaimed shrublands may provide yellow rail habitat, mitigating the loss of fens.* • *Regulators have requested focussed monitoring for yellow rails and this is now a standard Approval Condition.*
	The reviewer states that "the vast majority of the RSA outside of the Project will be developed by other oil sands proponents"	• *This is incorrect as all planned projects result in a disturbance of only 13% of the RSA (soil disturbances, or about 33% soil and vegetation disturbances, which is not appropriate for rail).*

23	*Can Environment Canada or ASRD provide advice on how monitoring and follow-up programs can be designed to evaluate the impact predictions and protect any potential yellow rail populations (or local aggregations) from the effects of the Project? Is there a guideline for any given percentage of the potential habitat that would need to be surveyed in order to assure that the chance of affecting locally aggregated populations of SARA-listed species is minimal?*	This question is posed to the regulators; however, Shell can provide some background.
		• *Yellow rails may be more abundant than currently thought, because yellow rails:*
		  • *prefer to run or hide beneath vegetation.*
		  • *prefer wetlands that are difficult to access.*
		  • *vocalize primarily at night.*
		  • *call less when other marsh birds are calling.*
		• *Yellow rail monitoring surveys are a condition of approval for recent oil sands projects.*
		• *Surveys are based on the CWS yellow rail survey protocol (Bazin and Baldwin 2007).*
		• *The focus is on surveying suitable habitats (i.e., FONS, FONG, MONG wetlands) in complete darkness.*
		• *The CWS protocol does not specify the percentage of habitat to survey.*
		• *Survey methods and sampling intensity will be developed in consultation with the regulators and stakeholders.*
		• *In the summer of this year (2009), targeted yellow rail surveys were conducted.*
		• *34 plots searched in the JME LSA and 22 in the PRM LSA.*
		• *4 yellow rails detected.*

24	*What specific issues were identified by the Mikisew Cree during the development of the current regulatory submission?*	*Specific issues raised include but are not limited to:* • the potential impact to the exercise of Treaty and Aboriginal Rights, which spurred ongoing attempts to collect and incorporate additional TEK and TLU into the EIA; • impacts to movement of wildlife throughout the region, which informed wildlife corridors design (e.g. 250 m buffer zone along Athabasca River) to ensure genetic connectivity and which informed adjustment of the corridor monitoring plans to expand and provide more information; • impacts to integrity of local watercourses, which informed water drainage plans to balance ore recovery with maintenance of the lower reaches of the Muskeg River and Kearl Lake; • impacts to the integrity of Athabasca River due to cumulative industry water withdrawals, which informed design of water storage for the projects; • impacts to fish habitat, which informed development of the project's No Net Loss Plans, with ongoing discussion with DFO and Aboriginal groups, including MCFN..

Vegetation		
Q #	**Question**	**Response**

1;11;13	*Q1. Please justify how the use of stand attribute calculations provides a meaningful description of the pre-disturbance landscape.*
	
	Q11. Why was no accuracy assessments of AVI conducted using vegetation plot data? In addition, please explain the amount of adjustment necessary following the conversion of AVI to ecosite phases.
	
	Q13. Besides the mean, provide descriptive statistics on the average percent cover by vegetation type. Ecosite phases in the LSAs were originally modeled from AVI data. Please give an assessment of how many adjustments were necessary to the modeled output. In other words, how accurate are the AVI unadjusted modeled ecosite phases?
		• Alberta Vegetation Inventory (AVI) datasheets contain uncertainties and have limitations, but combined with air photograph interpretation and ground-truthing vegetation surveys , appropriate adjustments to underlying data were made, allowing for an accurate characterization of the Base Case LSA landscape.
		• No other comprehensive stand attribute datasets exist in the Oil Sands Region.
		• Stand attributes within AVI were not used exclusively to describe the Base Case landscape.
		  • Stand AVI used to inform preliminary ecosite phase/wetlands map.
		  • Aerial photograph interpretation used to refine polygon boundaries and re-assign ecosite phase and wetlands types.
		  • Data from reconnaissance, rare plant and vegetation inventory plots used to adjust landscape vegetation type classifications.
		• Adjustments to preliminary map were completed using results from air photograph interpretation and field survey results. The following adjustments were made to the map:
		  • Jackpine Mine Expansion LSA: 560 out of 1,742 polygons adjusted (32% changed).
		  • Pierre River Mine LSA: 830 out of 7,191 polygons adjusted (12% changed). Fewer changes due to presence of large areas of wooded fen.
		• Although field survey points do not cover all polygons in the LSA, air photo review encompassed entire LSAs.

2	*Please explain why detailed vegetation plots for verifying ecosite/wetland types were not conducted in some ecosite/wetlands types or in cutblocks and other disturbances in either the JEMA or PRMA LSA.*	• Detailed vegetation plots were distributed within LSAs based on proportion of area associated with ecosite phases/wetlands type. Extra effort was directed to uncommon ecosite phases/wetlands types. • Uncommon ecosites are often small and widely distributed making it difficult to visit all such sites. Professional experience, aerial interpretation and the existing Golder vegetation database were used to describe these sites. • Ground-truthing revealed that uncommon ecosite phases/wetlands types were another vegetation type (e.g., e1 change to d1 or Sh changed to SONS). • Regional data from the Golder vegetation database also provides details about uncommon ecosite phase and wetlands types. Table showing Total Area (ha) of Some Uncommon Vegetation Types in the JME and PRM LSAs is at the end of this section.
3	*Please include the detailed information on basic statistics in order to facilitate the monitoring of change over time. This information is also necessary to assess the accuracy for the land cover classification in the RSA.*	• Basic statistics were not used for all components of the Base Case and EIA because they do not add to the impact assessment process. • Raw data is provided in appendices L, M and N in the Environmental Setting Report, if this information is required. • As part of the approvals process, monitoring programs will be conducted. A biodiversity monitoring program will be established as per the guidelines established by the Alberta Biodiversity Monitoring Institute (ABMI).

Vegetation		
Q #	**Question**	**Response**

4	*Coniferous jack pine in the RSA and ecosite phases a1 (lichen jack pine, Central Mixedwood; bearberry jack pine, Athabasca Plain) in the LSAs should be ranked high for traditional plant potential.*	• Traditional Plant Potential (TPP) rankings are based on data collected in plots on the LSAs and throughout Oil Sands Region. Data indicates low abundance of traditional plant species in this ecosite type relative to other ecosite types, therefore ranked as low.
		• TPP rankings were developed using lists of identified traditional plants in the Oil Sands Region.
		• The ranking was developed in a five step process (CNRL 2002):
		  • Vegetation data in the region were queried to calculate the abundance (i.e., frequency of occurrence and mean cover) of each traditional plant species within each vegetation type (i.e., ecosite phase/ wetlands type).
		  • Abundance values were ranked into 5 classes: 0 = not present; 1 = infrequent; 2 = frequent, 3 = common; 4 = abundant.
		  • The abundance ranks were summed for each ecosite phase/ wetlands type.
		  • Based on the total score, traditional plant potential for each ecosite phase/ wetlands type was ranked into three classes: high (>60), moderate (30-60) and low (<30).
		  • A review of traditional land use was completed by FMFN (Fort McKay 1994) and ACFN resulting in a list of 27 traditional plants.
		• An ecosite phase or wetland type with few traditional plants or with low cover would have a 'low' TPP ranking, whereas an ecosite where many traditional plants and/or with high cover would have a 'high' ranking. Thus, the ranking system is subjective but transparent in its approach.

5	*To determine change over time when modeling cumulative effects, please consider quantifying landscapes at several points of time, including the pre-oil sands development period.*	• Approximately 3,397 ha (8.6%) of LSAs is disturbed by human activities in the Base Case (i.e., industrial development, municipal areas and linear disturbances). This represents change from pre-oil sands development period (e.g., 1900). • Undertaking pre-oil sands development period scenario for terrestrial vegetation wetlands and forest resources will not result in different Project impacts or effects outcomes.
6	*Were searches of non-native and native invasive species in the LSA and RSA exhaustive? If not, what are the limitations of these data?*	• All non-native and native invasive species were identified, if present, at detailed vegetation and rare plant survey plots. • As the Terms of Reference for the Project include describing species associated with ecosite phases (EIA Volume 5, Section 7.5.3.c) and assessing significance of changes to vegetation from the introduction of non- native species (EIA Volume 5, Section 7.5.3.f.v) ground plots targeted native vegetation. • It is anticipated that additional non-native and invasive species may be present in the LSA.

Vegetation		
Q #	**Question**	**Response**

7;8;9	*Q7. Areas classified as "burn" throughout most of the EIA were actually sampled and classified as to their ecosite or wetland type in only one part of the EIA. Please explain why these detailed data in recently burned areas were not used in the baseline data for the assessment of Project effects on native ecosite/wetlands, traditional use plants, rare plants, biodiversity, and forest resources.*
	
	Q8. Will areas classified as "burn" in the baseline data be reclassified according to their actual ecosite or wetland types to reflect the fact that burned areas are simply young forests? Will project effects on losses of native ecosite/wetland types, areas of traditional plant potential, rare plants, biodiversity, forest resources, etc., be re-assessed based on these reclassifications?
	
	Q9. Will the burned areas be re-classified as to their ecosite/wetland type and then the areas within low, moderate, and high potential for traditional use plants in the JEMA LSA and RSA recalculated?
		• Vegetation species identified in burns area are diverse and variable because they are in a state of transition. It is acknowledged that burned areas will regenerate, and species composition will change over-time with an eventual return to the pre-burn, or similar, ecosite phase or wetlands type.
		• Because of their unique species compositions, ecosite phases and wetlands types are treated as unique categories (i.e., burned uplands and burned wetlands) and impacts to upland and wetland burn areas are assessed in the EIA.
		• Alberta Historical Fire information is used to delineate burned areas in LSAs:
		  • No recently large burned areas in the PRM LSA. Last large fire in 1958, therefore all previously burned areas classified to ecosite phases and wetlands types.
		  • Recently burned area in JME LSA in 2002. 407 polygons classified as either burned upland or burned wetlands areas.
		• Upland and wetland burns are treated as unique classes in the ESR and assessed as unique classes in the EIA, including being assigned unique rare plant and traditional plant potentials:
		  • Species richness is very different in sampled burns relative to other ecosite phases and wetlands types (Environmental Setting Report, Table 3.5-10 and Table 3.6-9).
		  • Areas classified as burns will not be reclassified since they are considered a unique feature on the landscape (i.e., different levels of re-growth with different wildlife use compared to forested stands).
		  • Tree species were identified in burns; however, this was based primarily on standing dead trees.

8		• Answer combined with # 7 above
9		• Answer combined with # 7 above

Vegetation		
Q #	**Question**	**Response**

10;12	*Q10. Although an important component of these assessments, the methods of data collection and analysis contributing to the updated land cover classification are not given in enough detail to evaluate their rigour. Please provide this information.*
	
	Q12. Please clarify how the new imagery was integrated with the old classification, or, if an entirely new classification was conducted with the new satellite imagery, please explain how this was done.
		• LANDSAT 5 and 7 Thematic Mapper images were used to map regional vegetation with an approximate pixel size of 30 x 30 m on the ground.
		  • Ground-truthed AVI data were used from past oil sands projects to classify the LANDSAT imagery.
		  • AVI data were translated into appropriate regional area vegetation classes suitable for the classification (e.g., AVI polygons with 100% aspen were selected and attributed as deciduous aspen-balsam poplar).
		  • Imagery was classified using eCognition and the AVI polygons; the translated land cover classes were then used to train the classification.
		  • Training areas based on known classifications acquired during field surveys.
		  • Training areas were selected to ensure that the land cover classes had maximum separation between classes of similar spectral signatures.
		  • Some polygons were digitized from the raw imagery (i.e., burns) in a GIS software called ArcMap.
		  • Although difficulties in identifying land cover classes are inherent during classification, standardized methods are used to provide an accurate representation of the study area.
		• Accuracy Assessment was completed for the Regional Study Area (RSA) classification.
		  • Queried dataset to randomly select 10 polygons for each land cover class. The 10 largest polygons for each class that did not overlap the training areas used for the classification and did not overlap disturbance areas were used for the accuracy assessment.
		  • Classified land cover classes were compared to about 176 ground-truthed sites, to verify and train satellite.
		• An overall accuracy assessment of the LANDSAT imagery classification in the RSA was identified as 80% (June 2006).

11		• Answer combined with # 1 above
12		• Answer combined with # 10 above
13		• Answer combined with # 1 above
14	*Specifics are lacking regarding how the LSA was stratified by habitat for rare plant surveys. Please provide this information.*	• Followed Alberta Native Plant Council (2000) guidelines and focused on meandering searches and judgment of experienced field botanists for selection of rare plant survey locations. • Searches completed in all vegetation types, but focused on microhabitats such as mud flats, shorelines, transition zones, depressions, natural and human disturbances.

Vegetation		
Q #	**Question**	**Response**
15	*Provide details of how the LSAs were stratified for the rare plant surveys. Please provide the frequency data of rare plant occurrence for vegetation types and natural break values for evaluation.*	• No stratification was used for rare plant surveys. Alberta Native Plant Council Guidelines for Rare Plant Surveys (2000) were followed. • We combine plot data from all our oil sands projects, as described below; however, we are not able to provide the raw data because it belongs to multiple owners. • Rare plant potential was assigned to each vegetation type using vegetation and rare plant data collected by Golder in over 3,000 plots within the Oil Sands Region. Plants occurring on the ANHIC watch and tracking list (ANHIC 2006) were queried. • The number of rare plant occurrences was tallied along with the total number of sites visited within each vegetation type. Using this information, rare plant frequency of occurrence was calculated for each vegetation type. • These frequency values were sorted to identify natural breaks in the data to distinguish between low, moderate and high ranks. • Information on rare species habitats within the region was also evaluated. The results were used to adjust the rankings accordingly, especially in cases where there was a limited sample size of a particular vegetation type (e.g., horsetail [f] ecosite phases and open bog [BONS] wetlands type).
16	*Will any additional detailed vegetation samples be taken to include all ecosite/wetland types and disturbances in the JEMA and PRMA LSAs? For samples taken from outside the LSA, will more information be provided, such as what site information was collected in these samples and the locations of samples in relation to the LSAs?*	• Sampling is sufficient for EIA level of assessment. • Most samples taken outside the LSAs are from other projects and are therefore confidential and cannot be provided.
17	*Please verify riparian habitat characteristics within the 100 m buffer of watercourses that defines the riparian category in the LSAs. How much does this buffer distance over or under estimate riparian habitat?*	• Riparian areas are variable and their extent along watercourses is difficult to predict. • Width of a riparian zone varies according to topography and hydrologic regime; the 100 m buffer zone criterion was used to represent the likely maximum riparian zone width. • Over or underestimation of riparian habitat was not determined, because the resolution of the imagery is limited when estimating riparian areas for small area features (i.e. ponds, swallow open water) and long, narrow features (i.e., creeks).

18	*Why was old growth attributes of stands within the LSAs not verified in the field or derived from vegetation plot data? Please verify with field or AVI data that old growth characteristics (snags, downed logs, canopy gaps, etc.) are correlated with areas modeled as old growth forest.*	• Site index evaluations were completed during detailed vegetation surveys and were used in conjunction with AVI data.
		• 27 detailed vegetation surveys were identified within areas modelled as old growth:
		  • 17 plots were confirmed to be old growth (100 to 140 years) and 10 plots were confirmed to be mature forest (60 to 139 yrs) (Schneider 2002), based on characteristics measured within the plot such as tree age and successional status.
		  • plots only describe trees within 20 m x 20 m plot and may not necessarily represent an entire polygon.

