Government of **Western Australia**
Office of the **Environmental Protection Authority**

Kintyre Uranium Project

Environmental Review Management Programme
ASSESSMENT NO. 1845

SUMMARY OF PUBLIC SUBMISSIONS

This document forms a summary of matters raised by the Office of the Environmental Protection Authority (OEPA) and the Department of the Environment (DotE).

Contents

1. Rehabilitation and Closure

1.1 Pit Lake

	Submitter	Comment	Response to comment
1	DotE, OEPA	The submitter notes that the proponent should undertake more specific pit lake work such as conceptual and numerical modelling of the final pit lake.	Numerical modelling of the pit lake has been conducted and is reported in Section 8.4.5.3 of ERMP. In response to requests from the Office of the Environmental Protection Authority and the Department of the Environment, further modelling has been undertaken of the final pit lake. The purpose of this modelling was to quantify the amount of groundwater flow through the pit area before and after mining operations and to assess the potential for salt plume migration out of the pit lake after mining operations cease via density gradient flow pathways. The analyses performed in this assessment demonstrate that variable-density groundwater flow from the pit lake is minimal and will not impact down gradient receptors. A copy of the report of the additional modelling work undertaken is attached as Attachment 1.
2	DotE	The submitter notes that the pit lake is likely to be unsuitable for future use as a regional lake and requests the proponent to state this more clearly.	Agreed. The pit lake is likely to be unsuitable for use as a regional lake.
3	OEPA	The submitter recommends that the proponent commit to updating the pit lake models and to continue to gather data during operations of the mine.	Noted. Cameco can continue to obtain data throughout the operational period to further refine the pit lake model. Cameco will consult with the OEPA, the WA Department of Water and Geosciences Australia when developing the data collection program.

1.2 Integrated Waste Landform, Waste Rock Dump and Tailings Management facility

	Submitter	Comment	Response to comment
4	DotE, OEPA	The submitters require information that the integrity of the TMF and liners will be assured over a long term time period.	<u>Integrity of the TMF</u> The focus of the TMF long-term closure strategy is to cover the tailings mass with an appropriate capping system, minimize erosion and promote landform stability. Closure of the TMF tailings facility is envisioned to be comprised of two main elements: a cover system for the tailings deposited in the TMF facility, and a surface water management system. The cover system will be designed to be water shedding so as remove the potential for infiltration of rain water after closure. The engineered cover will be designed and constructed to provide long term integrity. The detail is not covered in the conceptual mine closure plan and will be developed and addressed in a future version of the plan. <u>Integrity of the Liners</u> During operation, tailings liquor may seep through the TMF. Any seepage through the first layer of HDPE liner is captured in slotted pipe and pumped back to surface for discharge. Modelling based on the design of the liner system estimates approximately 29 litres per second will seep to the drainage system. Monitoring of the volume of discharge provides evidence of the status of the liner. Following closure the drainage system will continue to be operated to remove seepage from the final tails profile. At decommissioning, pumping systems will be removed and the closure plan expects that the HDPE liners will eventually fail in the long term. The closure cover is designed to shed rainfall to limit seepage through the tailings profile. The clay base of the TMF will further limit seepage into groundwater. In addition, the pit lake will be a terminal sink. Therefore even if the closure cover

			allowed seepage, and the clay base of the TMF permitted seepage, it would be captured by the pit lake. That is, any seepage will not affect regional groundwater. A network of monitoring wells will be located down-gradient of the TMF and Evaporation Pond. Perimeter wells will be located within 100 m of the facility to measure any leakage from the facility. These design and location of these wells would be completed as part of the detailed design of the TMF. Post closure monitoring is outlined in section 8.4 of Appendix E.
5	DotE	The submitter notes that the proponent should demonstrate that the design of the waste rock landform has considered scouring.	Cameco commits to undertaking appropriate landform evolution modelling during the feasibility study stage of the project to further inform the design of the WRL with regards to scouring.
6	DotE, OEPA	The submitters note that a commitment should be made to demonstrate the long term stability of the waste rock landform and TMF through an appropriate landform evolution model.	Erosional stability is addressed in section 4.5.4.6 of Appendix E. In addition, Cameco commits to undertaking appropriate landform evolution modelling during the definitive feasibility study stage of the project. The landform evolution modelling will be incorporated into an amended version of the Mine Closure Plan. Approval of the amended Mine Closure Plan will be obtained prior to the commencement of construction. Cameco has designed the WRLs considering nearby terrain to ensure that the WRLs are contoured to minimise the visual impact to the local environment.
7	DotE, OEPA	The submitter requires the proponent to provide further details on the long term integrity of the tailings cover in the context of climate and seismic activity.	Section 4.4.4 of Appendix E states: "*Considering the requirements of the Australian National Committee on Large Dams (ANCOLD), the TMF was designed using a Maximum Design Earthquake (MDE) PGA of 0.18g, and an Operating Basis Earthquake (OBE) PGA of 0.14g, based on an MCE of moment magnitude 5.3 generated by a background event within 10 km of the Kintyre site. These PGA estimates are anticipated to reflect the current tectonic environment with greater accuracy than a probabilistic value based on the very short historic seismic record available*". Three sources were identified to establish the design basis including Balfour Downs Lineament (170 km from site), Munro Scarps (220km from site) and a Background Event 10 km from site.

			Peak ground accelerations were developed for deterministic analyses, and published probabilistic values were also provided. Attenuation relationships provided by the PEER NGA project, Atkinson and Boore (2006), Somerville et al. (2009), and Liang et al. (2008) were used for the deterministic analyses, while probabilistic data published by the USGS and Geoscience Australia were used for comparison purposes.
8	DotE	The submitter suggests the proponent discuss the relevant datasets for the seismic hazard assessment.	Refer to the last paragraph of 7, above.
9	DotE	The submitter notes that a baseline of radon exhalation assessment should be undertaken in areas where there is likely to be a radon flux change during and after mining.	Section 8.11.4.3 of the ERMP provides a summary of the radon exhalation measurements performed to date. The monitoring program includes the areas of the pit and the TMF. Figure 8-26 shows the location of the baseline radiation monitoring program with the proposed site layout superimposed. If required, additional radon exhalation monitoring can be completed prior to the commencement of construction.
10	DotE	The submitter requires the proponent to comment on the availability of material for the waste rock landform.	Cameco presumes the submitter is referring to the availability of material to cap and close the waste rock landform. Section 8.2.4.2 of the ERMP identifies that soil units 1, 3, 4 and 5 contain suitable soils and rocks for rehabilitation and closure. Cameco has not completed a quantity analysis of the more suitable soil types. However, there is no suggestion that soil and rock requirements cannot be met. As set out on pg. 131 of the ERMP, Cameco will identify the quantities of soil and rock (and source locations) in an amended Mine Closure and Rehabilitation Plan. The amended Mine Closure Plan will be approved prior to the commencement of construction.
11	DotE	The submitter recommends the use of distal monitoring point for the TMF and downstream	Both the TMF and the Evaporation Pond will have under-drainage recovery systems in place. Preliminary modelling based on the type of liner system

