



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 1576: MULGA ROCK URANIUM PROJECT
SHIRE OF MENZIES**

PROPONENT: VIMY RESOURCES LIMITED

Appeal Numbers 050 to 073 of 2016

November 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 Vimy Resources Limited (the proponent) to develop, mine and rehabilitate the Mulga Rock Uranium Project (the proposal).

The appellants raised a range of issues in relation to the proposal, which have been broadly summarised as follows: flora, vegetation and priority ecological communities; terrestrial fauna; impacts to human health; impacts on Aboriginal heritage and adequacy of consultation; ground water abstraction and hydrological processes; waste, tailings management and contamination; rehabilitation and mine closure; transportation risks, regulatory framework and other matters.

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

With respect to appellants concerns about the adequacy of the assessment of impacts on flora and vegetation, the Appeals Convenor considered that the EPA's advice about the available information on vegetation communities provided sufficient certainty to assess the significance of both direct and indirect impacts on the vegetation communities within the Yellow Sandplain Priority Ecological Community, including potential impacts on the undescribed *Hakea* species. However, to provide consistency with the assessment and recommendations of the EPA, it is recommended that conditions 8 and 12 be amended to allow for clear outcomes within the respective management plans.

In relation to concerns about the assessment of impacts on the sandhill dunnart, the EPA advised that the proposal will impact on less than one percent of the habitat of the species, and recommended objective based conditions that require the proponent to minimise impacts to the species as far as practicable. While it is considered that the EPA's assessment of impacts was appropriate, it is recommended for greater clarity, that amendments to condition 9 include the objective for the camera trapping program.

In relation to appellants concerns that the EPA's assessment did not adequately address health risks, the EPA evaluated the different exposure pathways, including from contaminated dust, water, food (bush tucker) and direct exposure to gamma radiation (workers and transport). The EPA advised in its response to appeals, that the radiation exposure levels predicted under all scenarios will be below regulatory dose limits and any risks associated with radiation can be adequately managed by other agencies without conditions to be applied under Part IV of the EP Act.

The Appeals Convenor supported the EPA assessment in relation to health issues associated with groundwater, that there will be no impact to water quality outside the development footprint and considered that the recommended conditions to mandate this outcome were appropriate. In this regard the Appeals Convenor noted the EPA advice that groundwater resources near the proposal are hypersaline, generally acidic and not fit for human consumption or livestock purposes.

In relation to heritage, appellants contended that the proponent has failed to properly identify and consult with Aboriginal people with a cultural connection to the Mulga Rock area and the assessment could not be relied on to determine what values were likely to be impacted by the implementation of the proposal.

The EPA advised, in response to appeals, that the proponent consulted with a relevant Aboriginal community, the Wongatha people, during the surveys undertaken for the proposal, on advice from the North East Independent Body, the consultative body for heritage matters in the region at the time that heritage surveys were undertaken. The EPA further advised that this process was consistent with Guidance Statement 41 *Assessment of Aboriginal Heritage*.

The proponent provided details of consultation undertaken between 2008 and October 2015, including community briefings with the East Wongatha Community at Central Desert Native Title Services, group public meetings in the Leonora and Menzies town halls with community members and a number of consultations with DAA, to inform the investigation.

The Appeals Convenor considered that the EPA relied on the relevant information in its consideration of this factor, however, to provide greater clarity in relation to the intent of the condition to manage impacts on both registered and unregistered sites, consistent with the *Aboriginal Heritage Act 1972*, it is recommended that this ground of appeal be allowed to the extent that condition 10 is amended as recommended in this report.

In regard to the impacts from tailings storage facilities, the Appeals Convenor noted the EPA's recommended conditions 13 and 14, requiring the proponent to prepare a Tailings Storage Facility Management Plan, covering both the above and below ground Tailings Storage Facilities and in acknowledgement of the EPA's advice in regard to the importance of successful rehabilitation in ensuring a stable landform from the above ground tailings storage facility the Appeals Convenor recommended an amendment to condition 14 to include details of rehabilitation measures.

Having regard to the information and advice presented in respect to the appeals from appellants, relevant Government agencies and the proponent, the Appeals Convenor considered that the EPA had sufficient information to assess the proposal, that this assessment was consistent with section 44 of the *Environmental Protection Act 1986* and that its conclusion that the proposal may be implemented subject to the recommended conditions, is supported.

The Appeals Convenor noted that there is an established regulatory framework in place to adequately manage and mitigate potential risks from the proposal which provided confidence that potential impacts related to human health, flora and vegetation, fauna, groundwater abstraction and hydrological processes, rehabilitation and closure and transport risks, can be adequately managed.

However, having had regard for all of the information presented, the Appeals Convenor recommended that the appeals be allowed to the extent that the conditions should be amended as set out below and for the reasons detailed in this report.

Recommendations

For the reasons set out in this report, it is recommended that the appeals be allowed to the extent that conditions are amended for:

Ground 1 – Flora, vegetation and priority ecological communities

- Specify outcomes in condition 8-1 for:
 - Avoiding of impacts to unidentified *Hakea* species;
 - The extent of clearing of vegetation communities E3 and S6; and
 - Ensure the eradication of all weeds introduced in the development envelope as a result of the implementation of the proposal.

- Specify objectives in condition 8-2 to:
 - Minimise direct and indirect impacts on vegetation communities E3 and S6 as far as practicable; and
 - Minimise direct and indirect impacts on conservation significant flora as far as practicable.
- Specify an outcome in condition 12-1 (3) for maintaining soil quality within background concentrations established during baseline studies 10m from areas where dewater has been used for dust suppression in sandhill dunnart habitat (i.e. E3 and S6 vegetation communities); and
- Specify an objective in condition 12-1 (1) to minimise impacts on soil quality as far as practicable.

Ground 2 – Terrestrial fauna

- The objective of the camera trapping program is specified by amending condition 9-1
- The reference to 'camera trapping program' in condition 9-3 is replaced with a register for the reporting of impacts to conservation significant fauna.

Ground 4 – Aboriginal heritage

- Condition 10-2 is amended to include the timing for preparation and submission of the Aboriginal Heritage Management Plan, with phased implementation and completion before substantial commencement of the proposal or as agreed by the CEO; and
- A condition is added, consistent with the format of condition 9-3 to describe but not limit the management actions to be included in the Aboriginal Heritage Management Plan, such as procedures for ground disturbance and environmental induction and training.

Ground 6 – Waste, tailings management and contamination

- Condition 11-3 be amended, in a format consistent to condition 9-3, to include provisions to manage impacts on water quality including, but not limited to Acid and Metaliferous Drainage from seepage into groundwater and the reinjection of surplus water into the aquifer;
- Condition 11-3 be amended to remove duplication of the reference to the Department of Mines and Petroleum in condition 11-2;
- Condition 12-3 be amended, in a format consistent to condition 9-3, to include provisions to manage impacts on soil quality including, but not limited to Acid and Metaliferous Drainage from seepage into soil and use of dewater for dust suppression;
- Condition 12-3 be amended to remove duplication of the reference to the Department of Mines and Petroleum in condition 11-2;
- Condition 14-1 (1) be amended to refer to achieving the environmental outcome on the basis of best available landform modelling over 10,000 years post closure; and
- An additional condition be added to condition 14, in a format consistent with condition 13-3, to include details of appropriate rehabilitation measures, including, but not limited to timely trials for the revegetation of the tailings storage facility.

Ground 7 – Rehabilitation and mine closure:

- Condition 5-1 and 5-2 are amended to include reference to both data and plans, and not only data; and
- Condition 14 is amended to include the title of the management plan, so that the condition is not limited to Landform Evolution Modelling only.

The precise wording of the conditions should be finalised through the consultation process under section 45 of the EP Act.

TABLE OF CONTENTS

INTRODUCTION	1
THE PROPOSAL	1
KEY ENVIRONMENTAL FACTORS	3
OVERVIEW OF APPEAL PROCESS	3
OUTCOMES SOUGHT BY APPELLANTS	4
GROUND OF APPEAL	4
GROUND 1: FLORA, VEGETATION AND PRIORITY ECOLOGICAL COMMUNITIES	5
GROUND 2: TERRESTRIAL FAUNA.....	12
GROUND 3: IMPACTS TO HUMAN HEALTH	15
GROUND 4: IMPACTS ON ABORIGINAL HERITAGE AND ADEQUACY OF CONSULTATION	20
GROUND 5: GROUND WATER ABSTRACTION AND HYDROLOGICAL PROCESSES	23
GROUND 6: WASTE, TAILINGS MANAGEMENT AND CONTAMINATION	27
GROUND 7: REHABILITATION AND MINE CLOSURE	34
GROUND 8: TRANSPORTATION RISKS.....	36
GROUND 9: REGULATORY FRAMEWORK	37
OTHER MATTERS	40
CONCLUSIONS AND RECOMMENDATIONS	41
APPENDIX 1 - LIST OF APPELLANTS	44

INTRODUCTION

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 Vimy Resources Limited (the proponent) to develop, mine and rehabilitate the Mulga Rock Uranium Project (the proposal).

The proponent referred the proposal to the EPA on 31 July 2013. On 28 August 2013 the EPA set the level of assessment at Public Environmental Review (PER) with a 12-week public review period that commenced on 14 December 2015.

In August 2016, the EPA released its report and recommendations to the Minister for Environment on its assessment of the proposal, EPA Report 1576 (Report 1576), where it concluded that the key environmental factors identified for the proposal can be managed to meet the EPA's objectives and recommended that the proposal may be implemented subject to the conditions and procedures set out in Report 1576.

The proposal was determined to be a controlled action under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) on 7 January 2014 due to the proposal's potential impacts to Matters of National Environmental Significance (MNES): listed threatened species and communities and nuclear actions.

Twenty four appeals were lodged against the report and recommendations of the EPA for the proposal as listed in Appendix 1.

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).

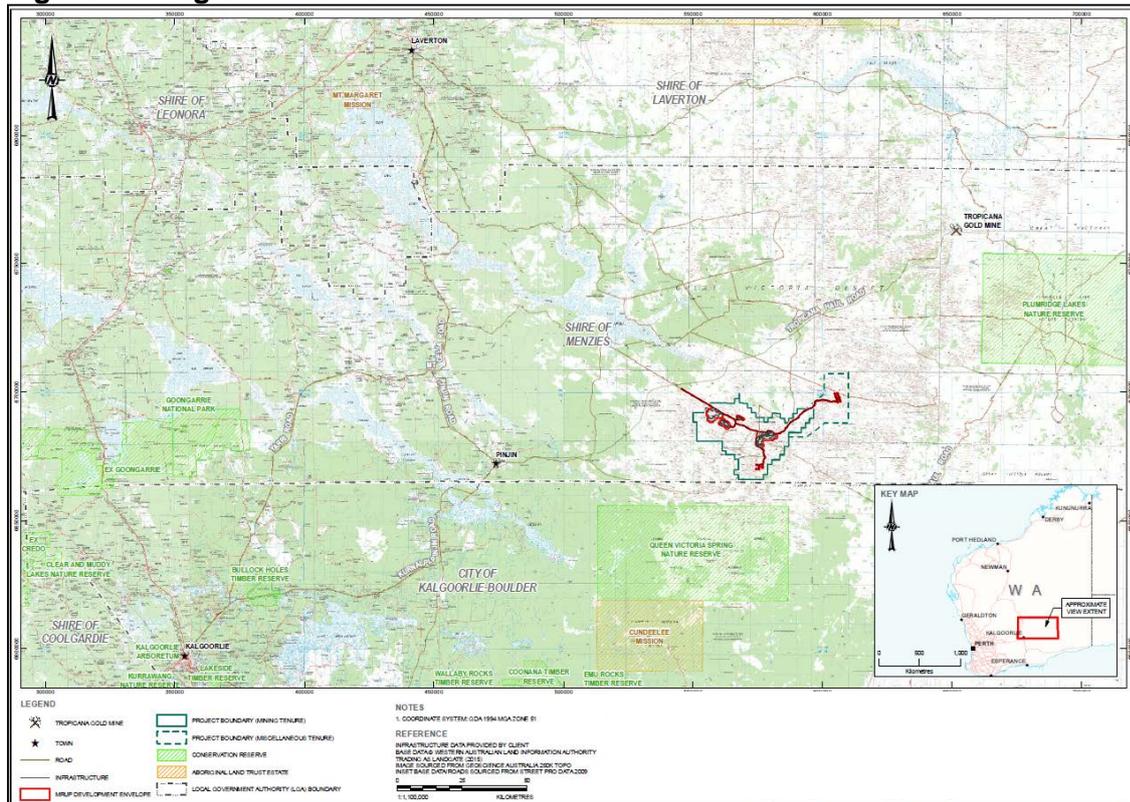
THE PROPOSAL

The proposal is located approximately 240 kilometres (km) east-north-east of Kalgoorlie in the Shire of Menzies (see Figure 1). The proponent proposes to mine and process four polymetallic deposits containing commercial grades of uranium through open-pit mining. The proposed mine would be located within a 9,998 hectare (ha) development envelope (see Figure 2) and have an expected mine life of 16 years. Direct disturbance of 3,787 ha of native vegetation within the development envelope is proposed to develop the Princess and Ambassador deposits (Mulga Rock East), and the Emperor and Shogun deposits (Mulga Rock West).

The Mulga Rock Uranium Project proposal would involve mining up to 4.5 million tonnes of ore per annum (Mtpa), which would be processed on site through an acid leach and precipitation treatment plant to produce up to 1,360 tonnes per year of uranium oxide concentrate (UOC). Other metal concentrates including copper, zinc, nickel and cobalt would subsequently be extracted using sulphide precipitation. The UOC would be transported by road to Port Adelaide in sealed steel drums within a secured shipping container. Infrastructure would include processing facilities, stockpile and laydown areas, tailings storage facilities, evaporation ponds, water treatment plant, reinjection borefield and associated pipelines, a solid waste landfill, accommodation facilities, an airstrip, roads, fuel and chemical storage, and a diesel or gas fired power station.