Vegetation		
Q #	**Question**	**Response**
19;20	*VE19: Please identify areas in the RSA and LSA that are particularly important for traditional plant harvest by season.* *VE20: We recommend that the Proponent identifies specific areas in the LSA and RSA that are of particular importance for TR.*	• Traditional Plant Potential was used to classify ecosite phases and wetlands types within the LSAs and RSA into areas of high, moderate and low plant potential. • Classifications methods were explained in Question VE04. • Some locations for TR plant species are known (e.g. blueberry and low-bush cranberry) and are identified in the EIA, Volume 5, Section 8.3.4.5, Page 8-45. • The EIA, Volume 5, Figure 8.3-5 , Page 8-35 provides TR plant utilization distributions within the Project area • No additional site-specific information has been provided by the MCFN, therefore information on specific areas of importance to MCFN for TR cannot be provided.
20		• Answer combined with # 19 above

VE02:

Total Area (ha) of Some Uncommon Vegetation Types in the JME and PRM LSAs

Total Area (ha) of Some Uncommon Vegetation Types in the JME and PRM LSAs												
Type	**a1**	**e1**	**e2**	**e3**	**f1**	**f2**	**f3**	**BFNN**	**BONS**	**Sh**	**Me**	**WONN**
JME LSA	-	7	5	4	-	-	16	<1	-	5	<1	2
PRM LSA	16	-	-	-	4	4	-	-	1	-	7	-

Biodiversity		
Q #	**Question**	**Response**
1	*Include baseline measures of genetic diversity on plant species within the LSA. Woody plants are likely to be more diverse and have larger population sizes than herbaceous plants, particularly annual or selfing taxa. Select representative species with different modes of reproduction. Genetic diversity measures could include allozymes or DNA markers (RAPD, AFLP, ISSR) (Nybom 2004) and follow guidelines suggested by ASRD (2009).*	• *Obtaining baseline genetic information on plant species within the LSAs is not part of the Terms of Reference for the EIA. These data were not collected.* • *Shell evaluated biodiversity at three of the four levels of biological organization (species, ecosystems and landscape). This is appropriate for an EIA-level assessment of Project effects at local and regional scales.* • *Genetic diversity is not part of the ABMI suggesting that it is not currently a practical indicator of overall biodiversity.*
2	*Provide the relative abundance of vegetation types used in the rare vegetation type index.*	• *The relative abundance of vegetation types used in the rare vegetation type index is provided in Tables BD02-1, BD02-2 and BD02-3.* *Tables BD02-1, BC03-2, and BD02-3 are located at the end of this section*
3	*Would the Proponent consider using % total area?*	• *Percent total area is not directly comparable to the other indices in the biodiversity potential ranking (e.g., species richness), and therefore, cannot be directly used in the ranking. Percent total area had to be standardized to create the rare vegetation index.*
4	*No verifications of the landscape metric predictions were carried out in the field, such as testing whether there is a correlation between metric calculations and species richness. Why was no verification completed?*	• *Landscape metric predictions are based on well established theories of landscape ecology (e.g., species-area relationship).* • *Shell's approach is appropriate for an EIA-level assessment because theoretical verification is not the purpose of an EIA.* • *Shell does not believe verification would add to the EIA because conclusions are drawn based on predicted changes in landscape metrics from baseline conditions. Mitigation measures are designed to avoid or minimize these changes.*
5	*Please provide the raw or summarized data used in the plant rarity scoring.*	• *Shell is unable to share this data due to confidentiality issues. However if MCFN will share their specific concerns we can discuss them.*
6	*Total species richness among vegetation types is based on LSA plot data and other vegetation surveys in the Oil Sands Region. This data does not appear to be provided, but rather is referenced as being in Golder's vegetation databases (Section 2.2.3.1, pg. X-10). Please recommend that Shell provide the data.*	• *Shell is unable to share this data due to confidentiality issues. However if MCFN will share their specific concerns we can discuss them.*
7	*When plot data was not available, species richness was estimated by inference from similar vegetation types, an assumption that may or may not be valid. Please discuss how these factors will impact the biodiversity assessment.*	• *Plot data were not available for wetlands types comprising less than 1% of the PRM LSA and about 2% of the JME LSA.* • *Most of this area consists of wooded patterned fen (FTPN), which was assumed to have high biodiversity potential similar to other rich fen wetlands types.* • *Assumptions regarding these vegetation types are conservative.* • *These factors will not change the outcome of the assessment.*
8	*One problem with ranking poorly sampled wetlands based on similar wetlands, is that if you assume the wetlands are similar, you would need to assume that they have a relative high percentage overlap in species composition and would therefore, deserve a lower rank than 3. Please discuss.*	• *Shell's assumption is that fens have more unique species than other wetlands types such as bogs.* • *This assumption applies to less than 1% of the PRM LSA and about 7% of the JME LSA.* • *High overlap among fens but low overlap between fens and other wetlands types justifies a ranking of 3 for species overlap.* • *This assumption is conservative and will not change the outcome of the assessment.*

Biodiversity		
Q #	**Question**	**Response**
9	*Please address variation of seasonal use of core areas in the analysis.*	• *Seasonal habitat selection occurs in many species in the boreal forest (e.g., moose).* • *Shell does not believe it is necessary to identify species-specific seasonal habitat use in the core area analysis for the biodiversity component because a species-specific approach to core areas was addressed in the Wildlife Modelling Appendix (EIA Volume 5, Appendix 5-4). Shell's intention in the biodiversity component was to apply a more general approach to core area analysis in order to assess the overall amount of interior forest habitat available within the landscape.*
10	*The biodiversity potential is a poor measure to use for monitoring the complexities of biodiversity and should be avoided. Instead, please consider protocols such as developed for the Alberta Biodiversity Monitoring Program should be considered.*	• *The biodiversity potential compiles data from 26 oil sands projects that span a decade (1997 to 2007). It is a comprehensive measure of baseline biodiversity conditions for the purpose of impact assessment.* • *At the time of Shell's baseline field work ABMI protocols were still being developed and were not incorporated into the EIA.* • *Protocols developed by the ABMI will be incorporated into Shell's monitoring programs.*

Table BD02 – 1 Relative Abundance of Wetlands Vegetation Types Used in the Rare Vegetation Type Index

Ecosite Code	Percent Total Area	Ranking	Ecosite Code	Percent Total Area	Ranking
BFNN	0.13	6	FTNI	0.30	4
BONN	0.02	6	FTNN	19.85	0
BTNI	0.24	6	FTNR	0.36	4
BTNN	5.41	2	FTPN	0.99	4
BTNR	0.46	4	MONG	0.68	4
BTXC	0.23	6	NWL	1.83	4
BTXN	<0.01	6	NWR	0.17	6
FFNN	0.03	6	SFNN	0.17	6
FONG	1.15	4	SONS	3.19	2
FONS	4.40	2	STNN	6.45	2
FOPN	0.16	6	WONN	0.33	4

Table BD02 Relative Abundance of Upland Vegetation Types Used in the Rare Vegetation Type Index

Ecosite Code	Percent Total Area	Ranking	Ecosite Code	Percent Total Area	Ranking
a1	0.88	4	e1	0.83	4
b1	4.11	2	e2	0.68	4
b2	1.38	4	e3	0.19	6
b3	1.14	4	f1	0.04	6
b4	1.43	4	f2	0.07	6
c1	3.46	2	f3	0.21	6
d1	15.24	0	g1	5.65	2
d2	7.17	2	h1	2.06	4
d3	1.70	4			

Rarity scores are based on a total coverage of more than 225,000 ha and more than 1,500 plots for projects in the oil sands region between 1997 and 2007 (Golder Ranking Appendix X).

Ranking is based on natural breaks in the data, which is a good classification methods that minimizes within class variation and maximizes between class difference.

Table BD02-3 Relative Abundance of Other Vegetation Types Used in the Rare Vegetation Type Index

Vegetation Type	Percent Total Area	Ranking	Vegetation Type	Percent Total Area	Ranking
burn	0.53	4	grassland	0.01	6
channel	0.01	6	meadow	0.06	6
cutbank	0.01	6	pasture	0.06	6
cutblock	1.58	4	sand	<0.01	6
disturbed	4.67	2	shrubland	0.30	4

Rarity scores are based on a total coverage of more than 225,000 ha and more than 1,500 plots for projects in the oil sands region between 1997 and 2007 (Golder Ranking Appendix X).

Ranking is based on natural breaks in the data, which is a good classification methods that minimizes within class variation and maximizes between class difference.

Hydrology		
Q #	**Question**	**Response**
1	*Why is Shell not using dry stackable tailings as part of its commitment to BATEA?*	• *In choosing NST as its preferred tailings management technology Shell considered many factors which included the state of technology development and the subsequent probability of successful implementation. At this time Shell is not aware of any successful commercial applications in the oil sands utilizing dry stackable tailings technology. Shell continues to investigate alternative tailings technologies through its ongoing R&D programme, however, at this time, believes that a project premised on dry stackable tailings would not meet the requirements of Shell, regulators or stakeholders.*
2	*If statistically significant trends are detected in certain flow conditions in the Athabasca River and other rivers and streams within the projected area, we recommend that the Mikisew Cree require that they be incorporated into the estimating of future stream flows and the project effects and cumulative effects analyses.*	• *Shell understands this recommendation to be for MCFN consideration. All current information is used.*
3	*The Mikisew Cree should request a mandatory commitment of existing, approved, and proposed oil sands projects to participate in collaborative water-related research projects to evaluate the cumulative effects of current, approved, and planned oil sands projects in northern Alberta. Research projects should include:* *- cumulative effects on groundwater with associated effects on local wetlands, lakes, streams, and rivers;* *- an oil spill dispersion analysis for the Athabasca River;* *- cumulative effects of oil spills and leakages on the Athabasca River and water bodies downstream of the Embarras; and* *- water balance analyses for each specific landscape unit with a unique land cover - soil - climate characteristic, with particular focus on reconstructed landscape units, so as to optimize conditions for successful reclamation.*	• Shell understands this recommendation to be for MCFN consideration and directed at larger oil sands development
4	*We recommend that the Mikisew Cree request, in the name of public interest, that an oil spill dispersion study be carried out, in addition to dispersion modelling, by the Proponent, with the collaboration of other oil sands operators.*	• *Shell, as part of its agreement with MCFN with respect to the MRME, has committed to the funding of an oil spill dispersion study. MCFN needs to identify the requested scope, assumptions and outcomes of a study so it will meet the needs of the community.*

5	*As the State of the Muskeg River Watershed Report (2008) includes data and analyses not included in the EIA, it is requested that the findings are integrated or amended into the EIA.*	• *The Muskeg River Watershed Report (2008) was finalized in October 2008 after the submission of the EIA Update in May 2008.*
		• *Data sources for each hydrologic indicator used to assess the state of the Muskeg River Watershed Report (2008) are based on available information from Environment Canada, Water Survey of Canada (WSC) gauging station 07DA008*
		  • *The same data are used for the EIA.*
		• *In the Muskeg River Watershed Report (2008), four indicators have been developed based on average annual discharge; annual maximum daily discharge; annual minimum 7-day flows; and the direct effects of mine development to runoff.*
		  • *Similar hydrologic indicators such as mean annual discharge, mean open-water, mean ice-covered, 7-day-10-year return period low flows and 10-year peak flood flows were used to assess flow changes for the EIA.*
		• *Hence, there are no new analysis and findings that were provided in the 2008 report that need to be integrated or amended into the EIA.*

Hydrology		
Q #	**Question**	**Response**
6;7	*Q6. Please provide an explanation as to why the runoff produced by precipitation is twice as high in JEMA as in PRMA.* *Q7. Please provide a scientific rational and data sources for the mean annual precipitation value at PRMA.*	• *Precipitation in the PRM area is significantly less than that of JME area due to rain-shadow effect. Hence, runoff produced by precipitation in JME area is higher than PRM area.* • *Analysis of precipitation for JME and PRM local study areas are provided in Section 2.5.1 of the Hydrology Environmental Setting Report for JME and PRM project.* • *Detail assessment of spatial variation of precipitation in the Oil Sands Region is provided in Golder (2003)* • The data presented in Golder 2003 was discussed with Dr. Stefan Kienzle during a half day meeting at Golder on February 26, 2010. The purpose of this meeting was to go over Golder's hydrology data and methodology. • Reference: Golder (Golder Associates Ltd.). 2003. Regional Surface Water Hydrology Study of Re-calibration of HSPF Model. Prepared for Canadian Natural Resources Ltd., Shell Canada Limited, Suncor Energy Inc. and Syncrude Canada Ltd..
7		• *Answer combined with 6 above*
8	*Please provide a scientific explanation for the wide range of runoff depths reported. Please provide information on how the noticeable difference in watershed characteristics is reflected in the parameters for hydrological simulation.*	• *Runoff from specific area is primarily dominated by meteorological input (such as precipitation and evapotranspiration) and watershed characteristics (such as upland and lowland, vegetation cover, and surficial geology).* • *For JME and PRM study area, for example, runoff from lowland areas is low compared to runoff from upland areas. Because evapotranspiration from the low land areas is high as compared to upland areas due to high groundwater table.* • *In the hydrologic simulation, hydrologic parameters for upland and lowland areas, different terrain/soil types are established based on model calibration and a sound understanding of the runoff processes from these areas. Details are provided in Golder (2003).* • Reference: Golder (Golder Associates Ltd.). 2003. Regional Surface Water Hydrology Study of Re-calibration of HSPF Model. Prepared for Canadian Natural Resources Ltd., Shell Canada Limited, Suncor Energy Inc. and Syncrude Canada Ltd.

Hydrology		
Q #	**Question**	**Response**

9	*Please provide the magnitude of the 100-year flood, as well as the 760-year (for PRMA) and 1034-year flood (for JEMA) for the watersheds under investigation.*	• *Channel morphology is the physical adjustment of a channel as a result of the interactions between stream discharge, channel material and sediment load.*
		• *Bank-full discharge is the maximum discharge that the channel can convey without overflowing onto the floodplain. This discharge is considered to have morphological significance because it represents the breakpoint between the processes of channel formation and floodplain formation.*
		• *In general, bank-full discharge in stable channels has been found to correspond to an annual flood recurrence interval of approximately 1 to 2.5 years.*
		• *Hence, for environmental effect assessment, the 10-year flood event is conservatively used to assess changes to channel geomorphology.*
		• *As provided in Volumes 1 and 2, Section 10.2, design of water handling facilities are as follows:*
		  • *The 100-year flood event is used as the design criteria for minor water storage (such as polishing ponds) and conveyance structures (such as drainage ditches) that would have low effects in case of failure.*
		  • *The design of major containment facilities, such as the external tailings disposal area (ETDA), will be based on Canadian Dam Safety specifications.*
		• *This is a standard approach for assessing project effects and design of water handling facilities in the Oil Sands Region.*

10	*As reported, the Kearl Lake water balance does not balance. Please provide the scientific rationale for the reported values.*	• *Mean annual lake inflow is about 0.27 m3/s and mean annual lake outflow is about 0.24 m3/s.* • *The difference between lake inflow and lake outflow, which is about 0.03 m3/s (i.e.,172 mm/year) is due to "net lake evaporation".* • *"Net lake evaporation" is precipitation (which is about 420 mm on the Kearl Lake) minus lake evaporation (which is about 592 mm as reported in Section 6.4.3).* • *Hence, the Kearl Lake water balance as reported in Volume 4A, Section 6.4.3, Table 6.4-3 does balance.*
11	*Please provide information on the consequences of the reported positive trend in air temperature in terms of the hydrology during the life time of the project and future reclamation efforts at the end of the project. Please specify how the trend in air temperature will change the snow-to-rain ratio over the life time of the project, and also specify the anticipated associated effects on the streamflow regime in the project area.*	• *The effect of the positive trend in air temperature and the effect of climate change or variability on stream flows in the local study area and in the Oil Sands Region were analyzed extensively and provided in EIA Volume 3, Appendix 3-4, Section 6.4* • *The sensitivity of flows to potential climate change in small tributary streams to the Athabasca River has be analyzed by assuming an increase in air temperature, an increase and a decrease in annual precipitation (i.e., two scenarios) and an increase in potential evapotranspiration over the next 50 years. The analysis indicates that the changes will result in increased winter flows and decreased annual mean and peak flows.* • *The increasing trend in air temperature will result in decreasing trend in snow-rainfall ratio. This is also reflected in streamflow regime with early snow melt and early peak runoff in spring.*

Hydrology		
Q #	**Question**	**Response**
12;23	*Please provide the scientific rationale as to why the model is expected to realistically simulate the change in runoff behaviour because of very severe changes within a watershed, when obviously those changes do not result in changes to the output.* *As the HSPF model is reportedly insensitive to parameter changes, why is it assumed that climate change scenarios can be simulated?*	• *The HSPF is not reported as being insensitive to parameter changes. As shown in EIA Volume 4B, Appendix 4-2, Section 1.4.2, the HSPF model is very sensitive to various model parameters.* • *However, it provides robust prediction results which are not very sensitive to the assumed level of uncertainty in the model parameters.* • *As shown in EIA Volume 4B, Appendix 4-2, Section 1.4, the HSPF model is also very sensitive to input variables such as changes in precipitation and temperature, which are input variables related to climate change.*
13	*Please provide the scientific basis to transfer hydrological parameters from a calibrated watershed with certain physical-hydrological characteristics to a watershed that is distinctly different. On what scientific basis do the Proponents assume that reconstructed soils and reclaimed vegetation are identical to baseline watershed conditions? Based on current soil reclamation research undertaken since 1971, what are the typical soil water properties of different terrain units within reclaimed areas? What are the combined effects of a reconstructed landscape under climate change conditions in terms of providing sufficient plant available water?*	• *Hydrologic parameters from calibrated watersheds were transferred to watersheds with similar hydrological characteristics not to watersheds that have different hydrological characteristics.* • *The reconstructed soils and reclaimed vegetation were not assumed to be identical to baseline watershed conditions (see Volume 4B, Appendix 4-2 Section 1.5, Table 4, page 32).* • *The model parameters for reclaimed landscape were developed based on professional judgement and a conceptual understanding of the characteristics of disturbed reclaimed areas (Golder 2003).* • *The effect of climate change on reclaimed watershed hydrology is presented in EIA Volume 3, Appendix 3-4, Section 6.4.*
14	*Please provide the scientific rationale for the statement that the basal aquifer depressurization will not increase the deep percolation water loss from Kearl Lake.*	• *Kearl Lake is shallow (maximum 2.5 m deep).* • *Surface water-groundwater interaction occurs with shallow Quaternary deposits.* • *Under Kearl Lake, Basal Aquifer is separated from the Quaternary deposits by up to 80 to100 m of low hydraulic conductivity McMurray Formation (oil sand) deposits.* • *McMurray Formation acts as a hydraulic barrier (aquitard) between the Basal Aquifer and the Quaternary deposits.* • *Effects of Basal Aquifer depressurization do not propagate to the shallow Quaternary deposits or Kearl Lake.*
15	*Please provide the impacts of the increased watershed area on the Kearl Lake water balance.*	• *The impacts of increased watershed area on the Kearl Lake water balance are provided in Volume 4A, Section 6.4.5.3, p. 6-298 to 6-300.*

