Section 8

Assessment Framework

8. Assessment Framework

8.1 EPA Guidelines for Environmental Assessment

Under the Western Australian EP Act, the EPA is required to identify, in its report to the Minister for Environment, what it considers to be the key environmental factors identified in the course of an assessment. The EPA uses environmental factors and associated objectives as the basis for assessing whether a proposal or scheme's impact on the environment is acceptable. Environmental Assessment Guideline No. 8 (EAG8) (EPA 2015a) sets out the EPA's environmental principles, policies, factors and associated objectives for the purposes of assessing environmental impacts.

Environmental Assessment Guideline No. 9 (EAG9) (EPA 2015b) outlines the EPA's 'Significance Framework' to determine the likely significance of a proposal and to inform decisions throughout the environmental impact assessment (EIA) process – from the EPA's decision on whether or not to assess a proposal, through to its recommendations to the Minister for Environment on whether or not a proposal should be implemented, and the recommended implementation conditions. The EPA has determined that the Yeelirrie Uranium Project will be assessed as a PER.

Cameco has applied these two guidelines to identify the key environmental factors for the Project and determine where mitigation measures will be required to minimise potential impacts.

The Environmental Scoping Document (ESD) for the Project was prepared by the OEPA in consultation with the key regulators (notably DPaW, DMP, DoW and DER) and was finalised on 10 April 2015. For this assessment, the EPA has identified the following key environmental factors that require assessment (Table 8-1, Appendix A1):

- Flora and vegetation
- Human health
- Subterranean fauna
- Terrestrial fauna
- Hydrological processes / Inland waters environmental quality
- Air quality and atmospheric gases
- Terrestrial environmental quality
- Heritage
- Rehabilitation and decommissioning
- Offsets.

The ESD outlines the required Scope of Works (Appendix A1). This PER has been prepared in accordance with this Scope of Works.

The 'Hydrological Processes' and 'Inland Waters Environmental Quality' factors address both surface water and groundwater impacts. As the impacts of the Project on surface water and groundwater are quite different, these have been discussed in separate sections Section 9.4, (Surface water) and Section 9.5 (Groundwater).

Key factors are addressed in Section 9, with the exception of Offsets which is addressed in Section 12. During assessment of proposals, other factors may be identified that are relevant to a proposal, but not of significance to warrant further assessment by the EPA, or impacts can be regulated by other statutory processes. For this assessment, the EPA has identified the other factor of 'Amenity' in relation to noise and access to roads. The potential impacts of the Project on local and regional amenity are discussed in Section 11.

Table 8-1: Environmental factors (EPA 2015a)

Theme	Factor	Objective	Applicability/ Significance to Project
Land	Flora and Vegetation	To maintain representation, diversity, viability and ecological function at the species, population and community level.	Key factor
	Landforms	To maintain the variety, integrity, ecological functions and environmental values of landforms and soils.	Other factor
	Subterranean Fauna	To maintain representation, diversity, viability and ecological function at the species, population and assemblage level.	Key factor
	Terrestrial Environmental Quality	To maintain the quality of land and soils so that the environment values, both ecological and social, are protected.	Key factor
	Terrestrial Fauna	To maintain representation, diversity, viability and ecological function at the species, population and assemblage level.	Key factor
Water	Hydrological Processes	To maintain the hydrological regimes of groundwater and surface water so that existing and potential uses, including ecosystem maintenance, are protected.	Key factor
	Inland Waters Environmental Quality	To maintain the quality of groundwater and surface water, sediment and biota so that the environmental values, both ecological and social, are protected.	Key factor
Air	Air Quality	To maintain air quality for the protection of the environment and human health and amenity.	Key factor
People	Amenity	To ensure that impacts to amenity are reduced as low as reasonably practicable.	Other factor
	Heritage	To ensure that historical and cultural associations are not adversely affected.	Key factor
	Human Health	To ensure that human health is not adversely affected.	Key factor
Integrating Factors	Offsets	To counterbalance any significant residual environmental impacts or uncertainty through the application of offsets.	Key factor
	Rehabilitation and Decommissioning	To ensure that premises are closed, decommissioned and rehabilitated in an ecologically sustainable manner, consistent with agreed outcomes and land uses, and without unacceptable liability to the State.	Key factor

8.2 Matters of National Environmental Significance

Under the Commonwealth EPBC Act, the Federal DoE is required to assess proposals which are likely to have a significant impact on matters of national environmental significance protected under the Act. These matters are:

- world heritage properties;
- national heritage places;
- wetlands of international importance (listed under the Ramsar Convention);
- listed threatened species and ecological communities;
- migratory species protected under international agreements;
- Commonwealth marine areas;
- the Great Barrier Reef Marine Park;
- nuclear actions (including uranium mines); and
- a water resource, in relation to coal seam gas development and large coal mining development

The matters of national environmental significance that are relevant to this Project are 'listed threatened species and ecological communities', 'migratory species protected under international agreements' and 'nuclear actions'. These are discussed in detail in Section 10.

8.3 Hazard and Risk Assessment Approach

BHP Billiton undertook a qualitative risk assessment for developing the Project. The risk assessment followed the methodology and processes outlined in Australian and New Zealand Standard AS/NZS ISO 31000:2009 Risk Management – Principles and Guidelines. The risk assessment was used to complement the EIA process and looked at the risks of potential failures of unplanned events.

The risk assessment process involved establishing the context, risk identification, risk analysis, risk evaluation and risk treatment. A set of Consequence[1] and Frequency[2] look-up tables were used during the risk assessment workshops to provide consistency throughout the process. Risks were categorised as:

- Extreme - considered unacceptable, immediate action required to reduce risk to a tolerable level;
- High - considered unacceptable, action required to reduce risk in accordance with the principles of ALARP;
- Medium - risk is tolerable, action is desirable to reduce risk in accordance with the principles of ALARP;
- Low - risk is acceptable, managed by routine processes.