		monitoring wells for the evaporation pond.	proposed for both facilities has estimated seepage from the facilities during operation will be 29L/sec from the TMF and 2L/sec from the Evaporation Pond. Long term monitoring of the volume of seepage recovered from the liner system will provide evidence of the performance of the facilities and assist in the prediction of seepage to groundwater. Section 8.12.6.4 of the ERMP identifies that a monitoring program will be included in the TMF Operating Plan that provides: "*A network of monitoring well locations down gradient of the TMF and evaporation pond. Perimeter wells will be located within 100 m of the facility to facilitate early warning of leakage. Groundwater levels would be sampled monthly for pH and electrical conductivity. Samples would be analysed in an independent laboratory for radionuclides and metals on an annual basis*". Down gradient surface water and groundwater bores are in place and are currently being monitored to establish baseline water quality prior to the commencement of mining. During the mining operations all bores will continue to be regularly monitored throughout the life of the mine and for a period following closure to assess any impacts. Final design of the TMF will include the design, location and construction of additional groundwater monitoring bores to monitor seepage from the TMF.
12	DotE	The submitter notes that there are no test pits or bores within the area of the TMF site and requires further clarification regarding the conclusions drawn on the TMF location.	There are a significant number of boreholes that have been drilled within the area of the TMF and the WRLs. There were a number of test pits and boreholes completed during the project development under the Rio Tinto ownership. These test pits and boreholes are discussed in the Dames and Moore Report 1996, which is referred to in section 8.12.5.1 of the ERMP. A copy of the Dames and Moore Report 1996 is included as Attachment 2. Cameco has completed further drilling which assessed lithologies to a depth of up to approximately 30 metres.

			The assessed near surface lithology includes silty sand, silty clay, sandy clayey gravel, sandy silty clay and clayey silty sand.
13	DotE	The submitter requests further clarification regarding the impacts of the final pit void on groundwater and terrestrial environment from attraction of fauna to the water.	<u>Impacts of the final pit void on groundwater</u> The impact of the final pit void is discussed in Section 8.4.5.3 of the ERMP. In summary, modelling undertaken has concluded the Pit will operate as a terminal sink and therefore water from the void will not seep to groundwater. In response to requests from the Office of the Environmental Protection Authority and the Department of the Environment, further modelling has been undertaken of the final pit lake. The purpose of this modelling was to quantify the amount of groundwater flow through the pit area before and after mining operations and to assess the potential for salt plume migration out of the pit lake after mining operations cease via density gradient flow pathways. The analyses performed in this assessment demonstrate that variable-density groundwater flow from the pit lake is minimal and will not impact downgradient receptors. A copy of the report of the additional modelling work undertaken is attached as Attachment 1. <u>Impacts of the final pit void lake on fauna.</u> The impact of the post closure pit void on terrestrial fauna, including avifauna, was raised as an aspect of concern by the Environmental Protection Authority. Cameco investigated the likely use of the pit by fauna, and the potential impacts from drinking and foraging on the pit lake. Concern is greatest for birds (and potentially bats), as non-flying fauna can be excluded. The final quality of pit lake water (after stabilisation, +10 years post closure) is expected to be 114,475 mg/L (hypersaline; approximately 10% compared with sea water at approximately 3.5%). It will be brackish to about year 3 but about as

			saline as seawater by year 5. The water will therefore be unpalatable to most wildlife after about year 3, with the exception of some marine waterbirds that can process seawater (but not the hypersaline water expected by year 10). If salinity stratification occurs, the surface layer of water may be palatable to some wildlife after year 5, and the possibility exists of a lens of low salinity water forming at the surface following heavy rain, or from the accumulation of low salinity groundwater. Such water would have lower concentrations of contaminants than pit-water, and it is likely that stratification would be offset by mixing following rain and by evapo-concentration at other times. If exceptional rainfall did create a layer of near-fresh water, this would occur at a time when numerous other and more attractive/accessible sources of fresh water would be available in the region, including Duck Pool, Pinpi Pool and Rock Pool. In comparison to natural water bodies, the pit void is characterised by steep banks, which lack shallow sandy shores, riparian vegetation (habitat) and shade. Furthermore, the pit lake will be deep with low nutrient availability and thus low productivity (food) and poor ecological connectivity. Waterbirds may forage on the surface of hypersaline water but are unlikely to drink it. Recent studies suggest that hypersaline tailings are basically abiotic and that the presence/absence of macro-invertebrates strongly influenced the occurrence of fauna, behaviour and consequent exposure. Water consumption by fauna depends on size and adaptation to arid environments; smaller birds require more water relative to body weight, arid zone birds require less water than mesic zone birds of the same weight. Predicted water consumption of birds ranges between 0.9 and 17% of body weight per day. Predicted post-closure water concentrations for potentially toxic elements (e.g. heavy metals) are below the NOAEL (no observed adverse effect level) benchmarks for fauna where these are available, with the possible exception of Uranium. Modelling predicts that Uranium concentrations in the water will initially be low, rising to about 1 mg/L by year 5, 3 mg/L by year 6, 4.1 mg/L by year 10 and stabilizing around 4.37 mg/L after a century. However, actual concentrations may

			be significantly lower. Uranium NOAEL benchmark for drinking water for birds is 68.8 mg/L, which is more than ten times higher than the predicted levels at stabilisation. NOAEL levels for mammals are much lower. Two years following closure, a bird drinking 20% of its body weight per day of water containing 0.10mg/L Uranium (TDS – 2,899 mg/L) would consume about 0.02 mg/kg/day of Uranium, a fairly typical arid-zone bird (drinking 5% body weight per day) would consume 0.005mg/kg/day. Both of these values are below the predicted no-effect concentrations for chemical toxicity of Uranium to mammals (0.1 mg U kg^{-1} body weight d^{-1}) (Sheppard *et al*. 2005). An equivalent value is not available for birds. After 10 years of closure, a bird drinking 20% of its body weight per day of water containing 4.10mg/L Uranium would consume about 0.82mg/kg/day of Uranium, a fairly typical arid-zone bird (drinking 5% body weight per day) would consume 0.20mg/kg/day. Both of these values are above the predicted no-effect concentrations for chemical toxicity of Uranium to mammals (no value is available for birds), however the evidence above suggests that birds may be less prone to accumulation of Uranium in the body over time and less susceptible to acute Uranium poisoning than mammals. Water consumption from birds and exposure may also be reduced as water will be hypersaline (114,475 mg/L or three times the concentration of seawater) and lack biota (e.g. macro invertebrates) compared with other wetlands in the area. It is therefore unlikely that birds will be able to drink the water (because of its high salinity) when Uranium levels are at their highest, while if stratification does occur, the water at the surface will have lower levels of Uranium than the pit water. Several deterrents are available to discourage waterbirds from using mine voids and will be considered as a part of a final pit void closure plan if bird use is high. Bird deterrents are used at the Olympic Dam mine site, South Australia where acidic liquid is stored. A rotating beacon with intermittent beam directed at a shallow angle across the water surface (in combination with gas guns) effectively discouraged most waterbirds. If bird deterrents or other barriers were deemed

			necessary and are employed in the first few years following closure then visitation and the likelihood of contaminant transfer will be reduced. After this time, increasing salinity and the lack of biota will most likely effect visitation and consumption rates and result in a low transfer of contaminants to the surrounding environment. A copy of the report of the review of the impact of pit void lakes upon fauna is attached as Attachment 3.

