Appeals Convenor

Environmental Protection Act 1986

REPORT TO THE MINISTER FOR ENVIRONMENT

APPEALS IN OBJECTION TO THE CONTENT OF, AND RECOMMENDATIONS IN, AN ENVIRONMENTAL PROTECTION AUTHORITY REPORT

EPA REPORT 1574: YEELIRRIE URANIUM PROJECT SHIRE OF WILUNA

PROPONENT: CAMECO AUSTRALIA PTY LTD

Appeal Numbers 025 to 045 of 2016

December 2016

Appeals Summary

This report addresses appeals lodged in objection to the content of, and recommendations in, the report of the Environmental Protection Authority (EPA) in relation to the proposal by Cameco Australia Pty Ltd (the proponent) to develop, mine and rehabilitate the Yeelirrie Uranium Project (the proposal). In EPA Report 1574, it identified nine key environmental factors and concluded that the proposal could not meet its objective for subterranean fauna.

In Report 1574 the EPA advised that in the event the Minister determines that the proposal may be implemented, the Ministerial approval should be subject to the conditions set out in Appendix 6 of the Report 1574 for those factors that do not pose a threat of serious or irreversible harm.

Appeals were received on a broad range of issues in relation to the proposal, which are summarised as follows: subterranean fauna; flora and vegetation; terrestrial fauna; impacts to human health; impacts on Aboriginal heritage and adequacy of consultation; groundwater abstraction and hydrological processes; tailings management and contamination; rehabilitation and mine closure; regulatory framework and other matters.

The Appeals Convenor's investigation included consideration of the appeal grounds, advice from the EPA and relevant government departments, the proponent's response to appeals and discussions with appellants.

In relation to subterranean fauna the Appeals Convenor noted the proponents appeal submission included information related to the potential for the extension of habitat and potential management measures to mitigate impacts to subterranean fauna. However, it is considered that it does not establish that the EPA's objectives for subterranean fauna can be met and on this basis the Appeals Convenor recommended that the proponents appeals against this factor be dismissed.

In relation to the other grounds of appeal and for the reasons outlined in this report the Appeals Convenor considered that the EPAs assessment was justified, however should it be determined that the proposal may be implemented it is recommended that conditions be amended in relation to *Atriplex yeelirrie* and the public availability of management plans.

Recommendations

For the reasons set out in this report, it is recommended appeals in relation to subterranean fauna be dismissed.

Should it be determined that the proposal may be implemented it is recommended that the appeals be allowed to the extent that the following conditions are amended.

- Condition 5 be amended to require that Management Plans to be made publicly available;
- Condition 6-3 be amended to ensure that salinity is appropriately considered in the *Atriplex yeelirrie* Conservation Management Plan
- condition 14-2(5) be strengthened to include reference to investigating unintended impacts on the receiving environment from translocation activities;
- condition 14 is amended to require review and update at regular intervals to ensure that Offset Plan remains contemporary

It is otherwise recommended that the appeals be dismissed.

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INTRODUCTION

This report addresses twenty (20) appeals lodged against the Report and Recommendations of the Environmental Protection Authority (EPA) Yeelirrie Uranium Project Report 1574 (Report 1574) in relation to a proposal by Cameco Australia Pty Ltd (the proponent) to develop and implement the Yeelirrie Uranium Project (the Proposal). The proposed project is located in the Shire of Wiluna, approximately 420 kilometres (km) north of Kalgoorlie-Boulder, Western Australia.

The location of the project is shown in Figure 1.

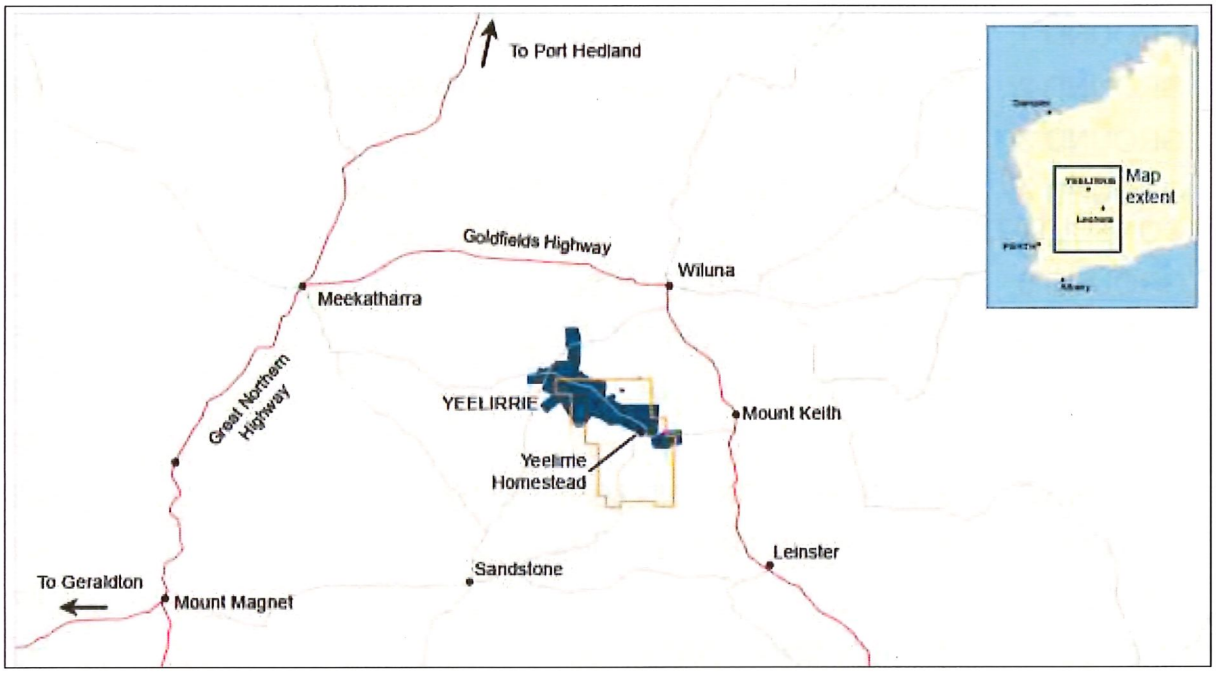

Figure 1 – Location of Proposed Yeelirrie Uranium Mine

(Source: Yeelirrie Public Environment Review (PER), Cameco Australia Pty Ltd, 2015)

This document is the Appeals Convenor's formal report to the Minister for Environment under section 109(3) of the *Environmental Protection Act 1986* (EP Act).

BACKGROUND

The proposal is to construct and operate a uranium mine at Yeelirrie. The proposal will be located within a 4,875 hectare (ha) envelope of which 2,422 ha will be cleared. The proposed mine site will comprise of the following:

- two open pits (totalling 9 km in length, up to 1.5 km wide and 15 metres (m) deep);
- in-pit tailings disposal;
- processing plant;
- borefield and dewatering infrastructure;
- roads;
- raw materials quarry;
- run-of mine pad;
- stockpile areas;
- accommodation village; and
- other supporting infrastructure.

The project layout is shown in Figure 2.

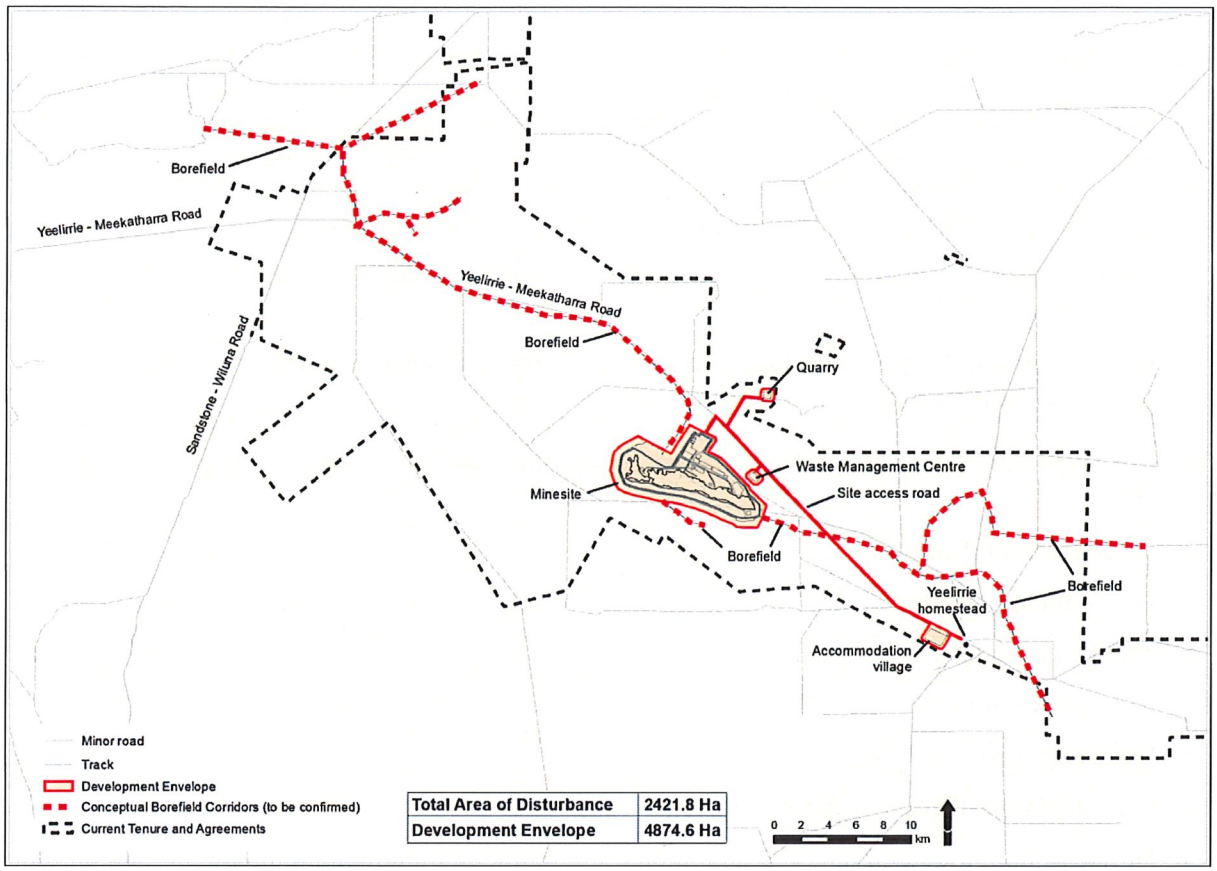

Figure 2 – Proposed Yeelirrie Uranium Mine Site Layout

(Source: Yeelirrie PER, Cameco Australia Pty Ltd, 2015)

Mining will be undertaking using conventional open pit mining techniques and will be undertaken in stages. An average of 3,850 tonnes per annum (tpa) (maximum 7,500 tpa) of uranium oxide concentrate (UOC) will be produced. The expected life of mine is 15 years (22 years to closure).

The pit will be dewatered with an abstraction rate of approximately 4.69 gigalitres per annum (GL/a) and reinjection of up to 1.3 GL/a of water in the early mine life where water abstraction exceeds water demands.

Overburden will be backfilled into the pit. The processing plant uses an alkali tanks leaching process followed by direct precipitation and all tailings will be returned to the in-pit tailings storage facility (TSF).

Containerised UOC will be transported to Port Adelaide, South Australia for export.

At closure the pit will be backfilled and capped with an engineered cover. All infrastructure will be decommissioned and removed, and the site will be rehabilitated.

OVERVIEW OF ASSESSMENT PROCESS

The proponent referred the proposal to the EPA on 12 November 2014. On 15 December 2014 the EPA set the level of assessment of Public Environment Review (PER) with a 12

week public review period. The EPA approved the Environmental Scoping Document (ESD) on 10 April 2015.

In determining the key environmental factors for the proposal, the EPA advised that it had regard for the object and principles as set out in section 4A of the EP Act to the extent relevant to the particular matter being considered during its assessment. The EPA also advised that the following guidelines set out the basis for the EPA's determination on what it considers are key environmental factors, and to form its recommendation on whether or not a proposal should be implemented, and if so, the recommended conditions:

- Environmental Assessment Guideline No. 8 – Environmental principles, factors and objectives.
- Environmental Assessment Guideline No. 9 – Application of a significance framework in the Environmental Impact Assessment process.

The EPA identified that the following key environmental factors as being relevant to the proposal:

- Subterranean Fauna;
- Flora and Vegetation;
- Terrestrial Fauna;
- Human Health;
- Hydrological Processes;
- Inland Waters Environmental Quality;
- Heritage;
- Rehabilitation and Decommissioning; and
- Offsets.

The PER was advertised for public comment from 21 September 2015 to 14 December 2015, and 169 submissions and 2,946 pro forma submissions were received.

The EPA advised that it undertook its assessment consistent with the EP Act and the *Environmental Impact Assessment (Part IV Divisions 1 and 2) Administrative Procedures 2012* (Administrative Procedures 2012).

The EPA published Report 1574 on 3 August 2016. In its report the EPA advised that it applied the principles under the EP Act consistently across all the environmental factors in undertaking its assessment and considers that the proposal would meet its objectives for each of the key factors, except for Subterranean Fauna.

The EPA concluded that the proposal cannot meet the EPA's environmental objectives for Subterranean Fauna, having regard to the *Precautionary Principle*, the *Principle of Intergenerational Equity* and the *Principles of the Conservation of Biological Diversity and Ecological Integrity.*

Whilst the EPA concluded that the proposal could not be implemented, in accordance with Section 44 (2a) of the EP Act the EPA included other advice and recommendations in Report 1574 to the extent that in the event the Minister determines that the proposal may be implemented, the Ministerial approval should be subject to the conditions set out in Appendix 6 of the Report 1574 for those factors that do not pose a threat of serious or irreversible harm.

In relation to subterranean fauna, the EPA in Report 1574 provided additional advice stating that the uncertainty surrounding the potential for serious and irreversible harm may be mitigated by further scientific investigation, research and study to determine if the restricted species extend beyond the impact areas of the proposal or if a compelling case is made to demonstrate that their habitat is continuous and extensive beyond the impact area.

To this end, the EPA advised that an industry-funded research program with the long-term aim of reducing uncertainty surrounding the conservation of subterranean fauna species in the presence of mining may assist with improving the currently limited scientific understanding of subterranean fauna across the State and inefficient sampling methods. The EPA advised that a commitment by the proponent to support such a program could potentially and indirectly offset the local impacts it might have on subterranean fauna at Yeelirrie to the broader benefit of subterranean fauna state-wide.

The proposal was determined to be a controlled action under the Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) due to its potential impacts on listed threatened species and ecological communities, migratory species protected under international agreements and nuclear actions. The Commonwealth Minister for Environment determined on 12 March 2015 that the project could be assessed in accordance with the current Bilateral Agreement Assessment process.

OVERVIEW OF APPEAL PROCESS

In accordance with section 106 of the EP Act, a report was obtained from the EPA in relation to the issues raised in the appeals. The proponent was also given the opportunity to address the matters raised in the appeals.

During the appeals investigation the Appeals Convenor consulted the appellants and the proponent in relation to issues raised in the appeals. The proponent was also provided an opportunity to address the matters raised in the appeals. During the appeals investigation the Office of the Appeals Convenor consulted with the proponents and appellants, which included meetings at Yeelirrie, Leonora, Kalgoorlie, and Perth and via telephone.

The environmental appeals process is a merits based process. For appeals in relation to an EPA report and recommendations, the Appeals Convenor normally considers the environmental merits of the assessment by the EPA, based on objectives as set by the EPA as well as other environmental factors. The appeals process considers environmental significance, relevance of factors, additional information not considered by the EPA, technical errors and attainment of policy objectives. Where the development has been the subject of previous EPA assessments, those assessments and any subsequent Ministerial appeal decisions also need to be taken into account.

OUTCOMES SOUGHT BY APPELLANTS

Two appellants submitted appeals in objection to the EPAs decision. In summary their view is that the impacts to the subterranean fauna could be managed and the proposal should be implemented.

Eighteen appellants support the EPAs recommendation that the proposal should not be implemented, however were of the view that several of the eight factors considered acceptable by the EPA were not in acceptable in their view. On this basis, the appellants maintained that the proposal should not be implemented, not just on the basis of potential impacts to subterranean fauna, but for a number of factors.

GROUNDS OF APPEAL

A range of issues were raised in the appeals, which are summarised as relating to the following subject areas

1. Subterranean Fauna
2. Impacts to Groundwater and Surface Water
3. Impacts to Human Health
4. Impacts on Aboriginal Heritage and Adequacy of Consultation
5. Flora and Vegetation
6. Impacts on *Atriplex yeelirrie*
7. Terrestrial Fauna
8. Amenity
9. Rehabilitation and Mine Closure
10. Regulatory Framework

Appellants raised a number of other matters that are considered to be beyond the scope of the appeal, however appellants contend these matters are relevant to the Minister's considerations.

