Government of Western Australia
Department of Environment Regulation

Works Approval

Environmental Protection Act 1986, Part V

Works Approval Holder: Alliance Mineral Assets Limited

Works Approval Number: W5759/2014/1

Registered office: Unit 6, 24 Parkland Road
OSBORNE PARK WA 6017

ACN: 147 393 735

Premises address: Bald Hill Tantalite Project
Shire of Coolgardie
Tenements M15/400 (including L15/264, L15/265, L15/266, L15/267, L15/268, L15/269, L15/270) and G15/17
As depicted in Schedule 1.

Issue date: Thursday, 12 March 2015

Commencement date: Monday, 16 March 2015

Expiry date: Sunday, 15 March 2020

The following category/s from the *Environmental Protection Regulations 1987* cause this Premises to be a prescribed premises for the purposes of the *Environmental Protection Act 1986*:

Category number	Category description	Category production or design capacity	Approved premises production or design capacity
5	Processing or beneficiation of metallic or non-metallic ore: premises on which – (a) metallic or non-metallic ore is crushed, ground, milled or otherwise processed; (b) tailings from metallic or non-metallic ore are reprocessed; or tailings or residue from metallic or non-metallic ore are discharged into a containment cell or dam.	50 000 tonnes or more per year	525 600 tonnes per annum

Conditions
This Works Approval is subject to the conditions set out in the attached pages.

Date signed: 8 September 2016
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Tim Gentle
Officer delegated under section 20
of the *Environmental Protection Act 1986*

Works Approval Conditions

1 General

1.1 Interpretation

1.1.1 In the Works Approval, definitions from the *Environmental Protection Act 1986* apply unless the contrary intention appears.

1.1.2 In the Works Approval, unless the contrary intention appears:

'Act' means the *Environmental Protection Act 1986;*

'annual period' means the inclusive period from 1 April until 31 March in the following year;

'CEO' means Chief Executive Officer of the Department of Environment Regulation;

'CEO' for the purpose of correspondence means;

Chief Executive Officer
Department administering the Environmental Protection Act 1986
Locked Bag 33
CLOISTERS SQUARE WA 6850
Telephone: (08) 9333 7510
Facsimile: (08) 9333 7550
Email: info@der.wa.gov.au;

'Premises' means the area defined in the Premises Map in Schedule 1 and listed as the Premises address on page 1 of the Works Approval;

'Schedule 1' means Schedule 1 of this Works Approval unless otherwise stated;

'Works Approval' means this Works Approval numbered W5759/2014/1 and issued under the *Act;*

'Works Approval Holder' means the person or organisation named as the Works Approval Holder on page 1 of the Works Approval;

1.1.3 Any reference to an Australian or other standard in the Works Approval means the relevant parts of the standard in force from time to time during the term of this Works Approval.

1.1.4 Any reference to a guideline or code of practice in the Works Approval means the current version of the guideline or code of practice in force from time to time, and shall include any amendments or replacements to that guidelines or code of practice made during the term of this Works Approval.