1.3 Geochemistry

	Submitter	Comment	Response to comment
14	DotE, OEPA	The submitters note that the proponent should continue to undertake geochemical testing of waste materials during the operational phases of the project.	Further testing of waste rock and tailings material will take place according to the testing required for each mine phase as per Guidelines issued by the Department of Industry, Tourism and Resources (DITR) guidelines and reported in later versions of the Mine Closure Plan.
15	DotE	The submitter requests that the proponent explain the derivation and use of trigger values for geochemical characterisation described in page 14 and Table 3.2 on page 15 of the Geochemical characterisation of the Cameco Kintyre uranium project-prefeasibility study.	The trigger value has been calculated based on the Geochemical Abundance Index where the whole rock concentration is compared to the average crustal abundance as a measure of enrichment. It is not an environmental or regulatory trigger value for whole rock concentrations but a rather an indication of what elements may be of concern in leachate based on their relative enrichment in the deposit. It does not predict what will leach but what may leach. Cameco has made a commitment to ongoing waste rock characterisation work and confirm that these preliminary assessments will be updated as the project develops.

1.4 Definition

	Submitter	Comment	Response to comment

16	DotE	The submitter requires clarification on what is mean by long term.	In the ERMP, modelling has been undertaken for up to 1000 years. Therefore it is appropriate to define "long term" as up to 1,000 years.

2. Human Health

2.1 Site Assessment and Dose Assessment

	Submitter	Comment	Response to comment
17	DotE	The submitter recommends the proponent use data that is fit for purpose for human ingestion of bush foods.	In section 8.11.5.4 of the ERMP, Cameco conducted an assessment of the potential ingestion dose to a person from the consumption of bush foods affected by the operation. The basis of the assessment was the assumption that the operation had been depositing dust into the environment for 15 years and that the food was consumed at the project boundary. It was also assumed that the bush food would be consumed for 2 months per year. The ERMP at section 8.11.5 notes that Cameco did take into account land use and traditional food gathering as part of the dose assessment. The calculated estimated ingestion dose was 2.5uSv/y. Note that over the same two month period, it would be expected that the person would receive 300uSv/y from naturally occurring radiation.
18	DotE	The submitter requests a copy of the corporate radiation protection programme, asks if cosmic radiation due to air travel was considered as occupational exposure and the exposure dose this pathway would represent.	A copy of the corporate radiation protection programme is attached as Attachment 4. Cameco has considered the potential impacts of air transport and it is estimated that for workers at Kintyre, it would result in 0.2-0.4mSv per annum for a typical FIFO worker. These levels are considered to be within the natural variation of background radiation and therefore have not been included as an additional occupational exposure within the assessment.
19	DotE	The submitter requests an expected average gamma dose and the maximum gamma dose to mine workers. The submitter requests an assessment on the uncertainty of pit radon values, pit ventilation rates, estimated open air	<u>Calculating the expected average Gamma dose</u> The assumptions provided in section 8.11.5.1 that are used for estimating an average gamma dose rate for miners are as follows; - Gamma dose rate factor of 65uSv/h per %U, - An average whole of pit U grade of 214ppmU,

		radon concentrations and a comparison of these concentrations to other open pit uranium mines.	- A typical working year of 2,000 hours per year. This gives an annual average gamma dose rate of 2.8mSv/y. This average gamma dose is then combined with the estimated dose from the inhalation of radon decay products (1.2mSv/y) and the dose from the inhalation of radionuclides in dust (0.7mSv/y). This gives an estimated average total dose of 4.7mSv/y. Section 8.11.5 of the ERMP also notes that working directly on ore could result in a gamma dose rate of 32uSv/h. This section also notes that the ore is approximately 2% of all the material mined. A conservative scenario was proposed, where it was assumed that a worker might spend 10% of their time (200 hours per year) working purely on ore, giving a maximum gamma dose of 6.4mSv/y. It was then assumed that the remainder of the year would be in non-mineralised areas, where gamma doses would be low. The scenario was for a production charge up worker, who has limited time working directly on ore charging production holes with explosives and a longer period preparing for the charging operation in a secure non mineralised area. Therefore when combined with the estimated doses from the inhalation of radon decay products and the inhalation of radionuclides in dust, gives an estimated maximum total dose to miners of 8.3mSv/y. <u>Radon Estimates, pit ventilation rates</u> Cameco is satisfied that the method used to estimate radon concentrations in the mine provides a reasonable average estimate. The method is based on simple steady state theory similar to the method outlined in Cember 2009, which describes how the steady state concentration of radon in a volume, with a known ventilation rate is assessed. The method has also been used in other environmental impact assessments, for example BHP Billiton's assessment of their proposed open pit mine (BHP Billiton 2009). An important consideration in the assessment is the overall shape of the proposed mine. It is not a deep and steep sided mine. The dimensions are 1.4km by 0.75km

			by 0.22km deep. In terms of mines, this is a relatively shallow open structure that would readily ventilate. Using the method provided by Thompson 1993 and outlined in section 8.11.5.1 of the ERMP, the steady state radon concentration in the pit was calculated to be 2.4Bq/m^3 (above natural background levels). Additional calculations were performed for temperature inversion conditions (which could occur on cold stable nights), where the ventilation rate of the mine reduces and the still condition cause radon to accumulate in the mine. The calculations showed that under two inversion scenarios, (related to the height of the inversion layer above the mine floor), the radon concentrations could reach up to approximately 350 and 700Bq/m^3. Both inversion scenarios were included in radon decay product dose assessment for miners and are presented in section 8.11.5.1 of the ERMP. It should be noted that the estimated radon concentrations do not include the naturally occurring concentrations and represent the concentration solely due to the proposed operations. <u>Comparison with other similar mines</u> Cameco has also reviewed doses for mine workers at Ranger uranium mine, which has similar grade material (ERA, pers. comm., September 2012). For the years 2009 to 2011, doses to miners from the inhalation of the decay products of radon averaged 0.21mSv/y from RnDP. These doses would be based on actual monitoring results and therefore provide an accurate indication of doses received. The estimated average miner radon decay products doses for the Kintyre mine are 1.2mSv/y. The results indicate that the Cameco estimates may be conservative, but are consistent with the Ranger results. <u>Radon Modelling</u> It is noted that there is a difference in the results of the mine radon modelling and