GROUND 1: SUBTERRENAEAN FAUNA

A number of concerns were raised on appeal with respect to the EPA's assessment of subterranean fauna, specifically in relation to the basis for its conclusion that the proposal will result in unacceptable impacts to stygofauna.

By its appeal, the proponent submitted that the EPA overestimated the proposal's impacts on subterranean fauna and did not apply the right test to establishing the significance of the identified impacts.

The proponent's view was shared by one third party appellant, who contended that the EPA overstated the values of the subterranean fauna identified within the impact area, and that the EPA misapplied the precautionary principle and the principle of intergenerational equity in its assessment.

Finally, another third party appellant, while generally supportive of the EPA's conclusion that the proposal is environmentally unacceptable in respect to subterranean fauna, expressed concern that the basis for the EPA's conclusion was unduly narrow, and did not sufficiently characterise the significant adverse impacts to subterranean fauna should the proposal be implemented.

These appeals are considered sequentially below.

Proposal meets EPA's objective for subterranean fauna (proponent's appeal)

This section examines appeals by the proponent which is to the effect that the EPA ought to have determined that the proposal met the objective for subterranean fauna, and that as a result, ought to have recommended the proposal could be implemented.

The proponent's appeal is based on the following grounds:

1. the EPA overstated the uncertainty of subterranean fauna species occurring outside of the impact area;
2. the EPA's conclusion understates the extent to which mitigation and offset measures could reduce uncertainty; and

3. any residual risk of significant impact can be offset by proportionate precautionary measures.

The proponent asserted that while uncertainty exists regarding the nature and extent of impact on subterranean fauna, such uncertainty is of a level whereby the Minister can be satisfied that the proposal meets the EPA's objective for this factor.

The detail of the proponent's submissions is set out as follows.

1. Overstatement of uncertainty of species outside the impact area

The proponent submitted:

> The assessment of a proposal necessarily involves an element of futurity, of which uncertainty is a component. An evaluation of the future cannot be reduced to scientific precision. There will always be a degree of uncertainty in any evaluation of a proposal that has not yet commenced.
>
> This level of uncertainty is necessarily much higher when it comes to the evaluation of subterranean fauna.

The proponent referred to the EPA's EAG 12 – *Consideration of subterranean Fauna in environmental impact assessment in Western Australia*, as confirming that by its nature, assessment of impacts to subterranean fauna will always entail a high level of uncertainty, viz:

> The assessment of subterranean fauna is often more complex than for other biodiversity factors due to limited knowledge of species distributions and habitat requirements, and the difficulties of survey. Adequate survey is integral to understanding the species present, nevertheless the EPA recognises that the use of surrogates can augment existing information. The use of surrogates together with information gathered during survey, aims to raise the level of confidence in the predictions of impacts and provide sufficient confidence that the environmental objective can be met.

The proponent noted that in consideration of the high degree of uncertainty in sampling and understanding the habitat requirements of subterranean fauna, the EPA considers the use of surrogates (both habitat and biological) as an acceptable means to determine impact – unlike for example, when evaluating impacts on terrestrial fauna, where the degree of uncertainty is lower.

Relying on the application of the precautionary principle, the principle of intergenerational equity, and the principle of the conservation of biological diversity and ecological integrity, the EPA recommended that no action be taken as 'uncertainty still remains when predicting the distribution of species'.

The proponent submitted that the EPA overstated the level of uncertainty of subterranean fauna species occurring outside the impact area (including the number of species) for three reasons:

(a) the EPA wrongly directed itself as to the test that it had to apply;

(b) the EPA insufficiently considered the availability of habitat and habitat pathways from the information before it; and

(c) the EPA insufficiently considered the likely distribution of individual subterranean fauna species from the information before it.

(a) Test applied by EPA

By this submission, the proponent contended that the role of the EPA is advisory, requiring it to be satisfied as to whether or not a proposal can meet the relevant environmental objectives.

The proponent specifically noted the inclusion of the 'precautionary principle' in section 4A of the EP Act, which defines the object of the Act. In this regard, the proponent stated:

> The inclusion of the precautionary principle in the EP Act is an express acknowledgement that the Act does not require the demonstration of absolute certainty for environmental factors. A requirement for absolute certainty would make the precautionary principle superfluous.
>
> The precautionary principle has been the subject of much consideration. However, it is clear that the principle does not necessarily prohibit the carrying out of a development plan, programme or project until full scientific certainty is attained.

Noting the above, the proponent contended that:

> Rather than considering whether it was reasonably satisfied that the environmental objective for subterranean fauna could be met, the EPA recommended that no action should be taken as "*uncertainty still remains when predicting the distribution of species*" and that, *"... a level of uncertainty remains as to whether a number of subterranean fauna species ... may be found outside the Impact Area*". This led the EPA to conclude that, *"... there is too great a chance of a loss of species ...*".

The proponent submitted that this conclusion reveals the EPA's error: in recommending that the proposal not proceed, the EPA demonstrated that it required a level of certainty about subterranean fauna occurring outside the impact area that was unreasonable given the enormous difficulties in assessing, characterising, understanding and predicting this particular environmental factor. In short, the proponent submitted that the EPA's response was not proportionate to the threat.

In response to the proponent's submission about the correct test to be applied, the EPA advised:

> The application of the s4A precautionary principle and the related need to take precautionary measures (as distinct from preventative measures) requires two pre-conditions or thresholds to be met. That is, there exists a threat of serious or irreversible environmental damage and scientific uncertainty as to the environmental damage.
>
> There must be reasonable scientific plausibility as to the threat of damage. The appellant does not dispute this.
>
> In relation to the scientific uncertainty which needs to exists [sic], the EP Act does not specify any particular level of certainty, but it is reasonable and well understood that the requisite degree of scientific uncertainty will vary depending on the magnitude of the threat. If the threat is serious and irreversible, then a high degree of uncertainty would trigger the application of the precautionary principle. Therefore where there exists a threat and the requisite degree of uncertainty, the decision of the EPA needs to be guided by caution; the EPA does not understand the application of the precautionary principle to mean that a proposal may not proceed. The EPA understands that if the principle is applicable, the principle requires that precautionary measures must not be deferred, and in some circumstances, for example where the threat is a serious or irreversible impact and the level of uncertainty is high, the only proportionate precautionary measure may be that the proposal not proceed. That was the EPA's assessment in this case.
>
> During the EPA's assessment of this proposal, the EPA ... gave the proponent an opportunity to undertake additional research and studies in order to demonstrate that either the threat

> does not exist or is negligible. The proponent, however, advised the EPA that it has nothing further to provide and therefore was unable to demonstrate that either the threat does not exist or is negligible.
>
> The proponent contends that the EPA was unreasonable in its consideration of the level of uncertainty of the threat because there are inherent difficulties in assessing, characterising, understanding and predicting (the habitat) of subterranean fauna. The EPA considers that this contention seems to be based on a false premise and would have the EPA finding the level of uncertainty of a threat to be less than what it may be in all circumstances where knowledge of the particular environmental factor is limited or difficult to obtain. Such an approach would be inconsistent with the precautionary principle in the EP Act.

(b) Insufficient consideration of habitat and habitat pathways

By this submission, the proponent contended that the EPA did not sufficiently consider the availability of habitat and habitat pathways relevant to subterranean fauna. This submission is based on four considerations:

- sampling undertaken by the proponent was appropriate;
- EPA unreasonably limited its consideration of the extent of stygofauna habitat;
- EPA failed to draw proper inferences from the available information on habitat; and
- EPA did not support its conclusions regarding troglofauna.

These issues are addressed as follows.

Sampling by proponent was appropriate

In respect to the appropriateness of the sampling undertaken, the proponent noted that the EPA accepted the sampling, stating in Report 1574 that 'sampling and survey methods used for subterranean fauna for this proposal were consistent with the requirements of [EAG 12] and Guidance Statement 54a'.

In response to this contention, the EPA advised:

> The EPA ... considered that the sampling and survey methods used were consistent with the requirements of EAG 12 and Guidance Statement 54a Sampling Methods and Survey Considerations for Subterranean Fauna in Western Australia. This view was based on the number of sampling bores (inside and outside the impact area), the sampling rounds undertaken and that the species accumulation curve estimated that sampling had recorded approximately 84 and 69 per cent of the available stygofauna and troglofauna species, respectively. In addition, the proponent's Response to Submissions document states that 'While it is almost impossible to collect all invertebrate species occurring within a large, species rich area without a very intensive sampling program across the whole area, importantly for this assessment the intensive sampling within the area of proposed groundwater drawdown appears to have recorded most of the stygofauna occurring within this impact area'.

Unreasonable limitation of consideration of extent of habitat

In relation to the extent of stygofauna habitat, the proponent noted the EPA's acceptance that the boundary of the area as being the *Yeelirrie calcrete groundwater assemblage type on Carey palaeo-drainage on Yeelirrie Station* Priority Ecological Community (PEC), as shown in Figure 3.

The proponent submitted that the proposal footprint, including the area affected by groundwater drawdown greater than 0.5 m only extends over approximately 43% of the PEC

area, and that of this, only 17% of the total area will be permanently impacted, with groundwater levels eventually recovering after cessation of mining.

The proponent contended that there was no logical basis to infer the habitat within the PEC is unconnected:

> In fact, the heterogeneous nature of calcrete habitat, its propensity for voids and the high species richness of the PEC should have led the EPA to infer the existence of available pathways, rather than to presume that all habitat expressions are constrained by physical or chemical barriers.

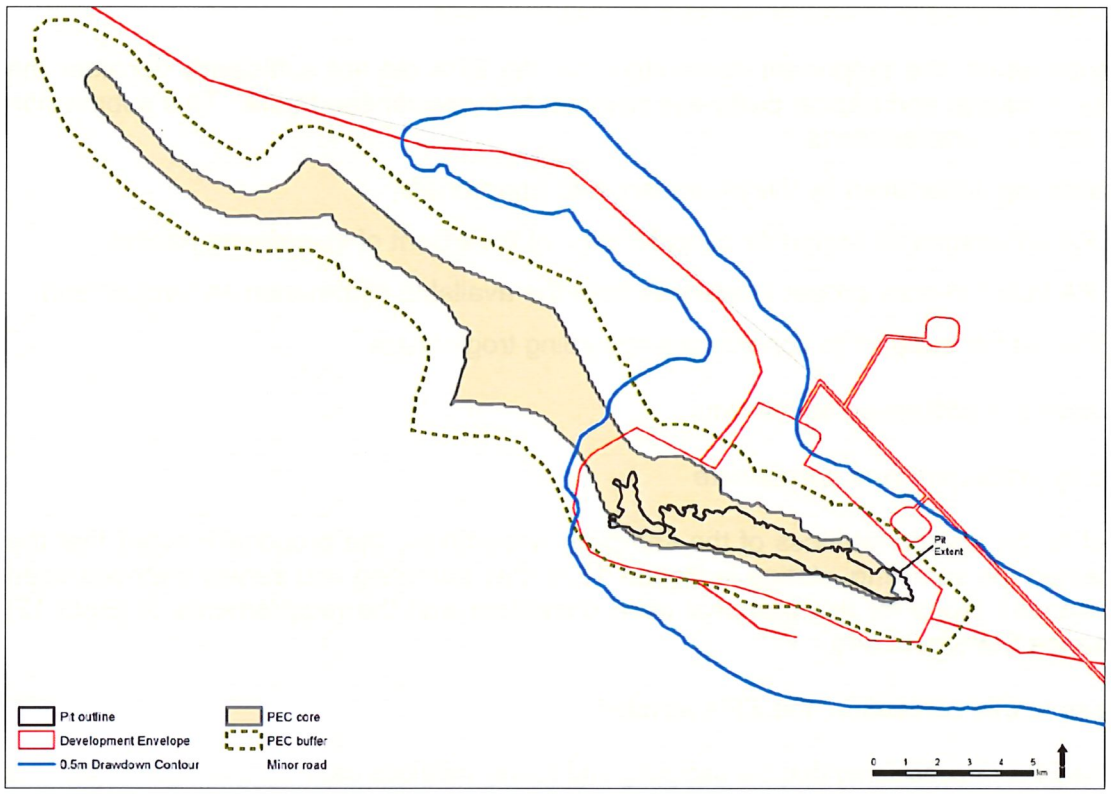

Figure 3 – Yeelirrie PEC (source: EPA Report 1574, 2016)

The proponent submitted that the EPA gave (without any justification) excessive weight to its finding that:

> … noting the complex nature of the habitat, the stygofauna species occurring in PEC No. 49 would not be expected to be evenly distributed throughout the PEC and different species may be confined to various areas across the PEC. There are no guidelines for what proportion of a subterranean habitat may be lost while still retaining reasonable certainty that species dependent on that habitat can be conserved.

In this regard, the proponent noted that two recent transverses of calcrete habitat approximately 2 kilometres and 5 kilometres to the west of the resource area demonstrated:

- thick sequences of saturated calcrete were intersected along both traverses, extending from the surface to a depth of up to 11 metres, and is between 2.5 to 4.5 kilometres wide;
- two styles of calcrete were observed in the drill holes :

- hard, vuggy, porcellaneous displacement style calcrete, occuring within the central portions of the profile, best developed just above and directly below the water table at an average depth of 4 m below the current surface; and
- fine-grained, powdery, earthy replacement style calcrete, observed above, below and on the margins of the porcellaneous core extending out to the central drainage margins;

- the style and distribution of the calcrete types observed in these new drill traverses is very similar to the calcrete morphology observed in the north-western part of the resource area where a number of species including, *Novanitocrella "araia"* sp. n., *Philosciidae* sp. n. Y2, *Schizopera akolos*, *Schizopera emphysema* and *Halicyclops cf. eberhardi* sp. B are currently only known from;
- there is no reason to suggest that the stygofauna calcrete habitat observed in the proposed mine area is not physically and hydrologically connected to the thick saturated calcrete observed in the more recent drilling area.

Finally on this point, the proponent submitted that the EPA failed to give consideration to the extensive bands of freshwater along both the north and south side of the palaeochannel, which the proponent stated infers that *Enchytraeidae* sp. Y4 is likely to be more widespread at Yeelirrie, based on surrogate biological and habitat evidence.

In its response, the EPA identified a number of issues raised by this submission, and advised as follows:

> *No justification regarding surrogate analysis outcome*
>
> The EPA considers that the proponent's surrogacy analysis was not consistent with EAG 12 for the following reasons:
> - in some cases an inappropriate biological surrogate was proposed; and
> - a number of statements were made that were not supported by evidence/data.
>
> Also, in other cases the proponent did not provide a surrogate or referred to a surrogate, but did not provide the specific details to support its use as a surrogate.
>
> *No logical basis to infer unconnected habitat*
>
> The EPA considers that the information provided by the proponent regarding the stygofauna habitat at Yeelirrie demonstrates a very complex, highly variable environment with a mosaic of microhabitats. The EPA agrees with the appellant that this complex environment makes the identification of habitat pathway difficult. As a result, a degree of uncertainty remains whether or not the habitat is connected. At the time of its assessment, the information that the EPA analysed did not demonstrate habitat connectivity for each of the 11 species from inside to outside the Impact Area.
>
> *Over-emphasised uncertainty regarding remaining habitat*
>
> The EPA notes that following closure of the mine and cessation of groundwater abstraction, the proponent predicts that within 20 to 100 years groundwater levels will recover to pre-mining levels in areas that have not been excavated ... No evidence was provided to support the prediction that subterranean fauna will recolonise areas after extended periods of dewatering. As a result the EPA considers that it did not over emphasise the uncertainty regarding the extent of habitat remaining.
>
> ...
>
> *Similar habitat extends outside Impact Area*
>
> The information provided in relation to the calcrete west of the resource area appearing to be morphologically similar, appears to be new information that the EPA had not considered. This information may infer that the habitat type for *Novanitocrella* "araia" sp. n., *Philosciidae* sp. n Y2, *Schizopera akolos*, *Schizopera emphysema* and *Halicyclops* cf. *eberhardi* sp. B species may extend outside the Impact Area. However, this inference would need to be supported by

> field data, including but not limited, to core sample results to confirm geology, and water chemistry (i.e. salinity) results from the bores.
>
> The EPA noted the information provided regarding the bands of freshwater along the palaeochannel, and that the proponent considered this would likely be the same habitat for *Enchytraeidae* sp. Y4. However, the EPA considered that a biological surrogate was not provided and the information did not demonstrate that the physical surrogate (habitat type) was continuous. Therefore, the EPA considers that it did not fail to consider the surrogate information provided.

Failure to draw proper inferences

The proponent provided the following example in support of this contention:

> An example of the EPA's failure to draw proper inferences is its focus on the high abundance of species *Kinnecaris lined* as justification that this species may be restricted, while failing to give consideration to available habitat.

Kinnecarris lined was captured towards the edge of the modelled 0.5 m draw down contour. The location corresponded with a 1.0 m groundwater draw down. However, the remaining depth of the water table was estimated up to 10 m. This information identified that there would not be a complete loss of habitat around the location site. Consequentially, despite this species only having been located at this site, the information did not suggest that the proposal would result in the extinction of this species.

