Section 12

Management Framework

12. Management Framework

12.1 Introduction

As one of the world's largest uranium producers, Cameco's mission is to bring the multiple benefits of nuclear energy to the world. Cameco's goal is to be recognised globally as a leader in corporate social responsibility by proactively addressing the social, environmental and financial aspects of the business.

Sustainable development is viewed as integral to the way Cameco does business. The company aims to integrate sustainable development principles and practices into every level of the company – from overall corporate strategy to every aspect of day to day operations. To track this, Cameco uses four measures of success:

- a safe, healthy and rewarding workplace;
- a clean environment;
- supportive communities; and
- outstanding financial performance.

These measures are supported by Cameco's values and effective governance to guide planning, decision-making and evaluation processes (Cameco's 2014 Sustainable Development Report; www.cameco.com/sustainable_development/2014).

12.2 Safety, Health, Environment and Quality (SHEQ) Policy

Cameco has a Safety, Health, Environment and Quality (SHEQ) Policy that is applicable to all of Cameco's employees, representatives, subsidiaries and joint venture projects. This policy recognises the safety and health of Cameco's workers and the public, protection of the environment, and quality of Cameco's processes as the highest corporate priorities during all stages of activities, including exploration, development, operations, decommissioning and rehabilitation. Cameco strives to be a leading performer through a strong safety culture, environmental leadership, operational excellence and commitment to the following principles:

- keeping risks at levels as low as reasonably achievable;
- prevention of pollution;
- complying with and moving beyond legal and other requirements;
- ensuring quality of processes, products and services; and
- continually improving overall performance.

Cameco's management system for implementation of its SHEQ Policy for the Yeelirrie Uranium Project will comprise the following programs:

- Quality Management Programme;
- Safety and Health Management Programme;
- Radiation Protection Programme;
- Environment Management Programme;
- Emergency Preparedness and Response Programme;
- Contractor Safety Programme; and
- Management System Audit Programme.

Cameco has also created an environmental management system (EMS) which commits each Cameco operating site to the development and implementation of a formal system which addresses

the short and long term impacts of its activities on the environment. The system includes written materials such as programs, plans and procedures, as well as the allocation of resources, the assignment of responsibilities and the training of employees.

12.3 Management Plans

In the PER, Cameco has outlined a range of management measures for each aspect and has made commitments to implementing these. A series of management plans, within the overarching Environment Management Programme, building on the measures outlined, will be developed for approval prior to the commencement of development of the Yeelirrie Project. These will include as a minimum:

- **Flora and Vegetation Management Plan** including ground disturbance procedures, weed management practices and a monitoring program to monitor the health of potentially groundwater-dependent vegetation, and vegetation potentially affected by surface water diversion and management structures.
- **Conservation Species Management Plan** for the management of known populations of *Atriplex* sp. Yeelirrie Station and priority flora present within the Development Envelope. A draft of the Conservation Species Management Plan, which includes an outline of the proposed Research Plan, is provided as Appendix E3. Prior to disturbance of *Atriplex* sp. Yeelirrie Station, Cameco will work with the Department of Parks and Wildlife (DPaW) to develop an Interim Recovery Plan which is likely to include proposed translocation, followed by a full Recovery Plan.
- **Fauna Management Plan** including specific measures for managing conservation significant species (State-listed and Commonwealth-listed).
- **Subterranean Fauna Management Plan** to be developed in conjunction with the Groundwater Operating Strategy and Groundwater Management Plan. The Plan will include measures to minimise impacts on subterranean fauna, including managing groundwater abstraction from the various borefields to limit drawdown in sensitive areas, requirements for the bunding of storage facilities for process chemicals and hydrocarbons to avoid any groundwater pollution.
- **Surface Water Management Plan** outlining how the site will be managed as a 'no-release' site to prevent the release of contaminants to the environment.
- **Groundwater Management Plan** to be developed as part of the Groundwater Operating Strategy. The Groundwater Management Plan will include measures to minimise impacts on subterranean fauna, groundwater-dependent vegetation and any interaction with surface water.
- **Dust Management Plan** outlining measures to keep dust levels as low as reasonably achievable (ALARA), the ambient air quality monitoring program (for PM_{10} and dust deposition), development of air quality management targets, and contingency measures to ensure compliance with the Air NEPM standard.
- **Mine Closure and Rehabilitation Plan** in accordance with the Department of Mines and Petroleum (DMP) and Environmental Protection Authority (EPA) guidelines for preparing mine closure plans (DMP & EPA 2015). This includes closure obligations and commitments, collection and analysis of closure data, identification and management of issues, stakeholder consultation strategy, post-mining land use and closure objectives, completion criteria, closure implementation, monitoring and maintenance, financial provisioning and management of information and data. A conceptual Mine Closure and Rehabilitation Plan is presented as Appendix O1.
- **Greenhouse Gas and Energy Management Plan** outlining measures to minimise greenhouse gas emissions through the application of best practices.
- **Cultural Heritage Management Plan** outlining the processes for the protection of cultural heritage during development, mining and closure. This will reference ground disturbance procedures to ensure no unplanned disturbance to areas of heritage significance.
- **Fire Prevention and Management Plan**.