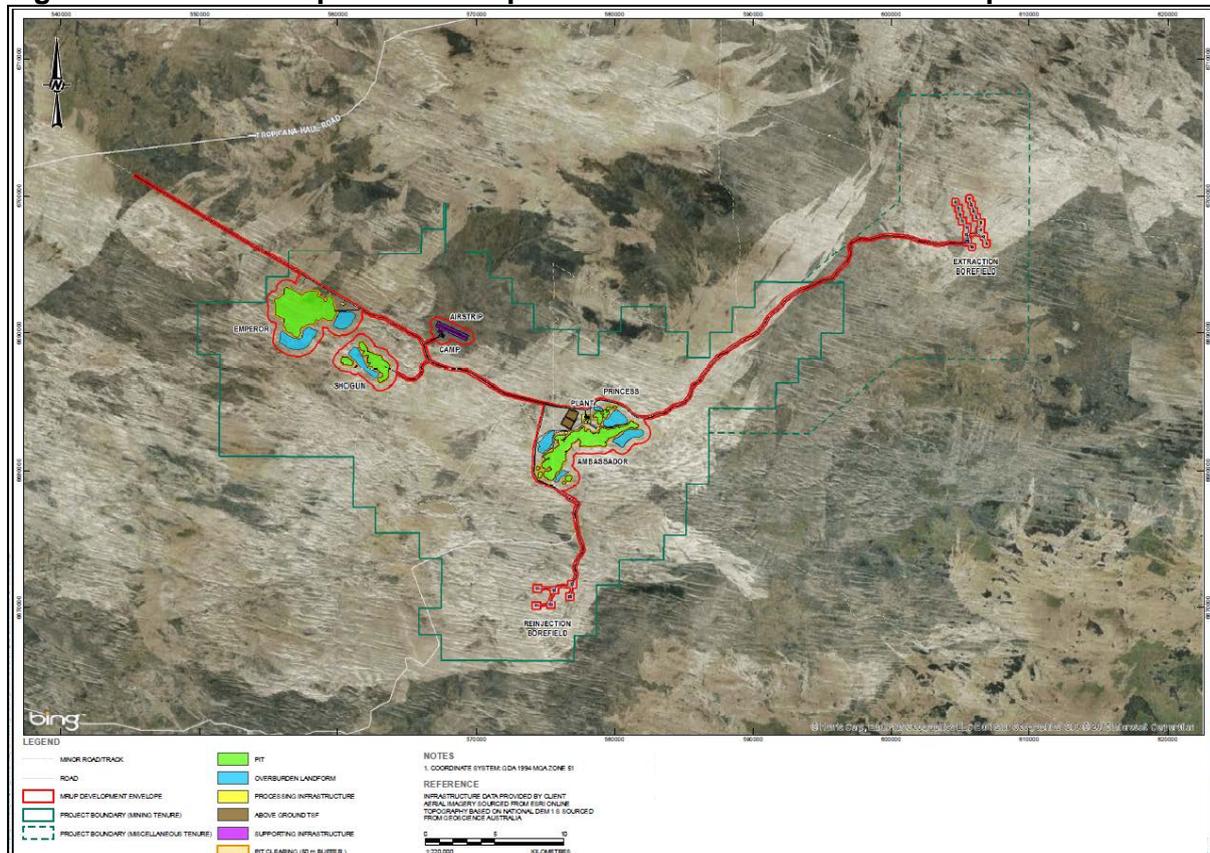
Tailings would initially be disposed of in an above-ground TSF, for approximately 18 months, after which they would be disposed of in two pits as void space becomes available. At the completion of operations, the in-pit TSFs would be backfilled with overburden. All TSFs would be capped and covered. Plant and equipment would be decommissioned and the site rehabilitated.

Figure 1 – Regional location



(Source: Adapted from EPA Report 1576, 2016)

Figure 2 - Mine development envelope and indicative disturbance footprint



(Source: Adapted from EPA Report 1576, 2016)

KEY ENVIRONMENTAL FACTORS

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:

- EPA (2015a) Environmental Assessment Guideline No. 8 – Environmental principles, factors and objectives;
- EPA (2015b) 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:

- Flora and vegetation;
- Terrestrial fauna;
- Human health;
- Heritage;
- Inland waters environmental quality / Terrestrial environmental quality; and
- Rehabilitation and decommissioning.

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). Appendix 3 of Report 1576 describes how the EPA has had regard to the principles of the EP Act, including the precautionary principle, the principle of intergenerational equity and the principles of the conservation of biological diversity and ecological integrity.

The EPA advised that it has applied the principles consistently across all the environmental factors in undertaking its assessment and considers that implementation of the proposal does not pose a threat of serious or irreversible damage to the environment and that the health, diversity and productivity of the environment can be maintained if the recommended conditions are imposed.

Further, the EPA advised that it considers that the proposal would result in local impacts to flora and vegetation and terrestrial fauna, however provided that conditions are imposed the EPA considers that the proposal would not compromise the biological diversity or ecological integrity within the region.

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 provided an opportunity to address the matters raised in the appeals.

During the appeals investigation the Office of the Appeals Convenor consulted the proponent and appellants, which included meetings in Leonora and Kalgoorlie, Perth and via the telephone and separately with representatives of the proponent.

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

Broadly the appellants sought for the proposal not to be approved as it cannot meet important principles of the EP Act, the EPA's assessment and recommendations to be rejected, or in the event of the proposal being approved, additional and revised conditions to be applied.

GROUND OF APPEAL

The appellants raised a number of common concerns, which have been broadly summarised under the following grounds:

Ground	Heading	Summary of matters raised by appellants
1	Flora, vegetation and priority ecological communities	Yellow Sand Plain Priority Ecological Community; impacts on the Queen Victoria Springs Class A nature reserve; risk of using saline water for dust suppressions and impacts on vegetation; recommended buffer to protect the Hakea species; risks considered in isolation, coordination of surveys; identification of species and regional representation; flora and vegetation management plans; management of weeds
2	Terrestrial fauna	Management of impacts to the sandhill dunnart and conservation significant fauna; conservation significance of the area for sandhill dunnart protection; impact of invasive species; limited information about the existence of the species outside the development envelope, terrestrial fauna management plans
3	Impacts to human health	Uranium is poisonous; correlation between radiation and cancer; premature deaths and undiagnosed cancers; potential pathways - exposure to dust, radiation, contaminated drinking water and bush tucker; elevated levels of nitrates and uranium levels in the Goldfields region and increased risk of kidney disease; mining activity releases more uranium into the environment
4	Adequacy of consultation and impacts on Aboriginal heritage	Failure to identify and develop measures to protect heritage values; studies based on a single report from the 1980's, Failure to identify and consult with communities with cultural connections to the Mulga Rock area; potential disturbance of burial sites
5	Water abstraction and hydrological processes	Water abstraction from an arid environment; failure to consider climate change; mining for 16 years and residual impacts over an estimated 145 year recovery period for groundwater; inadequate consideration of

Ground	Heading	Summary of matters raised by appellants
		long term impacts on the aquifer, subterranean ecology, groundwater dependent ecosystems, other users and downstream environment, including the Queen Victoria Springs A Class Nature Reserve.
6	Mining activities, tailings management and contamination	Contamination from tailings storage facilities; seepage and leaching of nitrate and uranium into groundwater; risks of Acid and Metalliferous Drainage (AMD); risks to and impacts of seepage on Queen Victoria Spring Nature Reserve, water of the Spring; seismic activity in the proposed tailings storage area; mining companies have a poor track record in waste management and containment; Tailings management plan should ensure the isolation of tailings for at least 10,000 years.
7	Rehabilitation and mine closure	Lack of evidence of ecologically sustainable closure of any uranium mine, lack of baseline data and completion criteria; uranium mines cannot be successfully rehabilitated; draft mine closure plan is not adequate
8	Transportation risks	Risks of transport accidents and spills
9	Regulatory framework	Regulatory jurisdiction and water quality, inadequate regulatory framework, deferral of environmental assessments to other agencies, deferral of mine closure to Department of Mines and Petroleum (DMP), studies not submitted, alternative energy

The appellants also raised issues which did not relate specifically to EPA Report 1576. These matters are described at other matters.

GROUND 1: FLORA, VEGETATION AND PRIORITY ECOLOGICAL COMMUNITIES

Appellants highlighted the pristine character of the desert environment in this area and submitted that it will be negatively affected by increased human interference.

Key concerns raised in relation to this ground of appeal have been broadly summarised as follows:

- Adequacy of the assessment including impacts of mining the Yellow Sand Plain Priority Ecological Community (PEC) and Victoria Springs Nature Reserve;
- Sufficiency of surveys, assessment and protection of the undescribed *Hakea* species;
- Sufficiency of recommended conditions for weed control; and
- Adequacy of management and mitigation strategies

Adequacy of the assessment including impacts on the Yellow Sand Plain Priority Ecological Community (PEC) and Victoria Springs Nature Reserve

Appellants noted that the definition of the PEC community has not been updated since 2001 even though the listing and definition is in an updated document by the Department of Parks and Wildlife (Parks and Wildlife) dated November 2014.

An appellant contended that the EPA's assumption that vegetation communities are represented outside the development envelope for the proposal did not recognise that a PEC may cover a relatively large area and is not one community, but a collection of different sub-communities. The appellant raised concern that the Level 2 survey conducted by the

proponent did not demonstrate that sub-communities within the PEC were adequately represented outside the proposal footprint.

One appellant submitted that the percentage of the Yellow Sandplain PEC that will be affected by the proposal appeared as approximately 30%, but in Table 6 of EPA Report 1576 the percentage is only 1.01%.

Appellants raised concern that mining has been identified as the main threat to this PEC by Parks and Wildlife and the proponent has not considered the threat of mining for this PEC, including the risks associated with dust suppression with saline water from mine dewatering.

Appellants raised concern that the proposal area is in or close to the Queen Victoria Spring Class A Nature Reserve.

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.

Parks and Wildlife designated the 'Yellow sandplain vegetation of the Great Victoria Desert with diverse vertebrate fauna habitat', hereafter the Yellow Sandplain PEC, as Priority 3(iii) in its most recent PEC listing¹.

It is understood that Priority Three ecological communities are poorly known and defined² as:

communities made up of large, and/or widespread occurrences, that may or may not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing by domestic and/or feral stock, inappropriate fire regimes, clearing, hydrological change etc.

Parks and Wildlife described the Yellow Sandplain PEC as "Undulating yellow sandplain with an open upper stratum of *Eucalyptus gongylocarpa*, with or without a diverse mallee stratum of *E. youngiana*, *E. mannensis*, *E. platycorys*, over a sparse, though diverse shrubs over hummock grasses, *Triodia desertorum* or *T. scariosa*. Very high vertebrate diversity and unusual combinations of species, which includes a mixture of south-western and arid inter zones. Parks and Wildlife identified the main threatening processes to the Yellow Sandplain PEC as mining and exploration, extensive summer wildfire and feral predators.

With respect to the definition of the Yellow Sandplain PEC, the EPA advised that Parks and Wildlife were consulted throughout the assessment process and they have not advised that the definition of the PEC is incorrect.

In regards to appellants concerns about the extent of the PEC and assumptions the EPA relied upon, it is understood that the PEC has not been defined through mapping and is considered in reference to a mapped area of the Yellow Sandplains, covering 1,692,000 ha in the south-west corner of the Great Victoria Desert.

¹ Department of Parks and Wildlife, Priority Ecological Communities for Western Australia Version 24, 24 June 2016; May be downloaded from <https://www.dpaw.wa.gov.au>

² Department of Environment and Conservation Definitions, Categories and Criteria for Threatened and Priority Ecological Communities, January 2013; May be downloaded from <https://www.dpaw.wa.gov.au>

The PER in Appendix A1 summarises and consolidates the results of field surveys conducted between 2007 and 2015 and provides vegetation mapping and describes 26 vegetation communities within a 29,961.90 ha area.

In relation to the representation of sub-communities outside the development envelope, the PER in Appendix A1, described 26 vegetation communities mapped within an area of 29,961.90 ha and provided the proportion of each community that would be affected both directly through clearing within the disturbance footprint (3,787 ha) and indirect impacts within the development envelope (9,998 ha).

The development envelope of 9,998 ha, assessed in Report 1576, is 33% of the area mapped from field surveys. It is noted that the mapped area is fully contained within the mapped area of the Yellow Sandplains used for the purpose of the assessment. The EPA therefore considered the impacts of the proposal on vegetation communities, on this basis, in relation to the regional extent of 1,692,000 ha of the Yellow Sandplain PEC. The assumption was therefore used in Report 1576, that in relation to the regional extent of the Yellow Sandplain PEC, the disturbance comprises less than 1% of the PEC.

The EPA had particular regard to the proponent's references to the S6 vegetation community. This vegetation community represents the yellow sand dune crests that are extensive in the area and contains a high number of priority flora species which appear to be restricted to, or commonly present on, the S6 vegetation community. The PER considered that this community may have conservation significance in relation to the broadly defined PEC. The S6 vegetation community is also identified, along with vegetation community E3 as being prime habitat for the threatened sandhill dunnart.