In response to this issue, the EPA advised:

> The EPA's view regarding high capture rates providing a greater degree of certainty that these species may by restricted and less likely to be an artefact of sampling is based on the understanding that where a high number of specimens are recorded, if they were to be widespread and not restricted, the species would be expected to be found (even at lower numbers) in other bores close by.
>
> In the case of *Kinnecaris lined*, no physical or biological surrogate was provided at the time of assessment to demonstrate the likelihood that this species would be found outside the Impact Area. However, noting the new information provided relating to the remaining depth of habitat, if this information was to be supported by evidence i.e. core samples to show depth of habitat, depth of water table pre-mining and the change as a result of dewatering, water chemistry results, and impact of seepage of tailings on the remaining habitat, this may provide adequate information to infer that habitat for *Kinnecaris lined* extends outside the Impact Area and hence reduce the uncertainty.

EPA conclusions regarding troglofauna

The proponent submitted that the EPA's conclusions with respect to troglofauna were inconsistent with its assessment of an iron ore mine in the Pilbara (Yandicoogina Iron Ore Pocket and Billiard South deposits), in which it advised:

> The EPA supports the view that habitat allows movement of troglofauna species and that habitat is continuous and extends outside the area to be impacted. Due to the relatively small amount of troglofauna habitat to be impacted and the limited troglofauna records, the EPA considers that the proposal will not threaten the viability of troglofauna species in the Proposal Area.

The proponent submitted that the implementation of the proposal will result in permanent loss of 17% of the PEC, being the extent of the open pit, plus a small area around the mine pit extending only a few metres in which drying of habitat and the effects of mine pit activities will reduce habitat quality.

In response to this issue, the EPA advised:

> The EPA is required to assess a proposal on merit having regard to the principles of the EP Act. The EPA's assessment of troglofauna was based on the merits of the information available at the time of the assessment.
>
> The description of the troglofauna habitat at Yeelirrie was sourced from the proponent's documentation ... In particular the PER document states:
>
> > Troglofauna species mostly have more restricted ranges than stygofauna (Lamoureux 2004; Halse and Pearson 2014) and, given the calcrete 'island' theory of occurrence, they are expected to be mostly restricted to single calcretes in the Yilgarn'.

(c) EPA insufficiently considered distribution of subterranean fauna species

The proponent raised the following issues in support of this submission:

- use of surrogates was appropriate;
- level of certainty required by the EPA in respect to biological surrogacy was too high
- further sampling and genetic testing would likely identify species have wider habitat range;
- majority of the species comprising the PEC were known from outside the impact area; and
- wrong for EPA to equate higher capture rates of some species with having a more restricted range.

These issues are considered as follows.

Use of biological surrogates

The proponent noted the EPA's policy position about the use of biological surrogates, viz:

> A biological surrogate is a species, preferably with similar morphological characteristics, that is likely to have similar trophic and dispersal attributes to the species found in low abundance. If genetic analysis of a surrogate species demonstrates that there is genetic continuity between two areas, it may be reasonable to conclude that there is continuity of habitat. Therefore it can be argued that if a species found in low abundance in one area but not recorded in the other area it is similarly not likely to be restricted.

The proponent submitted that the EPA's conclusion that the proponent's use of surrogates was 'not consistent with EAG 12' was made without any explanation or logical reasoning. As such, the proponent expressed the view that the approach of the EPA does not permit the Minister on appeal to infer that the EPA correctly directed itself in applying EAG 12.

In response to this issue, the EPA reiterated the advice given above, namely that the proponent's surrogacy analysis was not consistent with EAG 12, as in some cases an inappropriate biological surrogate was proposed and a number of statements were made that were not supported by evidence/data.

Level of certainty required by EPA too high

By this submission, the proponent contended that had the EPA properly considered the available surrogacy information, it ought to have found that this information was sufficient to conclude that 'species found in low abundance in one area but not recorded in the other area is similarly not likely to be restricted' (EAG 12).

The proponent identified surrogate species as both being from the same genus and captured from the same or proximate bores. However, the proponent claimed that the EPA appears to have discounted the use of these surrogate species on the basis that there was uncertainty about species salinity preference.

The proponent argued that the EPA failed to consider (and therefore account for) the inherent uncertainty associated with its nominated sampling methodology. The required sampling methodology did not permit the identification of the precise depth of groundwater within which the animals were captured and therefore the precise salinity preference of either the subject species or the identified surrogate.

In response to this issue, the EPA advised:

> To be considered an appropriate biological surrogate the EPA would require the biological surrogate to be recorded in the same bore as the subject species and also in a bore that is located outside the impact area. This was not the case for *Atopobathynella* sp. 'line K', *Enchytraeidae* sp. Y6 and *Halicyclops* cf.*eberhardi* sp. B, Therefore the EPA considered the proposed biological surrogates for these species were inappropriate.
>
> However, noting the new information provided relating to the remaining depth of habitat, if this information was to be supported by evidence i.e. core samples to show depth of habitat, depth of water table pre-mining and the change as a result of dewatering, and water sampling results, this may provide adequate information to infer that habitat for *Atopobathynella* sp. 'line K' extends outside the Impact Area.

Further sampling and genetic testing

By this submission, the proponent stated that *Enchytraeidae* sp. Y4 is likely to be more widespread at Yeelirrie, based on surrogate biological and habitat evidence. In addition, it submitted that there are extensive bands of freshwater along both the north and south side of the palaeochannel that are likely to provide the same habitat for *Enchytraeidae* sp. Y4 as it occupied at North Bore.

The proponent noted that recent sampling by Gold Road Resources in the Yeo palaeochannel east of Laverton has shown: (1) ranges of up to 12-14 km within a calcrete aquifer for enchytaeid worms; and (2) that when four enchytaeid specimens from different samples were analysed genetically four species were recognised. Analysis of a further 26 animals from more samples from the palaeochannel showed nine species to be present, with two of the original four species shown to be abundant and widespread. The other two remained known from single bores and one or two animals, which fits with the standard log-normal pattern of species abundances in a community (i.e. a few species abundant and most rare).

The proponent submitted that at least nine enchytraeid species were also found at Yeelirrie and the more extensive results from the Yeo palaeochannel, combined with the wider range of enchytraeids shown by Brown et al. (2015), suggest that the apparent range restrictions at Yeelirrie are probably sampling artefacts. *Enchytraeidae* sp. Y5, which also appeared to be restricted on the basis on sampling results from 2009-2010, was shown in 2015 to be more widespread.

In response to this issue, the EPA stated:

> During its assessment the EPA considered that the field results of salinity and pH of water at the bore where *Enchytraeidae* sp. Y4 was recorded and along the north and south side of the palaeochannel was required to support the proponent's physical surrogate analysis. This information was not available and therefore the EPA did not accept the physical surrogacy information.

> The information provided relating to other enchytaeid in the Pilbara and Laverton can be used as examples to demonstrate potential ranges, however only similar local species (those recorded at Yeelirrie) can be used as biological surrogates. Therefore, the EPA considered that a biological surrogate for *Enchytraeidae* sp. Y4 was not provided.

Majority of the species known from outside the impact area

By this submission, the proponent noted the EPA's advice with respect to the Yandicoogina mine in the Pilbara, viz:

> Of the 39 taxa within the area of the proposed mine pit, three have been recorded from only within the area of the proposed pit... However, the abundance of other wider ranging Pilbara taxa collected from Yandi ... and that almost half of the overall assemblage is known from the wider region, may suggest a lower risk of very localised restrictions in species distributions. This may indicate that the recorded singleton species are more an artefact of sampling, rather than reflecting true distributions.

The proponent contended that the EPA did not give similar consideration to the Yeelirrie proposal, noting that significantly more than half of the overall assemblage is known from the wider calcrete habitat.

In response to this issue, the EPA advised that it:

> ... is required to assess a proposal on merit having regard to the principles of the EP Act. The EPA's assessment of troglofauna was based on the merits of the information available at the time of the assessment.
>
> Although *Trichorhina* sp. n. F (the restricted troglofauna species at Yeelirrie) was a singleton, the EPA did not consider that enough information was provided to demonstrate that the habitat extended outside the Impact Area. Noting that the *Trichorhina* sp. n. F was recorded in the middle of the mine pit and that the PER document states that *Trichorhina* sp. n. F 'will have a small range but further sampling may show it occurs outside the mine pit', the EPA required an appropriate surrogate to be provided to confirm continuous habitat outside the Impact Area.

Wrong to equate higher capture rates with more restricted range

The proponent submitted that it was open on the survey information for the EPA to determine from the sampling that the sampled locations represented preferred habitat (for an unidentified reason). However, it submitted that it was a misapplication of the abundance principle (and an error in logic) to infer (as the EPA did) that the relevant species do not have a broader range. The proponent submitted that all that the EPA could infer from the sampling was that the species would likely occur in lower abundance beyond this preferred habitat, noting that the precise extent of the preferred habitat could not be mapped. This abundance sampling also, in the view of the proponent, provided no information to infer that habitat pathways connecting to preferred habitat did not exist.

Further, the proponent stated that the EPA's reasoning suggests that it has used these three species (*Halicyclops* cf. *eberhardi* sp. B, *Novanitocrella* 'araia linec' ssp. n., and *Kinnecaris lined*) as surrogates for all species with an apparent restricted distribution. This had led the EPA to over-estimate the uncertainty regarding the likely distribution of these species and ignore available habitat information that provided a contrary indication.

In response to this issue, the EPA stated that its view:

> ... regarding high capture rates is that it provides a greater degree of certainty that these species may by restricted and less likely to be an artefact of sampling. This is based on the

> understanding that where a high number of specimens are recorded, if they [could be] considered to be widespread and not restricted, the species would be expected to be found (even at lower numbers) in other bores close by. However, this was not the case.
>
> The higher capture rates were not the only reason for the EPA to consider that the species were restricted. As the subterranean fauna species were only recorded within the Impact Area and the proponent was unable to demonstrate that the habitat extended outside the Impact Area, the EPA concluded that there was too great a chance that species may be lost. The higher capture rates of those species only increased the possibility that the species was restricted to the Impact Area and not likely to be a result of the randomness of sampling.

2. Potential for mitigation and offset measures to reduce uncertainty

By this submission, the proponent contended that if consideration is properly given to mitigation and offset measures, any residual uncertainty is further reduced, and there exists a stronger basis for the Minister to be satisfied that the proposal meets the environmental objective for subterranean fauna.

The proponent submitted that had the EPA correctly approached the assessment of this factor, it:

> ... would necessarily have led to a conclusion that mitigation and offset measures could be imposed as implementation conditions and the implementation of such measures would ensure that residual uncertainty associated with subterranean fauna would be at an acceptable level.

The appellant raised three issues in support of this submission:

- EPA is required to consider mitigation and offset measures;
- EPA erred in not considering mitigation and offset measures; and
- it is usual practice to require further research as an offset and mitigation measure.

These issues are considered as follows.

Requirement to consider mitigation and offset measures

The proponent noted that section 44 of the EP Act requires the EPA to assess the key environmental factors and provide a recommendation on the proposal. It submitted that the EPA's recommendation addresses the question of implementation, which itself is a future act and often occurs subject to implementation conditions. In making its recommendations, the proponent expressed the view that the EPA is required to give consideration to the likely effect of relevant implementation conditions on the undertaking of the proposal.

While the proponent acknowledged that the EPA is not required to recommend implementation conditions if it recommends that the proposal not be implemented, it submitted that the EPA needs to evaluate whether mitigation measures could reduce uncertainty sufficient to make a proposal acceptable in the first instance.

In response to this issue, the EPA advised:

> The EPA analysed the mitigation and offset measures provided during the assessment in drawing its conclusion regarding subterranean fauna. The EPA noted that implementation of the proposed Troglofauna Protection Area (page 24 of EPA Report 1574) would result in the protection of four of the troglofauna species recorded only within the Impact Area of the proposal. The EPA also advised (page 23 of EPA Report 1574) that the mitigation and management strategies provided at the time of assessment were well considered for stygofauna but it was unclear if they would mitigate impact to all the potentially restricted species.

The EPA advised the Minister (page 78 of EPA Report 1574) that the proposed mitigation measures for subterranean fauna should be conditioned if the proposal was found to be acceptable based on the provision of new information. Refer to Sections 3.1 and 5 of EPA Report 1574.

EPA erred in not properly considering mitigation and offset measures

The proponent submitted that the EPA should have considered what further information could and would likely be obtainable from future management actions. To withhold such consideration involves error.

The proponent referenced a number of parts of Report 1574 and contended that while the EPA acknowledged that it had presented well considered mitigation and management measures, it also stated:

1. the proponent provided some analysis to support the possibility that the subterranean fauna species found in the impact area may have a wider distribution; and
2. (in Other Advice) the 'uncertainty surrounding the potential threat of serious or irreversible damage may be mitigated by further scientific investigations, research and study to determine ...'

The proponent contended that these contrasting references indicate that the EPA did not properly consider the its proposed mitigation and offsets measures.

In response to this issue, the EPA advised:

> The WA Environmental Offsets Guidelines state that
>
> > *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*
>
> Environmental offsets are generally considered after the proponent has exhausted all other mitigation measures and there remains residual environmental impacts and uncertainty as to threat of serious or irreversible environmental damage - see EAG 8 and 9 for those which are capable of being offsets. In some instances an offset either direct or indirect is not appropriate.
>
> Contrary to the proponent's contention (that the EPA had not properly considered its proposed mitigation and offset measures), the EPA advises that:
>
> - the EPA considered the proponent's mitigation and management strategies (this is, referenced EPA Report 1574 at page 23);
> - its consideration of the proponent's mitigation and management measures for dealing with the impacts on subterranean fauna included the proponent's information regarding indirect offsets; and
> - the 'may be mitigated' in the EPA's Other Advice is a reference to the opinion held by the EPA that the level of uncertainty, relating to the threat of the environmental damage, could possibly be (i.e., may be) reduced with further research.

Usual practice to require further research as an offset and mitigation measure

The proponent submitted that, in considering appeals against the EPA's report on the Revised and Expanded Gorgon Gas Project in 2009, the then Minister for Environment stated:

> On the advice of the EPA, there remained three species of short range endemic taxa that have been located within the plant boundaries which have not been identified from any other area.

The proponent submitted that, in the above case, the EPA recommended the proposal not be implemented, but nonetheless recommended conditions in the event the Minister approved the proposal. Upon consideration of those issues, the proponent noted that the Minister approved the proposal. The proponent also cited two other cases which it asserted support its conclusions.

In response to this issue, the EPA advised:

> In deciding whether a proposal may be implemented pursuant to s45 of the EP Act, the Minister for Environment and the other relevant decision-making authorities may consider a range of matters which are not necessarily relevant considerations which the EPA is able to take into account in performing its functions and duties under Part IV of the EP Act: see *Coastal Waters Alliance of Western Australia Incorporated v Environmental Protection Authority; ex parte Coastal Waters Alliance* (1996) 90 LGERA 136.
>
> The EPA also notes that in some circumstances, for example, where there is a threat of serious or irreversible environmental damage, and the level of uncertainty as to that threat is more than negligible, that in the EPA's opinion, an indirect offset (research funding) is not appropriate.

3. Residual risk of significant impact can be offset

The proponent's final submission in support of its appeal is that the proposed mitigation and offset measures recommended to the Minister by the EPA through the 'Other Advice' section of Report 1574 would achieve both a reduction in uncertainty of local impact but also regional benefit.

Local benefit

The proponent submitted that there is local benefit from further information about capture location in the groundwater column, and therefore greater information on habitat preference. Such further information would improve the confidence in the use of the biological surrogates identified by the proponent.

The proponent noted the EPA's advice that this information 'would be of value in understanding, and potentially mitigating further impacts on, these species' and specifically would address 'sampling and identification of subterranean fauna taxa and/or suitable habitat of restricted species outside the impact area'.

Further, the proponent submitted that the sampling undertaken at Yeelirrie adopted the common survey practice of inferring from a single DNA-sequenced animal that all captured species (displaying similar morphology) were of the same species. For example, thirty-seven enchytraeid worms were found in the sample and it was assumed that all enchytraeids in the sample belonged to Enchytraeidae sp. Y4. The proponent argued that this common approach can result in biological surrogates (from the same sample) going unidentified. Mitigation in the form of further sampling and research will, the proponent submitted, likely improve confidence in the use of local biological surrogates through extending the range of surrogated species or by locating the currently restricted species. For example, the proponent stated that *Enchytraeidae* sp. Y5, which appeared to be restricted on the basis on sampling results from 2009-2010, was shown in 2015 to be more widespread.

Regional benefit

The proponent considered that the results of the Offset program endorsed by the EPA in the Other Advice section of Report 1574 will improve species baseline information within the Yilgarn region, which will facilitate improved cumulative impact assessment for future proposals. For example, the proponent stated that stygofauna reaction to groundwater drawdown is unknown, which the current proposal could explore. Similarly it submitted that there is limited information about what happens when groundwater recovers post-mining, which could also be the subject of analysis.