16	*Please provide the scientific method used or the source to define the PMF.*	• *PMF is the most severe flood that may be expected from a combination of the most critical meteorological and hydrological conditions that is reasonably possible in the watershed.*
		• *The scientific method to estimate PMF for Alberta, based on "Guidelines on Extreme Flood Analysis" developed by Alberta Transportation (2004), are as follows:*
		  • *PMF peak and volume estimates can be derived by applying the Probable Maximum Precipitation (PMP) and snowmelt, as appropriate to a hydrologic model.*
		  • *An estimate for PMF can also be made using empirical methods. Alberta Transportation Guideline indicates that the ratio of PMF to 100-year flood is in the order of 4 or greater for Alberta.*
		  • *For preliminary analysis and design of high-risk protection works and siting of structures and facilities that must be subject to almost no risk of flooding in the JME and PRM Application, the PMF peak discharges were assumed to be about 10 times the 100-year floods as indicated in EIA Volume 4B, Appendices 4-3 and 4-4, Section 3.3.3.*

Hydrology		
Q #	**Question**	**Response**
17	*How long will it take for the pit lakes to be filled with sediments? Please quantify by how much channel erosion in the receiving streams will be increased because of reduced sediment load.*	• *As indicated in EIA Volume 4A, Section 6.4.5 and 6.4.6, it will take over 50,000 years to fill any of the JME pit lakes with sediment and over 12,000 years to fill any of PRM pit lakes with sediment.* • *As indicated in EIA Volume 4A, Section 6.4.5, erosion in the receiving streams is expected to be lower than pre-development conditions since the peak flood flows will be significantly less than pre-development conditions for JME.* • *As indicated in EIA Volume 4A, Section 6.4.6, erosion in the receiving streams is expected to be similar to pre-development conditions since the peak flood flows will be comparable to pre-development conditions for PRM.*
18	*Are new sediment data available that were collected since 1991? If new data are available, please report them. If new data are available, please report if any adjustments have to be made to optimize the quality of the predictions.*	• *Yes. New sediment data for large streams such as Muskeg River are available for WSC monitoring stations and Alberta Environment monitoring locations since 1991 (Environmental Setting Report, Section 2.3.2, Tables 2.3-20 and 2.3-21, Section 2.4.2, Table 2.4-6, Section 2.5.2, Tables 2.5-6).* • *However, these data do not provide sediment data for specific land types such as upland or reclaimed land.* • *For reclaimed land, sediment data are based on study completed by AGRA (1996) for Suncor reclaimed areas.*
19	*Please provide flow parameters for characterizing changes and effects on the Athabasca streamflow because of the proposed projects for the peak flow and the 7Q10 low flow for at least the 100-year return period.*	• *Changes and effects on the Athabasca River flows are completed based on the Water Management Framework developed by AENV and DFO (2007). The framework prescribes three water management zones (Green, Yellow and Red zones) based on average weekly river flows, with increasingly restrictive withdrawal restrictions in place as seasonal flows become low.* • *Hence, 7Q10 low flow and 100-year return period peak flow were not used for characterizing changes and effects on the Athabasca streamflow.* • *DFO is in the process of developing their IFN policy concerning HADD determination. There is currently no other guidance available from DFO. Shell will evaluate its water withdrawals in accordance with that guidance when it becomes available.*
20	*Were these trends integrated into the effects analyses, in particular, into the cumulative effects analysis?*	• *Yes, the flow trends mentioned in Appendix 3, Section 6.3.4.1 were integrated into the effect analysis, see EIA Volume 4A, Section 6.4.7.*

Hydrology		
Q #	**Question**	**Response**

21	*In the interest of preparing for conservative future streamflow conditions in the Athabasca River, please base the hydrological effects analyses of the two projects on appropriate and conservative trend statistics, rather than on statistics from watersheds with very different physical and climatological characteristics. Alternatively, please provide scientific literature to support your argument that streamflow trends from two completely different watersheds are transferable.*	• *Detailed analysis including supporting information about the comparison of Bow River and Athabasca River flows and associated trends are provided in EIA Volume 3, Appendix 3-4, Section 6.3.5.*
		• *The conclusions provided in EIA Volume 3, Appendix 3-4, Section 6.3.5 based on recorded data for the two watersheds are:*
		  • *Similar trends are observed for both Bow River and Athabasca River using data over the same period of record (1958 to 2006).*
		  • *However, using the longer period of record (1911 to 2006) for Bow River shows trends that are less exaggerated compared to the 40 years of record data (1958 to 2006).*
		  • *It appears that cycles present in the hydrologic series tends to exaggerate when only partial segments of the cycles (short periods of record) are analyzed.*
		• *Both the Bow River and Athabasca River receive base flows from glacial melt from head-watersheds.*
		• *Comparison of the two watersheds is not based on flow magnitudes but based on the trends of recorded flows.*
		• *The trends for the short period of records (1958 to 2009) are exaggerated and are not realistic since they include the dry hydrologic cycle compared to the wet hydrologic cycle that occurred in the 1930s.*

22	*Please provide information on the climate change scenarios reported:* *Which GCM was used?* *Which emission scenario is used?* *How were the streamflow values derived?* *Which variables were changed, and how?* *Was the entire Athabasca River watershed simulated?*	• *Detail Information on Climate Change Scenarios are provided in EIA Volume 3, Appendix 3-4, Section 6.4.* • *For Surface Water Hydrology assessment, two scenarios were developed based on forecasted changes in precipitation and air temperature by several GCMs considered in EIA Volume 3, Appendix 3-4, Section 3.1.* • *As provided in EIA Volume 3, Appendix 3-4, Section 6.4, CGCM2 and ECHAM4 were used for the surface water hydrology assessment.* • *As provided in EIA Volume 3, Appendix 3-4, Section 6.4, emission scenarios A2(1) for CGCM2 and B2(1) for ECHAM4 were used for surface water hydrology assessment.* • *The two scenarios were used to assess the potential effects of climate change on streamflows in the Muskeg River using HSPF model.* • *Details of the variables changed to assess the effect of climate change are provided in EIA Volume 3, Appendix 3-4, Section 6.4, Table 45, p. 84.* • *For Athabasca River, the effect of climate change on streamflows was assessed based on recorded flow data at WSC station (07DA001) (Athabasca River below Fort McMurray) and expected percentage of seasonal flow reductions due to potential climate change.* • *Details are provided in EIA Volume 4A, Section 6.4.7.*
23		• *Answer combined with # 12 above*

Hydrology		
Q #	**Question**	**Response**
24	*Does the surface water quantity monitoring plan include soil moisture monitoring within the various reclaimed landscapes? Please provide the plans to monitor residual impacts on surface water quantity and soil moisture, including the monitoring design, sample sizes, statistical analyses, models, and assumptions.*	• *The surface water quantity monitoring plan does not include soil moisture monitoring plan.* • *Soil moisture data gathering during mine operation is typically done as part of upland reclamation research projects on a very limited and site-specific basis and does not form part of the surface water quantity monitoring.* • *Soil moisture levels will be monitored as part of reclamation area monitoring programs, in addition to other soil chemistry and physical parameters and soil horizon development.*

Hydrogeology		
Q #	**Question**	**Response**

1	*Why did the EIA not comply with the ToR and clearly identify Project impacts to hydrogeology, including major, negative, irreversible impacts such as dewatering and excavation of portions of the Kearl Channel aquifer?*	• *The EIA did comply with the ToR*
		• *Identified Project impacts to hydrogeology included:*
		  • *The removal of a portion of the Pleistocene Channel Aquifer (PCA) or Kearl Channel, which was addressed by assessing the effects of aquifer removal on the groundwater receptors, i.e. reduced baseflow to Muskeg River*
		  • *Water table drawdown in surficial deposits, PCA and wetlands; drawdown of potentiometric surface in basal aquifer.*
		  • *Reduced baseflow to surface water features and wetlands.*
		  • *Reduced groundwater quality due to the operation of the ETDA and mine pit backfilling.*
		References: Volume 1, Section 17.5 (EIA Summary)

2	*Why were the peak impacts of degraded groundwater quality discharging to surface water systems in the LSAs not determined in the EIA?*	• *Peak impacts are captured by EIA snapshots:*
		  • *Degraded groundwater seepage to surface water is one component of peak impacts.*
		  • *EIA snapshots capture "peak" cumulative loadings and effects of overburden dewatering, closed-circuiting, pit lake discharge, groundwater seepage, tailings water expression.*

3	*Please discuss why more sampling was not conducted in fen areas.*	• *The baseline data was sufficient to assess the effects of mine dewatering on surficial aquifers within the LSA, including the fen area.* • *Larger extent of drawdown identified in updated groundwater modelling.*
4	*Why was no solute transport modeling of regional groundwater flow carried out to assess cumulative effects of the Project on regional groundwater quality? What are the expected cumulative effects of the Project with respect to regional groundwater quality?*	• *Local groundwater solute transport model includes all local projects.* • *Regional groundwater flow model includes all regional projects.* • *Project influence on ground water quality not expected to extend to regional scale.* • *Surface water quality assessment includes all local and regional oil sands projects.*
5	*What was the data source for natural biodegradation rates used by the proponent in the PAH contaminant transport analysis? If the PAH natural biodegradation source data is laboratory-derived, what plans, if any, has the proponent to conduct field-based studies of natural biodegradation rates for PAH compounds?*	• *PAH degradation rates from Mackay et al. (1992), as described in EIA Volume 4A, Appendix 4-2:* • *Compilation of published field and laboratory study rates.* • *Slowest measured degradation rates applied to modelling – often orders of magnitude slower than other rates.* • *Anaerobic degradation rates used for contaminant transport modelling.* • *Degradation rates will be confirmed as part of the test pit lake work being undertaken through CEMA/CONRAD.* *Figure at end of Hydrogeology section in this document*

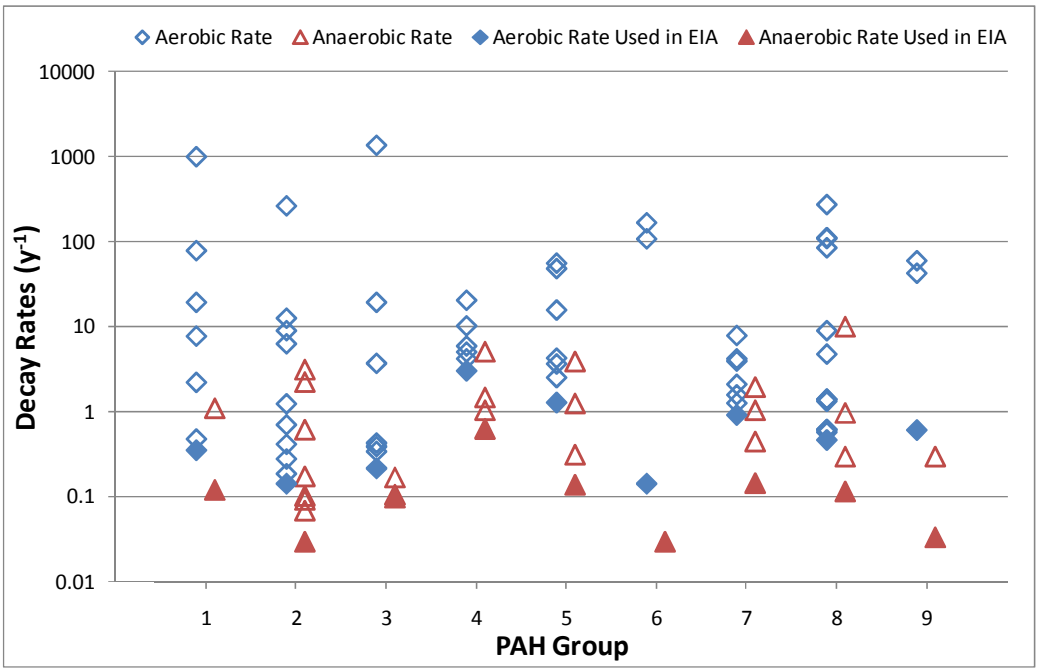
Hydrogeology		
Q #	**Question**	**Response**

6	*Why was the contaminant transport model time scale not selected to include arrival of peak concentrations for all Project-related contaminants of concern at all model water quality assessment nodes? What are the predicted peak concentrations of all Project contaminants at all water quality assessment nodes?*	• *Effects of groundwater quality degradation were conservatively assessed in the EIA in terms of impacts to surface water quality and aquatic, human and wildlife health:*
		  • *Groundwater flow rates and chemistry profiles used in the small streams model are included in EIA Volume 4B, Appendix 4-2 (Table 19).*
		  • *Water quality modelling results are presented in EIA Volume 4A, Section 6.5.5 of the EIA.*
		• *The closure snapshot was selected based on the largest volume and load of contaminants reaching the water bodies. Beyond the closure time, the overall volumes of water decrease with consequent reduction in contaminant loads.*
		• *Closure is the time when peak concentrations will arrive.*
		• *Timeframe of local scale transport model for JME was extended to investigate changes in concentrations for an additional 2,000 years following the far-future snapshot.*
		• *Concentrations were conservatively assessed (i.e., without mitigation measures).*
		• *For node JMFC1, relative TDS (i.e., conservative solute) concentrations do not exceed 2% of source; for node M1, relative TDS concentrations do not exceed 0.8% of source (after an additional 2,000 years).*
		• *Proposed mitigation measures will ensure that tailings-affected seepage will be directed towards wetlands and the end pit lakes for treatment prior to release.*

7	*What are the predicted impacts to groundwater quality degradation within the Fort McKay Indian Reserve No. 174C because of the proposed development of the JEMA and existing, approved, and planned oil sands projects in the area?*	• *Results are conservative (no mitigation implemented).*
		• *High source concentrations are contained within the mining footprint.*
		• *In surficial deposits, relative TDS concentrations are between 1 and 10%; plume migration is limited by discharge to surface water. These effects were addressed in the water quality assessment.*
		• *In basal aquifer, relative TDS concentrations are also between 1 and 10%; plume does not interact with local surface water.*
		• *Plume size is relatively stable in the far future.*
		• *Surficial Deposits:*
		  • *The reclaimed landscape and proposed mitigation measures will ensure that seepage from mine backfill (Non Segregating Tailings [NST]) will be directed towards wetlands and the end pit lakes for treatment prior to release.*
		• *Basal Aquifer:*
		  • *TDS concentrations of source and background Basal are similar (1,250 mg/L vs. 1,470 mg/L).*

8	*Why is it considered acceptable to establish the temporal boundaries for the EIA within a time frame that will not realize the maximum predicted impacts to water quality degradation?*	• *Maximum predicted impacts to surface water quality degradation were captured in the closure snapshot.* • *Pit lake water quality is expected to improve over time, so water quality and aquatic health concerns are typically greatest at the initial release of pit lake water (EIA, Volume 4A, Section 6.2.4, Table 6.2-1).*
9	*As the monitoring plan is a conceptual plan without details on the proposed number, depths, and locations of monitoring wells, what opportunity will the local FNs have to review and comment on the final plan if the project received approval?*	• *FNs are consulted by proponents and the regulators as part of the development of approval conditions, which happens roughly every 10 years. There is opportunity for input as part of this process. Shell is also willing to discuss MCFN review and comment on monitoring plans as part of a negotiated agreement.*

Figure Q5


Aerobic Rate
Anaerobic Rate
Aerobic Rate Used in EIA
Anaerobic Rate Used in EIA
10000
1000
100
10
1
0.1
0.01
Decay Rates (y-1)
1
2
3
4
5
6
7
8
9
PAH Group

Water Quality		
Q #	**Question**	**Response**
1	*Please discuss how the likelihood of reclamation success could be evaluated.*	• *Key factor of success is meeting water quality discharge requirements to the Athabasca River and other water bodies.* • *All reclaimed lands must pass certification requirements including adherence to aquatic health and water quality guidelines. Certification guidelines are currently in development.* • *Shell will monitor reclaimed wetland plant species, plant growth and health, substrate characteristics, water quality, water levels as will be required by the certification process.* • *Evaluation of monitoring data against certification requirements will inform status of reclamation progression.*

2	*It would be preferable to see explicit inclusion of mechanistic relations among biological, chemical, and physical components affecting water quality.*	• *Physical, biological and chemical processes were modelled at a level we believe is appropriate for assessing potential effects and appropriate for the level of available information:*
		  • *Models were physically-based, with mass balance approach and probabilistic sampling of constituent concentrations, and included biochemical decay processes, where appropriate.*
		  • *Approach has been independently reviewed by regulators and international experts.*
		  • *Expert reviewers concluded that the approach and assumptions are innovative and consistent with available measured data, site-specific conditions and objectives of the EIA.*
		  • *Assessment carried through to biological receptors (aquatic, wildlife and human health).*
		• *Focus of EIA is assessment, not research:*
		  • *Shell supports research through regional initiatives (e.g., CEMA, RAMP, CONRAD, etc.).*

3	*Even if aeration occurs during outflow, please explain how water coming from under ice, where anoxia likely develops during winter, would be this oxygen rich.*	• *Figure* 6.5-4 (EIA, Volume 4A, Section 6.5.5) *shows observed data from existing polishing ponds.*
		• *Likely factors contributing to observed and predicted oxygen levels:*
		  • *Polishing ponds are primarily fed by groundwater during winter, which is pumped from the aquifer at temperatures above the freezing point. System has low biological activity and therefore low O2 consumption under ice.*
		  • *Depending on pumping rates and ambient air temperatures, polishing ponds and ditches are periodically ice-free during winter, so water in these systems may be well oxygenated.*
		  • *Oxygen is highly soluble at cold temperatures.*