1.2 General conditions

1.2.1 The Works Approval Holder shall construct the works in accordance with the documentation detailed in Table 1.2.1:

Table 1.2.1: Construction Requirements[1]		
Document	**Parts**	**Date of Document**
Bald Hill Tantalum Mine. Works Approval Application Supporting Document. Golder Associates Report Number: 147645020-009-R-Rev0.	All	October 2014
Works Approval Application Form	All	7 October 2014
Bald Hill Tantalum Project. Tailings Storage NOTICE OF INTENT. D E Cooper & Associates PTY. LTD.	All	February 2001
Bald Hill Works Approval Application – Response to the Department of Environment Regulation's request for additional information. Golder Associates. Document No. 147645020-016-L-Rev0.	All	10 November 2014
Correspondence from Alliance Mineral Assets Limited to the Department of Environment Regulation: "Comment on draft Works Approval W5759/2014/1, Bald Hill Tantalite Project". (A863956)	All	4 February 2015
Correspondence from Alliance Mineral Assets Limited to the Department of Environment Regulation: "Responses" in relation to draft Works Approval W5759/2014/1, Bald Hill Tantalite Project Shaking Table Shed emission point and TSF freeboard. (A878161)	All	9 March 2015
Application form to amend Works Approval W5759/2014/1 – installation of rotary dryer and associated infrastructure	All	16 December 2015
Golder (2016) *Bald Hill Tantalum Mine. Works Approval Application - Design Report for In-pit Tailings Disposal at Boreline Pit and Boreline Extended Pit*, Report No. 147645020-022-R-Rev0, May 2016. The works to be constructed are: • In-pit TSF at Boreline Pit and Boreline Extended Pit; • Tailings delivery HDPE pipeline within a bunded trench; • Tailings distribution pipework and single discharge spigots installed at the southern and western perimeter of Boreline Pit and northern perimeter of Boreline Extended Pit (refer Figure 2 in Schedule 1). Pipework to be valved at intervals; • Decant water return pipeline installed within the pits as per Figure 2 in Schedule 1; • Water return HDPE pipeline from Mill Return Pond to Process Plant via bunded trench • Recommission Mill Return Pond • Floating pontoon and pump system for each In-pit TSF; and • Installation of additional 5 groundwater monitoring bores GMB01 – GMB05 (refer Figure 3 in Schedule 1).	Sections 2, 5, 8 and 9.	May 2016

Note 1: Where the details and commitments of the documents listed in condition 1.2.1 are inconsistent with any other condition of this works approval, the conditions of this works approval shall prevail.

2 Information

2.1 Reporting

2.1.1 The Works Approval Holder shall submit a compliance document to the CEO, following the construction of the works and prior to commissioning of the same.

2.1.2 The compliance document shall:

(a) certify that the works were constructed in accordance with the conditions of the works approval;

(b) be signed by a person authorised to represent the Works Approval Holder and contain the printed name and position of that person within the company.

Schedule 1: Maps

Premises map

The Premises is shown in the map below. The red line depicts the Premises boundary.