In response to this matter, the EPA stated:

> The EPA provided other advice to the Minister for Environment in Section 5 of EPA Report 1574. This section (pages 77-78 of EPA Report 1574) advises the Minister that the uncertainty may be reduced through scientific investigation, research and study or a compelling case regarding habitat connectivity and distribution.
>
> The EPA recognises the difficulty in sampling subterranean fauna accurately and considered that further research, study and information has the potential to reduce the uncertainty regarding their distribution locally and across the State.

Overstatement of subterranean fauna values (third party appeal)

One third party appellant submitted that the stygofauna identified by the EPA are biologically insignificant, and would be considered to have little value in any form. In addition, the appellant noted that each species is not lost until the last one dies, and current technology of genetic engineering, biological banking and cryopreservation even makes extinction of simple organisms redundant.

The appellant specifically invoked the principle of intergenerational equity in section 4A of the EP Act, contending that denying the development of this mine may jeopardise options for addressing climate change. He also questioned the EPA's assessment of the proposal against the precautionary principle.

The appellant also contended the EPA's recommendations were out of step with majority public opinion, citing comments lodged online in response to an article in *The Australian* on 4 August 2016 titled 'Desert prawn blocks WA uranium mine'.

In response to this appeal, the EPA advised that it:

> ... is required to assess a proposal on merit having regard to the principles of the *Environmental Protection Act 1986.* The EPA's conclusion (page 27 of the Report) regarding subterranean fauna was based on the merits of the information available at the time of assessment and had regard to the principles of the [Act].
>
> ...
>
> The EPA considered the potential restriction of one or more species of subterranean fauna to the impact areas to be "serious or irreversible damage" to the environment for the purposes of the precautionary principle set out in section 4A of the [Act]. Allowing a proposal to be implemented which is likely to serious impact to a species would also be contrary to the principles of intergenerational equity and conservation of biological diversity and ecological integrity. The EPA considers that its application of the section 4A principles as part of its assessment of the key environmental factor of Subterranean Fauna and as summarised in Appendix 3 of the EPA Report was appropriate and justified.

The appellant, in response to the above advice from the EPA, made an additional submission expressing concern that the justification used to recommend against the proposal being implemented was as a result of the EPA's ideological use of the precautionary principle and the principle of intergenerational equity.

In relation to the precautionary principle, the appellant submitted that the principle is directed at 'major' effects where risks and their consequences are 'weighted'. The appellant submitted that this approach was not followed by the EPA.

On the principle of intergenerational equity, the appellant stated that the concept was originally formulated to insure that future generations are not saddled with the financial public debts bought about by current generation's excessive expenditure. The appellant submitted that, like the precautionary principle, the principle of intergenerational equity was hijacked by those who employ 'intrinsic value' concept for all non-human biological entities to justify non-approval of projects, contrary to the requirements of the EP Act and EAG 8.

The appellant reiterated that the WA environment will be worse off for not approving the proposal, by losing an opportunity to directly increase the scientific knowledge of WA stygofauna; indirectly increased management of the WA environment through an increase in government income; and possibly benefited the world environment by managing CO_2 levels in the atmosphere.

Underestimation of impacts to subterranean fauna (third party appeal)

By contrast to the above appeals, another third party appellant was of the view that the EPA's recommendations with respect to subterranean fauna were appropriate, however maintained that the proposed management options would not mitigate against impacts to subterranean fauna. In particular, the appellant was of the view that the 50 m exclusion zone was inadequate and the proponent had not provided justification on the merits of the zone. The appellant notes that in other assessments where a singleton has not been identified outside the impact area, a 500 m buffer was placed around the troglofauna habitat.

The appellant also argued that monitoring and reporting are not considered active management measures to protect the species, and should the proposal be implemented, it asked at what point would mining cease if monitoring indicated that the population is in decline.

In response to this appeal, the EPA noted that the adequacy of the buffer was previously raised in the Summary of Submissions and no new information was put forward by the appellant. The EPA report noted that the Troglofauna Protection Area (TPA) was well considered and based on advice provided by Parks and Wildlife. The TPA is located at the edge of the pit and is contiguous with the calcrete areas used by troglofauna outside of the pit. The EPA advised that although the TPA has a buffer of 50 m the TPA has an overall area of 10,500 square metres.

Additional submission by proponent

The proponent submitted additional information to the Office of the Appeals Convenor in November 2016 which it contended would further reduce impacts to subterranean fauna if the proposal was approved.

South Eastern Borefield (*Atopobathynella* sp. 'line K', *Enchytraeidae* sp. Y4 and *Kinnecaris 'lined'* sp. n.)

In relation to the three species potentially affected by groundwater abstraction in the borefield south-east of the mine, the proponent advised it is now of the view that abstraction can be managed to ensure drawdown at the location of these species does not exceed 0.5 m. While previously reluctant to commit to this outcome due to the uncertainty of the impact on groundwater production from the region, following some further work and considering the conceptual nature of the current borefield design, the proponent stated that it is now in a

position to commit to managing groundwater abstraction at the three locations to not exceed 0.5 m drawdown, and would accept an outcomes-based condition to this end.

North Western Open Pit (*Schizopera akolos*, *Philosciidae* sp. n. Y2, *Novanitocrella* 'araia' sp. n., *Halicyclops* cf. *eberhardi* sp. B, *Enchytraeidae* sp.Y6

The proponent noted that a cluster of five species occur within the northern end of the north western open pit, and these species would be affected by drawdown from mine dewatering.

The proponent stated that there are limited options to reduce the impact of dewatering at the location of the species and it committed to undertake further drilling and sampling to determine the extension of range or of similar habitat beyond the areas affected by drawdown.

Following the release of the Report 1574, the proponent stated that it has commenced discussions with the WA Biodiversity Science Institute to determine its interest to lead and co-ordinate a research program. The proponent advised that these proposals could be expanded to include new technologies and innovation looking at the protection of species where habitat may be impacted by groundwater drawdown, and that it would accept an objective-based condition to this end.

Advice from Office of the EPA

To assist with the consideration of the proponent's additional advice, the information regarding the management of water abstraction from the south eastern borefield was provided to the Office of the EPA for review and comment. In its response, the Office of the EPA advised that:

> Information on other mining operations in WA shows that [the proponent has] a number of potential options to manage groundwater and with the use of an appropriate groundwater management system should be able to manage groundwater drawdown around the three stygofauna species.

Consideration

The EPA identified subterranean fauna as one of the key environmental factors for the proposal. The EPA's objective for subterranean fauna to maintain representation, diversity, viability, and ecological function at the species, population and community level.

The PER identified two types of subterranean fauna are present in the project area: troglofauna (species that occur below the ground but above the water table) and stygofauna (species that occur below the water table).

At total of 73 species of stygofauna were identified in the Study area, and of these, 11 species are currently only known from the impact area (mine pit plus groundwater drawdown area of 0.5 m). Of these, the EPA noted that:

> ... three (Halicyclops cf. eberhardi sp. B, Novanitocrella 'araia linec' ssp. n., and Kinnecaris lined) of the 11 stygofauna species only known from the Impact Area, had higher capture rates (100 plus specimens) which provides a greater degree of certainty that these species may be restricted and may not be an artefact of sampling.

While the proponent considered that each of these species may have broader ranges than the impact area based on its evaluation of biological and physical surrogates, the EPA reported that the information provided on surrogates was inadequate to reduce uncertainty to an acceptable level.

A total of 45 trolgofauna species were recorded in the study area. Five species were only found to be in the impact area, however the proponent made a commitment to establish a Trolglofauna Protection Area (TPA), reducing the potential impact to one species. This species is located in the centre of the mine pit and outside of the TPA. The EPA noted in Report 1574 that further investigation is required to determine if this species has a wider distribution.

From this analysis, a total of 12 subterranean species (11 stygofauna, 1 troglofauna) were identified as occurring only within the impact area of the proposed mine. In its consideration of this factor, the EPA concluded that:

> ... a level of uncertainty remains as to whether a number of subterranean fauna species, particularly the three stygofauna fauna with higher capture rates that were confined to the Impact Area, may be found outside the Impact Area, assuming development within the proposed Troglofauna Protection Area is excluded from operations. As such, the EPA considers that there is too great a chance of a loss of species that are restricted to the Impact Area.

In having regard to the principles under section 4A of the EP Act, the EPA considers that the Precautionary Principle, the Principle of the conservation of biological diversity and ecological integrity, and the Principle of intergenerational equity are particularly relevant to the assessment of this factor. The EPA is of the view that the Proposal is not consistent with these principles, due to the threat of serious and irreversible damage, and the degree of uncertainty that biological diversity would be conserved.

As detailed above, the proponent and one third party appellant contended that the EPA was incorrect to reach the above conclusions, and ought to have concluded that the proposal would meet its objective for subterranean fauna and as a result, the proposal should be approved for implementation. By contrast, another third party appellant contended that the EPA's assessment underestimated impacts to subterranean fauna.

In response to the appeals, the EPA advised that:

- its conclusion regarding the level of uncertainty was based on an analysis of the information provided and collected throughout the assessment process, and that evidence was not sufficient to support the view that all species of subterranean fauna recorded at Yeelirrie would be found outside the impact area;
- the mitigation and offset measures put forward by the proponent during the assessment were considered, with the EPA concluding that the proposed Troglofauna Protection Area would result in the protection of four of the troglofauna species recorded only within the impact area of the proposal, and while the mitigation and management strategies for stygofauna were well considered, it was unclear they would mitigate impacts to all the potentially restricted species;
- in relation to offsets, the EPA determined that the impacts to stygofauna were likely to be unacceptable within the meaning of the WA Environmental Offsets Policy, but provided other advice that the level of uncertainty may be mitigated through further scientific, research and study or a compelling case regarding habitat connectivity and distribution.

As noted above, the proponent put forward additional information through the appeal process which it considered justifies the conclusion that the uncertainty of risks identified by

the EPA was overstated, and which would reduce the level of impact to some species of stygofauna as a result of altering groundwater abstraction rates. In response to these issues, the EPA advised that if the new information was supported by suitable evidence, it may provide adequate information to infer that habitat for some species of stygofauna extends outside the impact area.

In relation to the possibility that management of groundwater abstraction may protect three species of stygofauna within the drawdown area, the Office of the EPA advised that there is available information on other mining operations in WA which shows that the proponent has a number of potential options to manage groundwater and with the use of an appropriate groundwater management system should be able to manage groundwater drawdown around the three stygofauna species

Taking into account the issues presented in relation to this ground of appeal, including the EPA's advice and the object of the EP Act, it is considered that the EPA's assessment of subterranean fauna was justified. Specifically, it is noted that on the information available through the assessment process, 12 species of subterranean fauna are known only from the impact area. The proponent was afforded an opportunity through the assessment process to provide further scientific evidence to demonstrate that the threat does not exist or to minimise uncertainty, however the EPA advised that no such information was forthcoming through the assessment process.

As identified in the PER, scientific uncertainty exists and there is potential for species to be lost as a result of the implementation of the proposal. In this regard, the EPA advised that the acceptable level of uncertainty varies and is dependent on the magnitude of the threat. The EPA takes the view that precautionary measures may not be deferred where there is a threat of serious and irreversible damage and the level of uncertainty is high. In such cases, the only proportionate precautionary measure may be that the proposal not be implemented, consistent with the EPA's recommendations in this case.

In respect to the principles in section 4A of the EP Act (including the precautionary principle and principle of intergenerational equity), these are to be read in context with the object of the Act, which is to protect the environment of the State. In this context, the EPA found that the implementation of the proposal may result in serious or irreversible damage to the environment as there is a risk that species of subterranean fauna may be lost. Given the degree of scientific uncertainly remaining as to the extent of serious and irreversible damage to the environment, the EPA determined that the risk of species loss is too high and therefore recommended that the proposal should not be implemented.

While the question as to whether or not the EPA had correctly applied the precautionary principle and other principles is primarily legal in nature (and thereby beyond the scope of the appeal), given the uncertainties raised in the proposal around the potential threat of serious and irreversible harm, the EPA's conclusion that the proposal cannot be managed to meet its objective for subterranean fauna and therefore should not be implemented, is considered to be justifiable having regard to the object of the Act.

Conclusion

While the new information presented on appeal by the proponent is noted, the EPAs advice that, if supported by suitable evidence, the new information about extent of habitat, may provide adequate information to infer that habitat for some species of stygofauna extends outside the impact area, and its advice that an appropriate groundwater management system may be able to manage groundwater drawdown around three stygofauna species is also noted. It is considered that the information provided by the proponent does not establish that the EPA's objectives for subterranean fauna can be met.

Taking into account all the information presented in relation to this ground of appeal, it is considered that the EPA's conclusions with respect to subterranean fauna were justified and appropriate. It is specifically considered that the EPA properly assessed the risks associated with the implementation of the proposal, and correctly considered the object of the Act, and the principles relevant to that object.

It is recommended therefore that appeals in relation to subterranean fauna be dismissed.

GROUND 2: IMPACTS TO GROUNDWATER AND SURFACE WATER

Appellants raised a number of concerns regarding potential impacts to ground and surface water associated with the proposed mining activities. Many appellants raised a general view that the water resources in the area should be protected. However some appellants had specific concerns. These concerns are broadly addressed under the following:

- impact of abstraction and recovery of groundwater levels; and
- groundwater and surface water contamination.

Abstraction and Recovery of Groundwater Levels

Appellants submitted that the volume of groundwater abstracted for mining activities has not been considered by the EPA. Appellants also contended that the EPA underestimated the short term and long term impacts of groundwater abstraction and recovery, and therefore underestimated subsequent impacts on the availability of groundwater for groundwater dependant ecosystems and for neighbouring bores that support pastoral activities in the area.

An appellant also submitted that climate change was not considered in the water balance for the proposal and cumulative impacts of the water for use for the project has not been considered by the EPA.

Consideration

The EPAs objective for the environmental factor Hydrological Processes is to maintain the hydrological regime of groundwater and surface water so that existing and potential uses, including ecosystem maintenance are protected.

The proponent advised that has part of the assessment process it has developed a conceptual hydrogeological model and a numerical groundwater flow model to simulate the extent and magnitude of groundwater drawdown in the area from the proposal.

The PER provided a description of the abstraction and reinjection regimes for the mining at Yeelirrie and the total water demand for the project (including ore processing, dust suppression and domestic services) is approximate 8.7 mega litres per day (ML/day). Water will be sourced from water abstracted for pit dewatering and proposed water supply well fields.

The EPA noted in response to the appellants contention that climate change was not considered in the assessment that the PER provides an explanation of climate change impacts to the proposal. The appellants Water Balance Study (URS, 2015) for the project which was also provided in the PER is noted in this regard and the proponents advice that the PER discussed the broad impact of climate change on groundwater and surface water.

It is noted that the PER discussed climate change and indicted that it is likely to result in a reduction in groundwater storage due to decreased recharge and increased evapotranspiration. In its assessment of this factor the EPA noted that the two likely impacts to groundwater dependent species would be to stygofauna and groundwater dependent vegetation.

With regard to the impacts to groundwater dependant species, the EPA advised that the proponent established a conservative threshold of greater than 0.5m drawdown as the level at which adverse impacts may occur to subterranean fauna. This threshold considered the low variations within the groundwater levels over a four year period (less than 0.1m) and a recharge event that increased water levels to 2.5 m in the eastern portion of the palaeo-channel. Based on consultation undertaken with the Department of Parks and Wildlife (Parks and Wildlife), the EPA considered the 0.5 m threshold for groundwater drawdown to be reasonable in assessing the impacts to stygofauna.

In regard to ground water dependant vegetation the EPA considered that the impacts would not result in less than 30 per cent (%) of each vegetation unit remaining as consistent with the EPA Position Statement 2 and advised that this was a conservative estimation made without taking into account the recovery of groundwater levels.

Noting the issue of potential impact on neighbouring bores was raised on submissions, the EPA advised that it specifically addressed the issue of water drawdown at Dempsey Bore in Report 1574. The EPA advised that drawdown of two to three metres is predicted in a localised area within about one km of the proposed production bores in the south-west corner of Ullula Station. Drawdown is strongly attenuated with distance from the proposed abstraction bores and is predicted to be limited to 0.5 m or less beyond about two to three km from the actual bores.

The EPA further advised that at its maximum extent at Year 18, the 0.1 m (10 cm or 4 inches) drawdown contour extends a few kilometres west of the Sandstone - Wiluna Road, which indicates that it is unlikely to have a significant effect on station bores west of this point. Dempsey Bore and No-Ibla Bore are both about 6 km from the nearest modelled 0.1 m drawdown contour, indicating that drawdown at those bores is unlikely to be detectable.

In order to provide assurance that the abstraction of groundwater from mining activities will not have an impact on the nearly pastoral bores, the EPA recommended conditions should Minister decide to implement the proposal. The conditions include independent and expert reviews on the groundwater monitoring program prior to its implementation, the independent reviews and monitoring results are made publically available and a management, monitoring and reporting plan is developed to minimise impacts to groundwater.