Water Quality		
Q #	**Question**	**Response**

4	*Please clarify what is meant by "several layers of conservatism" (page 6-47) in the preliminary assessments. Please justify how conservative assumptions will be sure to place the results in a biologically meaningful parameter space.*	• *Multiple conservative assumptions used in assessment:*
		  • *Modelled total metals instead of dissolved metals.*
		  • *Aquatic health assessment assumed total metals are bioavailable.*
		  • *Omitted processes such as settling, chemical partitioning, adsorption, precipitation that will reduce concentrations.*
		  • *Used slowest available decay rates and assumed no decay in watercourses.*
		  • *Applied instantaneous travel times for tailings release water.*
		  • *Overlapped timing of worst case events in models.*
		• *Conservatism is used to overestimate effects where uncertainty exists:*
		  • *For example, use of slowest available decay rates helps to ensure that predictions are based on low estimates of organic chemical decay.*
		  • *Assessment carried through to biological receptors (aquatic, wildlife and human health).*

5	*How can it be stated that any further increase does not matter? It is inappropriate to assume infallibility of one component of the EIA so as to dismiss possible effects in another. Can assurance be provided that where linkages have been deemed invalid, the possibility for discovery of unexpected results that may result from non-linearities, for example, has not been precluded?*	• *Potential effects of acidifying emissions on aquatic health:*
		  • *Assessed in EIA Volume 3, Section 5.5 of the EIA and did not require further assessment in EIA Volume 4, Section 6.6, as predicted residual effects were classified as negligible.*
		  • *As stated in Section 5.5.5.1, a 4% change in acid input would not result in a measurable change in pH in the lakes.*
		• *Linkage invalidation is appropriate:*
		  • *Linkages considered invalid if there is no identifiable connection between a Project activity and an effect on a component.*
		  • *Where a non-measurable change is predicted, there is no basis for carrying the effect forward to other EIA components.*

6	*Alternatively, if it becomes too onerous to conduct the basic research to understand specific processes in detail, would the Proponent consider an approach by Reckhow (1999) whereby probability network models are used to provide predictive capacity? Are there alternative analytic structures or models that can incorporate so-called outliers, particularly those attributable to process error?*	• *Approach suggested by Reckhow may have value in decision making process, but we believe that it may place too much emphasis on professional judgement to be accepted for environmental impact assessment.* • *Physical, biological and chemical processes were modelled at a level we believe is appropriate for assessing potential effects and appropriate for the level of available information. For additional detail, please see response to Water Quality question 2 above.*

Water Quality		
Q #	**Question**	**Response**

7	*Please provide more recent scientific research literature into the end pit lake discussion.*	• *A literature review was conducted on pit-lake related articles up to and including journal articles in press.*
		• *Several more recent papers confirmed assumptions made for EIA modelling regarding decay of labile and refractory naphthenic acids (See references below).*
		• *Only one study (Han et al. 2009) differed from EIA assumptions, which was the assumption that refractory naphthenic acids would not decay.*
		  • *Field observations in the Han study indicated a half-life of about 13 years for these compounds.*
		  • *Had this study been incorporated into EIA, predicted concentrations of refractory and total naphthenic acids would be lower.*
		  • *EIA assumptions are conservative; therefore, does not alter the conclusions of the assessment.*
		• *Pit lake modeling by CEMA has been conducted and updated over the last five years. Modelling is advancing and getting better. New models are currently being developed for predicting gas production and dissolved oxygen levels in pit lakes. Additional information is available on the CEMA website.*
		
		References:
		
		Frank, RA, Kavanagh, R, Burnison, BK, Arsenault, G, Headley, JV, Peru, KM, Van Der Kraak, G, and Solomon, KR. 2008. Toxicity assessment of collected fractions from an extracted naphthenic acid mixture. Chemosphere. 72(9): 1309-1314.
		
		Han, X, Scott, AC, Fedorak, PM, Bataineh, M and Martin, JW. 2008. Influence of molecular structure on the biodegradability of naphthenic acids. Environmental Science and Technology. 42: 1290-1295.
		
		Han, X., MacKinnon, M., & Martin, J. 2009. Estimating the in situ biodegradation of naphthenic acids in oil sands process waters by HPLC/HRMS. Chemosphere, 76(1), 63-70.
		
		Lo, CC, Brownlee, BG and Bunce NJ. 2006. Mass spectrometric and toxicological assays of Athabasca oil sands naphthenic acids. Water Research. 40:655-664.
		
		Paslawski, J, Headley, JV, Hill, GA and Nemati, M. 2009. Biodegradation kinetics of trans-4-methyl-1-cyclohexane carboxylic acid. Biodegradation. 20(1): 125-133.
		
		Scott, AC, MacKinnon, MD and Fedorak, PM. 2005. Naphthenic acids in Athabasca oil sands tailings waters are less biodegradable than commercial naphthenic acids. Environmental Science & Technology. 39:8388-8394.

Water Quality		
Q #	**Question**	**Response**
8	*What assurance is there that viable biological processes will be established, and should these fail, what contingency measures could be implemented given that drainage areas will continue to drain and supply water to pit lakes and to natural waterbodies, all of which discharge ultimately to the Athabasca River? If an appropriate treatment can be provided when water quality is sub-standard, then why not apply it to all water and be assured of adequate quality? Can assurance be given that the complex interactions among biota and their environment characteristic of lakes will establish successfully?*	• *Modelling for EIA predicted acceptable water quality in pit lakes with respect to aquatic health, and was based on lab and field research on oil sands reclamation waters.* • *Numerous peer-reviewed research studies have been conducted on wetlands, experimental ponds and test pits containing MFT. The results of these studies support the viability of the pit lake concept. Although more research is necessary to refine management options and optimize conditions, current research suggests that pit lakes will be capable of supporting life at all trophic levels.* • *Information on oil sands research projects is available through the Cumulative Environmental Management Association (CEMA) and the Canadian Oil Sands Network for Research and Development (CONRAD). Independent universities are conducting ongoing research and study findings are being published in peer reviewed journals.* • *Modelling will be refined and updated well in advance of filling based on regional research and test pit lake.* • *Lakes will be monitored and modelled throughout filling to refine assumptions and facilitate the appropriate mitigation.* • *The available research and modelling predictions provide strong support that passive treatment will be effective. If necessary, Shell will apply active treatment, using conventional and proven techniques.* • *The cost of applying such treatment to all water will be prohibitive and we believe that it would add unnecessary redundancy.*
9	*How can this happen if potentially novel properties exist for the developments being evaluated here? Whereas it is possible during modelling of individual substances to sample repeatedly from the respective distributions established, can this be done meaningfully for toxicity? Could more detail be provided as to how modelling occurs for WET? Because WET synthesizes many possible effects and mechanisms, can more detail be provided as to how the dynamic and probabilistic modeling accounted for complex interactions?*	• *WET results for process-affected water (PAW) from existing developments provide best available estimate of PAW for proposed projects.* • *The WET approach is supported by AENV, Environment Canada and US EPA.* • *PAW will be tested as new projects come on line to confirm predictions and manage potential impacts.*
10	*Will the Proponent consider the addition of technologies such as semi-permeable membrane devices instream to provide longer-term integrated measures of water quality? Please provide assurance regarding what will happen should water quality deteriorate.*	• *Appropriate technologies for water quality monitoring will be reviewed during development of detailed monitoring plans.* • *AENV has deployed these devices at 12 sites in Lower Athabasca Watershed, including the Muskeg River.* • *Shell will be required to ensure water quality is consistently maintained to meet approval requirements and achieve reclamation certification. In the unlikely event an issue arises, Shell will adaptively manage to address it.*

Fisheries		
Q #	**Question**	**Response**
1	*Is the decline in Arctic grayling between 1981 and 2004 an atypical 1 year event, or does this represent a gradual deterioration in conditions in the region over time?*	• *Arctic grayling populations have been in decline across Alberta, particularly sub-populations along the southern extent of their range which includes Jackpine Creek and Muskeg River, with most declines suspected to have occurred in the 1950s to 1970s (ASRD 2005).* • *Table 5.4-5 in the Aquatics Environmental Setting Report presents two data points of fish counts at a fish fence on Jackpine Creek in 1981 and 2004. Two data points are not sufficient to determine if this is a trend or natural variability.*
2	*Please explore other possible explanations of the decline in migrant fish populations in the Muskeg River because these changes may signal a gradual deterioration of fish abundance and aquatic habitat in the region overall.*	• *The monitoring of aquatic environments in the Athabasca Oil Sands Region to detect regional trends is part of RAMP's mandate, of which Shell is a participant.* • *Regionally, RAMP has concluded that catch per unit effort of large-bodied fish in the Athabasca River has fluctuated over time, with no clear trend (RAMP 2009).* • *Muskeg River flows were highest in late 80s and early 90s (from 1974-2008 flow record)* • *70s had big runs, 90's and 2001 had the smallest runs, in 2003 and 2006 improved to moderate runs* • *Little development in Muskeg River watershed prior to 2002. Pierre River is not developed.* • *No clear relationship with flow or development. Not clear if decline is real. Naturally variable systems.* • *Interpretation of results confounded by inability to sample in best years. Physically can't sample top half of flow years.*
3	*Electrofishing details useful for future study replication are lacking (e.g., current used, electrofisher settings). Please provide this information.*	• *Electrofisher settings are adjusted to suit water conditions at the time of sampling. During future sampling events, electrofisher settings should also be adjusted, as required, to suit site specific water conditions.* • *The electrofisher settings used during baseline sampling are presented in Table F103-1.* *Table F103-1 is located at end of the Fisheries section of this document.*
4	*Please discuss this discrepancy in the setting of minnow traps and provide a justification for the conclusions predicated on this data.*	• *The purpose of fish sampling for the Environmental Setting Report is to characterize fish habitat and fish species present in local waterbodies and watercourses.* • *In conjunction with historical records of fish presence, the field data from the fish inventory (including minnow trapping and other capture methods) was used to derive a composition of fish species present in local waterbodies and watercourses.* • *The scope of historical data and field survey effort was sufficient to characterize baseline conditions of watercourses and waterbodies that could be directly impacted by the Project and was of a scope typical of other environmental setting studies that have been conducted in the region for the purpose of assessing potential impacts of an oil sands development.* • *Monitoring will take place prior to and during the construction and operational phases of the Project, which will among other things, examine for potential effects on Aquatic Resources and supplement the ESR data (EIA, Volume 4B Aquatics Monitoring Program, Appendix 4-9).* • *To ensure No Net Loss of fish habitat, these data are supplemented with TEK, monitoring results and fish salvage results when determining required fish habitat compensation.* • *Additional TEK was collected as part of the detailed NNLP to supplement the fish distribution ESR data.* • *New information collected through monitoring programs and fish salvages will be added to the ESR data when determining required habitat compensation to achieve No Net Loss of fish habitat.*

Fisheries		
Q #	**Question**	**Response**
5	*Please provide the rationale for sample size, frequency, and number of samples chosen because it is not clearly defined consistently. Without this information, how can stakeholders be assured that the Proponent has (or has not) complied with their mandate to restore aquatic resources as required by the Fisheries Act Authorization to be released for the Projects.*	• *The rationale for selection of the study sites and methods used is provided in the Fish and Fish Habitat Environmental Setting Report, Section 5.2.2.* • *The purpose of sampling for the Environmental Setting Report is to characterize fish and fish habitat to the degree required to conduct an Environmental Impact Assessment.* • *Additional TEK and professional judgement by Shell, DFO, SRD and FN biologists, is collected as part of the detailed NNLP to supplement the fish distribution ESR data.* • *To ensure No Net Loss of fish habitat, these data are supplemented with TEK, monitoring results and fish salvage results when determining required fish habitat compensation.* • *Part of the reason for a compensation ratio of greater than 1:1 is to address any uncertainty in the impact prediction.* • *Shell's Compensation Monitoring Plan will be specifically designed to determine the level of compensation achieved. If the target compensation ratio is not achieved, Shell will be required to provide more compensation habitat until that ratio is achieved.*
6	*Please provide regional monitoring plans.*	• *RAMP provides the regional aquatics monitoring program. In addition Shell does fish and fish habitat monitoring on, and immediately adjacent to, its existing mines through its consultants and in partnership with AENV, Syncrude and Imperial. The reports from those programs are available.*
7	*How can the Proponent purport that the Project will have negligible effects on surface water quality, and thus fish health/abundance, given the uncertainty in the effectiveness of the mitigation measures?*	• *Mitigation measures used for existing and approved developments have proven to be effective in oil sands and other industries and supported by previous and ongoing research in oil sands operations.* • *For example, surface water drainage systems during operations will be designed to handle extreme precipitation events and closure drainage systems will be designed using established and tested engineering and biological principles that will result in a stable and self-sustaining landscape.* • *Shell has also proposed monitoring to adaptively manage any unforeseen effects.*
8	*Are there examples of where these compensation measures have been effective? Given that the Proponent recognizes the uncertainties in their own prediction confidence, how will the Proponent ensure that the Mikisew Cree can continue to pursue traditional rights?*	• *There are many publications, symposia and workshops on reservoir creation, operation and, most recently, reclamation that demonstrate successful fisheries have been established, even when operated for other purposes.* • *There are numerous examples of successful fisheries created in reservoirs developed for hydroelectric generation or irrigation in Alberta, as well as other provinces.* • *The predictions help us understand that the compensation is achievable. Monitoring and adaptive management ensure that the compensation regulatory requirements are achieved.*
9	*Please discuss whether reduced spring flow may change conclusions for northern pike.*	• *Reduced spring flow was considered as part of the evaluation of effects on the Muskeg River due to changes in the flow regime. These changes were examined in the context of potential effects these changes may have on migratory and resident fish species and their habitats (EIA Volume 4A, Section 6.7, p. 6-601).*

Fisheries		
Q #	**Question**	**Response**
10	*Please justify how the fish abundance at these low levels would be adequate for comparisons with future monitoring programs?*	• *Field survey efforts for the fish and fish habitat component included a four season fish inventory at two Muskeg River sites (Aquatics ESR, Section 5.4.1.2).* • *The purpose of fish sampling for the Environmental Setting Report is to characterize fish habitat and fish species present in local waterbodies and watercourses as opposed to being part of the monitoring program.* • *Catch Per Unit Effort (CPUE) and species diversity are low for the 2 Muskeg River sites and this is not unexpected (Table 5.4.9). The Muskeg River as a whole contains a fairly high diversity of fish species, but not in the upstream reaches.* • *Muskeg River sites further downstream that have been sampled for our monitoring program in 2006-2009 (MUR-3a d/s of Jackpine Ck and MUR-4 d/s of Muskeg Ck) have also shown low CPUE, particularly at MUR-4 which is typically <1 fish/100 s. They also show low fish species diversity despite being below major tributaries.* • *These results appear to be due to the poor quality of the habitat in the upper reaches as indicated by the species present. Although the difficulty of capturing fish in deeper water and with significant shoreline vegetation overhang is also a factor, from multiple years of monitoring it is clear these reaches do have poor fish species diversity. Sites further upstream from MUR-4 like sites 30 and 41 in the EIA are expected to have even lower species diversity, and low populations of suckers and sportfish. Declining fish species diversity with distance from the mouth of a cool water stream is a well-documented phenomenon.*
11	*How will the decline in migratory fishes impact the Mikisew Cree's Treaty Rights?*	• *Muskeg River flows were highest in late 80s and early 90s (from 1974-2008 flow record). The 70s had the biggest fish runs, the 90s and 2001 had the smallest runs, 03 and 06 improved to moderate fish runs. There was little mine development in Muskeg River watershed prior to 2001 and the Pierre River watershed is still not developed.* • *There appears to be no clear relationship between fish run size and flow or development. These are naturally variable systems and data are limited, even for the Muskeg River. Interpretation of the results is confounded by the inability to sample with the fish fence in what are believed to be the best fish migration years - the top half of flow years.* • *Shell is modelling expected impacts to fish habitat from this proposed development and is working with DFO, SRD and MCFN to develop a NNLP that will fully compensate for the fish habitat losses resulting from the mine development.* • *Fish harvest potential is predicted to be greater after compensation than it was in the pre-development area and there would be no impact of this development on the ability to catch fish.*

Fisheries		
Q #	**Question**	**Response**
12	*Please provide justification for the removal of lotic habitat with the replacement of lentic habitat.*	• *Same fish species plus higher diversity and richness in lake habitat compared to the habitat it is replacing* • *Cannot physically provide required compensation quantities as self-sustaining stream habitat. There is no place we can create new streams without impacting existing streams.* • *Reservoirs are proven to produce high quality fish habitat, even when not managed for fish – e.g., hydro or irrigation reservoirs.* • *Significant shallow wetland and stream fish habitat rebuilt on closure landscape, but doesn't count as compensation. This habitat will support the forage fish species these areas currently support.* • *Although lotic habitat is also part of the compensation plan, it is not possible to provide all the required compensation for lotic habitat as lotic habitat. Lotic habitat will be converted to lentic habitat.* • *We can build a self-sustaining lake without negatively impacting existing fish habitat, but we cannot build a self-sustaining stream of the size required to achieve No Net Loss of fish habitat without large impacts to existing streams. Those impacts would require additional compensation. Therefore, no gains are possible with a strict lotic for lotic compensation strategy.* • *On closure, watersheds will be connected and a considerable amount lotic habitat typical of the habitat being disturbed will be developed that will also support fish. However, that habitat is currently not accepted as compensation by DFO.* • *The proposed compensation for this project will provide better production of traditional food fish than the habitat being disturbed.*
13	*How can the Proponent ensure that these mitigation measures will be effective?*	• *Shell will monitor the development of compensation habitats (EIA Volume 4B, Appendix 4-9, page 53). The monitoring program will evaluate the progress of compensation habitat colonization and function against set standards.* • *If compensation habitat is not performing as expected, Shell will intervene as required to help it develop as required to meet No Net Loss. If necessary, additional habitat will be created to meet Shell's compensation regulatory requirements.* • *In the case of fish passage, monitoring would evaluate how successful fish are at passing constructed stream habitat. If fish passage was not adequate, mitigative action like reducing stream gradient or adding channel roughness would be undertaken, as appropriate.*
14	*To mitigate uncertainty associated with the compensation lakes to date, we recommend that a shallow lake free of MFT be constructed to replicate those standing water bodies that have been lost in the RSA (and will be lost within the LSA).*	• *The proposed design of the Redclay compensation lake is proven to support high quality fish habitat. Shallow lakes may support no fish of any kind as found in some of the shallow lakes in the Oilsands region. We can't ensure a shallow lake won't winterkill. We can ensure a deep lake won't. Shallow lakes will increase compensation uncertainty.* • *Shallow wetlands will be an important feature of the reclaimed landscape. Although they will not be considered compensation by DFO, they will support the same resilient forage fish species found in predevelopment shallow lakes and ponds.* • *Shallow lakes outside the mine footprint would flood several times more terrestrial habitat to meet the same compensation requirements because they support fewer species of fish. They would not support any fish that would be used for traditional purposes.*