In relation to appellants contention that the threat that mining poses to the Yellow Sandplain PEC had not been adequately considered, the EPA advised that it considered direct and potential indirect impacts of mining activities in its assessment. The assessment acknowledged direct impacts including clearing and disturbance, which may result in the loss of conservation significant species and/or loss of a portion of the S6 vegetation community as well as potential indirect impacts from dust deposition, altered fire patterns, erosion, uptake of radionuclides and other contaminants from dust, groundwater and surface water, the introduction and spread of weed species, altered hydrological regimes associated with dewatering and aquifer reinjection or modified surface hydrology and feral animals as well as air quality and accelerated erosion/soil loss to flora and vegetation.

In relation to the use of saline water from mine dewatering for dust suppression, the EPA considered this risk and noted, in response to appeals that this saline water will only be used for dust suppression on haul roads and access roads.

The EPA noted that the proponent committed to design road drainage systems to collect runoff and ensure that the impact of this saline groundwater on flora, vegetation fauna habitat and soil is minimised. Report 1576 also stated that at closure, all potentially contaminated soil material contained in haul roads and site access roads, will be excavated down to the original surface and deposited in the pit void and then covered with a sufficient thickness of material to allow revegetation.

The EPA also noted the appellants concern that the proposal would directly impact the Victoria Springs Nature Reserve and advised that the proposal is not within a Class A nature reserve and that the Queen Victoria Spring, which is a Class A Nature Reserve, is located more than 25 km south of the proposal area. Appellants concerns about potential indirect impacts to this area are discussed under Ground 6.

The EPA advised, in response to appeals, that the information on vegetation communities provided by the proponent, has been considered and provided sufficient certainty to assess the significance of the impacts on the vegetation communities within the Yellow Sandplain PEC. The EPA advised, in response to appellants concerns about the application of the precautionary principle, that the investigation on the biological and physical environment undertaken by the proponent, provided sufficient certainty to assess the significance of the impacts and identify measures to avoid or minimise impacts.

The EPA concluded in Report 1576 that due to the limited impact on sand dunes within the development envelope, the absence of Declared Rare Flora and that Threatened Ecological Communities and vegetation communities are likely to be adequately represented in the wider region that's its objective for Flora and Vegetation could be met.

The EPA recommended condition 8 'Flora and Vegetation' and condition 12 'Terrestrial Environmental Quality' to address impacts on conservation significant flora and vegetation. Condition 8 in Report 1576 seeks to limit

- the clearing of vegetation communities within the development envelope to 3,474 ha of vegetation community E3 and 200ha of vegetation community S6 and
- requires the proponent to minimise direct and indirect impacts as far as practicable on vegetation communities E3 and S6.

The EPA's recommended condition 12 requires the proponent to meet the objectives of:

- minimising the impacts of soil quality as far as practicable from using dewater for dust suppression; and
- maintaining soil quality with within background concentrations established during baseline studies 10m from areas where dewater has been used for dust suppression in the E3 and S6 vegetation communities, which are prime sandhill dunnart Habitat.

Conclusion

Noting the intent of the recommended condition 8 to avoid and minimise impacts on flora and vegetation and condition 12 to maintain soil quality it is recommended that this ground of appeal be upheld to the extent that conditions 8 and 12 be amended to be more consistent with the assessment and recommendations of the EPA. For this reason it is recommended that conditions 8 and 12 be amended to allow for combined outcome and objective based management plans for the Flora and Vegetation Management Plan and the Soil Management and Monitoring Plan including distinct outcomes and objectives as follows:

- Specify an outcome in condition 8-1 for the extent of clearing of vegetation communities E3 and S6;
- Specify objectives in condition 8-2 to minimise direct and indirect impacts on vegetation communities E3 and S6 as far as practicable;
- Specify an outcome in condition 12-1 (3) for maintaining soil quality within background concentrations established during baseline studies 10m from areas where dewater has been used for dust suppression in sandhill dunnart habitat (i.e. E3 and S6 vegetation communities); and
- Specify an objective in condition 12-1 (1) to minimise impacts on soil quality as far as practicable.

Sufficiency of surveys and protection of the Hakea species

Appellants submitted that the proponent should have coordinated the stated thirteen field surveys over a period of eight years, to cover different seasons and a variety of conditions to capture the level of information needed to identify plants down to the species level,

specifically referring to the new *Hakea* species identified in flora and vegetation surveys for the area. An appellant raised concern that the EPA's recommended measures, including only a 50 metre buffer to protect a new *Hakea* species, demonstrated a failure by the EPA to apply the precautionary principle in its assessment.

Consideration

The proponent noted that 13 field surveys have occurred between 2007 and 2015. It is understood that these occurred in nine different months, across all seasons. Fire was noted as a constraint on vegetation mapping.

With respect to the coordination of surveys to identify plants to the species level, the proponent advised in its the Summary of Submissions³ (EPA, 27 June 2016) that plant species that are recorded during surveys cannot always be identified to species level due to key identifying characteristics, such as the fruiting body not always being present due to the season, or if the specimen is a juvenile that has not developed the taxonomic indicators. The proponent acknowledged that until identified, it is not known if the unidentified *Hakea* species are representative of a conservation significant species.

The EPA acknowledged the importance of taxonomic identification of the *Hakea* species in its assessment and considered it to be a conservation significant species until final taxonomic identification has been achieved. The EPA, in response to appeals, advised that both *Hakea* specimens were first collected in the April 2014 survey and both sites were revisited in the September 2015 survey, however flowering material was still not apparent on the specimens.

With respect to the recommended buffer, the proponent provided the locations of the unidentified *Hakea* species within the development envelope for the access road to the extraction borefield. The proponent, in response to appeals, confirmed that the access road will be re-aligned within the development envelope to avoid the unidentified *Hakea* species.

The EPA considered, in response to appeals, that a 50m buffer required under condition 8-1 (1) around *Hakea* sp. is appropriate until further surveys are carried out to establish their range outside the Development Envelope.

In relation to the application of the precautionary principle, the EPA advised, in response to appeals, that Condition 8 'Flora and Vegetation' to avoid and minimise direct and indirect impacts on *Hakea* sp., is adequate to ensure that there will not be any impacts on this species. The EPA considered that, from its assessment of the proposal and consideration of the precautionary principle, it concluded that there is not a threat of serious or irreversible harm if the condition is imposed.

Conclusion

Having regard to the information above, it is considered that the EPA appropriately considered the threat of serious or irreversible harm to the undescribed *Hakea* species, based on available information, and recommended condition 8 to manage potential impacts. However, to provide greater clarity of the EPA's proposed conditions to manage these impacts, it is recommended that this ground of appeal be upheld to the extent that:

- outcomes and objectives in condition 8 are separated to allow threshold criteria to apply to the avoidance of impacts on the *Hakea* species in condition 8-1 (1); and

³ Mulga Rock Uranium Project, Public Environmental Review Assessment No. 1979; Summary of Public Submissions – 27 June 2016; Office of the Environmental Protection Authority.

- the area for minimisation of direct and indirect impacts is specified in condition 8-1 (2) as the area within development envelope for conservation significant flora.

Sufficiency of recommended conditions for weed control

An appellant raised concern that the greatest threat to an arid ecosystem is the introduction of weeds, and that sandy soils in arid areas are particularly vulnerable to Buffel Grass (*Cenchrus ciliaris*) which can displace entire ecosystems in a short space of time. Appellants submitted that the EPA failed to take the importance of weed quarantine seriously, as no binding condition for eradication of weeds to return the area to its current 'excellent' condition, is included in the recommended conditions.

Consideration

The EPA noted in its assessment that no weeds were recorded within the development envelope for the proposal and considered that the spread of weeds could impact on flora and vegetation.

The proponent confirmed that the habitat condition within the project area was rated as Excellent – Pristine as an area with an intact vegetation structure and with no obvious sign of disturbance or disturbance only affecting individual species.

The proponent detailed its proposed weed management strategies in the Summary of Submissions, including a site-wide hygiene strategy, a weed monitoring programme and weed eradication protocols to prevent the introduction of weeds into the project area and to eradicate them should they be introduced.

The EPA, in response to appeals, advised that the EPA expected weed quarantine and management to be included in the Flora and Vegetation Management Plan recommended in condition 8 in Report 1576. The EPA, did however consider, in response to appeals that it is appropriate to state in condition 8 that any weeds introduced as a direct result of implementing the proposal should be eradicated.

Conclusion

Noting the advice from the EPA, it is recommended that this ground of appeal be allowed to the extent that condition 8 be amended to add an outcome, requiring the proponent to eradicate any weeds introduced as a result of the implementation of the proposal.

Adequacy of management and mitigation strategies

Appellants contended that a comprehensive management plan should take the full range of risks into account, as well as mitigation strategies to manage for the survival of species, and important habitat for threatened fauna species.

Consideration

The EPA advised, in response to appeals, that the significance of the range of impacts to Flora and Vegetation was considered, using the significance framework, detailed in the EPA's *Environmental Assessment Guideline 9 'Application of a significance framework in the environmental impact assessment process'*. The EPA noted that this framework focusses on the significance of impacts and mitigation of these impacts, rather than risk.

The EPA, in the consideration of these impacts, also had particular regard to the proponent's proposed management approach, which requires the preparation and implementation of a Flora and Vegetation Management Plan and condition 8 was consequently recommended to capture this requirement.

The EPA, in its response to appeals, concluded that the impacts to flora species and vegetation communities were considered together with the impacts on habitats for threatened fauna.

In this regard, it is noted that the EPA's *Environmental Assessment Guideline (EAG) 17 – Preparation of Management Plans under Part IV of the EP Act* provides for both outcome and objective based conditions to avoid and minimise the impacts of all proposal activities and in this case, the EPA applied the following:

- outcomes-based condition 8-1 (1) and (4) with the outcome to avoid all proposal-related impacts to the unidentified *Hakea* Species and defining the extent of authorised clearing in E3 and S6 vegetation communities; and
- objective-based conditions 8-1 (2) and 8-1 (3), a risk-based approach to manage the full range of impacts associated with proposal activities on conservation significant flora species and vegetation communities E3 and S6.

Conclusion

Noting the intent of the recommended condition 8 to provide for a Flora and Vegetation Management Plan with outcomes to avoid, and objectives to minimise, the impacts of all proposal activities, consistent with EPA Guidelines, it is recommended that this ground of appeal be dismissed.

Summary for Ground 1

Noting the intent of the recommended condition 8 to avoid and minimise impacts on flora and vegetation and condition 12 to maintain soil quality it is recommended that this ground of appeal be upheld to the extent that conditions 8 and 12 be amended to be more consistent with the assessment and recommendations of the EPA. For this reason it is recommended that conditions 8 and 12 be amended to allow for combined outcome and objective based management plans for the Flora and Vegetation Management Plan and the Soil Management and Monitoring Plan including distinct outcomes and objectives as follows:

- Specify outcomes in condition 8-1 for:
 - Avoiding of impacts to unidentified *Hakea* species;
 - The extent of clearing of vegetation communities E3 and S6; and
 - Ensure the eradication of all weeds introduced in the development envelope as a result of the implementation of the proposal.
- Specify objectives in condition 8-2 to:
 - Minimise direct and indirect impacts on vegetation communities E3 and S6 as far as practicable; and
 - Minimise direct and indirect impacts on conservation significant flora as far as practicable.
- Specify an outcome in condition 12-1 (3) for maintaining soil quality within background concentrations established during baseline studies 10m from areas where dewater has been used for dust suppression in sandhill dunnart habitat (i.e. E3 and S6 vegetation communities); and
- Specify an objective in condition 12-1 (1) to minimise impacts on soil quality as far as practicable.

GROUND 2: TERRESTRIAL FAUNA

A number of appellants raised concern that the disruption of a pristine ecosystem by the proposal will threaten endangered species, specifically the sandhill dunnart and the Marsupial Mole.

Key concerns raised in relation to this ground of appeal have been broadly summarised as:

- Introduction of invasive species; and
- Habitat size requirements and the significance of the sandhill dunnart population in the development envelope.

Introduction of invasive species

Appellants submitted that the conservation significance of the proposal area for the survival of the sandhill dunnart has been underestimated, as the proponent has downplayed the risk of introducing invasive species such as foxes and feral cats and overstated its capacity and ability to manage these risks without providing evidence through comprehensive management plans as part of 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.

The EPA in Report 1576 identified the conservation-significant fauna occurring in the Mulga Rock project area, including the sandhill dunnart (*Sminthopsis psammophila*) and the Southern Marsupial Mole (*Notoryctes typhlops*).

The EPA noted in its report that the sandhill dunnart is of highest significance of the conservation-significant species occurring in the project boundary, as it is classed as Endangered under the EPBC Act, and Schedule 2 (Endangered) under the *Wildlife Conservation Act 1950* (WC Act). The proponent stated in the Summary of Submissions that since the preparation of the PER document, the conservation status of the Southern Marsupial Mole has been modified. The species is no longer listed under the EPBC Act, and is listed by Parks and Wildlife as Priority 4 fauna (previously Endangered).

The proponent stated as part of the assessment that the sandhill dunnart was first recorded in the proposal area in 1985, when 5 individuals were captured during a fauna survey.

The EPA, in its assessment of impacts on the sandhill dunnart, noted the vulnerability of the species to predation by feral animals and weed colonisation. Parks and Wildlife, in its review of the PER identified predation by feral cats and foxes, as well as altered fire regimes as the key threats to sandhill dunnart survival. Other threats include declining habitat quality caused by introduced herbivores (especially rabbits, camels and goats).

The proponent as part of the assessment stated that a fauna survey in 1985 recorded feral animals on the proposal site, including feral cats (*Felis catus*), wild dogs (*Canus lupus familiaris*), dingoes (*Canus lupus dingo*), rabbits (*Oryctolagus cuniculus*) and the house mouse (*Mus musculus*). The proponent committed to the development of a Terrestrial Fauna Management Plan which will outline the management and mitigation measures to minimise direct and indirect impacts to conservation significant fauna and their habitat, including appropriate management of vehicle movements, appropriate egress when construction pipelines and well as a Fire Management Strategy.