In response to appellants concerns regarding the volumes of water used for the proposal and cumulative impacts of water use for the proposal, the EPA advised that advice from the Department of Water (DoW) was sought during the assessment of the proposal. The DoW did not raise any concern regarding the volume of water to be used for the proposal and also noted that no discernible change in groundwater flow was expected at the catchment scale. It is noted that groundwater abstraction would be regulated under Rights *in Water Irrigation Act 1914* licence, which would take into account other water users in the area.

As noted by the EPA in Report 1574, groundwater levels are expected to return to baseline levels within 50 to 100 years, with the exception of residual drawdowns of 0.3 to 0.5 m in the eastern and northern borefields which are expected persist for more than 200 years.

In relation to the concerns raised regarding the volumes of water that will be abstracted form the area, it is noted that the proponent will require a licence from DoW under the *Rights in*

Waters and Irrigation Act 1914 (RIWIA Act). DoW will have a further role in evaluating the modelling and hydrogeological information for the project in more detail and within the context of other users in the region.

The EPA advised that based on DoWs review of the PER, DoW advised that the hydrogeology of the area is well understood and the hydrogeological model is consistent with several large scale quantitative evaluations in the area. The DoW also advised EPA as noted in Report 1574 that the available hydrogeological studies are consistent with DoW Operational Policy 5.12 and provided sufficient rigor and accuracy to enable an adequate assessment of impacts on the environmental and other users and the aquifer system.

The EPA also recommended in its' response to appeals, that recommended Condition 5 within the implementation statement could be expanded to require that Management Plans be made publicly available, should the proposal be implemented. This recommendation is supported.

Conclusion

Having regard to the information above, it is considered that the EPA appropriately evaluated abstraction of groundwater and its impacts on other users. Noting that the EPA has recommended a potential condition, should the proposal be implemented, to provide for Baseline Survey and Hydrological Processes Management and Monitoring Plan to meet the outcome that dewatering does not impact on surrounding water bores including No-Ibla and Dempsey bores, it is recommended that this ground of appeal be dismissed.

Groundwater and Surface Water Contamination

Appellants raised various concerns regarding water quality changes as a result of the project, and in particular from the disposal of tailings. Appellants noted that there is potential for the water quality in the area to be diminished long term and will have an effect on ecosystems (including Lake Miranda), public health and will affect the quality of water used in the area for pastoral purposes.

One appellant contended that the EPA relied solely on the advice of the DoW to assess impacts to water from contamination. The appellant contended that as DoW does not have the regulatory authority to manage water quality in aquifers, the impact to contamination has not been adequately assessed. The appellant also maintains that the EPA will rely on the DoW and the DMP to manage those risks.

In addition, the appellant contends that there are no outcomes-based standards relating to water quality in the Department of Mines and Petroleum's (DMP) regulatory framework and also is of the view that the EPAs conditions are insufficient for the protection of water resources from contamination.

Consideration

The EPAs objective for the environmental factor Inland Waters Environmental Quality is to maintain the quality of the groundwater and surface water, sediment and biota so that the environmental values, both ecological and social are protected. Section 3.5 Hydrological Process and 3.6 Inland Waters Environmental Quality of the Report 1574 addressed pathways for uranium and other contaminants of concern to enter surface and groundwater.

The EPA identified that the primary source of contamination to groundwater is through the deposition of contaminated dust and seepage from the TSF. Issues addressing concerns on contaminated dust entering the environment are considered under Ground 3 of this report.

The EPA advised in its response to appeals that it considered the most likely source of contamination would be from the mine tailings. As described in Report 1574, tailings will be backfilled into the pit with other materials and covered with an engineered cover designed to withstand a 100 year ARI flood level. This will result in the TSF being below ground structure which according to the EPA is considered best practice for TSF design. The TSF will be lined with a clayey material which has a low permeability which is expected to retard seepage. The tailings material to be deposited into the TSF is expected to have a lower uranium concentration than the mined ore. In addition the concentration of soluble uranium in the tailings will decrease further through the formation of secondary minerals. The TSF will be designed with a freeboard of 0.5 m to withstand a 1:100 ARI 72 hour event.

The EPA advised that during operation the TSF will incorporate underdrainage structures to capture and return seepage to the metallurgical plant to avoid impacts to groundwater. At closure the cover will be designed to limit infiltration and support vegetation growth. In order to minimise the potential for runoff to overtop the rehabilitated area, a channel designed to with stand a 100 year ARI flood level will be constructed around the mine site and TSF.

The EPA has recommended that should it be determined the proposal may be implemented that conditions be applied that relate to the management of seepage from the TSF and ensuring the integrity of the cover is maintained.

Modelling was undertaken to predict the movement of contaminants (uranium, chloride, vanadium, arsenic and molybdenum) from the stockpiled material and the in-pit tailings storage facility (TSF) in groundwater for 15,000 years after closure. The EPA advised in its response that it sought advice from DoW on the rigour of the modelling and assumptions used. DoW advised the EPA that the hydrogeological parameters had sufficient rigour and accuracy to be incorporated into the solute transport modelling.

In Report 1754, the EPA noted the concerns of local pastoralist with respect to the pastoral bores on neighbouring stations, in particular Dempsey and No-Ibla bores which are located upstream of the mine site. The EPA advised that it concluded based on the information obtained from the modelling, that as the contaminant plume is not expect to extend beyond the Yeelirrie Station over 15,000 years, changes in water quality at these bores is not expected.

As noted under Ground 3 Human Health, the EPA advised that as the seepage is not expected to travel beyond the boundaries of Yeelirrie Station and the area is not a Public Drinking Water Area (PDWA) it is unlikely that the seepage will impact on drinking water.

In order to minimise potential impacts to stock should the proposal be implemented, the EPA suggested conditions to prevent the abstraction of groundwater downstream from the TSF for the purposes of stock watering, where uranium levels are above the low risk trigger value for stock listed in the *ANZECC Guidelines for Fresh and Marine Water (2000)*.

With regards to the appellants contention that the EPA did not consider radioactivity in the in the groundwater, the EPA noted that radioactivity of water would only be a concern where uranium is highly elevated. As discussed above, uranium in the contaminant plume is expected to be within the range of background levels.

The Department of Environment Regulation (DER) provided advice to the EPA with regard to fate and transport modelling of uranium in hypersaline groundwater which included the recommendation that, should the proposal be implemented a condition be applied for a program to confirm the predictions made around uranium transport in groundwater at Yeelirrie.

With regards to the appellants contention that there are no outcomes based standards relating to water quality under DMPs regulatory framework. It is noted that there was no discussion of the DMP in the Report 1574 relating to water quality management. The EPA in Report 1574 has referred the *ANZECC Guidelines for Fresh and Marine Water (2000).*

With respect to surface water contamination, the proponent has advised that a diversion bund designed for a 1,000 year ARI flood event will be constructed to redirect surface water flows around infrastructure during operations. The bund would also prevent potentially contaminated rainfall run off from leaving the site. Basins will be constructed downstream to capture sediment and dispose of the sediments to ensure they do not enter the environment. At closure, the site has been designed to be a 'no release' site for all rainfall up to a 1:1,000 year ARI event. Therefore the EPA found that it is unlikely that contamination from stockpiled material will enter the environment.

The EPA has recommended a number of conditions, should it be determined the proposal may be implemented to manage groundwater quality. The EPA noted in Report 1574 that DoW would be responsible for the regulation of abstraction of groundwater and the DER may regulate discharges from the operation under Part V of the EP Act. Although Report 1574 does not refer to DMP managing water quality, it is noted that the proponent will submit a mining proposal to DMP for approval under the Mining Act. The Mining Proposal will require the proponent to address the DMP objective to maintain groundwater quality.

Conclusion

Based on the information provided, it is considered that EPA had sufficient information to understand the potential contamination plume from the TSF and appropriately considered the management and mitigation measures proposed for the TSF in its assessment. Noting the EPAs recommended conditions, should it be determined that the proposal may be implemented, and noting the include a requirement to develop Groundwater and Surface Water Management Plans, including a program of work on the transport of uranium in groundwater, it is recommended that this ground of appeal be dismissed.

GROUND 3: IMPACTS TO HUMAN HEALTH

Many of the appellants raised a range of issues relating to the key environmental factor Human Health, which have been broadly summarised under the following headings:

1. Health impacts to the community and workers from radiation exposure, including bush tucker and food production; and
2. Drinking water.

Health impacts to the community and workers from radiation exposure, including bush tucker and food production

The appellants contended that the EPA's assessment of the proposal did not adequately address health risks to the community and workers in the vicinity of the mine site and along the transport route from radiation exposure, particularly from emissions of contaminated dust.

Appellants also contended that the proposed dust management measures, such as watering roads and stockpiles, would not be adequate due to the frequent occurrence of high winds and high evaporation rates at the location.

The appellants raised concerns regarding the potential doses of radiation to humans as a result of the consumption of plants and animals, particularly bush tucker, that have been

affected by radiation. One appellant asserted that the data entered into the ERICA model to assess the radiological risk to plants and animals were incorrect and therefore the results of the modelling were incorrect.

An appellant was concerned about the effects of radiation on cattle within the vicinity of the proposal and the potential consequences for pastoral enterprises. The appellant also questioned the data presented in Figure 2 of Attachment 11 ('Review of Impacts to Cattle') of the proponent's Response to Submissions.

Consideration

The EPA's objective for the factor Human Health is to ensure that human health is not adversely affected.

In the ESD, the EPA set out the requirements for the PER including information needed in relation to the factor Human Health. The ESD outlined that there are three pathways where radioactive material can adversely impact human health: inhalation of airborne particulate matter containing radioactive material (dust and radon decay products); ingestion of radioactive material; and external exposure from gamma radiation.

Report 1574 states that the cumulative dose of radiation (through internal and external exposure) may increase for mine workers, people living close to the mining operation and members of the public along the transport route. In its response to this issue, the EPA noted advice received from the former Commonwealth Department of the Environment (DotE), the DMP and the Radiological Council that the radiological assessments undertaken for the proposal were adequate. The EPA advised that the radiological assessments indicate that radiation exposure to any group would be below the appropriate regulatory dose limits.

In this regard, Report 1574 outlines that the proponent undertook an assessment of radiation exposure to permanent residences located up to 62 kilometres (km) from the proposal area. Report 1574 states that exposure at the nearest existing residence,10.2 km from the proposed mine site, was modelled to be less than 0.215 millisieverts per year (mSv/yr), which is below the regulatory public dose limit of 1 mSv/yr. In its advice, the EPA noted that radiation decreases with distance from the source and it expects the total dose of radiation at any sensitive receptor, such as homesteads and camp sites, located further than 10.2 km from the proposed mine site to be less 0.215 mSv/yr and therefore compliant with the regulatory public dose limit.

In relation to the radiation exposure for a mine worker, the EPA advised that with the appropriate mitigation measures the estimated average annual dose would be approximately 5 mSv/yr, which is similar to doses measured at other uranium mines and below the regulatory occupational dose limit of 20 mSv/yr.

It is noted that Schedule 1 of the *Radiation Safety (General) Regulations 1983*, specifies that the regulatory public dose limit above background is 1 mSv/yr and the regulatory occupational dose limit above background is 20 mSv/yr. It is understood that these limits align with those recommended by the International Atomic Energy Agency and the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA), which is the primary authority for radiation protection and nuclear safety in Australia.

In relation to the transportation risk of uranium oxide concentrate (UOC), the proponent undertook modelling to assess radiation exposure to a person travelling in a car behind a truck transporting sealed drums of UOC inside sealed shipping containers; a person standing on the side of a road as every truck passes in a year; and to the truck driver. The

modelled doses were 0.006mSv/yr, 0.004mSv/yr and 0.5mSv/yr respectively, which are below the relevant regulatory dose limits.

It is noted that the transport of radioactive material is regulated by the Radiological Council and the DMP. The EPA sought advice from the Radiological Council during the assessment of the PER and was advised that the transport assessment undertaken by the proponent was acceptable. Report 1574 states that the Radiological Council would regulate the transport of UOC under the *Radiation Safety Act 1975* and particularly the *Radiation Safety (Transport of Radioactive Substances) Regulations 2002*. Under these Regulations, a Transport Radiation Management Plan (including an Emergency Response Assistance Plan) is required.

In relation to the appellants' concerns around the adequacy of the proponent's dust management measures, the EPA advised that stockpiles and roads on the mine site would be subject to watering for dust suppression consistent with the Radiation Management Plan required as a statutory obligation under the *Radiation Safety Act 1975* and the *Mines Safety and Inspection Act 1994*, and the works approval and licence required under Part V of the EP Act.

With regards to the potential effects of radiation on bush tucker and other foods including beef, Report 1574 indicates that the consumption of locally grown vegetables and meat for a full year would give a radiation dose of 0.007 mSv/yr, and consumption of bush tucker at Yeelirrie Pool for a full year would give a radiation dose of 0.04 mSv/yr.

The PER indicates that the proponent undertook ERICA modelling to estimate the uptake of radionuclides by flora and fauna in consultation with Traditional Owners in the region. The assumptions of animal and plant material consumed were based on figures for Traditional Owners of the Maralinga Lands. The proponent's Radiation Technical Report (PER Appendix J) indicates that the limitation of the ERICA tool is that the parameters are derived for Northern Hemisphere flora and fauna however, recent data published by ARPANSA (2014) has provided some concentration ratio data that has enabled a more relevant assessment for the Australian environment. It was indicated that the assessment used a combination of ERICA default and proponent derived and the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) (2014) concentration ratios.

In response to concerns around the data presented in Figure 2 of Attachment 11 ('Review of Impacts to Cattle') of the proponent's Response to Submissions, it is noted that the graph shows calculated radiation ingestion doses from eating locally grown beef over time. The graph shows that cumulative doses, from ingesting both natural background and mining related radioactive material, increase over time. In its advice on this issue, the EPA noted that the contribution of the proposal to radiation doses from ingestion is very small compared to that contributed by naturally occurring background radiation.

Report 1574 states that the EPA considers that, in the event the Minister for Environment determines that the proposal may be implemented, it could be managed to meet the EPA's objective for Human Health. The EPA states:

> The EPA notes that in this case, the Radiological Council and the DMP would regulate the monitoring of radiological conditions, and the implementation of as-low-as-reasonably-achievable management practices and compliance to regulatory public and occupational dose limits. This would occur under the Radiation Management Plan required as a statutory obligation under the *Radiation Safety Act 1975* and the *Mines Safety and Inspection Act 1994*. In addition, the Radiological Council would regulate minimisation of radiation exposure and the transport of UOC using the Transport

> Management Plan required as a statutory obligation under the *Radiation Strategy (Transport of Radioactive Substances) Regulations 2002.*
>
> The EPA further notes that the DER and the Commonwealth DotE have legislation that can permit and regulate potential radiological impacts to human health, including exposure to radiological dust.

Report 1574 indicates that in forming this view, the EPA had regard to (among other things):

- the proponent's proposed implementation of 'best practice' design optimisation, operational procedures and monitoring to control exposure to hazardous pollutants to the Maximum Extent Achievable through the 'as low as reasonably achievable' ALARA approach;
- the proponent's management measures that would be implemented to minimise emissions of radionuclide containing dust and radon decay products, and limit the risk of spills in the event of a transport accident; and
- the proponent's assessment of radiation exposure to the public, transport workers and mine workers indicating that exposure to radiation would be below the regulatory dose limits.

Conclusion

From the information presented in respect to this element of the appeals, it is noted that the EPA is of the view that the risks to human health from radiation exposure, will be below relevant guidelines and that any risks associated with radiation can be adequately managed by other agencies without the need for conditions to be applied under Part IV of the EP Act, in the event the Minister determines that the proposal may be implemented.

It is considered that the EPA has had regard for the issues raised by the appellants under this ground of appeal, and that the EPA has had appropriate regard and evaluation of the different exposure pathways and potential health impacts. It is therefore recommended that this ground of appeal be dismissed.

Drinking water

The appellants contended that the PER did not adequately address the potential pathways for uranium to enter drinking water and affect water quality. It was also contended that the EPA did not consider existing levels of uranium and its interaction with naturally occurring nitrates in groundwater. The appellants referred to the Western Desert Kidney Health Project, which identified water quality (increased concentrations of nitrates and uranium) as a serious issue in the Goldfields region. The appellants noted that research indicates uranium is mobilised by naturally occurring nitrates in groundwater resulting in the formation of uranyl nitrate. It was asserted that both uranium and uranyl nitrate are toxic substances that when consumed, cause renal damage and eventual failure, and that the release of uranium into the environment from mining will result in exacerbation of the existing problem.

One appellant opposed the EPA's contention that the contaminants would remain within the pastoral lease, on the basis that the pastoral lease boundaries may be altered in the future.