			the broad area radon concentration modelling in the vicinity of the mine. The purpose of air quality modelling (as described in appendix G of the ERMP) is to predict broad area impacts, while the mine modelling aims to determine levels in the mine void itself. It is well known that Gaussian plume models (such as the Ausplume model, used in the air quality assessment), provide conservative results for close in or low level sources and are therefore more likely to over predict ground level concentrations close to the sources. In addition, radon emission source terms that were used for the air quality modelling (see section 8.11.5.2 of the ERMP) were deliberately conservative in order to demonstrate that impacts outside of the operation would be negligible even under the worst case conditions. The combination of the air quality limitations and the conservative radon emission estimates contribute to the difference in the results from both modelling. Reference: Cember 2009 - Introduction to Health Physics (4th Edition) Herman Cember & Thomas E Johnson.
20	DotE, OEPA	The submitter notes that the proponent should clarify that 5mSv/yr. are the expected average and not the maximum dose. The submitter requests information on the guidelines used for dose assessment calculation to workers and a comparison of the dose to workers from other mine sites.	The 5mSv/yr. is the expected average dose. Refer to 17, above. In terms of the guidelines used for dose assessment, Section 7.2.3 of Appendix F of the ERMP notes that the dose assessment methods are based on the guidelines issues by ARPANSA and the Western Australian Department of Mines and Petroleum, specifically the NORM Guidelines from the Western Australian DMP.
21	DotE	The submitter requires clarification on why radon decay products are or are not considered a significant pathway.	It is incorrect to say that Cameco does not consider radon decay products to be a significant pathway. It is correct however to say that Cameco does not consider that exposure from inhalation of the decay products to be significant. Dose assessments were conducted for workers and the public, covering the three major radiation exposure pathways; gamma radiation, inhalation of radionuclides in dust and inhalation of the decay products of radon. The assessments were conservative and indicated that exposure from inhalation of the decay products would not be significant. This is outlined in sections 8.11.5.1 and 8.11.5.3 of the ERMP.

			Refer to 17, above for further information on how the radon and radon decay product estimates were made.
22	DotE	The submitter notes that a definition and description of appropriate dose constraints and references levels need to be described in the context of best international practice.	Cameco recognises the role of "dose constraints" and their applicability in the management of radiation. Cameco has operations in various countries around the world and has a consistent approach to radiation protection as described in the Cameco radiation protection policy. A cornerstone of the policy is the ALARA principle within which dose constraints are one means to achieve an optimised level of radiation protection. In section 6.1.1.2 of Appendix F of the ERMP, this is described. Practical application of dose constraint levels will be developed in consultation with the appropriate regulator as part of the approval process for the RMP. However, Cameco notes that consideration has been given to the ICRP proposal to double the radon decay product dose conversion factor in section 8.11.5.1 of the ERMP, as follows: "*With the ICRP proposing to double the dose conversion factor for inhaled radon decay products, this would result in an estimated RnDP dose of 2.4 mSv per annum. This would result in an increase in the total does estimate (discussed below) to 6mSv per annum*". Cameco has also developed internal action levels as described in Section 8.11.6.4 and outlined in Table 8.36 which will be part of the RMP and subject to approval of State regulators. In relation to ICRP publications 101 and 103, the recommendations of the ICRP form the basis of Cameco's approach to radiation protection.
23	DotE	The submitter requests that the proponent confirm that the correct radionuclide activity concentration has been used for the liquid fraction of the tailings and the correct values were use in all relevant dose assessments.	The concentrations of radionuclides in liquid fraction of the tailings reported in section 8.11.5.6 of the ERMP contain a unit error. The corrected statement should read; *"Concentrations of radionuclides in the liquid fraction of tailings are expected to be*

			in the range of 0.02 Bq/mL (Ra-226) to 50 Bq/mL (Th-230).” Note that table 8.41 of the ERMP also provides an indication of the potential radionuclide concentrations in the tailings liquor, by giving measured concentrations in leach liquor, which range from 0.01Bq/mL (Ra-226) to 20 Bq/mL (Th-230). It is confirmed that the radionuclide concentrations in the tailings liquid fraction were provided for information only and are not used in any dose assessments.
24	DotE	The submitter notes that the geochemical characterisation of the Kintyre uranium project feasibility does not reflect the ALARA principal and clarity on this wording is required.	Cameco does not understand the point being made here by the submitter. The ALARA principle is a guiding principle of radiation protection and is incorporated into Cameco’s safety, health, environment and quality policy. The application of the ALARA principle guides the implementation of operational controls both at a physical or design stage and ongoing procedural controls. (see Cameco’s Radiation Protection Program attached) We also refer to ALARA section 8.11 of the ERMP and in appendix F and appendix D2 (the draft Radiation Management Plan).
25	DotE	The submitter notes that further information on radiation protection personal may be required in management plans.	Noted. Cameco intends to finalise the Radiation Management Plan prior to construction for approval by the appropriate regulatory authorities. This is described in section 8.11.6.4 of the ERMP. Decisions on the number of radiation protection personnel would not be finalised until then. In relation to training and experience, it should be noted that Western Australian regulations spell out the minimum requirements of a Radiation Safety Officer, including a relevant tertiary qualification as well as relevant technical experience and background.
26	DotE	The submitter requires a copy of the corporate radiation protection program.	Refer to 16, above.
27	DotE	The submitter requests that the proponent model (or commit to model) holistic radionuclide transport and site radiological conditions over the long term.	Cameco has completed a number of models that predict radionuclide transport and concentrations and has made several commitments to ongoing monitoring and modelling during the life of the Project. The modelling reported in the ERMP includes, • Air quality modelling (see section 8.11.5 of the ERMP). As airborne dust is the only significant pathway, dust modelling was completed and the estimated radionuclide deposition for a location at the boundary of the Project area was

			estimated to be 2 Bq/m2/year, with a resulting soil concentration after 12 years of 0.16Bq/kg of soil. (see page 220 of the ERMP). • Radiological impacts to flora and fauna was also modelled based on 12 years of deposition. • Long term groundwater modelling was also completed. Commitments made in the ERMP include, • Commitment to ensuring that post closure doses are below the public dose limit • Section 8.10.6.6 (Closure and Rehabilitation) notes that "A Mine Closure and Rehabilitation Plan for the operation will be submitted to DMP for approval before commencement of operations. The radiation closure design aim is to ensure that all radioactive material is contained in the long-term so that radiation exposures are low and consistent with natural background levels." Cameco will consult with DotE to better understand their requirements over and above what has been completed and will work with them to address their concerns.