Fisheries		
Q #	**Question**	**Response**
15	*Will EPLs and polishing ponds support riparian buffers with native biotic indices typical of those found on upland ponds and lakes (e.g., Kearl Lake)? What will Shell do to encourage riparian buffers to grow around these ponds (and the compensation lake)?*	• *Shell will place shrublands for riparian buffers as per Wetlands Guidelines (CEMA 2007) for closure habitat.* • *Polishing ponds are operational structures, typically enclosed by earthen berms that are used as roads to access the outlets for sampling. The berms also require periodic maintenance. They would not be actively reclaimed to natural riparian vegetation during the operational period. However, marshes will provide wetland treatment during operations. They will also be an important part of the closure landscape and will be vegetated with natural wetland species.* • *Shell will place suitable substrates – fill and reclamation material – of appropriate types and grades for the establishment of desired marginal and riparian vegetation.* • *Shrub species are planted in the revegetation process and native forb species will naturally ingress (or be planted/seeded if necessary).* • *Reclamation development will be monitored for species composition, growth, health, and survival as required by the certification process.* • *Shell will plant and seed appropriate species if not provided thorough natural ingress.*
16	*AENV has yet to release their minimum flow requirements for key times of year in the lower Athabasca River. Why have these requirements not been released?*	• *AENV and DFO released Phase 1 of the Water Management Framework for the Lower Athabasca River in February 2007.* • *Phase 2 has been under development for the last 2 years and it is expected a non-consensus recommendation report will be released at the end of January which is approximately on schedule. At that time, the Regulators will begin the consultation process. It is believed their goal is development of a draft regulation for mid-year and a final regulation for the end of the year.* Government activity on the Land Use Framework might result in changes to this schedule.

Table FI03-1 Summary of electrofisher settings used during baseline sampling for the Jackpine Mine Expansion and Pierre River Mine Projects.

Season	Power Source	Frequency Range (HZ)	Pulse Width (milliseconds)	Output Volts (V)	Output Current (amp)
Spring	DC	30-50	3-6	190-500	0.21-2.1
Summer	DC	30-60	1.8-6.0	60-700	0.12-0.80
Fall	DC	40-60	2.0-8.0	300-400	0.14-0.48

AQUATIC HEALTH

Aquatic Health		
Q #	**Question**	**Response**

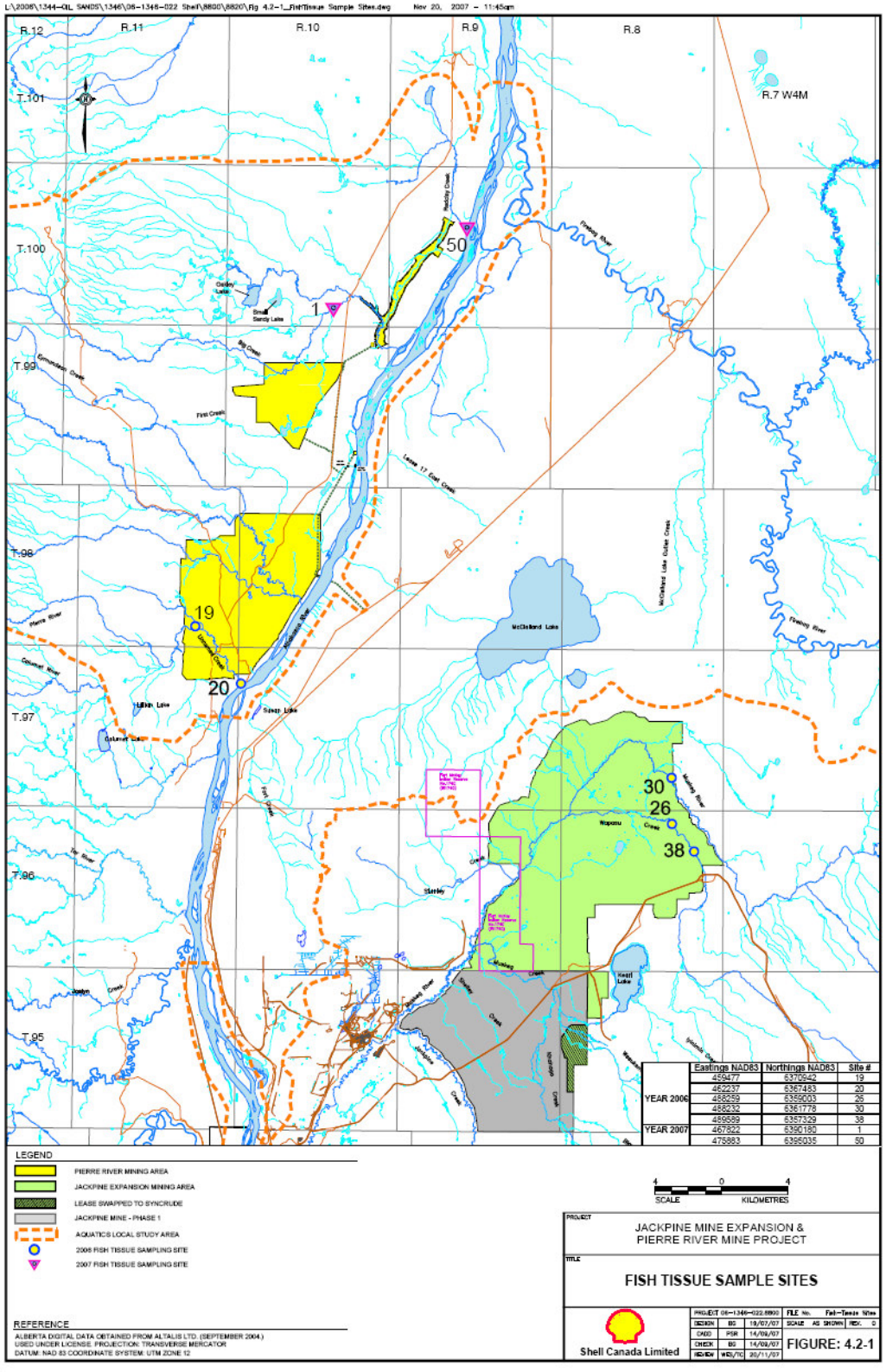
1	*We recommend requesting an increase in sample size, which would strengthen the rigour of analyses performed on individual parameters. Tissue sampling and analysis are expensive to do; however, compromising sample size can put ecosystem health at risk for aquatic life and humans. At least 30 samples need to be collected of individual parameters to achieve statistical significance.*	• *Seven species sampled with a total of 32 fish from the aquatic study area.*
		• *Obtained screening level spatial and taxonomic coverage.*
		• *Data appropriate for EIA-level of analysis.*
		Fish collected from ASA used for the aquatic health assessment; locations are provided in parentheses where appropriate
		• *Total of 8 fish for JME:*
		  • *2 samples of white sucker (26,38)*
		  • *1 composite sample (19, 20, 30, 38)*
		  • *5 Northern Pike from the RAMP program (Muskeg River)*
		• *Total of 4 fish for PRM:*
		  • *1 Lake chub, 1 slimy sculpin (1)*
		  • *2 long nosed sucker (50, 19)*
		• *20 fish from the Athabasca River (RAMP):*
		  • *10 walleye and 10 whitefish*
		
		Figure showing fish tissue sample sites is located at end of the Aquatic Health section in this document.

2	*Why does the Proponent not consider these other non-lethal end-points that may also have profound effects on fish health?*	• *WET acute tests used lethality as an endpoint. WET chronic tests used lethality, reproduction and growth as endpoints. Surface Water Quality ESR, Table E-1.* • *Each CoPC was compared to a CEB which was developed to protect early life stages and reproductive endpoints. EIA Volume 4B, Appendix 4-2, Section 3 and Attachment I.* • *These data were used together in a weight of evidence assessment to determine potential for acute and chronic (i.e., non-lethal) effects related to any changes in water chemistry.*
3	*At this point, limited scientific understanding of the indirect sub-lethal effects of these compounds, singly or in combination, may preclude the ability to assume that no effects of their presence in effluent waters on fishes would be expected. Please discuss.*	• *The reviewer's concern appears to be related to endocrine disruption and genotoxicity.* • *Endocrine disruption is not expected based on the effluent composition (both the constituents and their concentrations).* • *Previous studies have not shown significant endocrine disruptive effects from reclamation waters.* • *Similarly, genotoxicity is not based on effluent composition (i.e., lack of aromatic amines).*
4	*What assurance can the Mikisew Cree receive that RAMP testing will be sufficiently rigorous to monitor fish population health and abundance over time?*	• *CEMA is currently developing a monitoring recommendation to address water withdrawal as part of Phase 2 requirements. MCFN would be welcome at those meetings.* • *There is also a plan to conduct a workshop with Aboriginal groups so they can provide their monitoring requirements and MCFN is encouraged to attend that workshop.* • *RAMP is open to membership by local stakeholders including Mikisew Cree First Nation. Mikisew Cree First Nation are encouraged to participate in RAMP and help direct its monitoring program.*

Aquatic Health		
Q #	**Question**	**Response**
5	*Would the Proponent consider monitoring more rigorously for heavy metals?*	• *While we believe the long-term monitoring plan, which is part of the EIA submission (EIA Volume 4B, Appendix 4-9, Section 4), is adequate and accommodates the different operational phases (construction, operation, closure), Shell would be willing to consider additional monitoring, as appropriate, when detailed monitoring programs are designed.*
6	*At what point do small (i.e., negligible) effects on tainting and tissue metal burden following exposure to run off, which ultimately ends in the Athabasca River, become cumulatively detrimental to aquatic health?* *The proponent argues that their runoff will provide a clean bill of health and not lead to a bioaccumulation of metals and tainting in the lower river (i.e., Peace-Athabasca River); however, this is where sediment is appreciably finer and more likely to bind toxins and hydrocarbons in negligible concentrations. Did the Proponent consider this in their analysis?*	• *Shell is unclear on how finer sediments will bind toxins and hydrocarbons to a lesser extent than coarser sediments – this is incorrect.* • *Cumulative effects were examined by assessing the Base Case, Application Case and Planned Development Cases. All three scenarios suggest that aquatic health for the region will remain unchanged.* • *Bioaccumulation of metals does not necessarily lead to toxicity (see response to previous question).* • *Monitoring using weight of evidence will be conducted to ensure that unacceptable environmental effects do not occur.*
7	*We recommend that the Mikisew Cree question if perhaps regulators' guidelines are too weak in addressing longer term cumulative effects in aquatic ecosystem heath. We recommend that the Mikisew Cree request that the Proponent conduct bile analyses and measure and monitor for sub-lethal effects.*	• *PAH monitoring in edible fish tissues provides information relevant to public health and tainting concerns.* • *Bile analyses will only provide information on exposure, not on effects.* • *Information contained in research to date should be considered regarding any discussion to RAMP on changing low-level hydrocarbon exposure monitoring methods.*

AQ01:

Fish Tissue Samples



Air Quality		
Q #	**Question**	**Response**
1	*It is believed that further reductions in NOx emissions can be made with the mine fleets, but are there any procedures or plans to validate these emissions?"*	• *Shell will achieve its fleet NOx reductions through the manufacturer. Accordingly, verification of compliance with Tier emissions standards will be a requirement of equipment purchase.* • *Through the U.S. EPA Tier process, equipment manufacturers are required to construct equipment to meet specific TIER emission requirements by specific dates (e.g. Tier IV for large off-road equipment phased in from 2011 - 2015).* • *Additionally, Shell will conduct ambient air monitoring for NOx through WBEA. RAMP and TEEM do monitoring for acidification. These monitoring programs will inform potential emission issues in the region.*
2	*It was not clear if road emissions were accounted for by roads / traffic, or simply added in as a background factor. Please clarify.*	• *Traffic emissions are incorporated into the community background and added to community predictions.* • *The changes in traffic emissions due to the Project were considered negligible and were not included in the modelling.*

Air Quality		
Q #	**Question**	**Response**

3;18;19;20	*Q03 - Does Shell have any plans to address the observed increases in SO_2, NO_2, H_2S, THC, and $PM_{2.5}$? Are there plans to investigate possible reduction measures to limit or stop the increasing trend? The trends for $PM_{2.5}$ appear to be more diverse. Are there any contingency plans in the event $PM_{2.5}$ levels begin showing more upward tendencies?*
	
	Q18 - Will Shell increase their monitoring efforts at the Fort McKay station to ensure levels do not keep increasing in concentration?
	
	Q19 - If there is a likelihood of increasing H_2S in the region, and noting the excessive number of exceedances (417 in 2008), what contingencies or services will be added to address the potential of future issues, especially for the residents (permanent or not) of Cabins J, K, and L?
	
	Q20 - What does Shell propose to potentially reduce the upward trend of THC?
		• *Shell understands that with additional projects, additional emissions can be expected. Impacts to vegetation and wildlife and human health associated with Project emissions were assessed. No incremental health risk to humans or wildlife or significant effects to vegetation were determined.*
		• *Shell is an active participant in regional air quality management initiatives:*
		  • *AENV Regional Sustainable Development Strategy.*
		  • *Cumulative Environmental Management Association (CEMA).*
		  • *Wood Buffalo Environmental Association (WBEA).*
		• *Shell will meet requirements of the Acidification Management Framework and the Trace Metals Management Framework, both of CEMA, as well as the Clean Air Strategic Alliance's (CASA) $PM_{2.5}$ management framework.*
		• *Management systems:*
		  • *Leak Detection and Repair Program and plant-wide fugitive emissions identification and control per CAPP guidelines.*
		  • *Health, Safety and Environment plan and Environmental Management System (ISO 14001 certified).*
		• *Mitigation measures:*
		  • *Cogeneration units will meet CCME emissions criteria and Alberta Air Emissions Standards for Electricity Generation.*
		  • *Cogeneration units and boilers will meet Alberta's interim guideline for NOX emissions for new boilers, heaters and turbines (Best Available Technology Economically Achievable).*
		  • *Emission control efficiencies for asphaltene-fired cogeneration units: 99% for SO_2, 75% for NOX, 99.97% for PM.*
		  • *Mine fleet vehicles will meet applicable emission standards at time of purchase and will be maintained regularly.*
		  • *Flaring will be minimized.*
		  • *Tailings Solvent Recovery Unit (TSRU) tailings deposition will be managed to maintain annual average rate of 4 volumes of solvent per 1,000 volumes of bitumen produced.*
		• *Further information provided in EIA Volume 3, Sections 1.7 and 3.2.2.*
		• *If air quality becomes an issue at these cabin locations due to Shell, Shell will work with affected trapline holders to address their concerns.*
		• *The following compounds are monitored at the Fort McKay WBEA station:*
		  • *Continuous SO_2, TRS, THC, O_3, NO, NO_2, NOX, $PM_{2.5}$*
		  • *Intermittent PM10, VOCs*
		• *Current monitoring efforts at the Fort McKay station are considered appropriate.*

Air Quality		
Q #	**Question**	**Response**
4	*The Air Modelling Methods (pg 3-38) indicate that only two years of meteorological data are used for this assessment (1995 from BC/AENV, and 2002 from AENV), with local stations used to supplement localized effects. Why was this format chosen?*	• *At the time of the modelling assessment, two years of mesoscale model data (MM5) were available from AENV (1995 and 2002).* • *U.S. air modelling guidance recommends three years of meteorological data for regional modelling if mesoscale meteorological data are available. The two years available in Alberta were used and are considered adequate to represent meteorological conditions in the Oil Sands Region.*
5	*Has the use of ashphaltene as a fuel been tested and used elsewhere? Is there any direct emission testing that has been done? If so, what do the emissions look like?*	• *While other similar solid fuel sources are used commercially, there have been no commercial applications involving the combustion of asphaltenes derived from oil sands. In developing this technology,Shell has conducted pilot plant tests using ashpaltenes derived from its froth treatment process at MRM to obtain combustion data to complete preliminary engineering. Note: Pilot plant testing does not provide air emissions,these were calculated based on engineering judgement and other similar materials. ie:* • *SO2, NOx and $PM_{2.5}$ were calculated based on fuel properties* • *PAH and Metals were based on coke combustion (Suncor)* • *VOCs were based on heavy fuel oil*
6	*Based on the summary of the Regional Community impacts, specifically at Cabins J, K, and L, which show elevated levels of several pollutants, have there been complaints or concerns directly from people that own or reside at these cabins?*	• *Shell has received no complaints from these owners/residents to date.*
7	*Shell purports that "Generally the Oil Sands Region experiences a relatively high background ozone concentration". Can Shell validate this statement or provide the data to support it?*	• *EIA Volume 3, Appendix 3-7, Table 13 shows WBEA station ozone measurements.* • *Fort Chipewyan has highest annual average ozone in region.* • *While the average values are comparable with other Alberta sites, there have been exceedances of the 1-hour AAAQO in the Oil Sands Region.* • *Ground-level ozone attributed to photochemical ozone formation, stratospheric intrusion and long-range transport.* See Table 13 at the end of the Air Quality section in this document.
8	*There is no mention of the Project adhering to or addressing GHG emissions. Why was this not addressed under this key question?*	• *GHG emissions are discussed in Key Question AQ-6 (EIA Volume 3, Section 3.4.8).* • *Section 3.4.8.6 discusses Shell's commitment to adhere to Alberta's Climate Change and Emissions Management Amendment Act and federal climate change policies.*