In response to this ground of appeal, the EPA concluded in its assessment that the impacts to terrestrial fauna are acceptable and that the proposal represents a low risk to fauna that can be managed to meet the EPA's objective.

To ensure that the proponent's commitments are implemented regarding Terrestrial Fauna, the EPA recommended condition 9 Terrestrial Fauna' to ensure that a management plan for fauna be implemented in consultation with Parks and Wildlife.

Conclusion

Noting that feral animals have been recorded in the proposal area in 1985 already, and the EPA's recommendation in relation to condition 9, it is recommended that this element of this ground of appeal be dismissed.

Habitat size requirements and significance of sandhill dunnart population within the development envelope

An appellant submitted that the project should be rejected on the grounds that impacts to the sandhill dunnart are unscientific, could cause further population decline and that the EPA has not met the precautionary principle and principles of the conservation of biological diversity and ecological integrity, given fundamental consideration with limited information or without comprehensive management plans.

An appellant contended that the EPA's conclusions were based on:

- Presumptions that large areas of habitat are available for the sandhill dunnart;
- Limited information about the existence of the species outside the development envelope; and
- the threat of fragmentation and the significance of the population inside the development envelope to the overall survival and health of the population and the species .

Consideration

In relation to sandhill dunnart habitat, the EPA advised, in response to appeals, that an estimated 641,606ha of potential prime habitat occurs in the Yellow Sand Plain PEC.

The EPA acknowledged in Report 1576 that the proposal would disturb 3,673.5 ha of vegetation communities E3 and S6, associated with prime sandhill dunnart habitat, inside the development envelope. The EPA noted that the disturbance would result in the direct loss of fauna habitat and could potentially lead to habitat fragmentation, and isolation of the Western Australian population.

Parks and Wildlife noted, in its review of the PER, that the sandhill dunnart is currently known to occur in three disjunct populations, consisting of five known sub-populations, with one population in Western Australia and two in South Australia. Although the extent of occurrence of the species is currently stable, all five sub-populations are considered important for the long term recovery and survival of the species. Parks and Wildlife stated that the Mulga Rock proposal affects the area inhabited by the Western Australian sandhill dunnart population, which is located close to the Queen Victoria Spring Nature Reserve in the south-western corner of the Great Victoria Desert.

It is noted, that since the publication of the PER and Summary of Submissions (27 June 2016), the *Survey and monitoring guidelines for the Sandhill dunnart (Sminthopsis*

psammophila) in Western Australia⁴ was published, confirming the observation of representatives of the sandhill dunnart population in Western Australia in 15 locations in an area of 467,400 ha. While it is noted that some of these observations include those within the proposed Mulga Rock proposal area, the Guidelines confirmed observations outside the Development Envelope, on the northern border and close to the north eastern border of the Queen Victoria Springs Nature Reserve, as well as west and north west of Plumridge Lakes Nature Reserve.

The EPA recognised the vulnerability of the species and acknowledged in the PER that localised impacts on vertebrate fauna are likely. However, the EPA concluded that the existence of extensive suitable habitat outside the Development Envelope, restricting clearing of vegetation communities E3 and S6 (sandhill dunnart habitat) and the mitigation and management measures submitted by the proponent, that these impacts could be suitably managed and mitigated such that they would not be significant. The EPA therefore recommended:

- condition 9, requiring a Terrestrial Fauna Management Plan with the objectives of minimising direct and indirect impacts as far as practicable on conservation significant terrestrial fauna species and continuation of the camera trapping program for the sandhill dunnart; and
- condition 8 for a Flora and Vegetation Management Plan, including the restriction of clearing of vegetation communities E3 and E6 within the disturbance footprint and minimisation of direct and indirect impacts on vegetation communities E3 and S6 within the development envelope.

The environmental management plans required through recommended conditions 8 and 9 are expected to be further developed, in consultation with relevant stakeholders.

The EPA advised, in response to appeals, that investigations on the biological and physical environment undertaken by the proponent have provided sufficient certainty to assess the significance of the impacts and identify measures to avoid or minimise impacts. From its assessment of the proposal, the EPA had regard to the precautionary principle and the principles of the conservation of biological diversity and ecological integrity and concluded that there is not a threat of serious or irreversible harm if conditions are imposed.

Conclusion

Having regard to the above information, it is considered that the EPA had regard to the vulnerability of the sandhill dunnart species, the existence of the sandhill dunnart outside the development envelope and the potential impacts of the proposal.

In order to provide clarity regarding the intention of condition 9 to manage risks of proposal activities, it is recommended that this ground of appeal be upheld to the extent that:

- The objective of the camera trapping program is specified by amending condition 9-1 (2) to include continuation of the Camera Trapping Program for the sandhill dunnart to:
 - (i) provide information on continued sandhill dunnart use of the area in relation to management targets; and
 - (ii) inform management actions to minimise impacts on the sandhill dunnart.
- The reference to 'camera trapping program' in condition 9-3 is replaced with a register for the reporting of impacts to conservation significant fauna.

⁴ Department of Parks and Wildlife and the Great Victoria Desert Biodiversity Trust, May 2016

Summary of Ground 2

It is considered that the EPA's assessment of terrestrial fauna was appropriate noting the most recent published observation of sandhill dunnarts in 15 locations over 467,400 ha in Western Australia.

However, to provide greater clarity on the EPA's proposed conditions to manage these impacts, it is recommended that this ground of appeal be upheld to the extent that:

- The objective of the camera trapping program is specified by amending condition 9-1
- The reference to 'camera trapping program' in condition 9-3 is replaced with a register for the reporting of impacts to conservation significant fauna.

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:

- Health risk to the community and workers, including from bush tucker and other traditional uses of flora and fauna
- Drinking water – ground and surface water

3.1: Health risk to the community and workers

The appellants were of the view that the proponent's PER and the EPA's assessment process did not adequately address health risks to the community and workers in the vicinity of the mine from radiation exposure, particularly from emissions of contaminated dust and radioactive radon.

A number of appellants from the local Aboriginal community submitted that their parents and grandparents were exposed to radiation during the Maralinga nuclear tests, which has led to premature deaths, undiagnosed cancers, and skin and respiratory problems. The appellants questioned whether the proposal would have a similar legacy.

Appellants also submitted concerns regarding the exposure to radiation through different pathways, including from contamination of fauna that are hunted as sources of food (bush tucker) and flora such as grass trees from the area which have traditional. An appellant submitted that the modelling of radionuclide levels in fauna and flora in an arid environment was inadequate as European default values in modelling software are not sufficiently representative of Australian and Western Australian conditions.

The appellants contended that no level of radiation exposure is safe. An appellant submitted that the public dose limit of radiation exposure decreased from 500 millisieverts per year (mSv/yr) in 1934 to the current limit of 1mSv/yr, and that research shows the health effects of radiation are greater than previously recognised.

Consideration

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

In the Environmental Scoping Document⁵ (ESD), the EPA set out the requirements for the PER including information needed in relation to the factor Human Health. The ESD states that the PER should consider 'Any contamination of air, soils and groundwater that has the potential to expose humans to radioactive material pathway'. The ESD outlined the following

⁵ *Environmental Scoping Document*, EPA, February 2015, p14.

pathways by which humans may be exposed to radioactive material: inhalation of contaminated dust and radon containing radioactive material; exposure from ingestion of radioactive materials; and exposure from gamma radiation.

In this regard, the PER (Appendix E1) considered the dispersion of radioactive material from potential sources including mine pits, tailings storage facilities during operation and after closure, waste rock dumps, ore stockpiles, ore loading, hauling and dumping, waste rock and wheel generated dust from vehicles.

The PER also considered the various pathways of exposure from the above sources, including:

- contaminated dust and radon through dispersion modelling to predict concentrations (Appendix E1), with subsequent calculation of levels of radiation that would be inhaled (Appendix F1);
- contaminated water and food (bush tucker) and human exposure through ingestion (Appendix F1); and
- direct exposure to gamma radiation (Appendix F1).

Table 13.18 (below), taken from section 13 'Human Health' of the PER, outlines total annual radiation exposure for members of the public spending 100% of their time at the specified locations.

Table 13.18 Public Total Dose Estimates

Location	Exposure Pathway Dose (mSv/y) ¹				Total Dose
	Gamma	Dust	RnDP	Ingestion ²	
Accommodation Village	<0.001	0.004	0.073	0.229	0.306
Cundeelee	<0.001	<0.001	0.003	0.001	0.005
Pinjin	<0.001	<0.001	0.003	0.001	0.005
Tropicana Gold Mine	<0.001	<0.001	<0.001	0.001	0.003
Southeastern boundary	<0.001	0.001	0.030	0.010	0.041
Northwest boundary	<0.001	0.001	0.010	0.005	0.016

In its advice, the EPA noted that the dose estimates for the Southeastern boundary location listed in Table 13.18 represent a conservative hypothetical assessment of radiation exposure using a scenario of persons living on the southeast project boundary, approximately 9 km from the processing plant. In this regard, the EPA stated:

The radiation dose to a person at that point from gamma radiation, inhalation of dust and radon decay products was estimated to be 0.03 millisieverts per year (mSv/yr). The dose from ingestion of radionuclides (consumption of bush tucker) by a person was estimated to be 0.01 mSv/yr. The total dose from gamma radiation, inhalation (of dust and radon decay products), and ingestion was estimated to be approximately 0.04 mSv/yr. The EPA notes the conservative nature ('worst case') of the scenario, and that the predicted dose is below five per cent of the regulatory public dose limit of 1 mSv/yr above background. The EPA notes that natural background doses of radiation for people living in Australia are between 1.5 and 2 mSv/yr.⁶

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

⁶ Response to appeals, EPA, 22 September 2016, p19.

Australian Radiation Protection and Nuclear Safety Agency (ARPANSA), which is the primary authority for radiation protection and nuclear safety in Australia.

In relation to appellants concern about increased doses of radiation in flora and fauna because of the proposed Mulga Rock mine, the EPA noted that ARPANSA considered the Environmental Risk from Ionising Contaminants: Assessment and Management (ERICA) tool to be an appropriate assessment tool for undertaking an assessment of radiological impacts to the environment in their publication, *Radiation Protection of the Environment Guide G-1 November 2015*. ARPANSA⁷. ARPANSA has also published Australian specific species data that can be used in an ERICA assessment and recommends a Tier 2 level of assessment for uranium mining.

The PER confirmed that the proponent conducted the ERICA assessment for the proposed uranium mine at a Tier 2 level. It is shown in Appendix B to Appendix F that data for two Australian animals (kangaroo and a reptile), sourced from ARPANSA and two Australian plant species (short lived and long lived) sourced from published data from the Lake Way region, was used in combination with a number of default reference species in the ERICA database to determine human ingestion doses which are summaries in Table 13.18.

With respect to exposure of the public to radiation from tailings storage facilities in the future, the EPA noted in Report 1576 that the proponent's Mine Closure Plan proposed to return tailings and wastes to the open pit and covering the completed tailings storage facilities with at least one metre of appropriate material and two metres of soil as a growth medium to support revegetation. Report 1576 stated that tests on both sand and lignite ores saturated with water yielded and covered by a 25 cm clay cap, recorded values of 0.0 Bq/m²/s.

In relation to the potential radiological impacts on workers, the PER considered the exposure mainly through gamma radiation, inhalation of radon gas and progeny, and inhalation of radioactive dust, as exposure of workers through ingestion of radioactive material is managed through industrial hygiene measures. Section 13 of the PER considered the specific work undertaken, its location and measures implemented to reduce exposure doses and predicted radiation for workers ranging from 1.4 mSv/yr for transport workers to 3.3 mSv/yr for pit technicians.

The proponent provides a commitment to follow an 'As Low As Reasonable Achievable' (ALARA) approach to radiation exposure for workers, consistent with the concept formulated by the International Committee on Radiological Protection. The proponent also committed to the development of a site emergency response plan for radiological emergencies. The EPA advised that workers' exposure to radiation from the proposal is estimated to be similar to other open pit uranium mines in Australia.

DER stated in its review of the PER that the proposed dust management plans appear reasonable and have properly addressed minimisation of dust generation. In the Response to Submissions, the proponent confirmed that in addressing concern from the Federal Department of Environment and Energy (DEE) (previously Department of Environment), monitoring of the various contaminant pathways (e.g. groundwater, dust, and radioactivity) will be undertaken throughout the operations to establish whether actual dust levels are similar to those predicted.

In its review of the PER, the Department of Health (DoH) stated that it appears that DoH concerns in relation to the level of radionuclides in dust emissions have been addressed by

⁷ Technical Report 154; Environmental protection: Development of an Australian approach for assessing effects of ionising radiation on non-human species; Doering C.; Australian Radiation Protection and Nuclear Safety Agency; October 2010.

the proponent and that radionuclides in dust do not present a radiological risk. The DoH further stated that dust around the site will need to be managed for amenity and to reduce the potential for acute health effects to occur.

The Radiological Council in its review of the PER advised that the proponent has addressed the key requirements for radiation under the *Radiation Safety Act 1975* and relevant codes of practice. The Council advised that under this statute, the proponent is required to submit a Radiation Management Plan to the Council to ensure that risks associated with radiation can be adequately monitored and managed.

Report 1576 states that the EPA considers that the proposal can be managed to meet the EPA's objective for Human Health provided a condition is imposed which requires a Radiation Management Plan be prepared. In their advice to the EPA, the DMP and the Radiological Council both confirmed that they require a Radiation Management Plan be submitted for approval, which is a statutory obligation under the *Mines Safety and Inspection Regulations 1995* and the *Radiation Safety Act 1975*. The EPA further noted that both DER and the DEE have legislation that can permit and regulate potential radiological impacts to Human Health. The EPA was satisfied therefore that no additional condition is required under Part IV of the EP Act to address the matter.

