

1.0 OVERVIEW

1.1 PURPOSE

Information contained in this submission is provided to the Joint Review Panel (JRP) to:

- Respond to the 77 Supplemental Information Requests (SIRs) issued to Shell by the JRP on October 25, 2012.
- Provide additional information in response to the July 9, 2013 Joint Review Panel Decision Report on the Jackpine Mine Expansion (JPME) Project.
- Address errors or omissions identified in the Pierre River Mine (PRM) Application, its Environmental Impact Assessment (EIA) and Updates.

1.2 STRUCTURE OF SUBMISSION

This submission is composed of the following main sections:

- Section 1.0: Overview;
- Section 2.0: Project Errata;
- Section 3.0: Shell Responses to Supplemental Information Requests; and
- Appendices: Appendices 1 to 8.

Given the technical nature of certain SIRs, a high level summary response is provided in Section 3.0 with additional details provided in the Appendices.

To avoid confusion between the various assessment cases and their respective revisions, the following nomenclature has been adopted for this submission:

All references to the “EIA” refer to the 2007 EIA, as amended.

- All references to the “EIA Base”, “EIA Application” and “EIA Planned Development” cases refer to the 2007 EIA cases, as amended.
- All references to the updated assessments contained in this submission are referred to as:
 - 2013 Base Case;
 - 2013 PRM Application Case; and
 - 2013 Planned Development Case (PDC).

Table 1-1 provides a concordance of all SIRs that may have supporting information in the Appendices.

Table 1-1 Joint Review Panel Supplemental Information Request and Concordance to Supporting Information

SIR Category	Location of Supporting Information	
	JRP SIR	Appendix
Needs, Alternatives, Alternatives to	1	-
Needs, Alternatives, Alternatives to	2	-
Needs, Alternatives, Alternatives to	3	-
Needs, Alternatives, Alternatives to	4	-
Determination of Pierre River Mine Project Effects	5	Appendices 1 and 3.1
Significance of Effects	6	Appendices 1, 2 and 3.1
Significance of Effects	7	Appendices 1 and 2
Cumulative Effects	8	Appendices 2, 3.1 and 3.7
Cumulative Effects	9	Appendix 2
Mining and Geology	10	-
Mining and Geology	11	-
Process	12	-
Process	13	-
Process	14	-
Process	15	-
Tailings	16	-
Tailings	17	-
Tailings	18	-
Air	19	Appendix 3.2
Water Quality/Quantity and Navigation	20	-
Water Quality/Quantity and Navigation	21	-
Water Quality/Quantity and Navigation	22	-
Water Quality/Quantity and Navigation	23	-
Water Quality/Quantity and Navigation	24	-
Water Quality/Quantity and Navigation	25	-
Water Quality/Quantity and Navigation	26	Appendix 4
Water Quality/Quantity and Navigation	27	Appendix 2
Water Quality/Quantity and Navigation	28	Appendix 4
Water Quality/Quantity and Navigation	29	Appendix 2
Fish and Fish Habitat	30	-
Fish and Fish Habitat	31	-
Fish and Fish Habitat	32	Appendices 1 and 2
Aquatic Health	33	Appendix 1
Wildlife	34	-
Wildlife	35	Appendix 5
Wildlife	36	Appendix 2
Wildlife	37	Appendices 1 and 3.7
Wildlife	38	-
Wildlife Health	39	-
Species at Risk	40	Appendix 5
Species at Risk	41	-
Species at Risk	42	-
Species at Risk	43	-

Table 1-1 Joint Review Panel Supplemental Information Request and Concordance to Supporting Information (continued)