Radiation management will be undertaken as part of the Radiation Protection Programme which will include:

- a **Radiation Management Plan** incorporating radiation protection principles and controls, general radiation management measures, radiation dose monitoring, radioactive waste management measures including management of mineralised materials and radiation management during closure and rehabilitation. This management plan will require approval by DMP prior to commencement of the Project;
- a **Transport Radiation Management Plan** for the safe transport of uranium oxide concentrate in accordance with Australian and international requirements. This will include an **Emergency Response Assistance Plan** (ERAP) to outline emergency planning and preparedness for responding to a transport incident involving uranium oxide concentrate (UOC). The Transport Radiation Management Plan will also refer to the general **Traffic Management Plan** which will be implemented to minimise the impact of Project-related vehicle movements on other road users.

12.4 Offsets

Environmental offsets are actions that provide environmental benefits which counterbalance the significant residual environmental impacts or risks of a project or activity. Unlike mitigation actions which occur on-site as part of the project and reduce the direct impact of that project, offsets are undertaken outside of the project area and counterbalance significant residual impacts.

12.4.1 Regulatory Framework

State

The WA EPA has published the WA Environmental Offsets Policy (EPA, 2011) and WA Environmental Offsets Guideline (2104) relevant to the use of environmental offsets in such approvals. This document provides a position on environmental offsets and establishes an approach for the use of environmental offsets in the context of environmental impact assessments in Western Australia.

The EPA defines environmental offsets as “environmentally beneficial activities” undertaken to “an offsite action or actions to address significant residual environmental impacts of a development or activity” to achieve a “net environmental benefit”.

Offsets can be direct offsets or indirect offsets. The policy states that environmental offsets should only be considered after all avoidance and mitigation options have been considered.

Commonwealth

The Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) can also require the consideration of environmental offsets as part of approvals and have also prepared a number of guidance documents relevant to the use of offsets under the EPBC Act.

The Australian Government defines environmental offsets as “measures that compensate for the residual adverse impacts of an action on the environment” (SEWPaC 2012).

12.4.2 Proposed Offsets

In the PER, Cameco has outlined the mitigation and management measures designed to avoid and minimise the impact of the development of the Project on the environment. In applying the environmental impact assessment significance framework outlined in Environmental Assessment Guideline EAG9 (EPA 2015b) and EPCB Act Policy Statement 1.1, there are two environmental factors that are likely to have residual impacts:

- clearing of Threatened species *Atriplex* sp. Yeelirrie Station (Section 9.1.5); and
- excavation and groundwater drawdown impacts on restricted stygofauna species (Section 9.2.5).

Proposed offsets for these two factors are discussed below. In addition, Cameco proposes a overall land use management plan for the Yeelirrie Pastoral Lease.

Atriplex sp. Yeelirrie Station

Cameco proposes an offset to address the residual impacts of the Yeelirrie Project on the genetic diversity of *Atriplex* sp. Yeelirrie Station as follows.