Consideration

Consideration of the potential impacts to drinking water resulting from the proposal is closely related to that presented in Ground 2 (Hydrology). As noted in Ground 2, the EPA advised that the most likely source of potential contamination to water resources in the area would be from tailings. The EPA noted that the modelling demonstrated that changes to water quality would be restricted to the boundaries of Yeelirrie Station, which is not a public drinking water

source area, and that no changes to the water quality are expected beyond Yeelirrie Station. The EPA also noted that the groundwater in the area is naturally elevated in uranium and already above stock watering water quality (and ecosystem criteria), and is not used for stock water.

It is noted that the possibility of changes to pastoral lease boundaries in the future is not directly related to the EPA's report and recommendations and is therefore considered to be outside the scope of appeal rights in respect to the content of or any recommendation in a report prepared under section 44 of the EP Act.

Report 1574 states that the EPA considers that, in the event the Minister determines that the proposal may be implemented, it could be managed to meet the EPA's objectives for the factor Inland Waters Environmental Quality provided that a number of conditions are applied under Part IV of the EP Act to monitor and manage water quality.

Report 1574 also states that should it be determined that the proposal may be implemented, the DoW will regulate the abstraction of groundwater through the Groundwater Operating Strategy required by licensing under the RIWI Act, and that DER may regulate discharges from the operation under Part V of the EP Act.

Conclusion

From the information presented in respect to this ground of appeal, it is noted that the EPA is of the view that no changes to water quality are expected beyond the boundaries of Yeelirrie Station, and that any risks to water quality can be adequately managed through conditions applied under Part IV of the EP Act and by other regulatory processes, should it be determined that the proposal may be implemented. Noting that should the proposal be implemented, the EPA has suggested a potential condition to provide for Groundwater and Surface Water Management Plans, and an additional requirement for a program of work on the transport of uranium in groundwater, it is therefore recommended that this ground of appeal be dismissed.

GROUND 4: IMPACTS ON ABORIGINAL HERITAGE AND ADEQUACY OF CONSULTATION

It was the view of appellants that the impact of the mine on culture and heritage could not be sufficiently assessed as the proponent did not adequately consult with Traditional Owners. Many appellants were of the view that the proposal would impact on matters of cultural significance including the culture and customs of traditional owners and traditional food supplies and this was not taken in to account during the approvals process. Appellants contended that Aboriginal people have a right to own the land and the area was of significance to them. One appellant raised the Story of the Seven Sisters (a dreaming story) and many appellants referred to Yeelirrie as 'a place of death'.

While the appellants supported the EPAs recommendation that the proposal should not be implemented, they contended that the subterranean fauna was viewed by the EPA as having greater importance, rights and value than Aboriginal rights, culture and heritage. In this way appellants contended that the long standing opposition to the mine by the Traditional Owners and supporting interest groups should be taken into account by the EPA and by the Minister. They were of the view that future generations should be able to enjoy the lands without the impacts of uranium mining

Other appeals raised concerns regarding, in their view, intimidation tactics used by the proponent during consultation. Various appeals made a general comments that all

proponents and government use trickery and that the proponent for this particular project has disregarded their concerns and used the State Agreement against the appellant, claiming it gives them authority to implement the proposal in the manner they choose.

Consideration

The EPA identified Heritage as a key environmental factor for the proposal. The EPA's objective for Heritage is to ensure that historical and cultural associations, and natural heritage, are not adversely affected.

In relation to appellants concerns about the adequacy of consultation and therefore identification of the cultural significance and heritage values of the area, the EPA advised that similar issues were raised in the public submissions and were addressed by the proponent in its Response to Submissions.

The EPA advised that it in its assessment it had regard to *Guidance Statement 41 Assessment of Aboriginal Heritage* (GS41) which provides advice to proponents on the minimum requirements for environmental management of the heritage impacts of a proposal and specifies that the proponent is to undertake a competent analysis and report on the likelihood of the presence of matters of heritage significance to Aboriginal people.

The EPA advised in response appeals that the identification of stakeholders was undertaken initially in 2009 by BHP Billiton. BHP Billiton established a Community Reference Group specifically to identify stakeholders and their concerns. The process of identifying stakeholders included liaison and consultation with the Central Desert Native Title Services (CDNTS).

The EPA advised that the Aboriginal people identified by the proponent for the proposal are the Tjiwarl Native Title Claimant group, which are represented by the CDNTS. The claimants include Aboriginal people from Leonora and Wiluna regions and the EPA advised that the proponent have undertaken stakeholder consultation with members of the Tjiwarl Native Title clamant group since 2013. Consultation meetings included explanation of the Proposal and the proposed environmental impacts, including, on fauna and flora, dust and radiation, and transport.

It is noted that the PER (Appendix C) outlines consultation undertaken by the proponent including with various groups and individuals within the community including the members of the Tjiwarl Native Title claimant group and their families, the CDNTS, the local shire, pastoralists and individual Aboriginal elders.

In response to the appellants concerns about the cultural significant and heritage values of the area, the EPA noted that various surveys have been conducted over the past 40 years, which has included a review of the surveys conducted by Waru Consulting in 2015.

The EPA advised that it considered culturally significant sites, culturally modified Kopi Gum trees, and bush tucker in its assessment and acknowledged an area to the north-east of the proposal that includes a concentration of registered Aboriginal heritage sites of ethnographic and archaeological importance to the indigenous people, however advised that this area is not proposed for development as part of the proposal.

The EPA in Report 1574 noted that the heritage values of the project area comprise various unregistered artefact sites, two Aboriginal heritage sites registered under the *Aboriginal Heritage Act 1972* (AH Act), culturally modified Kopi Gum trees (*Eucalyptus gypsophila*) (CMTs) and various flora and fauna bush tucker species.

The EPA noted in its advice on the appeals that the two registered Aboriginal sites which are located partially within the development envelope are outside the proposed footprint and that although there were twenty recordings of culturally modified Kopi Gum trees within the Development Envelope, they are known to occur throughout the region. The EPA noted in Report 1574 that it is difficult to preserve the CMT in-situ due to termite activity and therefore does not view the impact to the CMTs to be significant. In relation to Bush Tucker, the EPA advised that species identified in the development area were found to be widespread over the arid zone.

The EPA also noted that the proponent has committed to avoiding as many of the recorded places as possible, to undertake consultation regarding the disturbance of these sites with the Department of Aboriginal Affairs (DAA), and comply with the requirements of the *Aboriginal Heritage Act 1972* in relation to approvals to remove any sites as required.

In relation to appellants concerns that subterranean fauna was viewed as having greater importance, rights and value than Aboriginal rights, culture and heritage that EPA advised that it views all environmental factors to be of equal importance and that its consideration in relation to each environmental factor are based on the significance of the impacts from the referred proposal.

In this instance, the EPA considered that there is too great a chance of a loss of species restricted to the impact area, and in applying its environmental principles, considered that the EPA's objective cannot be met for Subterranean Fauna. The EPA had regard for the same principles for Heritage and considered that the EPA's objective could be met, subject to conditions being imposed. The EPA also takes all public comments and submissions into consideration during its assessment.

In relation to appellants concerns that the State Agreement in place for the project provides authority to implement the proposal without regard for Aboriginal people's interests, the EPA noted that tenure arrangements are outside of the scope of the EPA's assessment. However, it is noted that in forming a decision on the proposal it is usual practice for the Minister to consider the EPA report and recommendations, the outcomes of appeals and will consult with other Ministers in relation to the proposal, including the Minister for Aboriginal Affairs.

Conclusion

Having regard to the above, it is considered that consultation undertaken for the proposal for the purposes of the EPAs assessment was appropriate and that the EPA relied on substantial survey effort and studies in its consideration of this factor and applied appropriate conditions to minimise potential impacts. It is recommended that this ground of appeal be dismissed.

GROUND 5: FLORA AND VEGETATION

Two appellants were of the view that the proposal would not be able to meet the EPA's objective for Flora and Vegetation. The appellants raised a number of concerns including:

- that the vegetation assessment was not adequate to make an informed decision, as regional representation of vegetation types was not provided. The government is lacking a database to store state-wide plot data, so that proponents can demonstrate actual, verifiable regional representation of vegetation types; and
- weed management commitments are weak and did not consider Ruby Dock (*Acetosa vesicaria*).

Consideration

The EPA identified Flora and Vegetation as a key environmental factor for this proposal. The objective for this factor is to maintain representation, diversity, viability and ecological function at the species, population and community level.

In the ESD the EPA set out the requirements for the PER including information required in relation to the factor Flora and Vegetation. In respect of appellants concerns about the vegetation assessment it is noted that the ESD required the proponent to undertake work considered necessary by the EPA to assess the impacts to flora and vegetation from the proposal. Amongst other things, a Level 2 Flora and Vegetation Survey was required in areas likely to be directly and indirectly disturbed, in accordance with the EPA's Guidance Statement 51.

The EPA in Report 1574 considered that it was likely that impacts would not result in less than 30 % of each vegetation unit remaining, consistent with EPA Position Statement 2. The EPA also stated that the survey methods undertaken to inform the PER document were consistent with the requirements of Guidance Statement 51.

In its response to the appeals, the EPA noted that the information provided by the proponent at the regional scale was based on the best available information. The EPA noted that land systems may be considered too broad a scale to consider impacts on a regional level, however given that the impacts at the land systems level and that the vegetation units surveyed by the proponent are expected to result in at least 30 % of each vegetation unit remaining, the EPA considered that impacts at a regional scale would not be significant.

Appellants concerns about weed management, it is acknowledge that management of weeds was not discussed as a specific matter in the Report 1574; however weed management for the proposal in general, and Ruby Dock in particular, were raised in the Submissions and addressed by the proponent in its Response to Submissions.

In its response to the appeals, the proponent acknowledged that Ruby Dock had not been discussed in the PER as it was not considered a critical factor for the proposal. The proponent is currently managing existing populations of Ruby Dock on rehabilitated areas of the site.

It is noted that the Mine Closure Plan (Appendix O1) provided as a technical appendix to the PER, stated that weed management is currently focusing on Ruby Dock and that controls will be established throughout the life of mine and at closure.

Report 1574 recommended that if the proposal was to proceed, the Minister apply implementation conditions that require the proponent to prepare and implement management plans to minimise the potential impacts to flora and vegetation from various potential impacts, including weeds. The recommended conditions require that the management plans are developed in consultation with Parks and Wildlife.

Conclusion

As the EPA has determined that the methodology used in its vegetation assessment is consistent with its relevant Policy and Guidance and was based on the best available information it is considered that its assessment was appropriate. It is also considered that the EPA appropriately considered weed management in its assessment and that the proposed conditions adequately provide for management of potential impacts in this regard. On this basis, it is recommended that this ground of appeal be dismissed.

GROUND 6: IMPACTS ON *ATRIPLEX YEELIRRIE*

Appellants contended that there was insufficient evidence to satisfy the EPA that the proposed management strategies would prevent the extinction of the Western population of *Atriplex yeelirrie* or protect the Eastern population of *A. yeelirrie* from the impacts of the Proposal.

More specifically, the appellants raised the following issues:

- the Western population of *A. yeelirrie* is not the same as the Eastern population and that the impact to the Western population is contrary to the precautionary principle;
- water drawdown and salinity may seriously hinder the efforts to enhance the health of the Eastern population and may not be successful in the long term; and
- there is a low likelihood of recreation of habitat and translocation being successful.

One appellant argued that having regard to the precautionary principle and the principle of intergenerational equity, the EPA should have concluded that the proposal cannot meet the EPA's objectives in relation to Flora and Vegetation.

Consideration

Difference between Western and Eastern Populations

The PER stated that the threatened flora species *A. yeelirrie* (previously known by the phrase name *Atriplex* sp. Yeelirrie Station (L. Trotter & A. Douglas LCH 25025)), has been recorded in the Development Envelope and will be impacted by the proposal.

A. yeelirrie occurs in two genetically distinct populations referred to as the Western and Eastern populations. The PER stated that in 2014, the Western Australian Herbarium undertook a project to determine whether *A. yeelirrie* was distinct from other known species of *Atriplex* by morphological and molecular evidence. The PER further stated that based on an unpublished paper it was recommended that the new taxon be described as a single species; but noted that the recommendation remained subject to peer review. The PER also stated that the unpublished paper recommended that the Western and Eastern populations of *A. yeelirrie* be managed as separate units for conservation to preserve the genetic diversity exhibited between the two populations. It is noted that this paper was subsequently published on 14 December 2015 (Shepherd et al, 2015) and the content is consistent with the statements made in the PER regarding the implications for taxonomy and conservation of the species.

Report 1574 stated that the proposal would result in the loss of the Western population of *A. yeelirie*, which represents:

- a 31 % loss of the known individual plants of *A. yeelirrie*;
- the loss of one of two known populations;
- reduction in the known area occupied from 206 ha to 130 ha;
- a loss of genetic diversity, given the Western population is genetically distinct from the Eastern population; and
- a loss of 37 % of the known extent of the vegetation unit within which it occurs.

In Report 1574, the EPA noted that removal of the Western population could not be avoided if the proposal were to proceed. The EPA also considered it relevant that, despite genetic work indicating that the genetic differentiation is similar to that previously reported between subspecies in other *Atriplex*, the Western and Eastern populations did not warrant taxonomic separation into separate species. This was due to the morphological similarity and proximity between the two populations. The EPA further noted that the loss of the Western population

would mean that about 63 % of this species would remain which is consistent with EPA Position Statement 2.

In its response to the appeals, the EPA advised that the assessment had been undertaken based on the current scientific knowledge of the taxa. The EPA advised that the assessment and recommendation in regard to the species considered the matter of genetic divergence between the two geographically separated populations.

Management of the Eastern Population

In Report 1574 the EPA considered that in order to maintain the status of the species the health of the Eastern population should not degrade further and that direct and indirect impacts were to be avoided.

In its response to the appeals, the EPA noted the measures that the proponent proposed to protect the Eastern population. The EPA advised that *A. yeelirrie* is not considered to be groundwater dependent and therefore is not expected to be impacted by groundwater drawdown. The EPA further noted that while salinity was identified as a potential threat to the Eastern population, the EPA considered that there was not enough evidence to either support or deny that salinity is a potential threat to *A. yeelirrie*.

Noting the importance of protecting the Eastern population the EPA recommended that should it be determined that the proposal may be implemented a condition requiring a conservation species management plan, be imposed to ensure the protection of the Eastern population.

In its response to the appeals, EPA acknowledged that draft condition 6-3 as provided in Appendix 6 of the Report 1574, could be amended to expressly include a requirement to consider impacts from salinity, in the event that the Minister decides to allow the proposal to be implemented.

Habitat recreation and translocation proposals

As described in EPA report 1574 approximately one third of the total number of *A. yeelirrie* plants will be removed by the Proposal. During baseline studies, the proponent advised that it undertook work to understand the requirements of the plant and to demonstrate that translocation can reasonably be achieved.

Translocation describes the overall approach to re-establish populations of *A. yeelirrie* to maintain the genetic diversity that occurs within the species.

Appellants raised a number of specific concerns relating to aspects of the habitat recreation and translocation proposed, including:

- tailings burial could seriously affect the natural soil profile and chemical makeup of the soils in the vicinity of the mining pit and seriously reduce the ability to revegetate the pit and relocate the Western population of *A. yeelirrie* back into the pit area;
- the EPA has not considered the long term recovery of groundwater and the hydrogeological risk to the successful revegetation of the translocated Western population of *A. yeelirrie* back into the pit area;
- the translocation program is unlikely to be successful due to groundwater drawdown and impact of salinity; and
- translocation of *A. yeelirrie* will compromise the integrity of the recipient ecosystem.

In considering the assessment of *A. yeelirrie* it is noted that following the public comment period on the PER, the proponent prepared a 'Revised Proposal for the Protection of *Atriplex yeelirrie'* as part of its Response to Submissions. In doing so, the proponent acknowledged that the measures initially proposed did not provide sufficient evidence and options to provide confidence that successful translocation could be achieved. The proponent stated that it reviewed the proposals presented in the PER and investigated additional measures and options in an attempt to address the issues raised in submissions. The revised proposal was provided as Attachment 8 to the response to submissions for consideration as part of the assessment of the Proposal by the EPA.

As outlined in Attachment 8, the proposed revegetation / translocation sites for *A. yeelirrie* within the mined out open pit are located within parts of the open pit that will not be backfilled within tailings material. The EPA advised that it is therefore unlikely that the success of the translocation of the Western population of *A. yeelirrie* will be affected by material from tailings in the soil.

In its response to the appeals, the EPA advised that current information suggests that *A. yeelirrie* is not groundwater dependent and therefore the long term recovery of groundwater is not expected to be an issue with the establishment of any translocated population of *A. yeelirrie*.

In Attachment 8 the proponent acknowledged that there were risks related to translocating *A. yeelirrie* to sites where it has not been previously recorded. This included the environmental risk of impacts occurring at the receiving site and the need for assessment of these.