3. Inland Waters Environmental Quality

3.1 Surface Water Quality

	Submitter	Comment	Response to comment
28	DotE, OEPA	The submitter notes that a relevant environmental value should be associated with surface water and the proponent should commit to meeting the ANZECC 2000 guidelines for water quality and sampling the pools surveyed during 2011.	Cameco commits to developing an environmental value for water quality and monitoring program to meet the ANZECC 2000 guidelines for water quality in nearby pools. As previously stated, it should be noted that Yandagooge and Coolbro Creeks are ephemeral and the pools are semi-permanent depending the amount and timing of rainfall in the region. This will obviously affect baseline water quality variability. It should also be noted that the management of the Pools is not within Cameco's control as the Pools are remote from the site and are open to public access.

			Cameco will work with DotE to develop a plan to meet the Guidelines.
29	DotE, OEPA	The submitter notes that the proponent should provide data to justify the statement that water quality of the stream has been monitored and commit to a zero release of surface water from the site.	Section 8.3.3 of the ERMP states: *In July 2009 MWH Australia* Pty Ltd (MWH) completed an assessment of the existing surface water information, undertaking a gap analysis and provided recommendations on how surface water management should proceed for the Kintyre Project. This involved the review of documents detailing surface water monitoring conducted from 1988 to 1992 and a field visit by MHW in May 2009 to the Kintyre Project area. Section 8.3.3 of the ERMP goes on to identify gaps "*due to the ephemeral nature of surface water flows in the creeks in the area, and inaccessibility to the area (due to flooding) following significant rainfall events*". As noted in section 8.3.3 of the ERMP, Cameco will take further samples "*as opportunities present*"; so as to further inform baseline levels. Cameco commits to a policy of zero release of surface water from the site.
30	DotE	The submitter requests justification for the monthly surface water monitoring program. The submitter further requests the analytes, environmental values and water quality objectives used in the management plan.	See the response to 28. Cameco will work with DotE to develop a monitoring plan suitable to the environment and risk posed by the Project on the surface water aspect.
31	DotE	The submitter requests that the statement "slightly elevated natural radionuclide values have been observed during these flood events" be clarified to determine how high these levels are above background levels.	Cameco agrees that the statement is ambiguous. The sentence has been amended to the following; "Opportunistic sampling of surface water occurred following a storm event in 2012. The results shows Th228 and Pb210 concentrations less than 0.1Bq/l and Ra226 and Ra228 concentrations ranging from <0.1 to 0.42 and <0.1 to 0.41 Bq/l respectively. In a study by ARPANSA 2008, typical radionuclide concentrations in water were reported as 0.017Bq/l for Ra226 and 0.086Bq/l for Ra228."

3.2 Groundwater Quality

<table>
<tr><th></th><th>Submitter</th><th>Comment</th><th>Response to comment</th></tr>
<tr><td>32</td><td>DotE</td><td>The submitter notes that the proponent should provide more data on the radionuclides sampled near or within the ore zones.</td><td>Section 8.11.4.4 and Table 8-28 of the ERMP identify that groundwater samples are taken from various types of bores in the region. In all, groundwater from over 100 bores has been analysed and radionuclides for radionuclides at various times.

The results have been re-assessed and a new table is provided below which provides an up to date summary of the data.

For this assessment, the “inside pit area” results are for bores which are directly within the footprint of the proposed pit.

For the mean and median calculations, the results reported as <MDL (less than minimum detectable level) have been assigned the minimum detectable level. For example, for gross alpha, the MDL was 5mBq/l, therefore all samples reported as <MDL were assigned 5mBq/l.

(*Note that U238 (soluble) and Th232 are reported as mass.
<table>
<tr><th></th><th colspan="6">Activity Concentration (mBq/l)</th><th colspan="2">Mass Concentration (mg/l)</th></tr>
<tr><th>ALL SAMPLES</th><th>Gross alpha</th><th>Gross beta</th><th>Pb210</th><th>Po210</th><th>Ra226</th><th>Th230</th><th>U238 (soluble)*</th><th>Th 232*</th></tr>
<tr><td>Mean</td><td>1073</td><td>3152</td><td>68.8</td><td>179</td><td>2544</td><td>63.3</td><td>0.691</td><td>3.5</td></tr>
<tr><td>Median</td><td>227</td><td>1723</td><td>0.04</td><td>7</td><td>67</td><td>23.5</td><td>0.031</td><td>1.0</td></tr>
<tr><td>Max</td><td>53000</td><td>200000</td><td>3800</td><td>17000</td><td>19000</td><td>1400</td><td>110</td><td>480</td></tr>
</table>
</td></tr>
</table>

						0				
MDL	5	28	0.04	7	0.05	7	0.001	1.0	
Total Num	260	258	134	144	191	96	292	239	
Num < MDL	38	40	97	75	1	27	50	212	

	Activity Concentration (mBq/l)						**Mass Concentration (mg/l)**	
INSIDE PIT AREA	**Gross alpha**	**Gross beta**	**Pb210**	**Po210**	**Ra226**	**Th230**	**U238 (soluble)***	**Th 232***
Mean	1611	2401	58.9	120	772	44.8	1.3	2.2
Median	264	1858	0.04	7	57	26	0.035	1.0
Max	53000	34000	1200	4700	21000	420	110	19.0
MDL	5	28	0.04	7	0.05	7	0.001	1.0
Total Num	90	89	43	48	65	34	109	87
Num < MDL	10	13	32	28	0	8	19	67

	Activity Concentration (mBq/l)	**Mass Concentration**

									(mg/l)		
			OUTSIDE PIT AREA	**Gross alpha**	**Gross beta**	**Pb210**	**Po210**	**Ra226**	**Th230**	**U238 (soluble)***	**Th 232***
			Mean	788	3548	73.8	205	3458	73.5	0.33	4.2
			Median	221	1700	0.04	9	69.5	23	0.028	1.0
			Max	21000	200000	3800	17000	190000	1400	27.0	480
			MDL	5	28	0.04	7	0.05	7	0.001	1.0
			Total Num	170	169	91	96	126	62	183	152
			Num < MDL	28	27	65	47	1	19	31	145
33	DotE	The submitter requires further clarification regarding groundwater radionuclide results in table 8-28.	Refer to 28, above.								
34	DotE	The submitter requests that Figure 8-11 be updated to show predicted drawdown rather than static water levels.	Figure 8-11 is incorrectly titled. The correct title should be – Static water levels within potentially groundwater dependent vegetation communities. The figure illustrates the discussion in Section 8.5.4.2 of the ERMP about the natural depth to groundwater and the susceptibility of riparian species to altered groundwater regimes and then compares the depth to groundwater at Kintyre with the depth to groundwater where groundwater dependence has been confirmed. Predicted groundwater drawdown within potentially groundwater dependent vegetation communities is illustrated in Figure 8-12.								