SIR Category	Location of Supporting Information	
	JRP SIR	Appendix
Species at Risk	44	Appendix 6
Species at Risk	45	Appendices 1 and 2
Vegetation and Forest Resources	46	Appendix 1
Vegetation and Forest Resources	47	-
Vegetation and Forest Resources	48	-
Vegetation and Forest Resources	49	Appendix 2
Vegetation and Forest Resources	50	Appendix 1
Effects of the Environment on the Project	51	-
Socio-Economic	52	-
Socio-Economic	53	Appendix 2
Socio-Economic	54	Appendix 2
Socio-Economic	55	-
Socio-Economic	56	Appendix 2
Socio-Economic	57	-
Socio-Economic	58	-
Health	59	-
Health	60	-
Health	61	-
Health	62	-
Aboriginal Rights and Interests	63	-
Aboriginal Rights and Interests	64	-
Aboriginal Rights and Interests	65	Appendices 2, 3.8 and 7
Aboriginal Rights and Interests	66	-
Aboriginal Rights and Interests	67	Appendix 3.8
Aboriginal Rights and Interests	68	Appendices 2, 3.1, and 7
Aboriginal Rights and Interests	69	Appendices 7 and 8
Aboriginal Rights and Interests	70	Appendices 2 and 7
Capacity of Renewable Resources	71	Appendices 1 and 2
Capacity of Renewable Resources	72	Appendices 1 and 2
Accidents and Malfunctions	73	-
Accidents and Malfunctions	74	-
Accidents and Malfunctions	75	-
Follow-up and Monitoring	76	-
Errata	77	-

Table 1-2 Additional Supporting Information

Shell Supporting Information	JRP SIR	Appendix
Consideration of all future foreseeable projects or activities as of the date of the Panel's Terms of Reference (June 2012)	8	Appendices 1, 2, and 3.1
Consideration of reasonably foreseeable forest harvesting plans over the operating life of the Project	8	Appendix 2
Consideration of the effects of past and future forest fires	8	Appendix 2
Updated socio-economic information	8, 69b	Appendices 2 and 6
Assessment of the potential effects of the Project on the Peace Athabasca Delta	8	Appendix 3.4
Use of updated Alberta Biodiversity Monitoring Institute, Alberta Conservation Management Information System and Fisheries and Wildlife Management Information System information as of September 2011	5	Appendices 1, 2, and 3.1
Climate Change Update	51	Appendix 4
Resource Management Criteria Assessment	8	Appendices 3.1 and 2

1.3 APPROACH TO JOINT REVIEW PANEL INFORMATION REQUESTS

The following sections provide an explanation of changes to the Pierre River Mine since 2011, additional considerations resulting from the Jackpine Mine Expansion Decision Report and the approach used by Shell in preparing some of the more detailed elements of this submission.

1.3.1 Background

On June 15, 2012, the PRM JRP requested public comments on the sufficiency of information available on the Canadian Environmental Assessment Agency (CEAA) registry to meet the PRM JRP Terms of Reference (TOR). After reviewing the Public comments that were filed (including Aboriginal persons or groups), along with Shell's responses to those comments, the PRM JRP issued 77 SIRs on October 25, 2012.

On October 23, 2012, a public hearing commenced for the Shell JPME project. Since the same internal resources were required for JPME and PRM, Shell informed the JRP on March 20, 2013 that it would be August 2013 before complete responses to the PRM SIRs could be filed. On July 9, 2013 the JRP for the JPME released their decision report. This report recommended approval of the JPME subject to 22 conditions. The report also contained comments regarding Shell's environmental assessment methodologies and 88 recommendations to government which commented on many aspects of the project development including cumulative environmental effects in the region. Due to the nature of these comments Shell believed that it should try, where possible, to address these issues in this filing.

Accordingly, on August 9, 2013, Shell notified the JRP that it would further delay the filing of the PRM SIRs until October 2013 to provide the JRP with a comprehensive information package and avoid potential second-round SIRs.

1.4 CHANGES TO THE PIERRE RIVER MINE PROJECT

Since the last submission of information to the JRP on the PRM project in May 2011, several events have taken place.

1.4.1 Lease 14

On June 10, 2013, Shell informed the JRP that on June 7, 2013, Shell Canada Energy and Teck Resources Limited (Teck) reached agreement to exchange the bituminous mineral rights to certain oil sand leases.