In forming this view the EPA advised that it had particular regard to the following:

- The proponent's implementation of 'best practice' design optimisation, operational procedures and monitoring to control exposure to hazardous pollutants to the Maximum Extent Achievable through the ALARA approach;
- The proponent's conservative assessment of public exposure to radiation and a predicted exposure dose of less than 5% of public dose limits; and
- The proponent's assessment of mine-site employee which estimates a dose of less than 20% of the regulatory occupation 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.

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.

3.2: Drinking water – ground and surface water

Appellants considered that the PER does not provide information on existing concentrations of uranium in groundwater and does not adequately address potential pathways for uranium to enter drinking water, specifically in relation to dust and groundwater. Some appellants referenced the Western Desert Kidney Project released in 2016 which identified water quality impacts due to existing elevated levels of nitrates and uranium levels as a serious public health issue in the Goldfields region.

An appellant submitted that the formation of uranyl nitrate is more toxic than either nitrates or uranium alone and any mining activity that releases more uranium into the environment will cause further contamination of ground water and increase the risk of renal disease. An

appellant submitted concern that indigenous families may be exposed to uranium when drinking water contaminated with uranium.

Consideration

The EPA determined that 'Inland waters environmental quality' was a key environmental factor for the proposal where the environmental objective is to maintain the quality of groundwater and surface water, sediment and biota so that the environmental values, both ecological and social, are protected.

The PER characterised groundwater in the Mulga Rock project area as hypersaline, generally acidic and not fit for human consumption or livestock purposes.

In relation to the existing water quality in the Mulga Rock paleochannel, the PER in section 11 attributed relatively low concentrations of metals, including uranium and various radionuclides in the groundwater to extraction of the elements by carbonaceous sediments in the aquifer. The PER in section 11 provided data on the minimum and maximum uranium concentrations for the Mulga Rock paleochannel with an average concentration of 0.021 mg/L.

The proponent used solute transport modelling to predict the movement of contaminants from the in-pit tailings facilities for 10,000 years after closure (PER, Appendix D). In relation to seepage from tailings storage facilities, the PER stated that modelling showed that metals, including uranium in the tailings plume, would be captured rapidly by the carbonaceous material through which the plume would move.

The EPA noted in Report 1576, that solute transport modelling for 10,000 years showed that by the time the uranium plume front leaches to the boundary of mining lease ML39/1080 its composition is expected to be similar to average background groundwater metal concentrations, but much lower than the maximum concentrations and below DoH Guideline values for domestic non-potable water.

The EPA noted in its report and in response to appeals that no sensitive environmental receptors, likely to be impacted by the proposal occur downstream of the Development Envelope, the water is not currently proposed to be used for any purpose besides mining and that there are no existing groundwater users in the area.

In relation to surface water, Report 1576 stated that surface water closest to the proposed mine, has been recorded at Queen Victoria Springs, approximately 30 km south-west of the most southern point of the ML39/1080 mining lease boundary, and at Malcolm Soak, located approximately 24 km south-east of the southern mining lease boundary. Both surface water features are ephemeral and considered in the EPA Report and Recommendations to be disconnected from the groundwater system and therefore unlikely to represent sensitive environmental receptors that could be impacted by the proposed activities.

In relation to the contamination of surface water through dust, the Department of Environment Regulation (DER) noted in their review of the PER that the modelling assessment of dust deposition indicated that incremental deposited dust contribution from the proposal is very low at the closest sensitive receptor, the mine accommodation village at approximately 5 km from the mine. DER further stated that the proposed dust management plans appear reasonable and have properly addressed minimisation of dust generation.

Further information about potential impacts to downstream users from groundwater abstraction and tailings management, including advice from DER, DMP and DEE, as well as

mitigation measures and regulation of the impacts are detailed at Ground 5 and 6 of this report.

Conclusion

Having regard to the above information, the absence of groundwater users in the area, the ephemeral nature of surface water, the distance of these sources from the proposed mine and the relatively low incremental dust deposition predicted, it is considered that the EPA had appropriate regard for relevant information in relation to pathways for uranium to enter drinking water and it is recommended that this element of this ground of appeal be dismissed.

Summary of Ground 3

Having regard for the following:

- The established regulatory dose limits and the relatively low radioactivity of uranium oxide concentrate and regulation of radioactivity and exposure;
- The EPA's evaluation of different exposure pathways for radiation and potential health impacts, and regulation through other regulatory processes;
- The EPA's advice on the conservative nature of modelled scenario's, and the EPA's assessment of potential impacts through exposure to contaminated fauna and flora;
- The proponent implementing ARPANSA's recommendations in conducting a Tier 2 ERICA assessment and the very low levels of exposure from exclusively eating bush tucker for a full year;
- The absence of groundwater users in the area; and
- The ephemeral nature of surface water and the distance of these sources from the proposed mine and the relatively low incremental dust deposition predicted;

It is recommended that this ground of appeal be dismissed.

GROUND 4: IMPACTS ON ABORIGINAL HERITAGE AND ADEQUACY OF CONSULTATION

Appellants contend that the proponent has failed to properly identify and consult with communities with a cultural connection to the Mulga Rock area and has therefore failed to identify and develop measure to protect the cultural associations and natural and cultural heritage values of the area. Appellants submitted that studies investigating cultural heritage are based on a single report from the 1980's and that the proponent is relying on limited information from the Department of Aboriginal Affairs on what Aboriginal heritage sites exist in the area.

Appellants raised concern that the proponent underestimated the number of people with cultural connections with the Mulga Rock area and its cultural value and submitted that Spinifex people were relocated to the Cundeelee community from the Maralinga nuclear test grounds. Appellants raised concern regarding the potential disturbance of burial sites, established during the time of the Cundeelee community, later re-established at Coonana, where appellants contend specific connections to the Mulga Rock area and Queen Victoria Springs.

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 identification of the cultural heritage values of the area, the EPA advised that no new specific or locational information on the proposal relating to heritage was provided in the appeals that had not been considered in its assessment. The EPA advised it considered heritage in Report 1576 and noted that no native title existed within the Project Boundary but that consultation had occurred with Aboriginal groups with an interest in the area.

The EPA advised that it had regard for Guidance Statement 41 *Assessment of Aboriginal Heritage* (Guidance Statement 41) in its assessment and that Guidance Statement 41 provides advice to proponents about 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 that this process involved a comprehensive review of all existing information, anthropological and archaeological surveys, consultation and engagement with Aboriginal people, and clear demonstration that Aboriginal concerns relating to heritage factor have been addressed.

EPA report 1576 indicated that the proponent engaged the North East Independent Body, the consultative body for heritage matters in the region at the time that heritage surveys were undertaken, and that the North East Independent Body nominated senior Wongatha people to conduct ethnographic surveys. EPA Report 1576 indicates that Wongatha people are considered to be an appropriate traditional owner group and in this regard, the EPA advised that this process was consistent with Guidance Statement 41.

In response to this ground of appeal the proponent also provided details of consultation between 2008 and October 2015, including community briefings with the East Wongatha Community at Central Desert Native Title Services, group public meetings in the Leonora and Menzies town halls with community members and a number of consultations with Department of Aboriginal Affairs (DAA), to inform the investigation.

In relation to the appellant's submission that the investigation of cultural heritage relied on a single report from the 1980's and limited information from the DAA on Aboriginal heritage sites in the area, the PER in section 14, stated that the following studies for the area were considered:

- Ethnographic survey (Mckeich, 1982 a and b), commissioned by the proponent (PNC at that time);
- Archaeological survey (O'Connor, 1984), commissioned by the proponent (PNC at that time);
- Regional ethnographic surveys between 2002 to 2008 for the Tropicana Joint Venture tenure that encloses the Mulga Rock Project on three sides;
- Two ethnographic surveys commissioned by the proponent, including a men's survey in July 2010 and a Woman's survey in October 2010; and
- An archaeological survey in July 2010 commissioned by the proponent in July 2010.

EPA Report 1576 indicated that as a result of the 2010 surveys undertaken by Wongatha men and women that no new significant heritage sites had been identified and no significant ethnographic sites have been recognised. Further EPA Report 1576 states that the proponent engaged with Wongatha people again in 2014, as the project description had changed, and the traditional owner group confirmed that their advice on the surveys of 2010 remained unchanged.

In relation to appellants concerns that the proponent has relied on limited information from DAA, it is noted that the results of the surveys undertaken over time were presented in the PER and that DAA confirmed in response that based on the records available to them, that registered Aboriginal heritage sites, 1986 and 1985, located within the development envelope contain artefacts and scatters.

In this regard, DAA advised that based on the records available to them and the information presented in the PER, that any potential impacts to Aboriginal heritage from the Proposal can be addressed by the provisions of the *Aboriginal Heritage Act 1972* (AH Act).

The EPA considered in Report 1576 that while impact to registered Aboriginal heritage site 1985 is avoidable, as it is mainly located outside the Disturbance Footprint, Aboriginal heritage site 1986 is located within the Development Envelope and has the potential to be impacted by the proposal.

The EPA also noted in Report 1576 that the proponent does not intend to disturb a further two registered sites located within the mining tenement boundary, occurring between two and six kilometres from the development envelope.

It is stated in Report 1576 that the proponent committed to avoid as many of the recorded places as possible when implementing ground disturbing activities, to undertake consultation regarding the disturbance of these sites with the DAA, and to comply with the requirements of the AH Act in relation to approvals to disturb any sites if required.

In response to the appeals and in making its assessment against this factor, the EPA advised it had regard for Guidance Statement 41 and in reaching its conclusion, considered the following:

- various surveys have been conducted within the Project Boundary over the past 35 years. The proponent has reviewed the various surveys in the context of the Proposal;
- although no native title exists within the Project Boundary, a relevant Aboriginal community, the Wongatha people, were consulted during surveys;
- the proponent has held meetings with members of the Wongatha people since June 2009. The meetings have included explanation of the Proposal and its environmental impacts on fauna and flora, and from dust, radiation and transport. Advice from the Wongatha people has been provided throughout the Project;
- the proponent has outlined the likely impacts and management of archaeological heritage on the heritage sites within and around the Development Envelope.

The EPA considered in Report 1576 that its objective for Heritage can be managed, provided that recommended condition 10 is imposed, requiring the preparation and implementation of an Aboriginal Heritage Management Plan to minimise impacts to DAA registered sites (1985 and 1986), and unregistered sites.

Conclusion

Having regard to the above it is considered that the EPA relied on the available information in its consideration of this factor. However, to provide greater clarity in relation to the intent of the condition to manage impacts on both registered and unregistered sites consistent with the AH Act it is recommended that this ground of appeal be allowed to the extent that:

- Condition 10-2 is amended to include the timing for preparation and submission of the Aboriginal Heritage Management Plan, with phased implementation and completion before substantial commencement of the proposal or as agreed by the CEO; and

- A condition is added, consistent with the format of condition 9-3 to describe but not limit the management actions to be included in the Aboriginal Heritage Management Plan, such as procedures for ground disturbance and environmental induction and training.

GROUND 5: GROUND WATER ABSTRACTION AND HYDROLOGICAL PROCESSES

Many appellants raised concerns in relation to the abstraction of water from an arid environment and the associated potential impacts. In addition, it was contended that climate change was not considered in the assessment. Concerns have been summarised under the following headings:

- Abstraction and recovery of groundwater levels;
- Impacts on groundwater dependent ecosystems and other water users; and
- Assessment of climate change and water consumption.

Abstraction and recovery of groundwater levels

Appellants submitted that the abstraction of groundwater, particularly in a region where water is limited, has not been adequately considered. Appellants raised concerns regarding the EPA's assessment of the impacts the project would have, in particular,

- the use of a up to 15 million litres of water a day from an arid region; and
- a failure to consider the full range of risks to the aquifer and the groundwater table associated with the abstraction after 16 years of mining and an estimated 145 year recovery period.

Consideration

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

The PER detailed dewatering of the Mulga Rock paleodrainage channel (ancient river channel) to access uranium deposits and the abstraction of groundwater from the Kakarook North sandstone aquifer system for process water and domestic supply.

Descriptions in the PER state that the water table in the Mulga Rock paleodrainage channel aquifer system occurs between 30 and 50 m below ground level. The aquifer has a flat gradient, confirmed by a slow rate of groundwater movement towards the south. The groundwater is relatively saline and relatively acidic with pH varying between 3.5 and 4.3.

The PER characterises the Kakarook North sandstone aquifer as located some 30 kilometre northeast of the proposed mining pits, with the water table some 20 m below ground level. The groundwater has a brackish salinity and is slightly acid-neutral (Average pH 6.7).

Potential impacts of dewatering and abstraction from these aquifer systems were discussed in the PER. In section 10 – Hydrogeological Processes of the PER it is stated that studies indicate that the Mulga Rock paleodrainage channel is geologically and hydraulically separated from the Kakarook North aquifer. It is noted in the document that any impacts from mine dewatering or groundwater abstraction will not impact on the reciprocal source.

The DEE in their review of the PER, stated that hydrogeological model predictions are dependent on the information and assumptions used. DEE submitted comment on the PER, identifying uncertainty in relation to modelling of the timeframe over which recovery occurs in

the Kakarook North aquifer. In addition, DEE submitted concern in relation to the capacity of the Kakarook North aquifer for the long term water supply of the proposal.

The EPA requested Vimy to address the issue, publishing further information in its Summary of Public Submissions (EPA, 27 June 2016). Vimy submitted in relation to concern in relation to the volume of water in the Kakarook North aquifer that it has a measured capacity of 167GL (based on current drilling extents), and only 29GL will be used over the life of the proposal.