The proponent also discussed timing in Attachment 8 and stated that there would be a four to five year lead time between approval and ground disturbing activity. Other than for the purposes of translocation trials, the Western population would not be disturbed during this time. The document also stated that there is a minimum of 12 years of Proposal implementation post approval before the last *A. yeelirrie* plants (Western population) would be cleared, providing a significant period for the completion of the proposed eco-physiological studies and commencement of translocation field trials. In this regard it is considered there is additional potential to review the completion of the trials, research and translocation tasks, and outcomes of translocation as the project proceeds, allowing for review of the programme before the entire Western population is removed.

The EPA considered that there is evidence that other sites with similar soil types exist in the region and with appropriate research and proper attention to micro-relief and microhabitat, new populations may also be established elsewhere. The EPA determined that based on the current scientific knowledge of the taxa, combined with the proposed research and offsets provided, there was a sufficient basis to support the EPA's view that the Western population of *A. yeelirrie* could be successfully translocated.

If this proposal were to be implemented, the EPA considered that it would be important to impose conditions requiring a research and re-establishment program that continues for sufficient time to provide a high level of assurance that the Western population of *A. yeelirrie* is re-established in the field. The EPA therefore recommended a condition 14 requiring the preparation of an *A. yeelirrie* Offset Plan on the advice of Parks and Wildlife.

Condition 14 specifies the requirements of the Offset Plan and addresses a number of aspects relating to translocation including the research and management requirements and that the plan must include contingency measures including trigger level actions and thresholds should completion criteria not be met. In this regard and in response to appellants concerns about translocation compromising the integrity of the recipient ecosystem, it is considered appropriate to include a requirement in condition 14-2(5) that also includes

investigations of unintended impacts on the receiving environment as part of the development of the Offset Plan.

It is also considered that the mechanism of standard compliance reporting required by condition 14-4, and the requirement of condition 14-5 for a revised Offset Plan after 20 years should the objective of the Offset Plan not be met, may not reflect the importance of recreation of habitat and translocation of plants in managing the significant residual impact of the proposal. It is therefore recommended that the Proposal be further conditioned to require review and amendment as necessary of the plan at regular intervals, to capture consolidated and contemporary knowledge of the species, research and trials undertaken and ensure the Offset Plan is updated in that regard.

The EPA in response to the appeal advised that it does not consider that there is a threat of serious or irreversible damage to *A. yeelirrie* that would trigger the *precautionary principle*, or that the potential impact on this species would be inconsistent with the *principle of the conservation of biological diversity and ecological integrity*.

However, noting the intent of the recommended condition 6 to avoid and minimise impacts on the Eastern population of *A. yeelirrie*, it is recommended that this ground of appeal be upheld to the extent that condition 6-3 be strengthened to expressly include impacts from salinity.

Also, noting the above, it is considered condition 14 should be amended to improved the Offset Plan to counterbalance the significant residual impacts of the proposal on *A. yeelirrie,* it is recommended that this ground of appeal be upheld to the extent that:

- condition 14-2(5) be strengthened to include reference to investigating unintended impacts on the receiving environment;
- the reporting and review requirements of the offset plan be improved to require review and update at regular intervals, not exceeding three (3) years, or as otherwise specified by the CEO, to ensure that current knowledge of trials, research and translocation tasks undertaken within that period are reflected in the Offset Plan;

Conclusion

For the reasons set out above, and the advice of the EPA, it is considered that EPA had adequate information in its assessment of this factor. The EPA advice in this regard that it came to its conclusion that its objective for Flora and Vegetation could be met based on the current scientific knowledge of the taxa and with regard to the genetic divergence between the Western and Eastern populations of *A. yeelirrie* is noted.

It is considered that the EPAs conclusion, that should it be determined that the proposal be implemented, that conditions be applied to avoid and minimise direct and indirect impacts to flora and vegetation and a condition to counterbalance the significant residual impact of *A. yeelirrie*, is appropriate to ensure that potential impacts are mitigated and managed. On this basis, it is recommended that the ground of appeal be upheld in part.

GROUND 7: TERRESTRIAL FAUNA

There were two issues raised by appellants with regards to terrestrial fauna:

- fauna will drink the tails water and become sick; and
- the impacts of loss of habitat for conservation significant species should have been taken into account in the assessment.

Consideration

The EPA identified Terrestrial Fauna as a key environmental factor for this proposal. The objective for this factor is to maintain representation, diversity, viability and ecological function at the species, population and assemblage level.

In response to this ground of appeal the EPA stated that the TSF will be fenced and visually monitored for fauna. In the event that fauna visitations occur, the proponent has committed to the development of a Fauna Management Plan. This plan would outline the management and mitigation actions to be taken to ensure that impacts are minimised. These actions include appropriate management of vehicle movements to reduce fauna strike deaths, implementation of appropriate egress as well as fencing to minimise entrapment impacts and fire management to ensure appropriate management actions are undertaken to reduce the occurrence of fire-related incidents.

The PER documented the studies and investigations, described the fauna habitats present and the vertebrate fauna assemblage supported in the project area. The PER also contains an assessment of the conservation significant fauna present, their expected status in the study area and potential direct and indirect impacts that would result from implementation of the proposal. Impacts to terrestrial fauna were raised in public submissions and considered by the EPA in the assessment process.

Report 1574 identified that 2,422 ha of vegetation would be cleared for the project and considered both the direct and indirect impacts to terrestrial fauna habitat, and the species it supports. Consideration of the loss of habitat for conservation significant fauna species is demonstrated in Section 3.3 of Report 1574.

The EPA noted that there are likely to be localised impacts on vertebrate fauna through the implementation of the proposal. However, given the existence of continuous and extensive suitable habitat outside the development envelope and the proponent's management commitments, the EPA considered that these local impacts could be suitably managed and mitigated such that they would not be significant.

In regards to management of conservation significant fauna and to ensure that the proponent's management commitments are implemented the EPA advised that it recommended a condition requiring a Conservation Significant Terrestrial Fauna – Management-based plan be developed in consultation with Parks and Wildlife, if the Minister found that the proposal may be implemented.

Conclusion

It is considered that the assessment has appropriately and adequately considered the potential impacts from clearing of vegetation and the consequent loss of habitat for conservation significant fauna species. It is recommended that this ground of appeal is dismissed.

GROUND 8: AMENITY

An appellant contends that the EPA failed to consider the impact of dust on the Youno Downs and No Ibla Homestead. In the appeal the following concerns were raised in relation to dust:

- The EPA and the proponent based all assumptions on the mine being 70 km from Youno Downs Homestead, whereas the homestead is 60 km from the pit and 20km from the station boundary. The centre of the mine is approximately 25 km to the Dempsey Bore and 30 km to No-Ibla Bore, which are cattle watering points.

- The proponent did not provide dust predictions, including dust deposition rates, at Youno Downs or No-Ibla Homesteads.
- The dust assessments were undertaken on the eastern side of the proposed mine, even though the winds are easterly.
- The appellant claims that the EPA did not require the proponent to assess the impact of heavy metals in dust, and on this basis the EPA does not have sufficient evidence or data to assess the impacts of heavy metals in dust.
- The New South Wales 2005 Guidelines and criteria for coal dust management that the proponent has used, have failed in the Hunter Valley. On this basis, the appellant contends that the guidelines will fail at Yeelirrie.
- The proponent did not consider the frequent and intense dust storms that occur in the area in the modelling.
- Cameco will not be monitoring for dust particle size 2.5 micron, which travel further and more easily inhaled or ingested.

The appellant also raised concerns regarding the impact of blasting at the Yeelirrie mine site on the No-Ibla and Youno Downs homesteads, located 30 km and 60 km, from the mine site, respectively. The appellant contended that the impact of blasting on the homesteads had not been addressed by the proponent or EPA.

In support of their appeal, the appellant described two examples where blasting has previously impacted on the Youno Downs homestead: detonating ammunition at Mcquees property located 140 km from the homestead and blasting of Arimco's mine pit located 28 km from the homestead.

Consideration

In relation to concerns about potential dust impacts from the proposal, the EPA noted that no new scientific information on the proposal had been provided in relation to air quality. The EPA advised that the proponent undertook an air quality assessment for the proposal, which included quantifying particulate emissions, predicting ground level concentrations and dust deposition rates at sensitive receptors. The EPA noted that both the predicted maximum 24 hour and the annual average ground level concentrations of TSP, PM_{10} and $PM_{2.5}$ would comply with the relevant air quality criteria at the nearest sensitive receptors. The incremental dust deposition rates outside the mining lease area boundary from mine operations are also predicted to comply with the relevant air quality criterion.

The EPA noted that it considered in Report 1574, the proponents assessment of radiation exposure at permanent residences located up to 62 km from the proposed Development Envelope. Impacts from dust containing radionuclides were predicted using air quality modelling.

The EPA noted that the estimated total dose of radiation at the closest permanent residence, located 10.2 km from the proposed mine site, is estimated at 0.215 mSv/yr, which is well-below the regulatory public dose limit of 1 mSv/yr. As radiation decreases with distance from the source, the EPA further advised that it expects the total dose of radiation at any sensitive receptor, such as other homesteads, camp sites or bores to be less than 0.215 mSv/yr and below the regulatory public dose limit.

In response to the appellants concerns about impacts from heavy metals, the EPA advised that it considered the main risk from metals (and radionuclides) in dust to be from radiation as would be expected for a uranium mine.

The EPA also advised that the proponent had put forward a number of well-considered dust management options and that all mining and processing is proposed to occur on the mine

site, which would not be accessible to members of the public. It is noted that in the Response to Summary of Submissions, the proponent presented an opportunity to work with the neighbouring residents to install dust and radiation monitors at an appropriate location.

In relation to the concerns raised about the dust storm events were not considered in the modelling, the EPA referred to the Response to Summary of Submissions (pages 6 and 7). The Response to Summary of Submissions stated that the meteorological data generated was evaluated against five weather stations at Yeelirrie and Wiluna. The data represented the type, magnitude and frequency of meteorological conditions that are likely to occur, including maximum wind speeds and dust storms. During the investigation, the proponent advised that despite stronger winds causing more localised dust on exposed surfaces and will be transported over longer distances due to dust particles remaining suspended for longer, lower ground level concentrations of dust are expected as the stronger winds also create high turbulence. Worst case dispersion conditions are expected to be in a stable atmosphere coupled with a low level jet stream which was the subject of modelling.

The EPA advised that stockpiles and roads on the mine site would be subject to watering for dust suppression consistent with the Radiation Management Plan which is a requirement of the *Radiation Safety Act 1975* and the *Mines Safety and Inspection Act 1994* and the works approval and licence required under Part V of the EP Act

In regard to appellants concerns about noise and vibration, the EPA noted that they were not considered to be a key environmental factor for the proposal.

The PER stated that minimal drilling and blasting will be required as the ore and overburden material is expected to be high friability. However, if hard rock is encountered, blasting will be required and the proponent has allowed for 16 blasts per annum as a worst case scenario. The nearest sensitive receptor is the Yeelirrie Homestead, located 10.2 km from the pit and it is not expected that there will be any impact on the Yeelirrie homestead.

The EPA in response to the appeal describes mining as being undertaken primarily by standard surface mining equipment and reiterates that minimal blasting will be required. The EPA also refers to the Response to Submissions document, which states that the impacts of any blasting is likely to only extend ten metres, as the impacts are dependent on the type of blasting and quantity of explosives used.

In its' response to appeals, the proponent advised that impacts from blasting were considered only in the dust modelling and not for vibration. The proponent did not view the vibration impact from blasting to be significant as a high blast load would not be required due to the weak nature of the rock structure and the shallow orebody.

It is noted that the proponent will be required to comply with the *Dangerous Goods and Safety (Explosives) Regulations 2007* (Explosives regulations) and prepare a 'Blast Plan' to identify risks, hazards and controls, including the assurance of the safety of public, site personnel and surrounding properties.

Conclusion

Having regards the above information; it is considered that the EPA undertook an appropriate and proportionate assessment of the potential impact to amenity from the proposal and that the regulatory framework in place allows for potential impacts from dust and noise and vibration from blasting to be managed appropriately. Therefore it is recommended that this ground of appeal be dismissed.

GROUND 9: REHABILITATION AND MINE CLOSURE

Various issues were raised with respect to rehabilitation and mine closure during the appeals process. In broad terms the issues raised by appellants include:

- Rehabilitation of tailings materials; and
- Mine Closure Plan.

The EPA identified Rehabilitation and Closure as one of the key environmental factors for the proposal where the objective is to ensure that the 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.

Rehabilitation of Tailings Materials

Appellants contended that no uranium mine in Australia has been successfully rehabilitated nor has any uranium mine or mill site been satisfactorily remediated on a permanent basis anywhere in the world. One appellant maintained that the Western Australian regulatory framework for tailings management is inadequate.

Appellants also claim the EPA did not consider the responsibility to not pass radioactive waste onto future generations.

Consideration

In response to the appellant's contention that no uranium mine has been successfully rehabilitated in Australia, the EPA noted that it assessed the proposal on its merits in accordance with the EP Act and its Administrative Procedures 2012. The EPA considered the TSF design, tailings management and mine decommissioning for the proposal in Sections 3.6 and 3.8 of the Report.

It is understood that tailings will be stored in an in-pit TSF which the EPA advised is considered best practice, as it avoids the risk of wall failures, and is consistent with EPA Guidance Statement 55 "*Implementing Best Practice in Proposals Submitted to the EIA Process*".

The PER detailed the investigations undertaken for tailings management which included:

- 10,000 year landform evolution modelling;
- TSF cover system and seepage modelling (over 15,000 years);
- Post closure groundwater modelling (including contaminant transport); and
- ERICA assessment of potential post closure radiation impacts on non-human biota.

The EPA noted in in its response to this ground of appeal that the rehabilitation and revegetated landforms would not be subject to significant erosion, thereby reducing the likelihood of tailings becoming exposed.

Further detail on the TSF design and structure is provided under Ground 2 Impacts to Groundwater and Surface Water. As also described under Ground 2 Impacts to Groundwater and Surface Water, the modelling over 15,000 years indicated that seepage through the tailings would not result in concentrations of contaminants in groundwater to be significantly above background levels.

The PER notes that the most significant dispersion pathway for radionuclides resulting from the proposal is expected to be via project-generated dust. ERICA modelling for non-human biota which was conservatively conducted at the project boundary determined that the operating project will not have any impact on non-human biota. It is expected that once the

mine closes, emissions will reduce significantly and therefore have negligible impacts on non–human biota. ERICA modelling undertaken for the proposal is discussed in further detail under Ground 3 Human Health.

Radon emissions from the tailings at the surface post closure are discussed in Section 9 of the PER. The EPA noted in Repot 1574 that the construction and depth of the tailings cover will create an effective barrier to radon emissions at the surface. The cover will increase the diffusion time of radon as it moves through the cover and consequently will result in an increase in radon decay before it reaches the atmosphere.

The EPA noted that the radon emission rate after mine closure is expected to be below the baseline emission rate prior to mining 3.7 becquerel per metre squared per second ($Bq/m^2/s$) (over the orebody) and 0.37 $Bq/m^2/s$ away from the orebody). Using a conservative prediction of radon emission from the tailings, the radon emission rate from the tailings is expected to be 0.08 $Bq/m^2/s$ for an average ore grade of 1,600ppm uranium.

Mine Closure Plan

Appellants contended that the assessment of a draft mine closure plan is not adequate and the EPA failed to comply with its own guidelines in assessing mine closure and stated that a final MCP is required to be assessed by the EPA to adequately demonstrate that the proponent will meet the States Mine Closure Objectives:

> "*For every mine in Western Australia a planning process is in place so that a mine can be closed, decommissioned and rehabilitated in an ecologically sustainable manner, consistent with agreed post – mining outcomes and land uses, and without unacceptable liability to the State*"

Appellants also contended that by assessing the MCP as a draft, the final MCP would not be available for public review.

One appellant contended that the EPA had not given due consideration to the environmental impact of the mine in care and maintenance. The appellant noted that other mining companies in the area have a history of going in and out of care and maintenance due to fluctuations in commodity process. While on care and maintenance, these companies demonstrated poor environmental management resulting in issues associated with dust and roads.

Consideration

In response to this ground of appeal, the EPA noted that the proponent's Conceptual Mine Closure Plan (MCP) was considered in Section 3.8 of Report 1574. The EPA advised that the MCP was prepared based on the requirements of the Guidelines for Preparing Mine Closure Plans (DMP & EPA 2015) (MCP Guidelines) and that it considered that the MCP adequately covered the key risks of the backfilled mine pits and in-pit tailings storage facilities.

While the tenure of the mine is granted under the *Uranium (Yeelirrie) Agreement 1978*, the EPA would need to regulate compliance with the MCP process.

The EPA advised that the MCP is expected to be reviewed and resubmitted to the Office of the EPA for assessment every three years and the proponent has committed to incorporating the findings of additional studies into future version of the MCP. The EPA could also use this process to monitor the implementation and success of rehabilitation, and to require the proponent to rectify any deficiencies and produce public reports on its rehabilitation activities (page 68 of Report 1574

The EPA noted appellants' concerns regarding premature closure and advised that the proponent had included information in relation to unplanned and unexpected closure in Section 9.4 of its Conceptual MCP. If and while on care and maintenance, the proponent will be required to comply with safety obligations under s42 and 88 of the *Mines Safety and Inspection Act 1994* relating to mine suspension.