Figure 1: Prescribed Premises Boundary

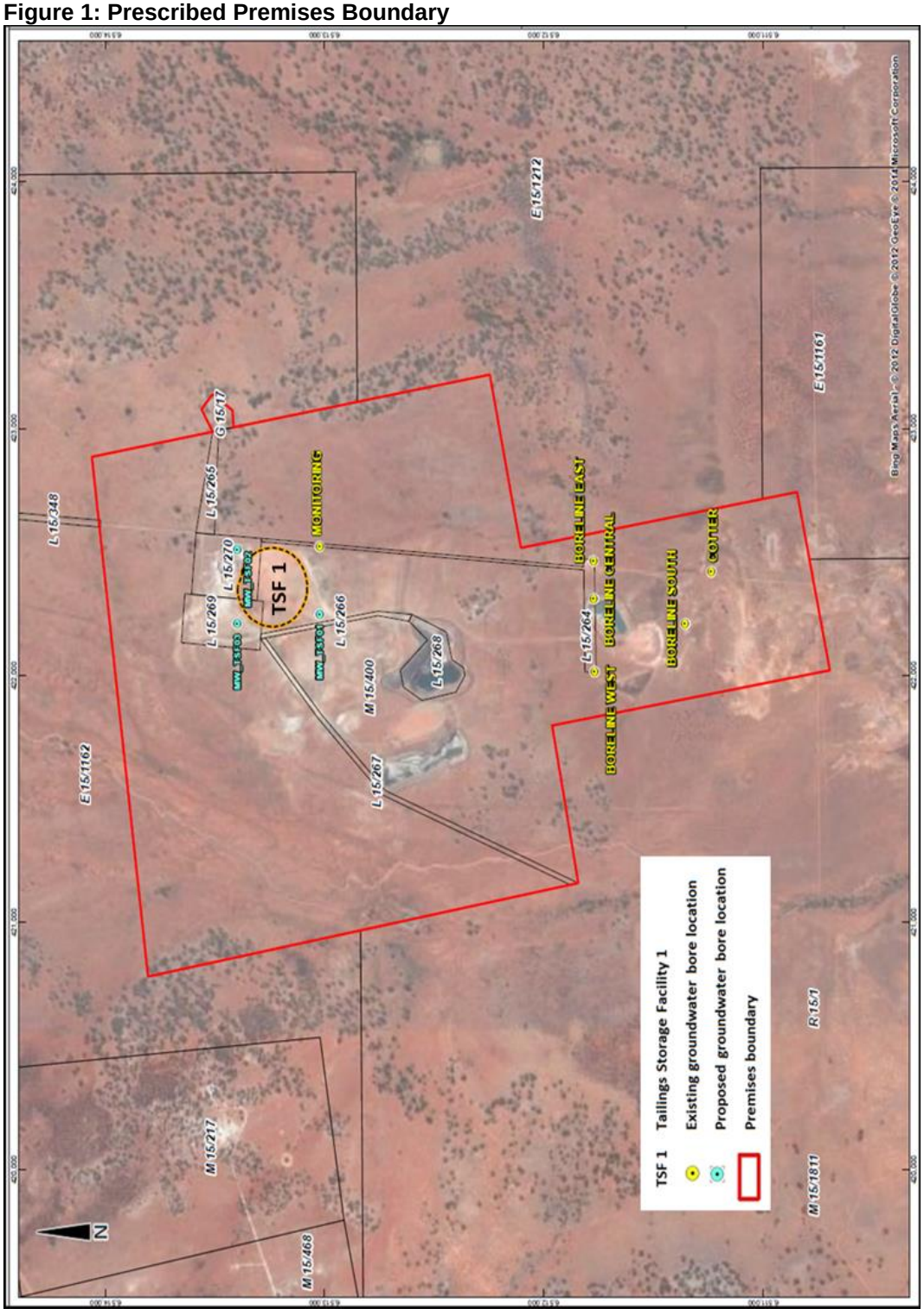


Figure 2: Indicative In-pit TSFs Tailings