- Permanent protection of the Eastern population of *Atriplex* sp. Yeelirrie Station:
  - In the medium term, this would involve erecting a boundary fence and conducting ongoing maintenance;
  - In the long term, establishing appropriate vesting of land, for example with DPaW, or provide permanent long term protection for the area within the existing Pastoral Lease.
- Commitment to work with the DPaW and the EPA to develop and implement a Recovery Plan to translocate *Atriplex* sp. Yeelirrie Station (Western population) to the satisfaction of the EPA.

Subterranean fauna

Cameco proposes indirect offsets to address the residual impacts of the Project on Subterranean fauna.

- Cameco commits to develop and implement a plan, with input from DPaW and the EPA to define the values of the Yeelirrie PEC.
- Cameco commits to develop a research program to further understand the key variables required to support subterranean fauna habitat. Cameco would work with DPaW and the EPA to develop a research program and fund the program.

The Offsets Table is shown as Table 12-1.

12.5 Principles of Environmental Protection

The object and principles of the *Environmental Protection Act 1986* (EP Act) are outlined in Section 4A of the Act. The object of the Act is to protect the environment of the State having regarding to the principles outlined in Table 12-2. These Principles of Environmental Protection are also reflected in the EPBC Act under Section 3A (Principles of ecologically sustainable development) and Section 391 (Precautionary Principle). Cameco has considered these principles in the design and proposed management of the Project.

Table 12-1: Offsets Table

Project Name: YEELIRRIE URANIUM PROJECT									
Existing environment/ Impact	Mitigation			Significant Residual Impact	Offset Calculation Methodology				
	Avoid and Minimise	Rehabilitation Type	Likely Rehab Success		Type	Risk	Likely Offset Success	Time Log	Offset Quantification
Clearing of a population of *Atriplex* sp. Yeelirrie Station (Western genotype). An estimated 84,500 plants exist over an area of approximately 76 hectares which occurs above some of the highest grade ore within the Open Pit.	Avoidance of the impact is not possible if the Project is to proceed. A second population of the species (Eastern genotype) will be avoided and protected from grazing and longer term tenure options will be considered for permanent protection.	Pre-impact offsets are planned and presented in the Project PER. Plantations of equivalent area containing similar number of plants to be established over a number of sites to replace lost population. May not be able to restore full ecosystem function. Research and planting will occur prior to the commencement of mining.	**Can the environmental values be rehabilitated/Evidence?** Cameco considers that it has established reasonable (albeit preliminary) multiple lines of evidence to suggest successful revegetation to replace the population removed through mining is achievable. Work completed so far includes, • seed collection, storage and germination testing demonstrating that the plants seed well and that seed can be stored and will retain viability for several (at least) 5 years. • identification of suitable relocation sites. Soil and hydrology surveys of habitat and potential relocation sites to demonstrate similar sites can be located. • Plant demographic studies have been completed, including assessment of a small population on a rehabilitation site to understand and record population demographics.(see Section 9.1.5.3 of the PER for a full discussion of the work completed). A plan for ongoing work and revegetation has been proposed. The plan includes annual seed collection, preparation of Management and Relocation Plans and the commencement of seeding of new populations. The plans continue until 2018 when it would be reviewed based on the success of the work and approvals and plans to commence mining at Yeelirrie. **Operator experience in undertaking rehabilitation?** Cameco has not undertaken rehabilitation of *Atriplex* sp. before. Cameco have engaged companies with extensive experience in seed collection, handling and storage and in seed treatment and seeding, who will continue to support the project. In the PER Cameco has committed to the revegetation work prior to approval and commencement of ground disturbing activities, which provide a long lead time to establish techniques for successful revegetation. **What is the type of vegetation being rehabilitated?** Cameco will be re-establishing populations of *Atriplex* sp. Yeelirrie, a saltbush plant belonging to the subfamily Chenopodiaceae. **Time lag?** Research and planning has commenced. Establishment of new populations is planned for 2017, which is at least 4 to 5 years before the natural population would be cleared. **Credibility of the rehabilitation proposed (evidence of demonstrated success)** Cameco has not demonstrated success in re-establishing the plants. However, there are examples where the plant has grown within rehabilitated areas and Cameco has done considerable work at this stage to provide multiple lines of evidence to support the hypothesis that the plant can be successfully re-established.	**Extent** Low. Cameco proposes to establish new areas of similar area and numbers of plants. This work will commence a number of years before the natural population is cleared. **Quality Conservation Significance** The conservation significance of the plants impacted is considered to be medium to high. The population to be taken represents approximately 30% of the species and 100% of the genotype. **Land Tenure** The replacement population would be established on land owned and managed by DPAW or by Cameco where full protection can be achieved. **Time Scale** The impact to the natural population is permanent. However, some of the replacement populations would be established before the natural populations are disturbed. According to the agreed significance framework, residual impact is considered to be of low to moderate significance because of the time available to establish new populations before disturbance of the natural population.	Research Program - As detailed in the PER (Section 9.1.5.3 and in Appendix E3)	**Low** The work completed to date, while preliminary, provides reasonable evidence to support a proposition that a population of *Atriplex* sp. Yeelirrie Station could be established to replace the Western population that would be lost as a result of proceeding with the Project.	**Can the values be defined and measured?** Yes. Value of the preservation of the genetic diversity of the species can be measured. **Operator experience/Evidence?** The science of revegetation using *Atriplex* species is well developed. Cameco will work with experienced consultants and DPaW to achieve success. **What is the type of vegetation being revegetated?** Cameco will be re-establishing populations of *Atriplex* sp. Yeelirrie Station, a saltbush plant belonging to the subfamily Chenopodiaceae. **Is there evidence the environmental values can be re-created (evidence of demonstrated success)?** Yes, there is a small rehab population in an area that was rehabilitated in 2004. These plants have persisted on sub-optimal soil types compared to the natural habitat and provide some confidence that the species can be established in new locations where soil types similar to the natural habitat have been identified.	Cameco has committed to continuing the research plan commenced in 2014 (see Table 9-22 and Appendix E3). Cameco plans to undertake the first round of seeding to re-establish the plant in 2017. This is at least 4 years before the natural population would be cleared.	Cameco is committed to funding and implementing the research program as outlined.