With regard to impacts of abstraction and water recovery, Vimy submitted that the estimated 145 year recovery period for aquifer recharge, following 16 years of abstraction during mining, was based on specific assumptions to provide a worst case recovery period. Vimy stated that rapid recharge is expected in the first few years after pumping for abstraction is ceased, with recovery expected to slow as the hydraulic gradient becomes flatter.

Vimy confirmed in the Summary of Public Submissions (EPA, 27 June 2016) that the Kakarook North aquifer is recharged directly by rainfall. Actual recharge rates are expected to be higher given the sandstone-nature of the vadose zone (unsaturated zone), and the high permeability of this material. Vimy submitted that observations during pumping trials and the relative low salinity of the aquifer supported this assumption.

The EPA advised, in response to appeals, that cumulative impacts from groundwater abstraction potential on the water resource need to be considered in the context of which aquifer is being utilised, and not simply on a regional basis. The EPA considered impacts for each aquifer in Report 1576 and concluded that the proposal can meet the objectives for hydrological processes.

Regarding the technical data and the assessment of impacts to groundwater in its response to the appeal process, the EPA indicated that it had sought Department of Water (DoW) advice during the assessment process. DoW advised that the assessment of groundwater impacts was acceptable and that the technical data indicates that future impacts on the groundwater resource can be maintained at an acceptable level.

Noting the EPA's advice that the assessment of impacts to groundwater need to be regarded in the context of specific aquifers and not on a regional basis, the extent of abstraction from the separate aquifers has been detailed in Schedule 1 where the authorised extent for abstraction of 'no more than 3 gigalitres per annum (GL/a)' from the Kakarook North aquifer while dewatering of 'no more than 2.5 GL/a' from the Mulga Rock paleodrainage channel is specified.

Conclusion

The concern in relation to the volume of water that will be taken from an arid environment is acknowledged, but it is noted that groundwater will be taken from two different aquifers and the EPA recommended limits for the abstraction from each aquifer.

Noting the proposal will require a licence from DoW under the *Rights in Water and Irrigation Act 1914*, it is considered that DoW will have a further role in evaluating more detailed hydrogeological information and modelling to assess proposed management responses through the process of assessing the application for a water extraction licence. Having regard to the information above, it is considered that the EPA's evaluation of groundwater abstraction issues was appropriate. It is recommended that this ground of the appeal be dismissed.

Impacts on groundwater dependent ecosystems and other water users

Appellants raised concerns that:

- Long term impacts on the subterranean ecology and groundwater dependent ecosystems and species have not been given adequate consideration;
- The use of water by the mine would impacts on local water users.

Consideration

The EPA considered, in Report 1576 impacts to groundwater dependent species in its assessment of impacts and noted the absence of stygofauna and groundwater dependant vegetation within the local aquifer.

In its assessment of hydrological processes in Report 1576, the EPA concluded that its objective could be met, noting that:

- there are no groundwater dependent ecosystems that would be impacted. The water table is deep, and the groundwater is saline and acidic; and
- there are no other groundwater users in the area.

In relation to impacts on subterranean ecology, the EPA considered in Report 1576 that: there are no PECs or TECs relating to subterranean fauna within 150 km of the project;

- no records of stygofauna were identified within the pit area;
- no recorded instances of troglifauna were found at depths of more than 10 m at the reinjection borefield; and
- any potential stygofauna habitat is extensive.

The EPA advised, in response to appeals, that groundwater in the area is over 30m below the ground surface and most groundwater dependent vegetation would not utilise water sources 30m below the ground surface.

The EPA considered that subterranean fauna was not a significant factor for the proposal as no records of stygofauna were identified within the pit area. The EPA also considered that potential stygofauna habitat is extensive and that troglifauna species found during sampling are likely to be present at shallow depth in layers that are widespread in the region.

In relation to impacts on stygofauna species recorded in the borefield, the EPA noted that significant impacts due to the proposal are unlikely,

Conclusion

Having regard to the above information, it is considered that the EPA gave adequate consideration to the impacts of water use on potential groundwater dependent ecosystems, other water users in its assessment of the proposal. It is recommended that this element of this ground of appeal be dismissed.

Assessment of climate change and water consumption

Appellants submitted that the EPA did not consider climate change in the assessment of water consumption.

Consideration

The EPA advised that Environmental Protection Bulletin 24 *Greenhouse gas emissions and consideration of projected climate change impacts in the EIA process* (Bulletin 24) was considered during the assessment. The EPA acknowledged in Bulletin 24 that there are

uncertainties surrounding the projection and impact of climate change, including environmental conditions such as more intense storms, flood and fire events, or reduced availability of groundwater, may change the risk profile of a project through its lifetime with the potential to cause environmental harm.

In relation to impacts of the proposal on climate change, the PER in section 10 stated that the effects of climate change on ground and surface water hydrological flows over the lifetime of the proposal is uncertain, but information on annual rainfall trends between 1970 and 2010 from the Australian Bureau of Meteorology, indicate an increase in the order of 20 to 30 mm per 10-year period. The PER stated that it is possible that increased rainfall could lead to increased surface water flows and local recharge of aquifers, but may also lead to greater evaporation through changes in vegetation cover and productivity.

The proponent submitted, in response to comments on the PER, that the variation or intensification in rainfall as a result of climate change over the planned 16-year life of the project is not expected to be significant.

The EPA advised, in response to appeals, that the only potential impacts to groundwater dependent species from a changing climate might be to subterranean fauna in the borefield area. The EPA also stated that any variation or intensification in rainfall as a result of climate change over a 16-year period is not expected to be significant and that the observed trend in rainfall approximates to an annual increase of 2-3mm per year.

It is noted that criteria set out in Bulletin 24 include the operational life of a proposal and consideration of the environmental impacts of proposals in the light of projected changes to environmental factors such as flora and fauna, and water quality and quantity as a result of climate change.

The EPA confirmed, in response to appeals, that Bulletin 24 was considered by the proponent in the PER and by the EPA in Report 1576. In relation to the potential impacts of climate change, the EPA considered, consistent with Bulletin 24, impacts to groundwater dependent species such as groundwater dependent vegetation in Report 1576 and noted the absence of subterranean fauna and groundwater dependant vegetation within the local aquifer. The EPA also considered in Report 1576 that subterranean fauna was not a significant factor for the proposal and any subterranean fauna species recorded in the borefield are unlikely to be significantly impacted by the proposal.

The DoW in its advice to the EPA, stated that the assessment of groundwater was acceptable and that the technical data indicates that future impacts on the environment, other users, and the groundwater resource can be maintained at an acceptable level.

Conclusion

Having regard to the above information, it is considered that the EPA considered climate change and the impacts of climate change in its assessment of the proposal, consistent with existing guidelines. It is recommended that this aspect of the appeal ground be dismissed.

Summary of Ground 5

Having regard to:

- the assessment by the EPA that groundwater abstraction is from two different aquifers and that the EPA's as assessed limits for the abstraction from each aquifer;
- DoW's further licensing role under the *Rights in Water and Irrigation Act 1914*;
- the absence of stygofauna and groundwater dependant vegetation within the local aquifer; and

- DoW advice to the EPA, that the assessment of groundwater was acceptable and that the technical data indicates that future impacts on the environment, other users, and the groundwater resource can be maintained at an acceptable level.

It is recommended that this ground of appeal be dismissed.

GROUND 6: WASTE, TAILINGS MANAGEMENT AND CONTAMINATION

Appellants raised a range of issues under this ground. Key concerns in relation to this ground of appeal related to:

- Tailings storage facilities
- Impacts of Acid and Metalliferous Drainage (AMD), chemical waste and tailings;
- Impacts of tailings on Queen Victoria Spring Nature Reserve, the water of the Spring and the surrounding environment;
- Risk of seismic activity in the proposed tailings storage area

Tailing Storage Facilities

Appellants generally do not believe that waste from uranium mining can be stored in a safe manner over the long term and concerns were submitted in relation to the regulation and the exposure of future generations to radio-active tailings post mining. An appellant submitted that there is consensus that uranium tailings pose a unique and long term risk to the environment and public health.

Appellants raised the following specific concerns in relation to tailings and chemical waste:

- Storage of tailings is inadequate;
- There is no plan for waste management and handling, including waste water, general waste and chemical waste.
- Chemical waste from the mining process presents an unacceptable risk to the environment; and
- The tailings management plan is inadequate and should ensure the isolation for a period of at least 10,000 years;
- Wind-blown radio-active dust will be a health risk to public health, including for traditional owners, into the future;
- The conditions placed on tailing management should be equal to those of the federal government where tailings must be isolated from the environment for a minimum of 10,000 years;
- There is lack of evidence that the requirements of recommended environmental condition 14 for isolation of tailings storage facilities in the PER can be met; and
- Enforcement is impossible over a period of 10,000 years.

Consideration

The EPA considered the long term isolation and impacts from tailings for the proposal under the key environmental factor Rehabilitation and Decommissioning. The objective for this factor is to ensure that premises are decommissioned and rehabilitated in an ecologically sustainable manner

In relation to appellant's concern regarding the adequacy of tailings storage, the EPA noted in Report 1576 that placing tailings below ground is considered best practice, consistent with *EPA Guidance Statement No. 55 – Implementing best practice in proposals submitted to the*

*environmental impact assessment process*⁸. The EPA confirmed in their response to appeals that deposition below ground can be considered best practice in that it avoids the risk of wall failures that can occur with above-ground tailings storage facilities.

The proponent advised that the tailings infrastructure will include an initial short term above-ground tailings storage facility and that once sufficient open-pit space is available, tailings will be deposited into the unlined Princess and Ambassador mine pits and covered with at least one metre of appropriate material and two metres of soil as a growth medium to support revegetation. In this regard, it is noted that Schedule 1, Table 2 in Report 1576, specifies that above ground disposal is permitted for no longer than 2 years after commencement of operations.

In relation to the above ground tailings storage facility the EPA noted in response to appeals that the landform evolution model was based on a worst-case scenario, over a 10,000 year timeframe, assuming that no vegetation is expected to re-establish. In this scenario, the EPA advised that erosion of the above-ground tailing storage facility might be substantial. However, as vegetation is expected to re-establish with appropriate rehabilitation and management measures, the EPA concluded that this was unlikely to be the case.

With respect to exposure of the public to wind-blown radio-active dust in the future, the EPA noted in Report 1576 that background gamma radiation within the project boundary was reported as 0.06 millisieverts per hour (mSv/h) which as discussed in at Ground 3 is below regulatory dose limits.

The DMP stated in their advice to the EPA that it can regulate the stability of the above-ground tailings facility in the long term via the Mining Proposal and Mine Closure Plan approval processes. DMP noted that the proponent was undertaking additional field-testing on erosion of landforms, the results of which should be used to further inform the mining proposal and Mine Closure Plan.

It is understood that process chemicals and process waste water will be disposed of in the tailing storage facility. The proponent advised process water will be recycled and reused and when salinity is too high, transferred to the tailings storage facility and sulphuric acid, used in the leaching stage of production and other chemical additives and chemicals used for neutralisation will become part of the process waste water that will be pumped with tailings into the tailings storage facility.

In relation to the contamination of groundwater from tailings, EPA noted in Report 1576 that the proponent conducted geochemical testing to estimate metal levels in the tailings water. The EPA identified the four metals of most concern being uranium, copper, cobalt and zinc. Maximum concentrations of these elements within the tailings were provided in Table 5 of Report 1576.

⁸ EPA (2003)

Table 5: Modelled concentrations of metals of concern in the tailings, at Ambassador and at the ML39/1080 boundary

Element	Maximum concentration in Tailings (mg/L)	DoH Guidelines for domestic non potable groundwater use (2014) (mg/L)	Average background concentration at Ambassador (mg/L)	Maximum background concentration at Ambassador (mg/L)	Maximum concentration in groundwater plume at the ML39/1080 mining lease boundary (mg/L)
Uranium	0.14	0.2	0.021	0.068	0.0039
Copper	8.5	20	0.434	2.8	1.8
Zinc	10.3	30	1.26	13	2.6
Cobalt	2.2	Not Available	0.585	4	0.6

The EPA considered in Report 1576 that concentrations of metals in the tailings with available guideline values are below the Department of Health guideline values for domestic non potable water (DoH 2014). It is noted that the maximum concentrations of uranium and copper in tailings are above the maximum background concentrations of these metals at the proposed Ambassador pit area.

The EPA considered in Report 1576 that the groundwater flow under the site is very slow, the reducing conditions have the potential to reduce oxidisation and any released metals are likely to be attenuated or absorbed onto lignite materials.

The EPA noted in response to appeals that the solute transport modelling undertaken to predict seepage from the above and in-pit tailings storage facilities was undertaken over a 10,000 year timeframe and as described in Table 5, by the time the leachate plume front leaches to the boundary of mining lease ML39/1080, its composition is expected to be similar to average background groundwater metal concentrations. The EPA noted that the assumptions used for modelling seepage were very conservative, for example, adsorption was not considered in the model.

The EPA advised in response to appeals that the Mine Closure Plan, which would include the tailings storage facilities, would be a live document that would be updated and refined throughout the life of the mine, as required by the 2015 version of the *Mine Closure Plan Guidelines*. The Mine Closure Plan would also include further research on the erosion rates of the vegetation cover, updated landform modelling, and on-ground data collection to calibrate the erosion models.

The EPA in Report 1576 formed the view that the proposal can be managed to meet its objective for Rehabilitation and Decommissioning, provided recommended condition 13 and condition 14 are implemented.