and Decant Water Pipework Layout

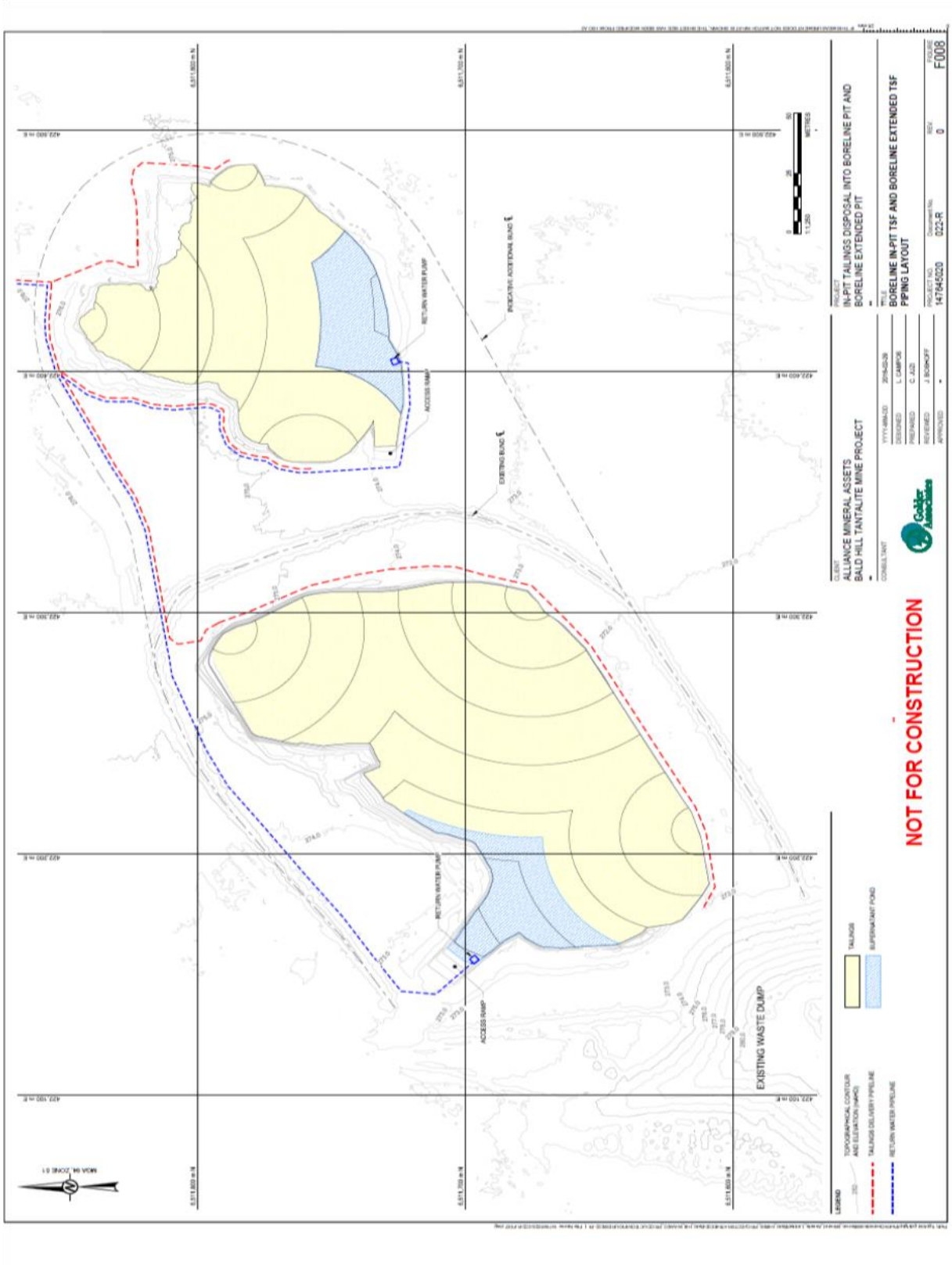
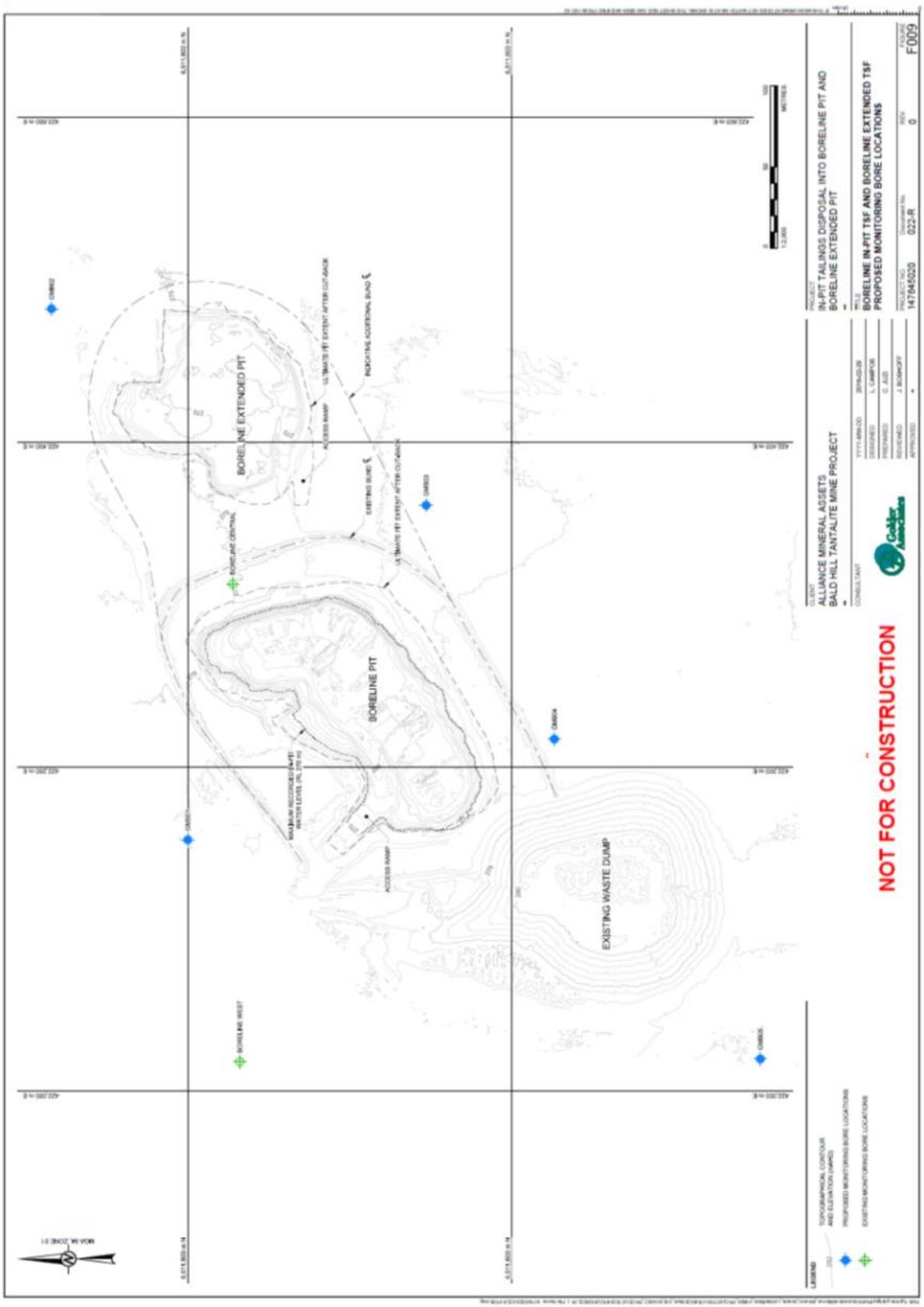