Project Name: YEELIRRIE URANIUM PROJECT									
Existing environment/ Impact	Mitigation			Significant Residual Impact	Offset Calculation Methodology				
	Avoid and Minimise	Rehabilitation Type	Likely Rehab Success		Type	Risk	Likely Offset Success	Time Log	Offset Quantification
Loss of subterranean fauna habitat due to excavation and dewatering. Potential loss to Troglofauna and Stygofauna species that are restricted to the pit and drawdown zone.	The management options to further reduce the impact of the operation on stygofauna species are limited. However, Cameco has utilised the hierarchy of control to manage the impact of the Project on stygofauna. This includes: • **Avoid**: No abstraction wells have been located within the palaeochannel to the northwest of the proposed mine pit. While this area is potentially an excellent source of groundwater, it also supports many stygofauna species. • **Minimise**: Abstraction wells will be relocated throughout the supply area to reduce the groundwater impact where possible. Cameco believes that there are number of opportunities to continue to minimise this impact and these opportunities will be explored during a DFS.	N/A	**Can the environmental values be rehabilitated/Evidence?** No, however there is potential for species to recolonise from adjacent habitats as groundwater recovers and areas are backfilled. **Operator experience in undertaking rehabilitation?** N/A **What is the type of vegetation being rehabilitated?** N/A **Time lag?** Groundwater levels are expected to significantly recover in 50 years following cessation of the Project. **Credibility of the rehabilitation proposed (evidence of demonstrated success)** Successful rehabilitation of Subterranean Fauna has yet to be proved or attempted.	**Extent** Drawdown of >0.5 m will occur in the eastern part of the Yeelirrie calcrete, impacting on approximately 37% and 60% of the areas of inferred calcrete and playa, respectively. **Quality** There will be changes to groundwater quality which may affect the ability for species to recolonise impacted areas. **Conservation Significance** The Yeelirrie Priority 1 PEC represents a conservation significant community None of the 115 subterranean fauna species from Yeelirrie is currently listed for special protection under the State WC Act or Commonwealth EPBC Act. **Land Tenure** Pastoral Lease **Time Scale** Groundwater levels are expected to significantly recover in 50 years following cessation of the Project.	Offsets are proposed. At this stage of the approval process Cameco has not proposed the specific offset for Subterranean Fauna. Cameco will have further discussions with DPaW and the OEPA to determine a suitable and practical offset.	Currently unknown	**Can the values be defined and measured?** To be determined once offset is developed **Operator experience/Evidence?** To be determined once offset is developed **What is the type of vegetation being revegetated?** N/A **Is there evidence the environmental values can be re-created (evidence of demonstrated success)?** To be determined once offset is developed	To be determined once offset is developed	To be determined once offset is developed