The EPA advised that progressive rehabilitation is proposed to minimise the area of land left open and not rehabilitated at any one time and to reduce the potential liability of the site. The proponent also intends to construct safe closure domains that do not represent a risk to humans and animals, preventative measures of potential physical and chemical pollution pathways from being established or accelerating over time, and development of management systems to prevent unsupervised access to sensitive domains. Monitoring programmes will be designed to evaluate the performance of rehabilitated mine landforms and to assess whether they have either met the site completion criteria or are showing satisfactory progress towards meeting these criteria.

The EPA noted in Report 1574 that, should it be determined that the proposal may be implemented, a condition requiring a MCP be prepared, regularly updated, implemented and publicly reported on, should be imposed on the proposal.

The EPA noted that successful decommissioning and rehabilitation could be achieved provided that best practice planning and implementation are applied. Accordingly, the EPA recommended environmental conditions to require:

- a revised MCP, that is effectively implemented and made publicly available;
- further research into the revegetation cover and erosion management;
- the establishment and study of analogue sites for rehabilitation;
- updated Landform Evolution Model; and
- the collection of on-ground data to calibrate erosion models.

DSD and DMP advised that the proponent will submit a mine closure plan to DMP for approval. In response to the appellants concern that the MCP will not be made publicly available, as noted above the MCP was made available for public review and comment as an appendix in the PER. In this regard, the EPA's proposed conditions in relation to Rehabilitation and Decommissioning are also noted and should it be decided that the proposal may implemented, the MCPs submitted in accordance with these conditions will be required to be made publicly available. It is also understood that MCPs assessed and approved by DMP will also be made publicly available (with the exception of commercially sensitive information or intellectual property).

Conclusion

Having regard to the above information, it is considered that the EPA had regards to the relevant guidelines on Mine Closure and TSF Management. Noting that should the proposal be implemented, the EPA has suggested a potential condition to provide for rehabilitation and decommissioning, it is recommended that this ground of appeal be dismissed.

GROUND 10 REGULATORY FRAMEWORK

Various appellants raised concerns regarding the capacity of the current regulatory framework to ensure that potential environmental and human health impacts from the proposal can be managed effectively. Appellants contend that the project should be rejected

on the basis that the existing regulatory framework does not meet the government's commitment to deliver World's Best Practice for uranium mining.

The appellants also referenced recent independent reviews of the existing regulatory framework, including the Uranium Advisory Group report (UAG report) released in April 2012 and led by the University of Western Australia, and CSIRO which they contend highlighted the deficiencies in the regulatory framework.

Consideration

Section 3 of the PER describes the regulatory framework that will apply to the Yeelirrie proposal. The Yeelirrie proposal will operate under the Yeelirrie State Agreement *(Uranium (Yeelirrie) Agreement Act 1978).* The State Agreement requires that the proponent submit a Development Proposal for the project which will provide detailed information on various aspects of the project, including environmental impacts.

The EPA, in their repose to appeals, confirmed that, in undertaking its assessment, the EPA considered the significance of the proposal's impacts on key environmental factors, the proposed mitigation strategies and determined if the proposal can meet its objective in each case. It is noted that the assessment is consistent with the EPA's Environmental Assessment Guideline (EAG) 8 – *Environmental principles, factors and objectives* and EAG 9 *Application of a significance framework in the EIA process.*

The EPA advised that it independently conducts its assessment, based on a range of different technical and scientific studies and advice. As part of this process the EPA considered the statutory roles and responsibilities of relevant state government agencies and then considered whether to recommend a ministerial condition in Report 1574 or whether the proposal can be adequately regulated through other processes.

In making this decision a decision about whether a proposal can be adequately regulated through other processes the EPA advised that it considers the capacity and experience of the regulator including:

- whether the regulator has established policies and guidelines to support its regulatory process related to the factor;
- whether the regulator has the technical skills and experience to manage the environmental impacts, particularly where non-standard technology is proposed or the type of proposal is not regularly considered by the regulator; and
- where the EPA considers that an opportunity for public comment is important, whether this is provided by the regulatory process

The current regulatory framework for mining activity in Western Australia has been established over time and is covered by several pieces of legislation. As with other resource projects in Western Australia, Uranium mining is subject to the multi-agency approval process to ensure that amongst other things, the environmental impacts of uranium mining are managed and mitigated. Environmental and human health aspects of the Yeelirrie Project will be managed under the following legislation:

- *Environmental Protection Act 1986*;
- *Mining Act 1978*;
- *Aboriginal Heritage Act 1972*;
- *Wildlife Conservation Act 1950*;
- *Rights in Water and Irrigation Act 1914;*
- *Mines Safety and Inspection Act 1994;*

- *Conservation and Land management Act 1984;*
- *Contaminated Sites Act 2003;*
- *Radiations Safety Act 1975; and*
- *Radiation Strategy (Transport of Radioactive Substances) Regulations 2002.*

As outlined in its response to appeals, the EPA notes where there is a statutory requirement for other agencies to regulate an aspect of the proposal and where it has confidence with the regulatory framework in place, that they regulate that aspect of the proposal. In areas where there is not clear statutory requirement, the EPA has drafted potential implementation conditions.

The PER, confirmed by advice received from the Department of State Development (DSD) and DMP, states that the projects will be subject to the environmental provision in the *Mining Act 1978* (the Mining Act). The Mining Act regulates effects on the environment through various provisions including allowing environmental conditions to be imposed on mining tenements, requirement for an approved mining proposal to demonstrate environmental mitigation and management prior to the commencement of works, requirement for annual environmental reporting and rehabilitation and environmental inspections for compliance.

In response appellants concerns about the UAG report, the EPA advised that the conclusions from the UAG review was that the regulatory framework was adequate to manage uranium mining in line with national and international standards. However the DMP should implement initiatives to improve transparency and communication, and look at adopting a risk-based approach to safety and environmental regulation. This is consistent with the findings of the previous 2009 Interagency Review.

EPA also advised that the DMP's response to the UAG Report has included actions that fall within its responsibilities, with the focus on improving efficiency and transparency of processes and it is understood that DMP has implemented a risk based and outcomes focused framework for environmental regulation, enhanced compliance powers and streamlined environmental approvals processes.

The DMP and Radiological Council have since developed a Memorandum of Understanding (MoU) (December 2012) regarding radiation safety for mining operations working arrangements.

It is understood that the MoU clearly sets out the roles and responsibilities for the Radiological Council and DMP. The Radiological Council is responsible for regulating the radiological aspects of the transport, mine closure and post closure monitoring, worker safety and public safety. DMP is responsible for worker safety, aspects of public safety relating to the mine and mine closure under the *Mines Safety and Inspection Act 1994*.

According to the MoU, a Radiation Management Plan (RMP) will be required to be assessed and approved by both the Radiological Council and DMP in order to identify and manage risks specifically associated with human and non-human biota, radiation. Under the RMP, a radiation waste management plan and radiation protection program would be assessed in greater detail. Compliance with the RMP is subject to inspection by DMP officers.

The transport of uranium oxide product would be regulated by the Radiological Council regulated under the *Radiation Strategy (Transport of Radioactive Substances) Regulations 2002.*

The conservation, protection and management of water resources in Western Australia is regulated by the DoW, in particular the abstraction of water will be licenced. DMP advised

that DMP and DoW have an Administrative Agreement in place for referral and advice where on mining proposals and mine closure plans.

DMP advised that the regulatory regime and resources within the Department are more than adequate to manage potential safety and environmental impacts resulting from uranium mining throughout the life of the mine, including closure.

Conclusion

Based on the review of the regulatory framework in place to support existing uranium mining (as is currently being applied to Wiluna and Kintyre Uranium mines in Western Australia), and the improvements that have been applied since the various reviews undertaken for regulation of uranium mining, it is considered that the EPA has appropriately applied EAG 8 and 9 in its assessment of the proposal.

In considering whether there is another statutory regime capable of regulating impacts from a particular factor, it is considered that the EPA has had appropriate regard for the capacity of other agencies to adequately regulate environmental and health impacts from uranium mining. It is also applied conditions to the proposal consistent with EAG 11 – *Recommending environmental conditions*.

It is therefore recommended that this ground of appeal be dismissed.

OTHER MATTERS

Appellants raised a number of other matters that are considered to be beyond the scope of the appeal, however appellants contend these matters are relevant to the Minister's considerations.

Fencing

An appellant maintained that the proponent must provide fencing at the boundary of the Yeelirrie pastoral leases to prevent cattle from entering the lease and consuming vegetation that has been covered with contaminated dust.

In response to this issue, the EPA advised that fencing was raised in the Response to Summary of Submissions. The pastoral leases that the appellant refers to in the appeal, does not share a boundary and is 6km to Yeelirrie's north western boundary. The EPA advised that the proponent has made commitments in assessment documentation that operational areas of the mine site, including the mine, waste rock dumps, and processing and infrastructure areas, will be fenced to exclude stray livestock and wildlife. Fencing is anticipated to remain for some time following closure until revegetation can occur without the pressures of grazing from wildlife.

In addition the proponent is of the view that neighbouring pastoralists have responsibility to maintain their on boundary fences to ensure that livestock do not stray onto neighbouring stations.

Uranium Lifecycle and Nuclear Energy

A number of appellants contend that EPA should have considered the whole of life cycle for uranium and the potential global impacts on human health and the environment. Many appellants referred to the impacts of the 2011 nuclear incident at Fukushima, issues of nuclear waste disposal and proliferation of nuclear weapons. It was also contended that EPA should have considered alternative sustainable energy sources with a focus on developing these projects over uranium.

In response to this matter the EPA noted the issues raised by appellants have been previously raised in public submissions and are outside of the scope of its assessment. The EPA's role includes conducting environmental impact assessments, preparing statutory policies for environmental protection, preparing and publishing guidelines for managing environmental impacts, and providing strategic advice to the Minister for Environment. The EPA has undertaken an environmental impact assessment of this proposal in accordance with Part IV of the EP Act and its Administrative Procedures 2012. The proposal is to mine four poly-metallic deposits containing commercial concentrations of uranium and to produce UOC and other metal concentrates. It does not include the consideration of the uranium or other metals life cycle.

The EPA further advised that the object of the EP Act is stated in s4A of the Act, and is to 'protect the environment of the State'. While broader issues associated with proposals can be considered by the Minister under s45 of the EP Act, it is not the role of the EPA to take into account environmental matters beyond the jurisdiction of the State. The EPA advised that in this case it determined the key environmental factors to assess the environmental acceptability of the proposal.

Lifecycle and global implications of uranium mining such as the generation of nuclear waste, the wider nuclear cycle, nuclear incidents and proliferation of nuclear weapons are issues outside the scope of the EPA assessment for this proposal. However, the life cycle of uranium would be subject to Commonwealth legislation, such as the *Nuclear Non-Proliferation (Safeguards) Act 1987* and Bilateral Co-operative Agreements with export countries.

Economics of the Uranium Industry

Some appellants acknowledged that the EPA cannot consider economic conditions in making its assessment, while others contended that the EPA should consider relative information, such as uranium pricing. Appellants requested the Minister for Environment to consider the risk of the proponent not having available funds to implement management commitments and the risk of premature closure that is exacerbated by the instability in the uranium price, the negligible employment benefits and the economic outlook for uranium.

The EPA noted, in response to this matter, that commercial considerations relating to the economic viability of the proposal are outside the scope of the EPA's assessment under the EP Act. Should the proposal be approved, the proponent would be required to comply with environmental conditions set by the Minister. Failure to comply with the Ministerial Conditions and Management Plans required by the conditions or other agencies can result in penalties for non-compliance.

Past Performance

Appellants considered that the EPA had not had regard for the proponent's corporate record and past performance in the assessment or required standards for environmental management. An appellant was of the view that the proponent should have submitted a detailed list of environmental and safety breaches and incidents to enable the public and EPA to evaluate the evidence of the proponent past performance.

In response to this matter the EPA advised that it assessed the proposal on its environmental merits and in accordance its Administrative Procedures 2012 and considered best practice in accordance with EPA Guidance Statement 55 *Implementing Best practice in Proposals Submitted to the EIA Process.* The EPA noted that should the proposal be implemented, the proponent would be required to comply with the conditions provided for the

key environmental factors as well as other Western Australian and Commonwealth Legislation. It is noted that this issue was raised in the Response to Summary of Submissions.

The EPA also advised that the past performance of proponents is a matter that may be relevant to a final decision on a proposal under Section 45 of the Act.

Transparency of Process

The issues raised around transparency primarily relate to the process subsequent to the appeals. In summary appellants contended that:

- The process should be more transparent and open to public submissions.
- Management plans are in draft form or were not provided in the PER, thereby allowing the proponent to change the proposal and the public will not have an opportunity to review and comment on the approved plans.

In response to these matters the EPA advised that the environmental impact assessment process provides opportunities for the public to be involved and that the proponent followed consultation requirements as outlined in its Administrative Procedures 2012 for the assessment. There were opportunity to comment on the referral (seven days) and the PER document (12 weeks). The normal period of time for public comment on a PER document is between four and 12 weeks. The EPA advised that it provided this proposal with the maximum period for public comment on the PER document. The EPA also noted that following release of the EPA report, the public is provided with a further opportunity to submit an appeal (two weeks).

In regard to the preparation of management plans and their public availability, the EPA advised that the EDS for the proposal required the proponent to prepare a Conservation Species Management Plan and a MCP for the proposal and these plans were provided in the PER as appendices E3 and O1, respectively. The EPA advised that the PER included the results of the detailed impact assessment studies and discussed the framework for the management of each impact. The EPA further advised that the PER described a range of mitigation measures that the proponent would need to implement as part of future management plans if the proposal was approved.

The EPA advised that Report 1574 provided several conditions requiring preparation and implementation of management plans in Appendix 6 to ensure that the EPA's objective is continuing to be met, should the determine that the proposal may be implemented. The EPA also noted in the report the statutory requirements of other agencies to regulate the proposal through management plans that would ensure the EPA's objective is continuing to be met.

The fundamental requirements of procedural fairness are that there should be a fair hearing and the decision maker should be free from bias. It is considered that the appeals process has awarded these opportunities to both the appellants and the proponent.

CONCLUSION AND RECOMMENDATIONS

For the reasons set out in this report, it is recommended appeals in relation to subterranean fauna be dismissed.

Should it be determined that the proposal may be implemented it is recommended that the appeals be allowed to the extent that the following conditions are amended.

- Condition 5 be amended to require that Management Plans to be made publicly available;

- Condition 6-3 be amended to ensure that salinity is appropriately considered in the *Atriplex yeelirrie* Conservation Management Plan
- condition 14-2(5) be strengthened to include reference to investigating unintended impacts on the receiving environment from translocation activities;
- condition 14 is amended to require review and update at regular intervals to ensure that Offset Plan remains contemporary

It is otherwise recommended that the appeals be dismissed.

Following the determination of these appeals, the decision as to whether or not the proposal may be implemented, and the precise wording of the conditions which apply to any such implementation, is made under section 45 of the Act

Emma Gaunt
APPEALS CONVENOR

Investigating Officer:
Tonya Carter, Senior Environmental Officer

APPENDIX 1 - ACRONYMS

ARPANSA	Australian Radiation Protection and Nuclear Safety Agency
CCWA	Conservation Council of Western Australia
CDNTS	Central Desert Native Title Services
CMT	Culturally Modified Trees
DAA	Department of Aboriginal Affairs
DEE	Department of Environment and Energy
DER	Department of Environment Regulation
DoTE	Department of the Environment (*now Department of Environment and Energy*)
DoW	Department of Water
DMP	Department of Mines and Petroleum
DSD	Department of State Development
EAG	Environmental Assessment Guideline
EPA	Environmental Protection Authority
EP Act	*Environmental Protection Act 1986*
EPBC	Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999*
ERICA	Environmental Risk from Ionising Contaminants: Assessment and Management Tool
ESD	Environmental Scoping Document
GDE	Groundwater dependant Ecosystems
MCP	Mine Closure Plan
MoU	Memorandum of Understanding
OEPA	Office of the Environmental Protection Authority
Parks and Wildlife	Department of Parks and Wildlife
PER	Public Environment Review
RMP	Radiation Management Plan
TSF	Tailing Storage Facility
UOC	Uranium Ore Concentrate

APPENDIX 2 - LIST OF APPELLANTS

Marilyn and Colin Bernhardt

Josephine Vallentine

Cameco Australia Limited

David Kabay

Warri Oviedo

Walkatjurra Walkabout

Sandra Evans

Richard Evans

Shirley Wonyabong

Dr Christine Jeffries-Stokes

Geoffrey Stokes

Marcus Atkinson

Kerrie-Ann Garlick

William Taylor

Phillipa Lucy Hancock

Conservation Council of Western Australia

Rob Gulley

Lisa Webb

Wildflower Society of Western Australia

Cassandra Schmitt

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