Figure 3: Indicative locations of new groundwater bores surrounding Boreline and Boreline Extended In-pit TSFs



Government of Western Australia
Department of Environment Regulation

Decision Document

Environmental Protection Act 1986, Part V

Proponent: **Alliance Mineral Assets Limited**

Works Approval Number: **W5759/2014/1**

Registered office:	Unit 6, 24 Parkland Road OSBORNE PARK WA 6017
ACN:	147 393 735
Premises address:	Bald Hill Tantalite Project Shire of Coolgardie Tenements M15/400 (including L15/264, L15/265, L15/266, L15/267, L15/268, L15/269, L15/270) and G15/17 As depicted in Schedule 1.
Issue date:	Thursday, 12 March 2015
Commencement date:	Monday, 16 March 2015
Expiry date:	Sunday, 15 March 2020

Decision

Based on the assessment detailed in this document the Department of Environment Regulation (DER), has decided to issue an amended works approval. DER considers that in reaching this decision, it has taken into account all relevant considerations and legal requirements and that the works approval and its conditions will ensure that an appropriate level of environmental protection is provided.

Decision Document prepared by: Louise Lavery
Licensing Officer

Decision Document authorised by: Tim Gentle
Manager Licensing

Contents

1 Purpose of this Document

This decision document explains how DER has assessed and determined the application and provides a record of DER's decision-making process and how relevant factors have been taken into account. Stakeholders should note that this document is limited to DER's assessment and decision making under Part V of the *Environmental Protection Act 1986.* Other approvals may be required for the proposal, and it is the proponent's responsibility to ensure they have all relevant approvals for their Premises.

2 Administrative summary

Administrative details		
Application type	Works Approval ☐ New Licence ☐ Licence amendment ☐ Works Approval amendment ☒	
Activities that cause the premises to become prescribed premises	**Category number(s)**	**Assessed design capacity**
	05	525 600 tpa
Application verified Application fee paid	Date: 28/6/16 Date: N/A	
Works Approval has been complied with Compliance Certificate received	Yes☐ No☐ N/A☒ Yes☐ No☐ N/A☒	
Commercial-in-confidence claim	Yes☐ No☒	
Commercial-in-confidence claim outcome	N/A	
Is the proposal a Major Resource Project?	Yes☐ No☒	
Was the proposal referred to the Environmental Protection Authority (EPA) under Part IV of the *Environmental Protection Act 1986*?	Yes☐ No☒	Referral decision No: N/A Managed under Part V ☐ Assessed under Part IV ☐

Is the proposal subject to Ministerial Conditions?	Yes☐ No☒	Ministerial statement No: N/A EPA Report No: N/A
Does the proposal involve a discharge of waste into a designated area (as defined in section 57 of the *Environmental Protection Act 1986*)?	Yes☐ No☒ Department of Water consulted Yes ☐ No ☒	
Is the Premises within an Environmental Protection Policy (EPP) Area Yes☐ No☒ If Yes include details of which EPP(s) here.		
Is the Premises subject to any EPP requirements? Yes☐ No☒ If Yes, include details here, eg Site is subject to SO_2 requirements of Kwinana EPP.		