Table 12-2: Principles of environmental protection

Principle	Cameco's Response
1. The precautionary principle Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of this precautionary principle, decisions should be guided by: (a) Careful evaluation to avoid, where practicable, serious or irreversible damage to the environment; and (b) An assessment of the risk – weighted consequences of various options.	The environmental impact assessment has enabled Cameco to gain a better understanding of the potential impacts of the Project and develop appropriate measures to mitigate and manage these potential impacts. Part of the environmental impact assessment has included a risk analysis (Section 8.3) to investigate the likelihood and consequence of certain events occurring, and identify high risks areas that may require further mitigation and management. Where there is uncertainty, Cameco has used conservative assumptions in assessing the potential impact of the Project and developing suitable management measures.
2. The principle of intergenerational equity The present generation should ensure that the health, diversity and productivity of the environment is maintained and enhanced for the benefit of future generations.	Cameco will ensure that the development of the Project does not affect the ability of future generations to benefit from a healthy, diverse and productive environment. One of the key issues is management of radioactive materials during all stages of the Project and beyond closure. The Conceptual Mine Closure Plan (Appendix O1) outlines the framework and measures Cameco proposes to ensure long term protection of the environment.
3. The principle of the conservation of biological diversity and ecological integrity Conservation of biological diversity and ecological integrity should be a fundamental consideration.	Cameco will ensure the disturbance of flora and fauna is kept to the minimum required for safe operation of the Project. Cleared areas no longer required, will be rehabilitated with native species throughout the life of the mine, and monitored for a period of time following closure to ensure the establishment of a self-supporting ecosystem. All aspects of the Project from design, construction, operation and closure will take into consideration the biological diversity of the area to ensure the ecological integrity of the broader area is protected. Where there are potential residual impacts on threatened flora and subterranean fauna, Cameco is proposing offsets as outlined in Section 12.4.2. A detailed Offset Package will be developed in consultation with DPaW and EPA.
4. Principles relating to improved valuation, pricing and incentive mechanisms (1) Environmental factors should be included in the valuation of assets and services. (2) The polluter pays principles – those who generate pollution and waste should bear the cost of containment, avoidance and abatement.	Cameco will: (1) Consider environmental factors in the valuation of the Project's assets; (2) Minimise the risk of pollution and generation of waste and ensure that any pollution that may occur is cleaned up; (3) Consider the full life cycle of materials used and generated by the Project and ensure waste is reused or recycled where practical; and (4) Pursue environmental goals in a cost effective manner whilst not compromising the environmental outcomes.

Principle	Cameco's Response
(4) Environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, which enable those best placed to maximise benefits and/or minimise costs to develop their own solution and responses to environmental problems.	
5. The principle of waste minimisation All reasonable and practicable measures should be taken to minimise the generation of waste and its discharge into the environment.	Cameco will implement the waste hierarchy of: • Avoid; • Reduce; • Reuse; • Recycle; • Recover; • Treat; and • Dispose.