The EPA's recommended condition 13 requiring the preparation of a Tailings Storage Facilities Plan and condition 14 requiring the proponent to manage the implementation of the Proposal to ensure the above-ground tailings storage facility is safe, stable and non-polluting. Condition 14 specifies that this outcome must be achieved in a time period of 10,000 years post mine closure.

Conclusion

Noting the information and advice above, it is considered that the management and mitigation of the impacts of tailings associated with the proposal, has been considered appropriately in the EPA's approach and recommendations.

Noting the EPA's advice in regard to the importance of successful rehabilitation in ensuring a stable landform from the above ground tailings storage facility and in order to provide greater clarity of the intention of conditions to manage the risk from the above-ground tailings storage facilities, it is recommended that this ground of appeal be allowed to the extent that:

- Condition 14-1 (1) be amended to refer to achieving the environmental outcome on the basis of best available landform modelling over 10,000 years post closure; and
- An additional condition be added to Condition 14, in a format consistent with condition 13-3, to include details of appropriate rehabilitation measures, including, but not limited to timely trials for the revegetation of the tailings storage facility.

Impacts of Acid and Metalliferous Drainage (AMD)

Appellants raised concern that Acid and Metalliferous Drainage (AMD) poses a considerable risk and there is no clear commitment from the proponent to assess the impacts from AMD.

Consideration

The EPA determined that Inland Waters Environmental Quality is a key environmental factor for this proposal. The objective for this factor is to maintain the quality of groundwater and surface water, sediment and biota so that the environmental values, both ecological and social, are protected.

In respect to appellants' concern regarding AMD, the EPA noted in Report 1576 that geochemical characterisation of the ore and overburden, carried out by the Australian Nuclear Science and Technology Organisation, classified the ore material and the overburden two to five metres above the ore, as potentially acid forming.

The proponent advised that AMD generated during operations is likely to be captured during dewatering of the pit, naturally attenuated by geochemical and hydrological processes and flow through the natural carbonaceous material layer directly beneath the pit. The proponent advised that the carbonaceous material would act as a natural permeable reactive barrier capable of stripping most elements of concern from the water.

The EPA understood that the potential for AMD to be generated from the dewatering of the pits may be reduced due to the limited timeframe for 'oxidation', as only the mining front would be dewatered and progressive backfilling of pits to at least 10 m above the water table would occur as the mining front moves forward. The EPA also noted that dewatering would only reduce the water table by between three and six metres. The EPA further considered that that oxidation ore material, during handling and storage, may impact on soil.

The DMP in their advice to the EPA, considered that the results of more detailed characterisation of the ore, tailings and overburden materials and kinetic testing should fully characterise the potential and magnitude of the various materials to generate acidity and AMD. The DMP advised that the outcomes of these studies and proposed management measures should be included in the Mining Proposal and Mine Closure Plan submission under the *Mining Act 1978*.

The EPA considered the actions proposed by the proponent to mitigate potential acid generation and metal release, in what is currently an acidic and hypersaline groundwater resource, to be acceptable and suitable to address the uncertainty regarding potential acid generation and metal release.

The EPA did however recognise the uncertainty regarding the leaching of metals and insufficient kinetic testing and considered that potential impacts associated with the implementation of this proposal on groundwater quality and soil can be managed through recommended conditions and by the DMP under the *Mining Act 1978*. The EPA formalised requirements for management in recommended condition 11 in Report 1576 that requires the proponent to prepare a Groundwater Management and Monitoring Plan and condition 12, requiring the proponent to prepare a Soil Management and Monitoring Plan.

Conclusion

Having regard to the information above, it is considered that the EPA's evaluation of contamination from chemicals and AMD related to the proposal, including the DMP's regulatory processes under the *Mining Act 1978* for management of AMD, was appropriate.

Noting that DMP confirmed that the outcomes of further studies and proposed management measures can be managed in the Mining Proposal and Mine Closure Plan required by the *Mining Act 1978*, it is recommended that this element of this ground of appeal be dismissed. However, to provide consistency in approach across implementation conditions, it is recommended that EPA's recommended Conditions 11 and 12 are modified for the Groundwater Management and Monitoring Plan.

It is recommended that:

- Condition 11-3 be amended, in a format consistent to condition 9-3, to include provisions to manage impacts on water quality including, but not limited to Acid and Metaliferous Drainage from seepage into groundwater and the reinjection of surplus water into the aquifer.
- Condition 11-3 be amended to remove duplication of the reference to the Department of Mines and Petroleum in condition 11-2;
- Condition 12-3 be amended, in a format consistent to condition 9-3, to include provisions to manage impacts on soil quality including, but not limited to Acid and Metaliferous Drainage from seepage into soil and use of dewater for dust suppression; and
- Condition 12-3 be amended to remove duplication of the reference to the Department of Mines and Petroleum in condition 11-2.

Impacts of tailings on Queen Victoria Spring Nature Reserve and water of the Spring

Appellants submitted that the proposed mine is located upstream from Queen Victoria Spring which is a Class A Nature Reserve and the pathway for the tailings plume in groundwater goes directly into these Springs and surrounding pristine environment. Appellants raised concern that:

- Tailings could reach the Queen Victoria Spring Nature Reserve within 10,000 years and contaminate a significant conservation area;
- There is no evidence to support the EPA's view that there is not a connection between the paleochannel and the Queen Victoria Spring;
- The EPA has not taken a precautionary approach to potential impacts to Queen Victoria Spring Nature Reserve.

Consideration

The EPA advised in response to this ground of appeal that the Queen Victoria Spring is 47km downstream of the mining lease boundary. In this regard and as discussed in the various sections of this report, modelling predicts that seepage from tailings would not result in groundwater concentrations of contaminants of concern being significantly above background levels by the time they reach the mining lease boundary.

The EPA also advised that since the discovery of the spring in the mid-1870's, subsequent expeditions described the spring as dry. The EPA advised that the ephemeral nature of the Queen Victoria Springs suggest that they occur above the regional aquifer.

Notwithstanding the above, the EPA considered it appropriate to recommend a conservative condition to protect the quality of groundwater and recommended condition 13 to ensure that:

- The tailings plume is within background groundwater concentrations at the mining lease boundary;
- A minimum two metre adsorption layer remains beneath the in-pit tailings storage facility to allow for adsorption of metals in any seepage; and
- The above-ground tailings storage facility has at least a 1 metre clay liner beneath it and is covered with a minimum of 1 metre of appropriate material to act as a capillary break at closure (in addition to the typical cover materials for rehabilitation) to reduce infiltration of water into the tailings.

The EPA advised in their response to appeals that, given the modelling results and the worst-case scenario approach, in combination with the outcome based condition that contaminants of concern must be within background levels by the time they reach the mining lease boundary, upstream of the Queen Victoria Spring, the EPA has had regard to the precautionary principle and concluded that there is not a threat of serious or irreversible damage to significant conservation and water values.

Conclusion

Noting the above it is considered that the EPA has adopted a precautionary approach and had regard for appropriate information in its assessment and on this basis, it is recommended that this ground of appeal is dismissed.

Risk of seismic activity in the proposed tailings storage area

A number of appellants raised concern regarding seismic activity in the area, specifically that:

- Seismic activity in the area has been under-reported and more investigation is needed before an uranium mine goes ahead;
- The Cundeelee fault line close to the Princess deposit and lower branch of the Turnback fault line at the bottom part of the Ambassador deposit pose a risk to the tailings dams;
- The potential for mining activities such as blasting to aggravate fault lines or seismic activity have not been considered;
- Seismic activity may expose tailings over a period of 10,000 years and cause leakage of tailings dams;
- Risk factors for tailings management have not been adequately considered;
- Geoscience Australia shows plenty of seismic activity throughout the Goldfields. Of the 61 reported instance of seismic activity throughout the Eastern Goldfields in the

past 90 days, GeoScience Australia lists 4 between Kambalda and Leinster. Only 2 - 3 on the Richter scale, but evidence of activity nonetheless;

- The proponent should provide evidence or third party confirmation on the risk of seismic activity for mining activities and tailings storage; and
- The precautionary principle in the EP Act should apply where there is lack of evidence.

Consideration

With regard to appellant's concern that seismic activity was not considered in the assessment of the proposed uranium mine, the EPA noted that fault lines were raised during the public review period of the assessment and have been addressed in the Summary of Submissions. The proponent also stated in the Summary of Submissions document that no blasting of overburden is required during mining of the overburden.

The EPA advised in response to appeals that recent seismic activity in the Goldfields was considered in its assessment of the proposed uranium mine and included in its Report 1576 in response to community concern.

The EPA noted in response to appeals that the faults within the Mulga Rock project area have not been active and the above-ground TSF would be constructed to standards appropriate for the level of seismic activity associated with the local area.

In relation to the long-term stability of tailings storage facilities and the risk of seismic activity, the EPA noted in response to appeals, that the design of the above-ground tailings storage facility would be consistent with *Australian National Committee on Large Dams (ANCOLD, 2012) Guidelines*. The EPA considered in Report 1576 that these guidelines establish the best-practice planning, design, construction, operation and closure guidelines on tailings dams and ensure a risk-based assessment for the design of the tailings storage facility.

The EPA stated in their response to appeals that it is the responsibility of the DMP, as part of its normal regulatory function, to consider all physical conditions, including seismicity, within the Mining Proposal and Mine Closure Plan.

The DMP in their advice to the EPA, confirmed that appropriate tailings design and management measures are implemented where the risk-based impact assessment process followed in the Mining Proposal has identified a potential risk.

The DMP in their advice to the EPA provided confirmation that seismic activity would be included in the design criteria for the Mulga Rock tailings storage facilities.

Conclusion

It is recognised that the proponent did not include the risk of seismic activity in relation to tailings storage in the PER, but provided information on seismic activity in the Summary of Submissions in response to concerns submitted. The EPA, in their assessment of the proposal, considered seismic activity in the area and its potential impacts to tailings storage facilities.

Noting the above information, particularly DMP's confirmation that appropriate tailings design and management measures will be implemented through a risk-based approach, and that there are recognised design guidelines in place, it is considered that the EPA had appropriate regard for the information available and it is recommended that this element of the ground of appeal be dismissed.

Summary for Ground 6

It is recommended that this ground of appeal be upheld to the extent that:

- Condition 11-3 be amended, in a format consistent to condition 9-3, to include provisions to manage impacts on water quality including, but not limited to Acid and Metaliferous Drainage from seepage into groundwater and the reinjection of surplus water into the aquifer;
- Condition 11-3 be amended to remove duplication of the reference to the Department of Mines and Petroleum in condition 11-2;
- Condition 12-3 be amended, in a format consistent to condition 9-3, to include provisions to manage impacts on soil quality including, but not limited to Acid and Metaliferous Drainage from seepage into soil and use of dewater for dust suppression;
- Condition 12-3 be amended to remove duplication of the reference to the Department of Mines and Petroleum in condition 11-2;
- Condition 14-1 (1) be amended to refer to achieving the environmental outcome on the basis of best available landform modelling over 10,000 years post closure; and
- An additional condition be added to condition 14, in a format consistent with condition 13-3, to include details of appropriate rehabilitation measures, including, but not limited to timely trials for the revegetation of the tailings storage facility.

GROUND 7: REHABILITATION AND MINE CLOSURE

Appellants contend uranium mines cannot be successfully rehabilitated and argue that the assessment of a draft mine closure plan is not adequate and failed to comply with the EPA's own guidelines in assessing mine closure. Based on the lack of successful rehabilitation, the appellant believe that a final MCP is required 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"

An appellant submitted that the regulation around the management of tailings is lacking with respect to operation and post closure and contends that the revised *Guidelines: 2013 Code of Practice for Tailings Storage Facilities in Western Australia*⁹ (2013 Code of Practice) do not distinguish between different types of waste including radioactive waste.

Appellants also contended that by assessing the Mine Closure Plan as a draft, the final Mine Closure Plan and closure objectives would not be available for public review.

Consideration

In its assessment of rehabilitation and decommissioning of the proposal, the EPA determined that the proposal could be managed to meet its objectives for Rehabilitation and Decommissioning - 'to ensure that premises are decommissioned and rehabilitated in an ecologically sustainable manner'.

In reaching this conclusion the EPA had particular regard to:

- Relevant EPA policy and guidance pertaining to rehabilitation and decommissioning;

⁹Code of Practice Tailings Storage Facilities in Western Australia, Government of Western Australia, 2013.

- The backfilling of pits and placement of potentially acid forming material in reducing conditions;
- The acceptability of the proposed progressive rehabilitation approach; and
- Modelling of a worst-case scenario.

The EPA noted in its assessment that a Mine Closure Plan prepared in accordance with the *EPA-DMP Mine Closure Guidelines (Mine Closure Guidelines)*¹⁰, is a statutory obligation (not a discretionary decision) under the *Mining Act 1978* and that the Guidelines for preparing mine closure plans is a joint document prepared by the DMP and EPA to meet both *Mining Act 1978* and EP Act regulatory requirements.

The EPA and DMP stated in the *Mine Closure Guidelines* that mine closure planning is based on adaptive management and continual review and improvement throughout the life of mine. In line with this management approach, the mine closure plan will be a working document until closure.

As part of the assessment the Proponent stated that progressive rehabilitation is the best mechanism to protect against unplanned or unexpected closure or suspension of operations and noted that the PER included detailed of progressive rehabilitation, starting from year 6 of the mine implementation schedule.

The EPA, in response to appeals, advised that the Mine Closure Plan contained in the proponents PER provided an appropriate level of detail, consistent with the Guidelines for preparing mine closure plans for the Environmental Impact Assessment stage of the proposal. In their advice to the EPA, the DMP confirmed that it would require a Mine Closure Plan as a condition of the Mining Lease under section 74 of the *Mining Act 1978*. The EPA was satisfied that the proposed approach to progressive rehabilitation outlined in the PER and response to submissions would be a requirement of Mine Closure Plans for the proposal.