3 Executive summary of proposal and assessment

Alliance Mineral Assets Limited (AMA) recommenced mining and treatment of tantalite and cassiterite ore at its Bald Hill mine in 2014. The site was placed into care and maintenance in 2005 after four years of operation by Haddington Resources. AMA acquired the site in 2010 and has begun Phase 1 of the Bald Hill Tantalite Mine operations under Licence L8830/2014/1 issued 13 November 2014.

Phase 1 encompasses trial mining the free dig material within the Boreline pit extension. The TSF, the existing pipes to the borefield and power generator are being reconnected and recommissioned under the Licence. In addition, a 42-man camp in the place of the old camp is being constructed; the access roads and other infrastructure are being improved under the Licence.

Phase 2 comprises the following works authorised under this Works Approval that are required to recommence mining and processing operations:

- Process plant construction, installation or upgrade of the following items:
    - Mobile (semi-permanent) crushing circuit and equipment, including a vertical shaft impact (VSI) crusher;
    - Mobile (semi-permanent) scrubber plant and equipment;
    - Construction of a permanent Shaking Table Shed, plant and equipment.

The related Phase 2 work proposed, that is not subject to this Works Approval includes:

- Mining of Boreline Pit, North Pit, South Pit, and Far South Pit. This specifically includes:
    - Extension of Boreline Pit;
    - Expansion of the existing Boreline Pit waste rock dump and abandonment bund;
    - Extension and raise of the backfilled South Pit using North Pit waste rock material;
    - Establishment of a new waste rock dump and topsoil stockpile for South Pit;
    - Establishment of a new waste rock dump and topsoil stockpile for Far South Pit;
- Dewatering activities between pits within the same aquifer;
- Reinstatement of the former laydown area and office facilities area adjacent to Boreline Pit;
- Installation of access tracks;
- Clearing of approximately 30.1 ha of vegetation (under permit, outside of the scope of this Works Approval).

The proposed plant throughput at Bald Hill is estimated to be 60 tonnes per hour which equates to the production of 45 to 90 tonnes of tantalum pentoxide per year.

AMA are licenced by the Department of Water (DoW) to abstract 507 500 kL annually from the Goldfield Combined – Fracture Rock West – Fractured Rock Aquifer over M15/400 for the purposes of dust suppression, mineral ore processing and mining camp purposes. The Licence (GWL174305 (1)) was issued in February 2012 and expires in 2017. AMA proposes to abstract 15 m^3 of water per hour for the purposes of dust suppression, mineral ore processing and mining camp purposes. This equates to approximately 18 720 kL water per annum where abstraction is constant. In-pit water will be transferred from pit to pit as required to allow mining to occur and since the pits are within the same aquifer, this dewatering does not constitute discharge to the environment.

An assessment of the environmental risk for the proposed works and operations was conducted by Golder Associates on behalf of AMA and identified the potential risks and impacts for groundwater, surface water, air quality, hydrocarbon and chemical storage, soils and landforms, flora, fauna, noise, heritage, waste, odour and light. The risk ratings and qualitative risk assessment were included in the application supporting document. Seepage impacts are considered moderate due to the estimated seepage rate of 0.6 L/s from the TSF.

Once the compliance certificate has been submitted for the works authorised under this Works Approval, Licence L8830/2014/1 should be amended to include the additional groundwater monitoring bores and to ensure that the Licence continues to reflect project activities and infrastructure.

January 2016 Amendment

The scope of the works approval has been amended to authorise installation of a rotary dryer and associated infrastructure. The dryer will dry the wet tantalum concentrate product after the wet processing stage. The dryer's size is 0.75m diameter by 8m long with a 1200 MJ/hr maximum capacity gas burner. A water bath exhaust gas scrubber will treat all exhaust gases from the dryer. Expected emissions are negligible as particulates and water soluble gases will be captured by the scrubber. Additionally the gas burner produces water vapour and CO_2 and has an automatic shutdown in the event that air flow is reduced or the CO content of the combustion products exceeds 1% by volume.

Associated plant to be installed includes 2 x 7.5 kL capacity LPG bullets (tanks), an above ground LPG pipeline to feed the gas burner, a feed hopper and open conveyor to transport the concentrate to the dryer. A telehandler will transport the wet concentrate into the hopper to feed the dryer. As the concentrate will be wet following wet processing, dusting is not expected from the conveyor or transfer to the hopper. The dryer is forecast to be operated for a total of 48 hours per month.