Specifically, former Shell leases 309, 310, 351, 475, 476, 607, 608, 609 and the northeastern portion of lease 352 have been exchanged for Teck's lease 14 which is located between Shell's lease 9 and 17 immediately adjacent to the PRM area. None of bituminous resource involved in this exchange was proposed to be mined as part of the PRM application.

Shell has also entered into a Co-operation Agreement with Teck that allows for the PRM to proceed as filed with no modifications. While Teck now owns the mineral rights to leases that are proposed for PRM infrastructure, such as external tailings facilities and fish compensation areas, the construction, operation and abandonment of these facilities is assured under this Agreement. Longer term, this Agreement will facilitate efficient development of the regional resource base by minimizing ore sterilization along common lease boundaries and by improving the utilization of infrastructure.

The impact of the newly acquired lease 14 on any future expansion of the PRM is not known at this time and would therefore be the subject of a future regulatory review. At this time, Shell has no plans to modify the PRM Application or development, and the attached SIR responses are submitted on this basis.

1.4.2 Development Timing

The PRM application was filed in December 2007 with an expectation that regulatory approval could be achieved by 2010, construction started in 2012 and first oil in 2018. This timing is no longer feasible and accordingly Shell has revised the timing

of the PRM development to reflect a more realistic start up of 2021. This delay has resulted in changes to:

- the EIA aquatic snapshots;
- air emissions from the mine fleet;
- timing of socio-economic impact assessment work force estimates; and
- mine planning schedules.

Where applicable, these changes are reflected in the attached SIR responses.

1.4.3 Asphaltene Energy Recovery (AER)

During the review of the JPME project, Shell notified the JPME JRP that Shell was no longer pursuing the development of Asphaltene Energy Recovery AER technology and that it was removed from the scope of the JPME project. The Planned Development Case (2012 JPME PDC) requested by the Panel reflected this scope change. The environmental assessment cases contained within this submission also reflect the removal of AER technology from the PRM.

1.5 RESPONSE TO THE JACKPINE MINE EXPANSION DECISION REPORT

The JPME Decision Report released on July 9, 2013 contained recommendations pertaining to certain methodologies Shell employed as part of its environmental assessment for JPME and PRM. In addition, a number of concerns were raised by stakeholders during the JPME hearing. These recommendations and concerns were not reflected in the October 25, 2012 SIRS because the information requests were issued before the public hearing and subsequent release of the decision report. The following section outlines some of these items and Shell's response to them in this submission.

1.5.1 Tier 4 Truck Availability

The original PRM EIA submitted in 2007 was based on information which indicated that Tier 4 trucks would be commercially available to Shell in 2018. Environment Canada challenged this assumption during the JPME hearing by stating that this is no longer a reasonable assumption. The updated PRM air modelling includes the original PRM EIA mine fleet emissions which were based on Tier 4 emissions standards (i.e., Tier 4 was assumed for the entire mine life). Therefore, the updated

PRM air assessment is in line with Environment Canada's statement and the updated JPME air assessment

1.5.2 Lower Athabasca Regional Plan

On September 1, 2012 the Lower Athabasca Regional Plan came into effect. To the extent possible, Shell has included the requirements based on this plan in the attached PRM submission. This includes the addition of new compounds into the water quality modelling sections.

1.5.3 Climate Change Modelling

During the JPME hearing, concerns were raised by interveners and Environment Canada around the potential effects of climate change on the Athabasca River flows. The JRP also requested updated climate change data in JRP SIR 26. As a result, further assessment is provided in this submission using outputs from projected climate change scenarios based on Global Circulation Model (GCM) forecasts of future climate conditions. These were analyzed using a calibrated and validated hydrologic model, (i.e., the Hydrological Simulation Program-Fortran [HSPF] model) developed for the Athabasca River basin and its tributaries.