Air Quality		
Q #	**Question**	**Response**

9	*What is an acceptable risk to the population being exposed – if 100 odour complaints have been filed, is an additional 4 acceptable? On a percentage basis this is small (~1%), but for an individual living at these Cabins, will the additional 4 to 12 hours of odour actually be only 4 to 12 hours? What contingency is in place for these individual(s) to protect their way of life or ensure that odours will not be rampant for them? What is the true number of complaints to AENV, ERCB, Municipality, WBEA, etc., on the odour issue? What additional mitigation procedures can be applied to help lower the potential for odour complaints, or address them when they come in? If a large number of complaints are registered, what is the Standard Operating Procedure to address them?*	• *Shell acknowledges that odours can arise occasionally*
		• *What is acceptable?*
		  • *No frequency of occurrence criteria for odour in Canadian jurisdictions.*
		  • *Australia and New Zealand have frequency of occurrence guidelines.*
		  • *New Zealand guidelines dependent on sensitivity of receiving environment – frequency of 0.5% above odour concentrations ranging from 1 to 10 OU/m3 generally used.*
		  • *Change in 1-hour average odour levels due to Project is less than 0.3%.*
		• *Shell has programs in place to respond to external odour complaints*
		• *If odours due to Shell become an ongoing problem, Shell will work with the trapline holders*
		• *Shell's odour complaint response plan:*
		  • *Complaints received by Security Dispatcher.*
		  • *Manager or Team Leader investigates complaint, takes appropriate action to correct situation and develops response.*
		  • *If designated to do so by Manager External Affairs, the person who made the complaint will be contacted with response.*
		  • *Manager External Affairs maintains records and provides summaries of complaints, actions taken and outstanding issues to senior management.*
		• *Management systems:*
		  • *Leak Detection and Repair Program and plant-wide fugitive emissions identification and control per CAPP guidelines.*
		  • *Health, Safety and Environment plan and Environmental Management System (ISO 14001 certified).*
		
		A table summarizing odour complaints is provided at the end of the Air Quality section in this document.

Air Quality		
Q #	**Question**	**Response**
10	*What plans are in place for "developing technology to capture and store carbon dixoide (CO2) emissions from industrial emission sources"? With many applications being dropped from the Alberta Technology Fund, is CO2 capture still being investigated by Shell? What specifically will be done for these projects, given that the maximum projected operating GHG totals is 5457 kt of CO2e per year (includes both JEMA and PRMA). Why would Shell consider a dirty technology (ashphaltene-fired cogeneration) that would put out an additional 2024kt of CO2e per year (without this co-gen the projected operating emissions are 3433 kt of CO2e per year). What are AENV Climate Change group's comments regarding this? Under Section 34.8.5 Project Greenhouse Gas Management Plan (page 3-109), the ideas presented are adequate, but as this was the only place these have been noted, what will actually be done in practice, and why were they not addressed anywhere else?*	• *Shell is currently advancing, in conjunction with the Alberta and Federal governments, the development of project Quest at our Scotford site. This carbon capture and sequestration project will offset CO2 emissions associated with our Oil sands operations. In addition, plot space and process capacity will be designed into the JPME project to allow for carbon capture should this become a feasible option in the future.* • *Specifically, Shell's Quest project is designed to capture and sequester 1.2 MT of CO_2e per year and under Alberta's Climate Change and Emissions Management Act it can be used to offset emissions at Shell's oil sands operations.* • *Shell believes that the increased emissions that result from AER can be managed in an environmentally acceptable manner and is investigating the development of this new technology to maximize the utilization of this valuable energy resource rather than disposing of it (which is the current practice).* *These principles of:* *• Incorporating learning's from MRM and JPM-1* *• Designing CO2 capture ready facilities where practical and economically feasible* *• Evaluating renewal energy sources* *• Optimizing and continuously improving energy efficiency in the design and operation* *• Utilizing co-generation of power and steam* *• Utilizing best practices for haul vehicles* *are constantly under evaluation as the project design evolves. The application as filed represents the current state of these developments.*
11	*Did the maximums of daily temperature and ozone occur on the same hour? Is a fair comparison being drawn? What does this look like when comparing the maximum ozone with corresponding temperature, and maximum temperature with corresponding ozone?*	• *Purpose of graph was to show relationship between temperature and ozone.* • *The maximum daily temperature and maximum daily ozone concentration did not always occur at the same hour.* • *Following figure shows hourly temperature plotted with hourly ozone for Athabasca Valley WBEA station.* • *The same general pattern is shown (i.e., peak hourly ozone does not always correspond to the highest temperatures).* See Figure of Athabasca Valley WBEA Station at the end of the Air Quality section in this document.

Air Quality		
Q #	**Question**	**Response**

12;14	*Q12 - Is there more detailed emission data that has not been included? Please provide the information pertaining to this modelling?*
	
	Q 14 - How many pollutants were modeled using the CALPUFF model? Based on the example shown in Table 9 (pg. 39), only six chemical species were used and only three were emitted. Was this just an example presented and other models were not included? What was the emission properties of the other 123 pollutants looked at in this EIA?
		• The following compounds were modelled - SO2, NOX, $PM_{2.5}$, CO, VOCs, TRS, PAHs, metals (EIA Appendix 3-9).
		• VOCs, TRS, PAHs and metals emissions were grouped by source type.
		• Source group emissions modelled in CALPUFF:
		  • 15 VOC groups
		  • 8 TRS groups
		  • 9 PAH groups
		  • 7 metal groups
		• Individual compound concentrations speciated from source group predictions.
		• Emission rates for each individual compound were not presented in the EIA, but were included in the assessment.

13	*Is there any indication that actual ammonia data may be collected in the future to address this problem?*	• Ammonia monitoring added to Fort McKay and Patricia McInnes WBEA stations in 2006. • Annual average ammonia concentrations ranged from 0.04 to 0.3 ppb (WBEA 2007 and 2008 Annual Reports). • US EPA recommends background of 0.5 ppb for forested areas (US EPA.1998. Interagency Workgroup on Air Quality Modeling (IWAQM), Phase 2 Summary Report and Recommendations for Modeling Long Range Transport Impacts). • Sensitivity analysis conducted using background values of 0.22 ppb and 14 ppb showed 8% reduction in annual nitrate deposition predictions.
14		• Answer combined with 12 above
15	*Data on maximum pollutants are presented that exclude the existing open pit mines and upgrading complexes within the RSA. If these facilities are currently present, why remove them from the calculations of maximum pollutants?*	• Emissions from all existing, approved and planned facilities were included in the modelling. • Maximum predictions are shown including the existing and proposed developed areas and outside existing and proposed developed areas. • Alberta Air Quality Model Guideline states Alberta Ambient Air Quality Objectives are applicable outside perimeter of disturbed area (where public access is denied). • Developed areas discussed in EIA Volume 3, Section 3.2.3.9, p. 3-39.
16	*What happens or what contingency will be in place to ensure that the time frame for flaring proposed by Shell is appropriate?*	• Flaring will only occur during upset or emergency periods, start-up and commissioning. • Ongoing improvements in maintenance learning and practices combined with operational experience has resulted in the current stable operation at MRM. These measures combined with improved PLC reliability and instrumentation redundancy will continue with the aim to minimize flaring.

Air Quality

Q #	Question	Response

17	*Understanding that some reductions are being applied for this project, what else is being done to help restrict the PAI load from increasing? What is being done to help reduce acid forming emissions or restrict emissions to the maximum level possible (Best Available Control Technology - BACT)? If nothing is done, what is the expected timeline before the high buffering capacity of this region can no longer hold the potential load and irreversible effects begin?*	• Mitigation measures to reduce acid-forming emissions (EIA Volume 3, Sections 1.7 and 3.2.2):
		  • Cogeneration units will meet CCME emissions criteria and Alberta Air Emissions Standards for Electricity Generation.
		  • Cogeneration units and boilers will meet Alberta's interim guideline for NO_X emissions for new boilers, heaters and turbines (Best Available Technology Economically Achievable).
		  • Emission control efficiencies for asphaltene-fired cogeneration units: 99% for SO_2, 75% for NO_X.
		  • Mine fleet vehicles will meet applicable emission standards at time of purchase and will be maintained regularly.
		• Critical load of 0.25 keq/ha/yr is a very conservative estimate for sensitive ecosystems on a coarse scale.
		• Alberta Framework specifies Regional Framework should be developed when action levels triggered and follow approaches of Alberta Framework.
		• Regional Framework (CEMA 2004) based on more refined critical loads.
		• Results of Air Emission Effects on Ecological Receptors (EIA Volume 3, Section 5.5).
		  • Area of soils where PAI above critical loads very small and decreased in Application Case relative to Base Case.
		  • Of 413 lakes considered, 21 had PAI above critical loads in Base Case and Application case; 18 of the 21 lakes are naturally acidified.
		  • Application Case assessment resulted in negligible environmental consequence.
		• Buffering capacity for region is sufficient for current loads, no effects anticipated.
		• Critical loads and PAI are conservatively estimated.
		• Monitoring indicates no measurable effects from sulphate and nitrate deposition to date.

18		• Answer combined with #3 above
19		• Answer combined with #3 above
20		• Answer combined with #3 above

21	*Where are the source profiles for these heavy metals based on emissions? How many sources of these heavy metals were used?*	• Source profiles were not provided since some of the information is confidential.
		• Primary sources of metals:
		  • Suncor and Syncrude main stacks.
		  • Fuel combustion.
		• Metal speciation information from U.S. EPA, EIAs and project-specific monitoring.
		• Since all metal predictions were rated as having a negligible environmental consequence in the Application Case, the analysis was not carried forward to PDC.
		• Effects of airborne metals in PDC is assessed in the Environmental Health section.
		• Predicted exposures for multiple pathways met health-based guidelines in most instances. Exceedances were not due to airborne metals.

Air Quality		
Q #	**Question**	**Response**
22	*With readings already noted above AAAQO in the region occurring for these species, is it fair to assume that the increase, even though small, can potentially lead to more exceedances in the region? How close do you allow before commenting on the value?*	• Reasonable worst case Project emissions scenario used for Application Case. • While it is possible that the Project may add to existing exceedances, it is unlikely since changes in regional emissions due to the Project are small (i.e., 1.4 to 4.6%). • EIA only comments on exceedances of applicable criteria. • All predictions are supplied for reviewer's interpretation. • In some cases there are large margins of safety built into criteria.
23	*Why was there no mention of plans or reduction potentials to ensure compliance with CO2 policies as per directions of AENV Climate Change Policy Unit and the Federal Government?*	• Please refer to EIA Sections 3.4.8.5 "Project Greenhouse Gas Management Plan" and 3.4.8.6 "Regulatory Compliance Strategies" for more details.
24	*Based on these predicted exceedances, what is Shell going to do to reduce them? What is in place to ensure that a fleet retro-fit or change is going to be done?*	• Some planned project emissions are estimated based on limited information; therefore, maximum rates are used. Based on the information received at the time of the assessment, the actual emissions in the future would likely be lower than the estimated PDC emissions. • PDC concentrations are based on modelling; therefore, any exceedances are only estimates and are not planned. • While Shell will contribute to the PDC emissions, they do not have control over other operators in reducing PDC emissions. • Shell will ensure mitigation measures and management plans are in place for the JME and PRM Project as discussed in response to AQ03. • Mine fleet vehicles will meet applicable emission standards at time of purchase. • Jackpine Mine Expansion will result in the addition of 38 trucks to those approved for the Jackpine Mine – Phase 1. • Jackpine Mine Expansion is expected to become operational no earlier than 2015. • Tier 4 equipment is expected to be available for all mine fleet vehicles at the time of purchase; therefore, retrofits to meet Tier 4 emission standards are not required.
25	*What plans are in place to warn the people at Cabins H and K that there is a potential problem that could impact their location (specifically based on upset scenarios)?*	• Notification Plans have not yet been developed for Cabins H & K but will be in place prior to the JPME becoming operational. Shell will work with potentially impacted stakeholders, including the trappers and any affiliated First Nations to ensure plans are appropriate.
26	*Having grounds for potential odour issues, are there any standard protocols that will help follow-up in relation to odour issues raised in the region?*	• Through WBEA, industry has well established protocol for managing and identifying odour events in the region. WBEA operates a public air notification hotline where companies call in any upset conditions that may result in odours, identifying the issue, time and expected odour impacts and duration. Any member of the public can call in during an odour event to get this updated information. In addition, Alberta Environment also has a hotline for calling in environmental/odour complaints, which triggers a formal process of follow up. Any exceedances of the WBEA continuous monitoring sites are also reported immediately to AENV. The regulator uses this information to track down the expected source of the odour complaints to rectify the problem. It is important to note that Shell does not operate an Upgrader in the region, which is a source of many odour issues.

AQ07:

Table 13 Summary of Ambient Ozone Concentrations

Station	1-Hour O_3 [a][b]			8-Hour O_3 [a][b][c]				
	Average [ppb]	95th Percentile [ppb]	Max. [ppb]	Average [ppb]	95th Percentile [ppb]	4th Highest [ppb]	Number > CWS	Max. [ppb]
Fort McKay	20.9	42.0	**84.0**	19.4	40.7	68.8	0	71.6
Mildred Lake	—	—	—	—	—	—	—	—
Lower Camp	—	—	—	—	—	—	—	—
Buffalo Viewpoint	—	—	—	—	—	—	—	—
Mannix	—	—	—	—	—	—	—	—
Patricia McInnes	22.4	43.3	**82.0**	23.1	42.7	64.4	0	68.8
Athabasca Valley	19.4	43.0	**87.0**	20.5	41.9	62.1	0	68.1
Fort Chipewyan	28.2	44.0	66.0	28.4	43.1	61.5	0	64.5
Albian Mine	—	—	—	—	—	—	—	—
Barge Landing	—	—	—	—	—	—	—	—
Millennium	—	—	—	—	—	—	—	—
Syncrude UE1	19.5	43.0	81.0	21.0	41.9	63.4	0	66.4

[a] The monitoring period covers the years 1998 to 2006.

[b] The 1-hour AAAQO for ozone is 82 ppb. The CWS for ozone is 65 ppb and is based on the fourth highest 8-hour reading annually, averaged over a three-year period.

[c] Eight-hour concentrations are based on a rolling average.

— = Not monitored.
Note: Bold values indicate monitored concentrations that are above the 1-hour AAAQO.