While the appellants concern that 2013 Code of Practice does not reference uranium explicitly is noted it is understood that the 2013 Code of Practice requires proponents to undertake a hazard rating based on various potential impacts, not just radiation in isolation and that the hazard rating is considered in the development of the Mine Closure Plan in accordance with relevant guidance.

The EPA considered that successful decommissioning and rehabilitation could be achieved provided that the recommended environmental conditions 11, 13 and 14, discussed in previous sections of this report.

In response to appellant concerns that the Mine Closure Plan and closure criteria will not be made publicly available, it is noted that the Conceptual Mine Closure Plan was made available for public review as part of the PER process. It is also noted that should the proposal be implemented, DMP has the ability to make reviewed Mine Closure Plans publicly available. In addition, it is noted that the Mine Closure Guidelines also include requirements for stakeholder engagement prior to the submission of revisions of the Mine Closure Plan.

Should the proposal be implemented, it is noted that the EPA's recommended condition 5 – 'Public Availability of Plans and Reports' requires for the remainder of the life of the Proposal that the proponent make publicly available all validated environmental data, in a manner approved by the CEO. In this regard it is considered reasonable to amend the content of

¹⁰ Guidelines for Preparing Mine Closure Plans. Department of Mines and Petroleum and Environmental Protection Authority, May 2015.

this condition to ensure that 'Plans', not just 'data', are also required to be made publicly available as would appear to have been the original intent of this condition and consistent with similar requirements for other proposals that have recently been the subject of EPA assessment and conditioning.

Conclusion

Having regard to the above information, it is considered that the EPA had regard to their policies and joint EPA-DMP guidelines, and had sufficient information to form the view that the mine closure for the proposal can be managed to meet its objective for Rehabilitation and Decommissioning.

The various provisions for making public the revisions of the Mine Closure Plan, Tailings Storage Facility Management Plan and Landform Evolution Modelling are acknowledged. However, it is recommended, to clarify the intent of the recommended conditions, that the appeal ground be allowed to the extent that condition 5 is amended to include the term 'plans' within the content of the condition.

Summary of Ground 7

Having regards to the above information, it is recommended that this ground of appeal be allowed to the extent that Conditions 5-1 and 5-2 are amended to include reference to both data and plans, and not only data.

GROUND 8: TRANSPORTATION RISKS

Appellants contended that there is insufficient information on the impacts of transport of radioactive material past communities, homes and hospitals, specifically in regard to exposure of the public to radio-activity.

Appellants raised concern that transport of uranium across vast distances from Mulga Rock to either Port Adelaide or Darwin, increases the risks of road accidents due to external factors such as floods, fire, storms or human error. Appellants questioned the capacity to responds to emergencies and clean-up spills.

Consideration

The EPA in response to appeals advised that it assessed potential impacts from transporting uranium oxide concentrate (UOC) on public roads as part of its assessment against the EPA's environmental objective for Human Health which is to 'ensure that human Health is not adversely affected'.

The EPA's Report 1576 presented the proponent's preferred transport route from Mulga Rock to the Port of Adelaide. The proponent also submitted that UOC is a low volume product, requiring less than one estimated truck movement per week.

In relation to the assessment of potential impacts associated with the transport of UOC, the proponent provided two scenarios with potential for public exposure from gamma radiation for the EPA's assessment. The first scenario considered a member of the public following closely behind a UOC transport truck for six hours and found that the person could receive a dose of 0.006 mSv/yr. The second scenario considered a member of the public standing permanently beside the transport route for a year and found that a person could receive a dose of 0.004 mSv/yr. It is noted that these hypothetical doses are well below the public dose limit as described at Ground 3 – Human Health.

Regarding appellants concerns about responding to a transport emergency, the proponent confirmed, in the Summary of Submissions, that the risk of transport accidents had been assessed in accordance with the Uranium Council (2012) Guide to Safe Transport of Uranium Oxide Concentrate and that with the required controls in place, the risk (in terms of both the likelihood and consequence of any environmental impact) was assessed as low.

The proponent confirmed in the Summary of Submissions that an Emergency Response Management Plan will be developed in consultation with local and regional authorities including Main Roads WA. It is understood that the Emergency Response Plan would include detailed design and construction of entry and exit points onto the public road network and development of suitable traffic management plans under emergency conditions to deal with the management of incidents.

The EPA noted in their assessment that the Radiological Council is responsible for regulating the radiological aspects of transport and public safety. It is understood the Radiological Council advised that the information the proponent provided in the PER was acceptable and that the proponent has addressed the key requirements for radiation under the *Radiation Safety Act 1975* and relevant codes of practice.

The EPA advised, in response to appeals, that 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*.

In this regard, the EPA advised, that the environmental assessment of the proposal concluded that potential impacts of transporting UOC on public roads could be managed to meet its objectives for Human Health.

Conclusion

Having regard to the EPA's assessment and noting the advice from relevant agencies who have statutory obligations relating to the regulation of transport of radioactive material and public safety, it is recommended that this ground of appeal be dismissed.

GROUND 9: 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.

Appellants also objected to the use of the term 'as far as practicable' in conditions as the proponent would be provided with an option to decide that a specific action is 'impracticable'. Appellants sought for the EPA to be specific and explicit about what is meant by 'practicality' if this term is included in recommended conditions.

Consideration

The EPA, in their response 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 1576 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 Mulga Rock Project will be managed under the following key 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.*

The project will be subject to the environmental provision in the *Mining Act 1978*. The *Mining Act 1978* 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.

The EPA advised that 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*.

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

Potential radiological impacts to human health, including exposure to radiological dust can also be regulated under DER and the DEE legislation.

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 Department of Water, in particular the abstraction of water will be licenced. DMP and DoW have an Administrative Agreement in place for referral and advice on mining proposals and mine closure plans.

The appellants reference recent independent reviews of the existing regulatory framework, is understood to be a reference to the Uranium Advisory Group (UAG), led by the University of Western Australia, and CSIRO, who released its report (the UAG report) on the independent review of uranium mining regulation in Western Australia in April 2012.

In response to this element of the appeal 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 (December 2012) regarding radiation safety for mining operations working arrangements.

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.

In relation to the use of the term 'as far as practicable', it is noted that the term 'practicable' is defined in the EP Act 1986 as follows:

practicable means reasonably practicable having regard to, among other things, local conditions and circumstances (including costs) and to the current state of technical knowledge;

The EPA's approach to conditions is set out in *Environmental Assessment Guideline 11 - Recommending Environmental Conditions*. The Guideline outlines three model types for conditions:

1. Outcome-based conditions – these conditions identify a measurable environmental outcome that must be met (model 1);
2. Management-based conditions – these conditions identify a environmental objective that must be met; (model 2); and
3. Prescriptive conditions – these conditions require the implementation of specified actions or procedures (model 3).

While the EPAs preference is to set outcome-based conditions, it is recognised that this is not always possible. With respect to Model 2, EAG 11 states: 'The environmental objective in a model 2 condition will generally be expressed in terms such as 'minimising impacts as far as practicable' on an element of the environment, for example flora, vegetation or fauna.'

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 Mulga Rock 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.

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

Summary of Ground 10

Having regard to the regulatory framework for regulation of uranium mining proposals in Western Australia and the extent of improvements since Tsurikov's report in 2009, as well as the development of detailed guidance for tailings management, it is considered that this ground of appeal be dismissed.

OTHER MATTERS

Uranium industry, lifecycle and waste

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 the *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

Appellants contended that the proposal may not be viable in the current economic situation for uranium. An appellant submitted that the international uranium industry is characterised by oversupply, stockpiling, falling uranium prices and uranium price forecasts that have been adjusted downward by an economic strategist to at least 2019¹¹. The appellant noted that the current Australian uranium industry accounts for just 0.2 % of national export revenue and less than 0.01 % of all jobs in Australia.

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 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.

Rehabilitation costs and financial assurance

Appellants submitted that, based on the contention that no uranium mine has been successfully rehabilitated that mine closure and rehabilitation should be provided for financially, prior to approval, otherwise in their view taxpayers are likely to be financially responsible for the rehabilitation costs. An appellant requested the Minister for Environment to consider that one abandoned uranium mine, with in their view extraordinary high costs of rehabilitation, could compromise the entire Mining Rehabilitation Fund. An appellant submitted that if the Minister approves the Mulga Rock Uranium Mine, applying a 100% bond to the proposal is the best way to provide certainty, to ensure rehabilitation of the site, and to maintain the Mining Rehabilitation Fund for other much needed rehabilitation work on Western Australia's approximately 11,000 abandoned mines¹⁷.

In response to this matter the EPA noted that the proponent has a responsibility under the EP Act to fulfil conditions applied under that Act. Failure to meet conditions, including rehabilitation and closure conditions, can result in enforcement actions. If requirements for rehabilitation and closure under the Mining Act are not met, they too are subject to enforcement actions. The DMP also has provisions to apply bonds in the event that a mine site represents a suitable degree of closure risk.

CONCLUSIONS AND RECOMMENDATIONS

Having regard to the information and advice presented in respect to the appeals from appellants, relevant Government agencies and the proponent, it is considered that the EPA had sufficient information to assess the proposal, that this assessment was consistent with

¹¹ <http://www.economiccalendar.com/2016/07/27/uranium-prices-remain-below-cost-of-production-recovery-is-years-away/>

section 44 of the *Environmental Protection Act 1986* and that its conclusion that the proposal may be implemented subject to the recommended conditions is supported.

It is noted that there is an established regulatory framework in place to adequately manage and mitigate potential risks from the proposal which provided confidence that potential impacts related to human health, flora and vegetation, fauna, groundwater abstraction and hydrological processes, rehabilitation and closure and transport risks, can be adequately managed.

However, having had regard for all of the information presented, it is recommended that the appeals be allowed to the extent that the conditions should be amended as set out below and for the reasons detailed in this report.

For the reasons set out in this report, it is recommended that the appeals be allowed to the extent that conditions are amended for:

Ground 1 – Flora, vegetation and priority ecological communities

- Specify outcomes in condition 8-1 for:
 - Avoiding of impacts to unidentified *Hakea* species;
 - The extent of clearing of vegetation communities E3 and S6; and
 - Ensure the eradication of all weeds introduced in the development envelope as a result of the implementation of the proposal.
- Specify objectives in condition 8-2 to:
 - Minimise direct and indirect impacts on vegetation communities E3 and S6 as far as practicable; and
 - Minimise direct and indirect impacts on conservation significant flora as far as practicable.
- Specify an outcome in condition 12-1 (3) for maintaining soil quality within background concentrations established during baseline studies 10m from areas where dewater has been used for dust suppression in sandhill dunnart habitat (i.e. E3 and S6 vegetation communities); and
- Specify an objective in condition 12-1 (1) to minimise impacts on soil quality as far as practicable.

Ground 2 – Terrestrial fauna

- The objective of the camera trapping program is specified by amending condition 9-1
- The reference to 'camera trapping program' in condition 9-3 is replaced with a register for the reporting of impacts to conservation significant fauna.

Ground 4 – Aboriginal heritage

- Condition 10-2 is amended to include the timing for preparation and submission of the Aboriginal Heritage Management Plan, with phased implementation and completion before substantial commencement of the proposal or as agreed by the CEO; and
- A condition is added, consistent with the format of condition 9-3 to describe but not limit the management actions to be included in the Aboriginal Heritage Management Plan, such as procedures for ground disturbance and environmental induction and training.

Ground 6 – Waste, tailings management and contamination

- Condition 11-3 be amended, in a format consistent to condition 9-3, to include provisions to manage impacts on water quality including, but not limited to Acid and Metaliferous Drainage from seepage into groundwater and the reinjection of surplus water into the aquifer;

- Condition 11-3 be amended to remove duplication of the reference to the Department of Mines and Petroleum in condition 11-2;
- Condition 12-3 be amended, in a format consistent to condition 9-3, to include provisions to manage impacts on soil quality including, but not limited to Acid and Metaliferous Drainage from seepage into soil and use of dewater for dust suppression;
- Condition 12-3 be amended to remove duplication of the reference to the Department of Mines and Petroleum in condition 11-2;
- Condition 14-1 (1) be amended to refer to achieving the environmental outcome on the basis of best available landform modelling over 10,000 years post closure; and
- An additional condition be added to condition 14, in a format consistent with condition 13-3, to include details of appropriate rehabilitation measures, including, but not limited to timely trials for the revegetation of the tailings storage facility.

Ground 7 – Rehabilitation and mine closure:

- Condition 5-1 and 5-2 are amended to include reference to both data and plans, and not only data; and
- Condition 14 is amended to include the title of the management plan, so that the condition is not limited to Landform Evolution Modelling only.

The precise wording of the conditions should be finalised though the consultation process under section 45 of the EP Act.

Emma Gaunt
APPEALS CONVENOR

Investigating Officer:
Annarie Boer, Senior Appeals Officer

APPENDIX 1 - LIST OF APPELLANTS

- Joe Vallentine;
- Beth Tilley;
- Paul Longva;
- Christine Jeffries-Stokes;
- Janice Scott;
- Kerrie-Ann Garlick;
- Walkatjurra Walkabout;
- Sandra Evans;
- Richard Evans;
- Marcus Atkinson;
- Geoffrey Stokes;
- Glen Cook;
- Libby (Namila) Carmody;
- Luke Skinner;
- Linda Ray;
- Toshiko Morinaga;
- Cassandra Schmitt;
- Karen Davis;
- Prudence Robertson;
- R Gulley;
- Conservation Council WA;
- Environment House;
- Wildflower Society of Western Australia Inc; and
- Brenda Conochie.