1.5.4 Terrestrial Impact Assessment

In response to comments and concerns raised during the JPME hearing, Shell has updated its terrestrial impact assessment. Specifically;

- Federally listed wildlife species at risk that had not previously been identified as Key Indicator Resources (KIRs) are included as KIRs in this submission.
- An updated disturbance layer was applied to all components of the terrestrial assessment, and was incorporated into predictive models. Updated linear feature data were obtained from the Government of Alberta in February 2013.
- Access features including roads and cut lines were updated as of October 2010 and May 2011 (depending on the location in the Regional Study Area).
- Updates are based on interpretation of linear features from satellite imagery. Pipelines and well site updates were obtained from IHS Energy in February 2013 and are current as of November 2012. Within the Local Study Area, linear and non-linear disturbances were updated by Golder Associates Ltd. (Golder) based on August 2011 high-resolution satellite imagery. Updated Alberta Biodiversity Monitoring Institute

(ABMI), Alberta Conservation Management Information System (ACIMS), and Fisheries and Wildlife Management Information System (FWMIS) were incorporated into the updated assessment of the effects of the PRM.

The PRM update assessed the likely significance of potential effects of PRM on terrestrial resources based on ecological thresholds (May 2009 Pierre River Mine, Supplemental Information, Volume 1). However, the JPME JRP decision report reassessed the effects of JPME using a resource management criteria approach as advocated by the Cumulative Environmental Management Association's (CEMA's) Terrestrial Ecosystem Monitoring Framework.

The application of ecological thresholds and resource management criteria do not necessarily produce identical significance determinations for all KIRs. Shell believes that the ecological threshold approach is the most appropriate methodology for the determination of significance. A discussion of each approach and a comparison of the two methodologies is contained in Appendix 3.1, Section 2.11.2.4

To assist the JRP in reconciling the differences between these two different approaches, the terrestrial significance determinations were carried out for each KIR using both the ecological threshold and the resource management criteria approach. These parallel approaches to significance determination were based on exactly the same data inputs, but in most cases produced different results.

1.5.5 Mitigation for Terrestrial Effects and Conservation Offsets

Shell acknowledges the July 2013 JPME JRP's findings and recommendations regarding significant adverse cumulative effects in the oil sands region. Shell also agrees with the JRP's finding that conservation offsets are one mitigation option that should be considered to minimize effects given the long disturbance period inherent with any open pit mining activity. Shell is also committed to working with the relevant regulators on various mitigation options for JPME and PRM (see Appendix 4.3.7) including conservation offsets.

In addition, Shell is currently involved in a tri-lateral process with the Government of Alberta, non-governmental organizations and other companies to discuss the policies that will be necessary to support a process by which cumulative effects can be mitigated, not only in the oil sands, but in other parts of Alberta. Shell believes that this initiative together with other existing frameworks such as the Lower Athabasca Regional Plan and the Alberta Wetlands policy will address many of the concerns raised by the JPME JRP.

Recognizing that the development of policies can take time, Shell is also actively working with non-governmental organizations to acquire conservation lands that will help preserve valuable ecosystems in the province. Shell's recent partnership with Ducks Unlimited Canada resulted in the acquisition of approximately 6,000 acres of sensitive grasslands and prairie wetlands to create the Shell Buffalo Hills Conservation Ranch. This recent example demonstrates Shell's commitment to mitigate its impact on wetlands by protecting habitats for migratory birds and water-reliant species at risk. Through similar initiatives over the last six years, Shell has created conservation areas that are now equal to approximately one-third of its oil sands mine disturbance footprint with an aspiration longer term of net neutral disturbance for land.

1.5.6 Aboriginal Concerns

As a result of information presented during the JPME review Shell has revised and updated the PRM cultural effects review by:

- including recent Traditional Land Use (TLU) information submitted during the JPME hearing;
- including the potential effects of noise, odour, visual effects and cultural factors that may influence how individuals choose to exercise TLU activities; and
- separating the potential effects by Aboriginal group.