Key Project risks identified by BHP Billiton related to water management, flora and vegetation, cultural heritage, terrestrial fauna, rehabilitation and closure, stakeholder engagement, radiation management and emergency response (e.g. in relation to a transport incident). There was considered insufficient information (at the time of BHP Billiton's assessment) to complete the risk assessment for impacts to subterranean fauna, invertebrate fauna and groundwater dependent ecosystems.

Cameco has reviewed the outcomes of BHP Billiton's risk assessment, and undertaken further work on significant flora, subterranean fauna and invertebrate fauna, to identify the following key risks for the revised Project (Table 8-2).

Detail of the impact assessment and proposed management measures for these key risks are discussed in detail in Section 9.

1 Consequence is defined as a measure of the magnitude of the impact from a risk event, should it occur.

2 Frequency (or likelihood) describes how often an event might occur.

Table 8-2: Key risks identified by Cameco for the Yeelirrie Project

Aspect	Inherent Risk	Management	Residual Risk
Atriplex sp. Yeelirrie Station (Threatened) (Section 9.1)	Loss of genetic diversity of the species by the removal of one population of *Atriplex* sp. Yeelirrie Station on the orebody.	Permanent protection of the other population of *Atriplex* sp. Yeelirrie Station. Ongoing research on all aspects of the plant eco-physiology to inform a translocation plan. Develop and implement a threatened species recovery plan	Medium to Low Sufficient work has been completed to indicate, with a reasonable level of confidence, that sustainable replacement populations can be estalished to maintain long term genetic diversity.
Subterranean fauna (Section 9.2)	That mining and groundwater production will have a significant impact on stygofauna.	Extensive sampling has been conducted. 115 subterranean species in total have been recorded in the Yeelirrie study area, which approximately matches the extent of Cameco's tenements at Yeelirrie. 10 species of stygofauna and five species of troglofauna are currently known only from areas where the extent of habitat will be reduced by development of the Yeelirrie Project. Moderately robust inferences may be drawn from the distribution patterns of related species and proximity of recorded species occurrences to the boundary of disturbance areas that eight of the 15 species may occur beyond the areas impacted by mining and groundwater abstraction. Management of groundwater abstraction to minimise the drawdown across the Project Area and therefore reduce the overall impact on the vertical habitat.	Medium Seven species out of the 109 species recorded may be restricted to the impact zone.
Yeelirrie Calcrete Priority Ecological Community (PEC) (Section 9.2)	That groundwater production will have an impact on the Yeelirrie Calcrete PEC. Approximately 37% of the calcrete habitat within the PEC will experience groundwater drawdown of >0.5 m as a result of groundwater production.	Management of groundwater abstraction to minimise the drawdown across the Project Area and therefore reduce the overall impact on the vertical habitat.	Medium

Aspect	Inherent Risk	Management	Residual Risk
Radiation (Radon gas) (Sections 9.6 and 9.8)	That levels of radon gas in the atmosphere might build up to unsafe levels in the open pit during periods of temperature inversions.	Modelling of radon gas in the open pit under stable atmospheric conditions (as would occur under an inversion) was conducted under worst case conditions (maximum hours in the pit under the worst case inversion) and showed that the maximum worker dose from Radon gas would be 4mSv/yr. Real time radon monitors would be established to confirm radon gas levels in the open pit and workers rotated or removed as required to minimise dose.	Low Radiation dose calculations suggest that radon gas would form about half of the overall dose to workers. Dose calculations are based on first principles and are extremely conservative. Real doses are expected to be less than half of the calculated dose.
Radiation contamination of public roads (Section 9.6)	Radioactive contaminated soil may be transferred out of the mine site onto public areas on the tyres and wheels of trucks and light vehicles.	Implementation of management measures to separate "clean" vehicles from “dirty” vehicles limiting each classification to the designated areas. Contaminated vehicles (vehicles that traffic on radioactive material) will not be allowed to enter “clean” areas or leave the site without decontamination.	Low Radiation levels are inherently low. Properly implemented procedures will ensure contaminated vehicles remain within contaminated areas.
Radiation contamination of soils, surface water and groundwater (Section 9.6)	Contamination of soils, surface water runoff and groundwater from active mine areas.	Implementation of radiation, dust and surface water management measures.	Low Project has been designed to minimise radiation risk.
Terrestrial fauna (Sections 9.3 and 10.1)	Terrestrial and avian fauna may consume contaminated water from tailings storage facilities and evaporation ponds resulting in the death of wildlife.	The input water quality is generally poor with initial salinities approaching sea water quality. Evaporation will result in salinity levels two to three times higher than discharge levels is making the water unpalatable. Implementation of management measures including fencing the facilities, bird scare horns and mirrors will also act as a physical deterrent.	Low

Aspect	Inherent Risk	Management	Residual Risk
Safe long term closure of the tailings storage facility (Sections 6.13, 9.5, 9.10 and 9.12)	That the closure and rehabilitation of the TSF will be unsuccessful, resulting in releases of radioactive tailings to groundwater and the environment.	Cameco has designed the mine plan to allow for in pit storage of tailings. Extensive studies have confirmed the hydrogeology is suitable for construction of an in-pit TSF. The TSF has been designed with low permeability floor and walls, with an under-draingage system to capture seepage. Suitable cover materials is also available to cover and rehabilitate the TSF. Surface water hydrology studies and landform evolution modelling have been completed confirming that in pit disposal provides long term security and integrity of the TSF.	Low