4. Terrestrial Fauna

4.1 Conservation Significant Fauna and National Park

	Submitter	Comment	Response to comment
35	DotE	The submitter requires further clarification on species listed in Table 8-16 and requests a summary of why certain species are likely/unlikely to be impacted and the extent of potential impact. The discussion of potential impact should also include a disturbance to each habitat type within the project area.	The following species listed in Table 8-16 are considered unlikely to occur within the Project area including the access road corridor: • Night parrot – status uncertain, but unlikely to occur in the region; • Orange leaf-nosed bat – unlikely to occur as no caves within Project area, or along access road. • Ghost bat – unlikely to occur as no caves within Project area, or along access road. • Northern quoll – highly unlikely to occur along the access road and not likely to occur within mining area due to lack of suitable habitat. Scats were recorded outside of development envelope (at north bore and on a breakaway about 1 km south of the ore body). • Western pebble-mound mouse – likely to be locally extinct. Only inactive mounds present and those mounds were present outside the development envelope. • Black-flanked rock-wallaby – tracks and scats recorded outside of Project area. It is uncertain if this was *Petrogale lateralis lateralis* (Vulnerable, Schedule 1), or *P. rothschildi*. Two rocky hills will be disturbed by the Project, however, no significant species were found on them and this habitat is well represented both within and outside the Project Area. Additional investigations conducted after the completion of the ERMP did not find any further evidence of rock wallaby in suitable habitat at and around the Project Area. Additional inspections will be conducted on an opportunistic basis and before the commencement of clearing. The following species could possibly occur because habitat is present in the Project area, or they may be an irregular visitor, but the species were not recorded during surveys: • Great desert skink – possibly present in sand dunes and plains along access road;

			• *Lerista macropisthopus remota* (skink) – possibly present in leaf litter at bases of shrubs; • Northern marsupial mole - possibly present in sand dunes along access road; • Princess parrot – irregular visitor; • Peregrine falcon – expected to be resident; • Eastern great egret – irregular visitor; • Fork-tailed swift – migratory, regular visitor; • Long-tailed dunnart – possibly present in rocky hills surrounding Project area. • Spectacled hare-wallaby – possibly present in open woodlands, shrublands or hummock grasslands, but no local records; • Lakeland Downs mouse – possibly present in sand plains within Project area and along access road; • Striated grass wren – possibly present in mature spinifex grasslands. The following species were recorded in the Project area. A description of the area of habitat likely to be affected is provided. • Rainbow bee-eater - a migratory species which inhabits open woodlands, shrublands, inland sand dune systems, inland sites in close proximity to water and grasslands. This species is often recorded in disturbed habitats including roadside vegetation and mine pits, where they often breed. The Project is unlikely to affect this species. • Bilby – spinifex sandplains with open Acacia shrubland and sparse low Eucalypt woodland on red sandy loam (including drainage lines). Habitat loss due to the Project on the Sandy Loam Plains is estimated to be 5.6% of an area mapped within a 15 km radius of the Project. • Mulgara – only active burrows recorded in sandy loam plains. It is not known if it is *Dasycercus cristicauda* (Vulnerable, Schedule 1) or *D. blythi* (unlisted). Habitat loss due to the Project on the sandy loam plains is estimated to be 5.6% of an area mapped within a 15 km radius of the Project.

			• Grey falcon - likely to be resident along eucalypt-lined watercourses. With the exception of the access road crossing, this habitat will be undisturbed. • Australian bustard – recorded in grassland, grassy woodland and shrubland habitats along the access road. Cameco expects to align the access road within the survey corridor to minimise the impact to this species. • Bush stone-curlew – recorded in open woodland with a shrubby understorey and grass along the access road. Cameco expects to align the access road within the survey corridor to minimise the impact to this species. Prior to any disturbance, pre-clearing surveys will be undertaken to confirm if any species of conservation significance occur within the proposed area of clearing.
36	DotE	The submitter notes that Table 7-1 is missing details of any ongoing monitoring measure related to conservation significant fauna.	This comment is in relation to Table 7-1 of the Fauna Management Plan in Appendix D10 which will be regularly reviewed and revised prior to, and during construction and operations. Ongoing monitoring measures relating to conservation significant fauna will be included in the Fauna Management Plan.
37	DotE	The submitter requests further clarification regarding the fauna management measures, SMART criteria and how these measures represent industry best practice.	The Fauna Management Plan will be reviewed and revised prior to, and during construction and operations to include SMART (specific, measurable, achievable, realistic and timely) criteria. Cameco commits to seek information on current best practice for fauna management (particularly conservation significant fauna) from DPaW during the reviews of the Fauna Management Plan.
38	DotE	The submitter requests further information on how the landscape scale fire management program will assist with fauna management.	It is generally accepted that fire, in particular large scale wild fires, are a major contributor to the decline of a large proportion of Australian mammals (Section 8.6.5.1 of ERMP which references Burbridge and McKenzie, 1989). It is also accepted that a mosaic of fire ages provides the range of habitats likely to promote and support populations of small mammals such as bilby and mulgara. Over the last twelve months Cameco has been involved with a project being co-ordinated by Rangelands WA. Members include, Rangelands, DPAW, Cameco and other mining companies and organisations representing the Martu people including WDLAC and Kanyirninpa Jukurrpa which are involved in the management

			of Martu lands. One project under discussion involves third parties, such as Cameco, supporting (financial and other) the Martu to undertake traditional burning practises to attempt to re-establish a fire mosaic. There is no certainty that the fire mosaic project will proceed at this time and given the land is within a granted native title claim, Cameco would not proceed without the approval and involvement of the Martu. However, the project is not sufficiently advanced to provide further details on the timing, funding and potential scope of the programme.
39	DotE	The submitter notes that listing of two Mulgara species should be clarified to avoid confusion.	As only active Mulgara burrows (no animals) have been observed within the Project area, Cameco has not been able to determine which species is present. Although it is likely to be *Dasycercus blythi* which is not listed as a threatened species, Cameco has taken the conservative approach and assumed it is *Dasycercus cristicauda*.
40	OEPA	The submitter requests that the proponent commit to undertaking pre clearing surveys for conservation significant fauna.	Agreed. Cameco will undertake pre-clearance surveys in consultation with DPaW prior to ground disturbing activities.

4.2 Non Human Biota

	Submitter	Comment	Response to comment

<table>
<tr>
<td>41</td>
<td>DotE</td>
<td>The submitter notes that the proponent has undertaken a non human biota radiological assessment using ERICA. The submitter suggests that the proponent should identify representative organisms from around the Kintyre area when attempting to assess dose rates and exposure scenarios. The submitter requires information on the assessed scenarios and input and output information from the assessment.</td>
<td>Section 8.5 and section 8.6 of the ERMP and specifically tables 8-11 and 8-16 of the ERMP, record the significant flora and fauna of conservation significance in the project region and along the access road.

Some of these species have been nominated as the representative organisms for the non human biota assessment and are outlined in the table below with the relevant reference animals and plant (RAP) group. Cameco was unable to identify any specific local concentration ratio data for any of these species and therefore the ERICA default values were used.

The exposure scenarios were based on dust emissions from the project depositing in the region over the 12 year life of the project. The deposition was estimated using air quality modelling, the results of which are shown in figure 8-31 of the ERMP.