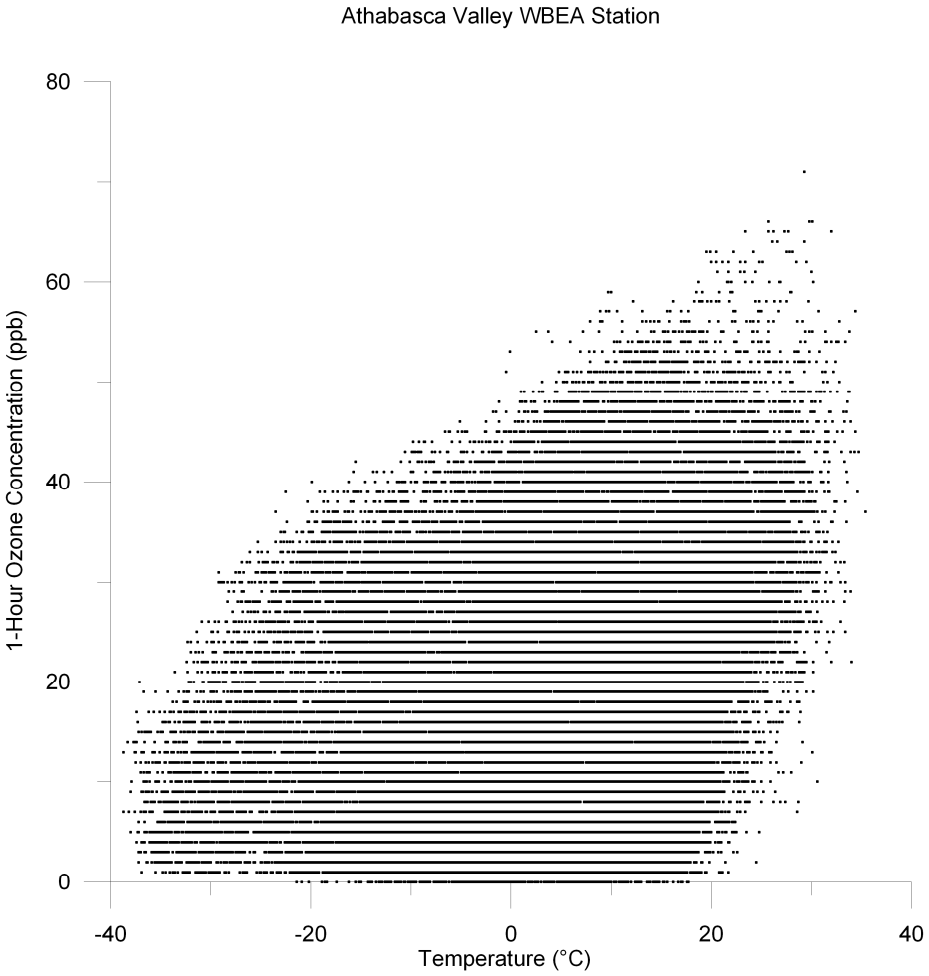
AQ09:

Summary of Odour Complaints

Year	Fort McMurray	Fort McKay
1991	367	19
1992	298	21
1993	263	22
1994	102	11
1995	62	19
1996	43	15
1997	13	4
1998	12	11
1999	2	2
2000	1	4
2001	3	0
2002	1	1
2003	5	2
2004	2	0
2005	0	0
2006	101	29
2007	not available	
2008	106	
2009	159	

AQ11:

Athabasca Valley WBEA Station



Monitoring and Follow-up		
Q #	**Question**	**Response**
1	*We recommend that AENV explain how and when the Approval terms and conditions will become sufficiently concrete to assure that the Mikisew Cree will be accommodated and that the continued exercise of their Treaty Rights will be protected.*	• *FNs are consulted by proponents and the regulators as part of the development of approval conditions, which happens roughly every 10 years.* • *There is opportunity for input as part of this process.*
2	*We recommend that AENV develop terms and conditions of approvals that require specific parameters to be measured during monitoring so that the proponent concretely demonstrates the success of re-establishing TR.*	• *FNs are consulted by proponents and the regulators as part of the development of approval conditions, which happens roughly every 10 years. There is opportunity for input as part of this process.*

3	*We recommend that the Mikisew Cree is invited to comment on what the reclaimed vegetation scenario means to continuing their traditional resource use. Please discuss how the removal of wetland ecosites from the landscape for both the JEMA and the PRMA may alter the landscape, and hence TLU.*	• *Following closure, high TPP will decrease by 2% (734 ha) in the LSA and <1% (9,630 ha) in the RSA.*
		• *Although the landscape will change to a degree after closure and reclamation, traditional use of the land can continue much as it does today.*
		• *Marshes can be re-created as proven at Suncor and Syncrude and have been designed into the project's closure landscape. These will support traditional plants, such as cattail, bulrush and mint.*
		• *Swamps may re-establish naturally along riparian areas.*
		• *Technology and techniques to re-create peatlands are currently being researched (e.g. CONRAD fen project at Syncrude) and learnings will be applied to reclamation design on Jackpine Mine Expansion and Pierre River Mine.*
		• *Beaver will likely migrate into the reclamation landscape as food becomes available, create wetlands by damming and moose will likely follow.*
		• *Reclaimed landscape will have proportionately more uplands and less wetlands areas.*
		  • *Reclaimed uplands will include more terrestrial forested areas that support many traditional plants.*
		  • *Upland forested areas prescribed for the reclaimed landscape typically have high traditional plant potential.*
		• *Expect greater moose habitat in uplands and shrub habitats and furbearer habitat as upland forests mature.*

4	*In order to complete a concrete plan on the re-establishment of TRs, Shell should document its understanding of how water resources after mine closure will accommodate traditional resource use, compared to baseline conditions. Furthermore, Shell should discuss with the Mikisew Cree how its plan will protect the continued exercise of Treaty Rights.*	• *The Closure and Reclamation Plan for the Projects serve as the primary method by which Shell will endeavour to mitigate Project impacts on biophysical components through adhering to the regulatory requirement of reclaiming the project area to an equivalent land capability.* • *As the exercise of the vast majority of MCFN Treaty Rights are directly related to various biophysical components and receptors, Shell's goal is to minimize the impacts to the continued exercise of MCFN Treaty Rights.*
5	*We recommend that Shell uses its own experience in the oil sands and its own methods and approaches that are already developed, and discuss with the Mikisew Cree how it intends to use this experience in developing concrete monitoring programs that test the effectiveness of mitigation. The mitigation should accommodate the FNs concerns. Shell should explain why it did not apply its concrete experience of the past programs and why only conceptual programs were presented in this EIA.*	• *The conceptual monitoring plans for the EIA applied the experience Shell is gaining through its existing monitoring plans. However, for the EIA, Shell only provided conceptual plans.* • *Conceptual plans were seen as appropriate for an EIA to allow regulators and stakeholders to determine if Shell's monitoring approach is sensible.* • *Detailed plans will be developed as part of the permitting process.* • *However, should the project be approved, Shell will develop detailed monitoring plans and is pleased to discuss possible MCFN involvement in detailed monitoring program development.*

Monitoring and Follow-up		
Q #	**Question**	**Response**

6	*We recommend that Shell provide a concrete, not conceptual, monitoring plan that quantifies mitigation success, of which reclamation is a major part. This must include evidence that progress is being made towards reclamation targets using all proposed mitigation measures. Moreover, the progress being made with respect to reclamation needs to be demonstrated in terms of traditional resource use.*	• *A detailed monitoring plan will be developed when the project is at the detailed design phase.*
		• *The vegetation reclamation monitoring program will be designed to evaluate the success of reclamation procedures over time and to adjust or modify these procedures where necessary to meet the following objectives:*
		  • *Reclamation methods are appropriate to meet end land use targets.*
		  • *Species composition includes planted species and non-planted native species, and encroachment by invasive (weed) species is minimized.*
		  • *Vegetation re-establishment is progressing toward target ecosystems as expected (e.g., tree density [post-planting], tree survivorship rate, height and condition)*
		• *Vegetation reclamation will be evaluated through annual assessments, which will begin the first year after disturbed areas have been re-vegetated.*
		• *The study design will be adapted from the AENV Forest Management Branch Regeneration survey manual and ABMI protocols, and other documents currently in draft through CEMA (such as the Alternative Regeneration Manual).*

7a	*If the progression of wildlife recolonization is predictable, then please provide:* *a) evidence that wildlife habitat utilization has been re-established, "similar to that which existed prior to disturbance" (Quote from Approval 20809-01-00), anywhere in any operation of the oil sands region;*	• *A "predictable progression" of wildlife recolonization refers to general trends of site occupation by species groups over time, and does not intend to suggest that precise site-specific timing and abundances are predictable.* • *Reclaimed sites based on current reclamation standards in the Oil Sands Region are not yet old enough to develop mature communities.*
7b	*If the progression of wildlife recolonization is predictable, then please provide:* *b) targets for wildlife habitat use and distribution after successful reclamation applied in Shell's monitoring programs;*	• *Habitat suitability model output forms the basis of species-specific projections.*
7c	*If the progression of wildlife recolonization is predictable, then please provide:* *c) measures of successful re-establishment of wildlife habitat utilization applied in Shell's monitoring programs;*	• *Long-term monitoring will allow an examination of changes through time and comparison to undisturbed areas.*
7d	*If the progression of wildlife recolonization is predictable, then please provide:* *d) a demonstration that the reclaimed landscape will allow the continued exercise of Treaty Rights.*	• *The goal of reclamation is equivalent land capability, including for traditional uses.* • *Progressive reclamation may provide effective habitat prior to end of mine life.* • *Shell anticipates similar species as occupy the proposed development areas today will recolonize reclaimed areas. These species will be available for hunting, fishing, trapping etc.*
8	*Alternatively, if such evidence and concrete targets and measures cannot be provided please engage in dialogue with the Mikisew Cree to establish a process by which TLU can be re-established, setting up the required concrete and detailed plans to protect the continued exercise of Treaty Rights.*	• *Habitat suitability models provide targets for predicted proportional distribution. Measures of success will take the form of species occurrence observations within long-term reclamation monitoring programs.* • *The Mikisew Cree First Nation is currently a member of Shell's Reclamation Committee, and as such is engaged in constructive dialogue regarding the progress of reclamation and monitoring of reclaimed sites.*

Monitoring and Follow-up		
Q #	**Question**	**Response**
9	*As such, the EIA for the JEMA and PRMA has not addressed Mikisew Cree concerns. Please explain how Shell intends to first collect, and then integrate, comments submitted by the Mikisew Cree in the Strategic and operational plans of these two projects.*	• *Since the announcement of the JPME and PRM projects, Shell has met regularly (through open houses, quarterly GIR meetings, Advisory Committee meetings, technical review meetings, and reports, NNLP meetings, site visits, etc.) with the MCFN and other First Nations to identify potential impacts, issues and concerns.* • *We have incorporated this information where possible and have expressed a desire to mitigate other issues through a negotiated agreement.* • *By the very nature of the development, there will be issues that Shell cannot resolve with the MCFN. Those concerns can go before the panel as part of the evidence to be considered as part of the public interest decision. MCFN has the opportunity to intervene at this hearing and further identify and expound upon issues and concerns with the projects.*
10	*We recommend that Shell explain how it intends to use the input already provided by the Mikisew Cree. TLU and its re-establishment must be specifically highlighted in Shell's operational plans, including scheduling, progressive reclamation, design of reclamation programs, and monitoring of reclamation.*	• *Operational C&R plans are developed and updated every three years as required by the conditions of EPEA approvals. C&R plans are dependent on a number of factors including production rates and efficiency, changes to the mine plan, the actual extent of the resource, final reclamation targets and updated regulatory requirements, and information from research and pilot programs.* • *Information about these C&R plans will be provided to MCFN once it is available. Shell is willing to discuss the participation of MCFN in this planning process, as part of a negotiated agreement.* •

RECLAMATION

Reclamation		
Q #	**Question**	**Response**
1	*Please provide more specific targets, for the mean number of species, species composition, and percent cover of species within each ecosite/wetland type so that the success of reclamation can be fully evaluated.*	• *Regulatory certification guidelines will specify the required targets at the landscape level.* • *Shell will use the specific targets to be provided in the new Revegetation Guidelines issued in early 2010 - future CC&R plans will be changed, if necessary, to meet these guidelines.* • *Adaptive management practices are already being applied, such as use of native topsoil (LFH) layers and establishment of the Seed Cooperative to support biodiversity in reclaimed sites.* • *The foundation for reclamation is placing the appropriate reclamation soils to establish target ecosites.*
2	*Please discuss why traditional use plants were not included in reclamation planning directly.*	• *Shell plans for specific ecosites as a broad approach which reflects an appropriate level of planning effort for an EIA.* • *Planting prescriptions include traditional plants that are referred to in the EIA and the conditions will be created to support the ingress of traditional plant species over time.* • *Shell wants and expects traditional plants to be established on the landscape and has targeted the collection of seed and plant propagation in current operations.* • *Research and adaptive management will be practiced at the landscape level of planning to ensure establishment of traditional species.* • *For example, smoke water and soil quality effects on revegetation research that is underway by Shell, and shrub propagation research that is underway by CONRAD will provide results that will be incorporated into reclamation practices.* •
3	*What are the objectives of species composition? How does one know if species composition is progressing towards targeted ecosystems?*	• *Shell's objectives are to establish a range of plant species with diversity levels that are analogous to natural areas.* • *The species composition objectives are targeted on a regional scale and all reclamation activities will be required to meet them.* • *Permanent soil and vegetation plots will be established in representative natural sites and reclaimed lands – to determine species present in natural analogues and to compare to the trajectory development of reclamation.* • *The guidelines provided for revegetation and wetlands re-establishment will be followed as required by the reclamation certification process.*

4	*How many vegetation and wetland sites will be monitored? Will the full range of ecosite/wetland types planned in the closure landscape (as indicated in Tables 7, 11, 14, and 17 in Appendices 5-1 and 5-2) be monitored? What are the targets or thresholds for tree density, tree survivorship, tree height, tree condition, plant species composition, height, percent cover, and vigour that would indicate the achievement of reclamation procedures over time?*	• *A detailed vegetation monitoring plan has not yet been developed - itwill be developed once the proposed closure landscape has been approved.*
		• *New benchmark and target information provided by regulators will be incorporated into monitoring plans*
		  • *Monitoring targets will likely be based on ABMI protocols and other CEMA documentation currently in draft (such as the Alternative Regeneration Manual).*
		  • *Monitoring plans will cover the full range of upland and wetland site types.*

Reclamation		
Q #	**Question**	**Response**
5	*Why are the tables showing target ecosites in the closure landscape not provided and discussed in the C&R plan, as they will be useful in developing some predictions about reclamation success that can be tested and supported or rejected by the results of the monitoring program?*	• *A discussion of the target ecosites provided in Section 2.3.2 was not provided as it was not required for CC&R Plan completeness.* • *The tables that identify planting prescriptions are presented in the CC&R Plan appended to the EIA, and reflect targets on a regional scale, and the site conditions that are required for revegetation success (reclamation material, slope, moisture, aspect).* • *These prescriptions identify regional target ecosites and are derived from the revegetation guidelines provided by CEMA.* • *Reclamation success will be further determined by reclamation certification criteria and will reflect targets at a landscape scale.*
6	*Will the Proponent use similarity coefficients to assess the similarity between each pre-disturbance and reclaimed ecosite/wetland types in terms of mean species richness (all plant types), species composition, and percent cover in each ecosite/wetland type? Will targets of similarity be established for each parameter so that the success of reclamation can be evaluated?*	• *Reclamation Certification Framework (CEMA) will determine similarity coefficients for assessment of reclamation success. The framework is currently under CEMA review.* • *The Revegetation Manual released in early 2010 by CEMA will be used as a reclamation guideline and is expected to provide parameters.* • *The benchmarks and targets for reclamation will be industry wide and Shell will follow the targets provided.*
7	*Will Shell include a more diverse array of upland ecosites as targets for the reclamation landscape such that the diversity of ecosite/wetland types is more representative of the pre-disturbance landscape?*	• *We have used all uplands ecosite types that are present in the Natural Subregions (pre-disturbance).* • *The reclaimed landscape will contain more open water (lakes) and more uplands than pre-disturbance.* • *Since not all successional phases of the ecosites are used in planning, it may be perceived that there are fewer ecosite types planned for the closure landscape.* • *Shell has taken a conservative approach to the replacement of wetlands types. The hydrological conditions will be created to provide the opportunity for wetlands to evolve on the landscape over time. This is the appropriate level of planning for an EIA.*
8;11	*Q8. Will the Proponent be more specific in terms of what is meant in reference to achieving equivalent land capability for these projects?* *Q11. Will a larger number of plant species be planted in each reclamation site during the initial stages of reclamation to ensure that the diversity and composition within reclaimed ecosites and wetlands is similar to that of pre-development ecosites and wetlands?*	• *Shell has used the Land Capability Classification for Forestry (AENV 2006) to target equivalent land capability. These classes are dependent on factors such as slope, aspect, moisture regime and reclamation soil characteristics.* • *Tree and shrub planting numbers include expected losses due to die-off and browsing.* • *Shell will establish reference sites (pre-disturbance and benchmark sites) and will manage slope, aspect and moisture regime to ensure that land capability for the project is equivalent to what was present in pre-disturbance conditions. Appropriate soil types will be placed to achieve target land capability classes, and plant species that do not ingress naturally will be planted or seeded.*

Reclamation		
Q #	**Question**	**Response**
9	*For each targeted ecosite/wetland type to be reclaimed, will the Proponent commit to planting or seeding a wider variety of species, with high similarity to that found in native ecosites/wetlands?*	• *Shell will commit to planting or seeding species that do not ingress naturally to achieve an acceptable level of biodiversity as outlined in the Reclamation Certification Guidelines.* • *The focus for reclamation is establishing a functioning ecosite, capable of successional processes. The appropriate species are expected to thrive once suitable conditions have been established.* • *Not all species are suitable for early reclamation – late successional species require specialized conditions that may only be met during maturation of the reclamation area. Regardless of how successional processes may occur on reclaimed sites, the key focus is to provide the soil, moisture and species conditions that support development of functioning ecosites.* • *There have been a series of ongoing changes made to soil and vegetation prescriptions as a result of adaptive management that have affected the outcome of revegetation on reclaimed sites (e.g direct placement, peat amendments, use of LFH), and it is expected that there will continue to be further changes as operations and research contribute to adaptive management of reclaimed areas.*
10	*Can the Proponent provide direct evidence that plant species will emerge from the reclamation material (LFH) placed in reclaimed sites? If not, will this expectation be removed from the EIA and more species planted or seeded in early reclamation to ensure that a wide variety of species become established in each of the reclamation sites?*	• *Shell has research currently underway at the Muskeg River Mine to investigate which species will emerge from LFH placed on test reclamation areas, and a large LFH direct placement program was completed at the Jackpine Compensation Lake site in April 2010 that will be monitored for vegetation regrowth.* • *CONRAD research is collecting data on the emergence of plant species from LFH.* • *Plant species will be planted or seeded to achieve an acceptable level of biodiversity as provided in the Reclamation Certification Guidelines.* • *In addition, Shell is investigating other modifiers to plant species germination such as smoke-water exposure, mycorrhizal inoculation, exposure to natural surface lean oil sands and fertilizer prescriptions – these are specifically designed to inform revegetation practices for reclamation on Shell sites.*
11		• *Answer combined in #8 above and discussed further in #9.*
12	*Will the effects of dust be assessed specifically for traditional use plants, with tables for each LSA and the RSA showing pre-disturbance ecosite/wetland types, their traditional use plant potential rankings, and the amount of area in each that might be affected by dust from the Projects?*	• *Dust associated with the project will affect 3,539 ha of high traditional plant potential (TPP) areas, 2,061 ha of moderate TPP areas and 3,248 ha of low TPP area.* *Summaries showing high, medium and low traditional plant potential are located in Tables RE12.*