1.6 ASSESSMENT CASES

1.6.1 Approach to the Pierre River Mine Effects (JRP SIR 5)

In the preamble of JRP SIR 5, the JRP notes that the original EIA for the JPME and PRM, as amended, contains some sections where assessment results were combined for the two proposed projects. The JRP requested that Shell provide effects related to PRM alone for specific components of the EIA. These components, as listed in JRP SIR 5, include; Air Quality and the Effects of Air Emissions on Human and Wildlife Health, and Ecological Receptors; Hydrology; Water Quality; Aquatic Health; Fish and Fish Habitat; Soils and Terrain; Terrestrial Vegetation, Wetlands and Forest Resources; Wildlife and Wildlife Habitat; and Biodiversity.

Shell's response to JRP SIR 5 in Section 3.0 is a summary of the updated 2013 PRM Application Case excluding JPME for the specified sections. Detailed supporting information provided in Appendix 1 was developed with consideration of

the other JRP information requests, items raised by regulators and stakeholders during the PRM application sufficiency review, and commitments made previously by Shell for supporting assessment work. Inclusion of these items provides a more robust assessment and maintains consistency between the JRP SIR 5 response and the other information presented in the submission. Supporting methodologies and detailed assessments are found in Appendix 3.

1.6.2 Approach to the Pre-Industrial and Updated Planned Development Cases (JRP SIR 8)

In the preamble to JRP SIR 8, the JRP requests Shell to update to its Cumulative Effects Assessment by including a Pre-Industrial Case (PIC), forest harvesting plans, effects of past and future forest fires in the Regional Study Area, and an update on future foreseeable projects or activities as per the PRM JRP TOR.

The 2013 PDC requested by the JRP assesses the cumulative effects that could result from existing and approved developments, the PRM, and planned (publicly disclosed) developments in the Athabasca Oil Sands Region, as of June 2012. It also incorporates additional information committed to by Shell (i.e., assessments for the Peace Athabasca Delta, forest harvest and forest fires, and updated socio-economic, ABMI, ACMIS, and FWMIS information as of September 2011).

Unlike many previous EIAs in the Athabasca Oil Sand Region, the comparison to 2013 PRM Application Case presented in JRP SIR 8 represents the cumulative effects from pre-industrial conditions and not the effects of the PRM compared to a base case.

In the EIA and subsequent regulatory filings that pre-date this submission, data intended to represent the environment prior to industrial development has been referred to as "Pre-Development" or the "Pre-Development Case". In the interests of consistency and clarity, this information has been re-titled Pre-Industrial Case (PIC) for this submission to avoid confusion with the term Planned Development Case (PDC).

To allow a meaningful comparison between the various assessment cases within this submission, the EIA Base Case and the EIA Application Case, as amended through subsequent regulatory submissions that pre-date this submission, also required significant updating to account for the revisions to the June 2012 project inclusion list. Detailed lists of the projects included in the updated assessment cases are provided in Appendix 3.1 (Section 2.4).

The PIC is intended to represent conditions before substantial industrial development occurred in the region. Since information for some components is lacking, the PIC is based on the oldest data available, or on the most representative data available for each component rather than on a consistent year basis.

Shell's response to JRP SIR 8 in Section 3.0 of this submission provides a brief overview of the PIC and the 2013 PDC for PRM. Detailed information for the PIC and the 2013 PDC are provided in Appendix 2. Shell's response to JRP SIR 8 was developed with consideration of JRP information requests, matters raised by regulators and stakeholders during the regulatory process, and commitments made previously by Shell for supporting assessment work. Supporting methodologies and detailed assessments are filed in Appendix 3.

1.6.3 Approach to the Cultural Review (JRP SIR 69a)

In the preamble to JRP SIR 69, the JRP notes the requirement to consider any effects on hunting, fishing, trapping, cultural and other traditional uses of the land as well as related effects on lifestyle, culture and quality of life of Aboriginal persons. In response to JRP SIR 69a, Shell undertook a review of the potential effects of PRM and planned development on culture using available Traditional Ecological Knowledge (TEK) and Traditional Land Use (TLU) information. This review is contained in Appendix 7 and supports the response to JRP SIR 69a.