Cameco recognise that there is some uncertainty in using default ERICA values, however given that the final assessed conservative derived dose rates are significantly below the screening level, it is expected that the uncertainty would not change the final conclusion that the radiological impact to non human biota is low.

It is noted that lichen and bryophytes are the only RAPs to exceed the screening level of 10uGy/h, and a subsequent Tier 2 assessment was conducted. This was discussed extensively in the ERMP in section 8.11.5.5 and confirmed that impacts to lichen and bryophytes would be low.

<table>
<tr><th>Reference Animal and Plant (RAP)</th><th>Kintyre Reference Species</th><th>Exposure Scenario</th><th>Conservative Derived Dose Rate (uGy/h)</th></tr>
<tr><td>Lichen and bryophytes</td><td>Not recorded in area</td><td>Included as RAP with highest derived dose rate (comments provided in ERMP at section 8.11.5.6)</td><td>27.54</td></tr>
</table>
</td>
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</table>

			Bird	Bush Turkey	Birds are assumed to nest, forage and reside in habitat on the project boundary. Although birds have the ability to enter the site area, habitat would be limited and noise and activity would act as deterrence to full time occupancy.	0.68
			Mammal (rat)	Bilby	Assessment conducted at operation boundary where it is assumed that there would be sufficient habitat for animals to reside. Noise and activity would likely act as a deterrence to full time occupancy in higher exposed area.	0.55
			Reptile	Sand Goanna	Assessment conducted at operation boundary where it is assumed that there would be sufficient habitat for animals to reside. Noise and activity would likely act as a deterrence to full time occupancy in higher exposed area.	0.64
			Shrub/Tree	Triodia grasses Acacia shrubs Corymbia opaca	It is assumed that the species of trees and shrubs are located on the	0.88/0.21

			and Eucalyptus camaldulensis trees	project boundary and that exposure is through deposition of dust from the operations.	

Cameco acknowledges that the application of ERICA to an Australian context is developing. We also point out that based ERICA data, existing final assessed conservative derived dose rates are significantly below the screening level and it is expected that the uncertainty would not change the final conclusion that the radiological impact to non human biota is low and that the value of additional modelling using "new" concentration ratio values is unlikely to produce a different outcome.

Cameco commits to ongoing dust monitoring using passive depositional dust gauges so that as the understanding of concentration values for Australian species and arid environments are developed there is the capacity to undertake further ERICA modelling.

5. Hydrological Processes

5.1 Surface water

	Submitter	Comment	Response to comment
42	DotE	The submitter notes that the proponent should commit to designing the TMF and evaporation pond in accordance with the Australian National Committee on Large Dams guidelines.	The Kintyre TMF design follows the requirements of the WA Department of Mines and Petroleum (DMP) Safe Design and Operating Standards for Tailings Storage (1999). This document provides requirements and guidelines for the design, construction, management and decommissioning of tailings facilities in Western Australia. Other applicable documents used to develop the basis of design include Australian National Committee on Large Dams (ANCOLD) and International Committee on Large Dams (ICOLD) manuals. Cameco commits to designing the TMF and evaporation pond in accordance to WA

			Department of Mines and Petroleum (DMP) Safe Design and Operating Standards for Tailings Storage (1999) and ANCOLD guidelines.
43	DotE	The submitter requires clarification if stream systems will be gauged around the site.	Three Gauging Stations have been established on Yandagooge Creek, two on the south branch and one on the west branch.
44	DotE	The submitter is unclear if water from the evaporation pond has been included in the tailing management facilities freeboard calculations.	The evaporation pond has been included in the TMF freeboard calculations. The TMF was sized to contain runoff from the extreme storm event of 400 mm in 72 hours with 1 m of freeboard. The extreme 72-hour design storm event is a conservative estimate of the Probable Maximum Flood (PMF) and considers historic cyclone-associated storm events. Free water from the TMF will be pumped to evaporation ponds. The evaporation ponds were sized to contain the volume of runoff from the extreme storm event from the TMF with 0.5 m of freeboard during average climatic conditions. (Appendix E of ERMP – Tailings Report – Page 29)

5.2 Groundwater and Water Supply

	Submitter	Comment	Response to comment
45	DotE, OEPA	The submitter recommends that the proponent discuss additional sources of potable water, the likely maximum amount of potable water that is required and the impact of extraction from these sources.	Water demand is discussed in Section 6.5.2 of the ERMP. Potable water demand has been estimated at 0.2 MLpd. It is unlikely that the requirements would be met by the existing potable supply bore. The additional requirements for potable water are likely to be met via the production borefield described in Section 8.4. As discussed in section 6.5.2 of the ERMP, a portion of the water from the production bores would be treated by an RO plant to produce potable water.
46	DotE	The submitter requires the proponent to commit to defining the location and extent of the Cenozoic channel and provide further information on the influence of geological structures in the area on the groundwater system.	The mention of the Cenozoic palaeochannel in the ERMP could have been clearer that the palaeochannel is in the Water Supply area; not the mining area. Accordingly the Cenozoic palaeochannel will not be impacted by the TMF and IWL. The Cenozoic deposits in the mining area are mostly unsaturated, having a thickness of less than 12 m in an area where the water table is mostly 20m below ground.

			There are saturated Cenozoic deposits that were intersected in the main water supply area, which appear to be part of a shallow buried river system. Cameco considers that further definition of the location of the Cenozoic palaeochannel is unnecessary.
47	DotE	The submitter requires clarification regarding whether the water table map is limited to the Paterson Formation and suggests the proponent commit to incorporating water level interpretation and model ongoing monitoring and conceptual model reviews.	Figure 4-1 of Appendix K represents the water table across all phreatic formations, whether measured in the Patterson Fm, Coolbro Sandstone or Rudall Fm. Figure 4-2 of Appendix K represents the potentiometric surface in the lower Patterson formation only (i.e. there is no potentiometric surface recorded in the saprolite aquifers).
48	DotE	The submitter requests an overview map showing geological structures, mapped geology, palaeovalley extent, project area, pit area and bore locations.	Please see the map included as Attachment 5.

6. Air Quality

	Submitter	Comment	Response to comment
49	DotE	The submitter recommends the use of more objectives methods for monitoring dust from the TMF.	In section 6.5 of the Radiation Management Plan, Appendix D2, Cameco outlines the proposed environmental radiation monitoring program. As part of this program, high volume dust sampling and passive dust sampling will be undertaken. A passive dust monitoring site would be installed close to the TMF to identify dust emissions. Operation of the TMF will ensure tailings retain sufficient moisture to minimise dust generation. Dust monitoring will be undertaken in accordance with the Dust Management Plan to assess the effectiveness of dust management measures. However, for proactive dust management on site, personnel will use meteorological forecasts and real-time visual observations to ensure dust generation is kept to a minimum.