RE12: Low Traditional Plant Potential

Vegetation type	Traditional Plant Potential (TPP)	Description	Base Case Area (ha)	Application Case Area (ha)
Low Traditional Plant Potential				
g1	low (CM)	Labrador tea-subhygric black spruce-jack p	13	128
a1	low	bearberry jackpine	147	1,095
d1	low (CM)	Labrador tea-subhygric black spruce-jack p	3	1
BFNN	low	forested bog	4	-
BONN	low	open bog	-	14
BTNI	low	wooded bog with internal lawns	-	80
FONG	low	graminoid fen	300	269
FONS	low	shrubby fen	148	859
FOPN	low	open patterened fen	146	146
SONS	low	shrubby swamp	353	567
WONN	low	shallow open water	2	5
Meadow	low	meadow	1	7
Shrubland	low	shrubland	5	27
CC	low	cutblock	19	49
		TOTAL	**1,141**	**3,248**

Moderate Traditional Plant Potential

Vegetation type	Traditional Plant Potential (TPP)	Description	Base Case Area (ha)	Application Case Area (ha)
ModerateTraditional Plant Potential				
c1	mod	Labrador tea–mesic jack pine-black spruce	10	39
h1	mod	Labrador tea/horsetail white spruce-black s	32	84
BTNN	mod	wooded bog	119	383
FTNI	mod	wooded fen with internal lawns	-	15
FTNN	mod	wooded fen	125	746
STNN	mod	wooded swamp	70	291
BUu	mod	burned uplands	565	360
BUw	mod	burned wetlands	294	144
		TOTAL	**1,215**	**2,061**

High Traditional Plant Potential

Vegetation type	Traditional Plant Potential (TPP)	Description	Base Case Area (ha)	Application Case Area (ha)
High Traditional Plant Potential				
b1	high	blueberry jack pine-aspen	142	910
b2	high	blueberry aspen (white birch)	165	702
b3	high	blueberry aspen-white spruce	115	501
b4	high	blueberry white spruce-jack pine	39	293
d1	high (CM)	low-bush cranberry aspen	78	268
d2	high	low-bush cranberry aspen-white spruce	119	494
d3	high	low-bush cranberry white spruce	18	68
e1	high	dogwood balsam poplar-aspen	4	40
e2	high	dogwood balsam poplar-white spruce	33	171
e3	high	dogwood white spruce	11	92
		TOTAL	**724**	**3,539**

REGULATORY SETTING AND CUMMULATIVE EFFECTS

Regulatory Setting and Cumulative Effects		
Q #	**Question**	**Response**
1	*What is the rationale for a single EIA report in the context of the JEMA and PRMA?*	• *During the most recent Muskeg River Mine Expansion regulatory process Shell received feedback from local stakeholders and regulators that incremental approvals to its development plans did not provide a sufficiently long term overview.* • *The question of "what's next" needed to be addressed so that a more comprehensive view of the regions development could be assessed. Based on this feedback, Shell presented two applications which, at the time, provided a long term comprehensive development plan of all its lease holdings.* • *To allow a better assessment of the cumulative impact of this long term plan a single EIA encompassing both the Pierre River and Jackpine Mine applications was filed. This single EIA was then subsequently broken down so that stakeholders and regulators could also separate the impacts of each development.*
2	*Will additional off-site infrastructure and facilities be required for the shipping of ore and bitumen froth? Please explain and indicate where these were considered in the EIA report.*	• *At this time there are no plans to build off site infrastructure to ship either froth or bitumen ore. Diluted bitumen from Pierre River mine will likely be transported via a third party owned pipeline and is outside the scope of the application.*
3	*How will the Mikisew Cree be meaningfully involved by Shell in any process that alters or changes existing approvals?*	• *Shell has met regularly (through open houses, quarterly GIR meetings, Advisory Committee meetings, technical review meetings, and reports, NNLP meetings, site visits, etc.) with the MCFN and other First Nations to identify potential impacts, issues and concerns and expects to continue the level of consultation into the future.* • *In addition, FNs are consulted by proponents and the regulators as part of the development or change of approval conditions.*
4	*Details regarding how continued, expanded, resource exploitation will be carried out in an "environmentally acceptable manner" are not apparent. Please elaborate and explain.*	• *Shell worked with its EIA consultants to understand the potential environmental and socio-economic effects of the proposed Project. In an iterative manner, the project design evolved to minimize potential effects. The result is a Project with impacts of primarily low or negligible consequence, but with some impacts of higher consequence.* • *The conclusions and predictions contained in the EIA are based on environmental consequence ratings, which are based on the criteria outlined by the CEAA and include direction, magnitude, geographic extent, duration, reversibility and frequency. All of these ratings are described in the EIA, Volumes 3, 4 and 5.* • *In addition, as part of this Supplemental Information, Shell has provided an Environmental Significance Assessment, which can be found in Appendix B.*

Regulatory Setting and Cumulative Effects		
Q #	**Question**	**Response**
5	*Please define the meaning of "acceptable environmental and social effects" as it relates to the Treaty Rights of the Mikisew Cree.*	• *Whether socio-economic and environmental impacts are acceptable is a matter for the regulators (both Provincial and Federal) to determine and is based on considering and balancing the various components of the public interest.* • *A component of this determination involves examining the potential impacts of a Project, if approved, on the exercise of Treaty and Aboriginal Rights. While the Project is predicted to have primarily low or negligible impacts, with a small number of impacts of higher consequence, none of those impacts are predicted to be significant. Specifically, while there may potentially be some level of impacts to the biophysical components that MCFN rely upon (either directly or indirectly) for the exercise of Treaty and Aboriginal Rights, those impacts are not expected to be significant.* *Where there are potential impacts on the exercise of Treaty or Aboriginal Rights, it then must be determined whether or not those impacts can be justified in a manner that is consistent with the honour of the Crown, having regard to the other benefits and impacts that might arise from the project.*

6	*Please explain how previous commitments to monitoring follow-up, and reclamation are impacted by the current application. For how long will the environmental impact predictions associated with the PRMA be valid?*	• *Previous monitoring and reclamation commitments for the Jackpine Mine Phase 1 Project would continue to apply. However, Shell and MCFN may choose to modify these commitments to reflect the addition of the Jackpine Mine Expansion.*
		  • *e.g. Input into monitoring program design, monitoring programs annual review, TEK integration, participation on Albian End Land Use and C&R Committees.*
		• *The EIA predictions for PRM are conservative and will remain valid for the duration of the project unless Shell proposes major changes such that the predicted impacts are no longer conservative.*
		  • *If the latter were to occur, Shell would be required to seek regulatory approval for the proposed changes.*

Regulatory Setting and Cumulative Effects		
Q #	**Question**	**Response**

7	*What feedback has Shell received from First Nations and the Government of Alberta regarding bitumen-fired cogeneration? Is Shell aware of other operators being denied the ability to use bitumen to fire steam generators? Does Shell believe that this is the most environmentally acceptable manner in which to exploit the resource? Will not the burning of bitumen result in the need for additional contaminant removal and subsequent storage or disposal?*	• *Shell is aware of AENV's Policy 1B governing the use of bitumen from in-situ operations to generate steam and has been asked a number of questions pertaining to the use of asphaltenes as fuel.*
		  • *See PRM Round 1 questions #164, 189, 227, 230, 231*
		  • *See JPME Round 1 questions # 161, 235, 206, 213, 214*
		• *Shell is not intending to use bitumen (which otherwise could be sold) to produce steam, rather, Shell's project is based further utilizing asphaltenes which are currently rejected and disposed of in tailings.*
		• *By utilizing this waste product, Shell is able to reduce the amount of purchased gas thereby allowing it to be utilized for higher value uses such as the production of hydrogen required for bitumen upgrading.*
		• *While the use of asphaltenes requires additional contaminant removal, Shell has demonstrated that these emissions can be managed in an acceptable way and has provided for the inclusion of on-site Class II waste disposal for ash and solids generated from the FGD. Incorporating the use of high efficiency co-generation further minimizes the production of these contaminants.*
		• *In proposing asphaltene-fired cogeneration, Shell believes it has provided an opportunity to maximize ore utilization while managing environmental aspects of this technology. Shell is not suggesting this technology is the most environmentally acceptable approach to power/steam generation, but suggests the it can sufficiently manage the impacts associated with using this technology.*

8	*What changes have been made to the tailings of plan to comply with all aspects of Directive 074?*	• *A tailings management plan for Jackpine Mine Phase 1 has already been filed with the ERCB as part of compliance to Directive 074.* • *Since the Jackpine Mine Expansion is an amendment to the existing Jackpine Mine approval it will also be compliant with D-074. Shell fully supports the objectives of D-074 and is currently working with the Board to meet the specific requirements outlined in the Directive.*
9	*How will Shell consider actual pre-disturbance conditions (not current or baseline conditions) in its reclamation planning efforts?*	• *Shell's reclamation planning considers that boreal forest is present in pre-disturbance conditions, reclamation activities will return boreal forest species, and boreal forest will be present at closure.* • *Baseline conditions in undisturbed areas are considered to be the same as pre-disturbance. Disturbed areas in baseline conditions are not the same as pre-disturbance in terms of species distribution.* • *However, reclamation planning considers that all existing disturbances will be reclaimed at closure, resulting in a reduction in disturbances at closure.* • *Shell uses the same ecosites and plant species as actual pre-disturbance conditions, and distributes them across the reclaimed landscape by comparing reclamation position, slope, aspect and moisture conditions with similar pre-disturbance conditions.*

Regulatory Setting and Cumulative Effects		
Q #	**Question**	**Response**

10	*What specific learnings exist from the Muskeg River Expansion and Jackpine Mine - Phase 1 that have been incorporated into current C&R Planning? Please elaborate and explain.*	• *MRM and JPM1 are both relatively young mines – so specific learnings are related to tree clearing and seed collection information, and to soil salvage handling operations such as:*
		  • *Information on soil types, textures and natural hydrocarbon content as found in soil salvage operations at Jackpine Mine Phase 1 and Muskeg River Mine*
		  • *Peat-mineral reclamation material storage and mixing ratios appropriate for conditions at Jackpine Mine Phase 1 and Muskeg River Mine*
		  • *Information from the Muskeg River Mine instrumented slope on LFH seed and propagule germination, soil moisture and mineralization rates.*
		• *Learnings also include Shell research programs tailored to, and located on the Muskeg River Mine site (and on the Jackpine Mine Phase 1 site once it is operational):*
		  • *Smoke water-assisted germination of native plant species (including labrador tea, blueberry, saskatoon and cranberry)*
		  • *Brush-mulching as an amendment to reclamation soils*
		  • *Cover crop and fertilizer application effects on native plant establishment*
		  • *Lean oil sands in the rooting zone and mycorrhizal associations with blueberry and Jack pine*
		  • *Bio-engineering of sloped areas and vegetated waterways*

11	*Please provide detailed C & R plan with targets and benchmarks and with strategies for monitoring progress. Such a plan should also contain alternative strategies should targets not be met. The plan should be based upon known successful C & R strategies and should include at minimum, lease-wide TR targets and associated temporal scenarios for reclamation, wildlife recolonization, revegetation, and wetland re-establishment The C & R plan should actively consider and utilize Mikisew Cree TEK.*	• *Current level of detail (scale) in CC&R planning is appropriate for conceptual scale at the EIA level.*
		• *Shell believes that the current CC&R Plan is conceptual, yet executable due to the commitment to adaptive management and the commitment to reflect current guidelines in reclamation planning.*
		• *Further detail in C&R planning is provided in updated mine closure and reclamation plans submitted during the approval period – these updated plans consider:*
		  • *Up-to-date operational information (e.g. mine plans, material balances)*
		  • *Up-to-date research information*
		  • *Updated guidelines and other regulatory requirements*
		  • *Available TEK*
		• *Detailed reclamation plans based on successful strategies and regional guidelines are reported annually to government.*
		• *Updates to CC&R Plans required within EPEA Approvals will incorporate results from reclamation research, adaptive strategies and updated guidelines.*
		• *Input has been solicited from Mikisew Cree at the Reclamation Advisory Committee on a regular basis.*

Regulatory Setting and Cumulative Effects		
Q #	**Question**	**Response**
12	*What steps will Shell take to develop, at minimum, lease wide targets and associated temporal scenarios for reclamation, wildlife recolonization, revegetation, and wetland re-establishment?*	• *Shell has already committed to lease-wide targets and associated temporal scenarios through the metrics applied to measuring equivalent land capability: the LCCS (land capability classification system) and the forest productivity ratings.* • *Shell will continue to work in CEMA to inform adaptive measures that can be included in CC&R plans.* • *These targets are expressed as areas of ecosite types and land capability targets in the CC&R plan, and addressed temporally through site-specific reclamation plans (with dates of activity) and far future prediction scenarios that are combined into the environmental impact analysis.* • *Shell agrees that the metrics available for equivalent land capability do not cover as many areas of closure and reclamation planning as are desirable (e.g. wetlands), and is working with government and stakeholders to generate targets and benchmarks that span an appropriate range of indicators of reclamation success.*
13	*Given the lack of regulatory requirements for detailed planning (i.e. targets and associated temporal scenarios), it is not clear what is being done. Please elaborate and explain.*	• *Mine planning coordination and cross-boundary planning for JME has been carried out in consideration of final landforms, drainage plans and revegetation plans adjacent to Imperial Kearl (Jackpine expansion area) and for JPM1 adjacent to Syncrude Aurora South using as much information as is publicly available for these neighbouring sites. Reclamation plans have applied the same boundary planning to areas of the lease boundary not adjacent to other developments, but adjacent to undisturbed areas, river buffer zones and wildlife corridors and we hold regular meetings with Imperial and Syncrude to discuss issues related to boundary planning.* • *Boundary planning for oil sands development sites is a current focus for CEMA - all oil sands mine operators have met in conjunction with the Closure Coordination Task Group of CEMA to support boundary planning related to: ore access across boundaries; integrated drainage plans; integrated landform plans; integrated revegetation plans (appropriate for boundary landforms). This boundary planning information is required to be shown in Mine Closure and Reclamation plans to be submitted to AENV as a requirement for all oil sands mine EPEA approvals in December 2011.*

Regulatory Setting and Cumulative Effects		
Q #	**Question**	**Response**
14	*It is not apparent that cumulative effects to TLU from multiple crossings, water intakes, river encroachment by industrial activity and increased recreational use of the Athabasca River and the Athabasca River Valley were considered and addressed in the EIA report. Please elaborate and explain.*	• *The TLU Assessment considered the disturbance to land available for MCFN TLU activities under the three cumulative assessment cases and also considered the traditional plant potential and representative fish, and wildlife habitats at Project closure.* • *The TLU assessment considered potential effects due to changes in access, land disturbances, wildlife habitat availability, traditional plant potential, and potential effects to hunting, trapping, fishing, vegetation harvesting, and culturally important areas or sites.* • *The results suggest that increased access into the region has resulted in increased hunting pressure from non-traditional hunters, and a decrease in the number of animals (e.g., bears) available for hunting or trapping.* • *The results also suggest that there has been an increase in vandalism to traplines and cabins as a result of more people coming into the region.* • *The results of the Fish and Fish Habitat assessment predict that the effects of the Project on fish habitat and fish abundance in the JME and PRM areas, and the Athabasca River will be negligible.* • *The potential effects of the Project on changes in access were assessed in the Resource Use component and were considered negligible.* • *Planned Development Case effects on non-traditional hunting, and other recreational activities were assessed in the Resource Use component and were classified as moderate (negative).*
15	*Provide a summary table that lists sources and dates of the last data updates.*	• *According to Alberta Environment's CEA Guide, a CEA explores "the changes to the environment caused by an activity in combination with other past, present, and reasonably foreseeable human activities".* • *Reasonably foreseeable human activities are planned projects, and for the purposes of an assessment a planned project is any project or activity that has been publicly disclosed prior to the issuance of the TOR or up to six months prior to the submission of the application and the EIA report.* • *Appendix 3-5 of the EIA provides information on those developments considered in the EIA. This information was current to June 2007. The EIA was submitted in December 2007.* • *Information for each project represented the most current information available.* • *Spatial data used includes seismic lines.*
16	*In the map references, IHS Energy Ltd. (August 2006) was listed as a data source. Please provide a description of the data set?*	• *IHS Energy Ltd. is a supplier of oil and gas regulator maps and spatial data. The data set includes geographic and production / licensing information relating to pipelines, well sites, facilities as well as some thematic mapping data related to regulations for wildlife, forestry, trapping, etc.*
17	*Can Shell provide a CEA which focuses on the impacts of the projects on Traditional Land Use?*	• *Cumulative effects are addressed in the EIA/SEIA and meet the conditions of the Terms of Reference.* • *Shell's EIAs have examined the cumulative effects on all relevant biological receptors, and have examined the potential impacts to resources available for MCFN TLU on both a cumulative and project–specific basis* (EIA Volume 5, Sections 8.1.1 and 8.3). • *Shell has remained open to working with MCFN in gathering further TEK/TLU information although it should be noted that the regulatory process is at a very advanced stage.*