7. Heritage

	Submitter	Comment	Response to comment
50	DotE	The submitter requires confirmation that mining activities that produce vibration have been considered when determining potential impacts to a heritage site.	There is heritage site close to the final open pit rim. The site comprises of large silicified mudstone rocks. During discussions on site with Martu and their heritage advisors and legal representatives, it was considered that the site could be damaged by mining activities including vibrations from blasting in the open pit and the movement of heavy vehicles near the site. Mechanisms to protect the site were established in the document titled "Cultural Heritage Management Plan Rules". Protective measures include, as assessment of the structural and geological integrity of the rock that makes up the site prior to the commencement of mining to better understand the risk, and to respond to the study by modifying mining activities as required to protect the rock. Site Protection Zone and Infrastructure Zones have been established to limit activities within proximity to the site, as well as the construction of a fence to identify the protection zones and restrict the site to all activities. In addition, Cameco cannot disturb the heritage site without approval under the Aboriginal Heritage Act 1972.
51	DotE	The submitter would prefer to assess environmental impact on direct information about values but understands the sensitivity of the information to the traditional owners.	Of the five ethnographic sites in the vicinity of the Project, there will be no impact on three and two will have limited impact. These impacts have been discussed at length with Martu people and their heritage advisors and legal representatives and protective measures have been agreed and captured in the Cultural Heritage Management Plan Rules. Cameco would be happy to discuss the impact of the project on the environmental and heritage values of the sites with the submitter as required.

8. Subterranean Fauna

	Submitter	Comment	Response to comment
52	DotE	The submitter notes that more extensive surveying is required to confirm local endemism or prove the range is wider than currently known.	Cameco has undertaken an extensive program of subterranean fauna sampling taking 336 samples in four rounds over twelve months and it is unlikely more sampling would prove the range of an individual species that has been shown to occur with low abundance. As reported in the ERMP, the conservation status of two troglofauna species is possibly threatened by mine development. section 6.3.1 of Appendix N states that "*Irrespective of whether the ranges of these are centred on the proposed mine pit, the threat to both will be small because the mine pit will occupy only 85 ha. The likelihood of either species having a range this small is very low…there is only one troglofauna species in north western Australia with a known range as small as the proposed mine pit which is a schizomid in a Robe Valley mesa. Its range is delimited by the extent of the mesa (Biota, 2006; Harvey et al., 2008) whereas other schizomids in the same landscape have ranges up to 1,970 ha*". It is believed that the potentially restricted species within the Kintyre Project area are associated with three geological environments, which are: • the Permian/Quaternary cover sequences; • the contact areas between chlorite-garnet-chert schists and pelitic schists; and • the potential presence of Coolbro sandstone near the contact of the chlorite-garnet-chert schists and pelitic schists (note: this only applies to two of the sampling points that contained the restricted stygofauna species). Cameco has mapped potential regional habitat locations that are consistent to the above description through the use the Geological Survey of Western Australia (GSWA) 1:250,000 geological map products and geophysical information mapped by Cameco and shows three areas with similar geological sequences as the habitat sampled in the Project area, within close proximity to the Project area, but outside the impact zone (2 m draw down contour).

			Therefore Cameco does not believe that there is a need for more extensive surveying.

9. Flora and Vegetation

	Submitter	Comment	Response to comment
53	OEPA	The submitter recommends that impacts to priority flora should be quantified where practicable.	The locations of priority flora across the project Area are shown on Figure 8-9 and discussed in Table 8-11. There will be no impact to any declared rare flora or Priority 1 flora. One population out of 7 of Priority 2 Eremophila sp. Rudall River may be disturbed by the construction of a sediment pond. Other impacts are associated with the access road, and may be avoided pending the detailed road alignment design. When mapping vegetation and the significant species, Cameco did not count individual plants of Eremophila sp. Rudall River as at that stage it was not known to be a P2 species so we are therefore limited to discussing occurrences or populations. Cameco's botanical consultant has advised that "Eremophila sp. Rudall River was common on all the screen slopes where there is quartz present. No counts were undertaken but it did vary in density from a few to being the dominant shrub". While unable to specifically recall the number of plants at the proposed sediment pond it was noted there were many other locations where it was located. Further, the consultant estimates that the development of the pond might disturb less than 10% of the total number recorded at the site. Table 8-11 is reproduced below: Conservation Category | Species | Location | Impact

				P2	Acacia auripila	Recorded historically in the Kintyre region by Hart Simpson & Associates (1994b, 1997). Not recorded in recent surveys.	NA
				P2	Eremophila sp. Rudall River (formerly small-leaved form of Eremophila tietkensii)	Recorded from scree slopes at several locations within the Kintyre leases in 2012	Populations recorded at 7 locations. Only one population is within the development envelope and may be disturbed by the Project.
				P2	Goodenia hartiana	Recorded historically in the Kintyre region by Hart Simpson & Associates. Not recorded in recent surveys.	NA
				P2	Thysanotus sp. Desert East of Newman (RP Hart 964)	Recorded from four sites along the access road in 2011 and historically in the Kintyre region by Hart Simpson & Associates	Populations recorded at four locations. Populations may be able to be avoided pending detailed road alignment design.
				P3	Comesperma pallidum	Recorded from the Project area within the proposed pit (1 plant) in 2007 and not recorded since, possibly due to fire	The location of the plant recorded in 2007 occurs within the area that would be disturbed by the construction of the open pit.
				P3	Indigofera ammobia	Recorded from one site along the access road.	Plant recorded from one site. The population may be able to be avoided pending detailed road design.
				P4	Ptilotus mollis	Recorded at 10 locations across the Project area in 2012 and historically by Hart Simpson & Associates.	Populations recorded at 10 locations. None of these populations would be disturbed by the Proposal.

10. Offsets

	Submitter	Comment	Response to comment
54	DotE	The submitter notes that management plans need to use SMART criteria or an offsets package needs to be developed in accordance with the *EPBC Act 1999* Environmental Offset Policy.	Noted. The management plans presented with the Environmental Review are draft documents that will be finalised with input from relevant agencies prior to the commencement of mining. The redrafting will provide an opportunity to incorporate SMART criteria.

11. Items not related to a specific key environmental factor but of public interest

11.1 Tailings

	Submitter	Comment	Response to comment
55	DotE, OEPA	The submitters need clarification on whether the TMF will be one or two celled.	The TMF proposed to be constructed at Kintyre will be one celled.

11.2 General

56	DotE	The submitter recommends that the risk assessment in Appendix B is reviewed when any additional studies are undertaken.	Agreed. In addition, the assessment will be reviewed annually once operations commence to confirm the status of the risk.
57	DotE, OEPA	The submitter requests the source document for Graeme Campbell and Associates 1997 and CSA, 2011. The submitter requests that these reports are provided in response to submissions.	These documents are attached. See Attachments 6 and 7.
58	DotE	The submitter requires clarification regarding arsenic concentrations in the lithological units studied and the derivation of trigger values used in these studies.	Typically arsenic values are relatively low in most lithological units, except for in a few ore host (BOGUM) samples, tillite (similar to sulphur concentrations), and hanging wall schist where values in excess of 300 ppm may occur.