September 2016 Amendment

This amendment authorises the development of two open pits as In-pit TSFs: Boreline Pit and Boreline Extended Pit. It also authorises the installation of tailings delivery and return decant water pipelines to the new In-pit TSFs, associated pumping systems and installation of an additional 5 groundwater monitoring bores.

4 Decision table

All applications are assessed in line with the *Environmental Protection Act 1986*, the *Environmental Protection Regulations 1987* and DER's Operational Procedure on Assessing Emissions and Discharges from Prescribed Premises. Where other references have been used in making the decision they are detailed in the decision document.

DECISION TABLE			
Works Approval / Licence section	**Condition number** **W = Works Approval** **L= Licence**	**Justification (including risk description & decision methodology where relevant)**	**Reference documents**
General conditions	W – no conditions Previous L1.2.5	Conditions concerning construction requirements and for storage and handling of environmentally hazardous materials are included as standard in works approvals. Environmental management of construction aspects are outlined in the Application supporting documentation and include the development of an Environmental Management and Safety Management System which includes a surface water management document which will ensure the following management measures are implemented: • Install appropriate bunds and a drainage system consisting of shallow v drains designed along contours with a sediment trap and outfall system designed to restore the sheet flow or direct the flow to an existing drainage channel, down gradient of the site to: ○ control possible surface runoff; ○ minimise erosion; ○ manage any sediment flows to Lake Cowan; ○ manage flooding. • Manage potential surface water contamination from spills such as hydrocarbons though the implementation of appropriate hydrocarbon and chemical management procedures based on AS 1940-2004. • Utilise spill kits onsite to clean-up and remediate spills.	Application supporting documentation *Environmental Protection (Unauthorised Discharges Regulations), 2004.* General Provisions of the *Environmental Protection Act 1986* DER (2015) *Guidance Statement: Setting Conditions*, October 2015.

DECISION TABLE			
Works Approval / Licence section	**Condition number W = Works Approval L= Licence**	**Justification (including risk description & decision methodology where relevant)**	**Reference documents**
		The Application supporting documentation also includes a Notice of Intent report and TSF Engineering Studies Report, which will ensure that construction is undertaken to the specified standard. No other conditions are required to be added to the Works Approval since Licence L8830/2014/1 is active and conditions the operation. **September 2016 Amendment** Condition 1.2.5 will be removed from the Licence, as the condition is considered not enforceable according to the DER *Guidance Statement: Setting Conditions*, October 2015. An improvement condition will be added to the Licence to review stormwater management at the Premises to ensure that adequate infrastructure and controls are in place to contain contaminated stormwater. Where the review identifies deficiencies, a plan for rectifying the stormwater control must be submitted to the CEO.	
Emissions general	W – no conditions	There are no conditions relating to emissions included in this Works Approval since Licence L8830/2014/1 is active and conditions the operation.	N/A
Point source emissions to air including monitoring	W – no conditions	**Construction and operation** No significant point source emissions to air are expected during the construction works. No specified conditions relating to point source emissions to air or the monitoring of such emissions are included in the Works Approval. Power supply on site will be provided from a new 860 kVa diesel generator (equivalent 0.68 MW) which falls below the threshold to be added to Licence L8830/2014/1. Greenhouse gas emissions from the power generation facilities are estimated	Application supporting documentation *Environmental Protection (Unauthorised Discharges) Regulations, 2004*

DECISION TABLE			
Works Approval / Licence section	**Condition number W = Works Approval L= Licence**	**Justification (including risk description & decision methodology where relevant)**	**Reference documents**
		to be at a level of <5 tCO_2/annum, which is well below the 25 kilotons (kt) or more of greenhouse gases (carbon dioxide equivalent (CO_{2-e})) reporting requirement for a facility under the Federal legislation (Clean Energy Regulator 2014). Controls to minimise air emissions proposed by AMA include to: • Maintain site facilities to operate at maximum efficiency and minimise emission of CO_2 and particulates; • Install a filtration system in the diesel power generation facility to remove particulates smaller than 5 microns.	
	W – no conditions	**Construction** No point source emissions are expected from construction of the rotary dryer and associated infrastructure. **Normal Operations** <u>Emission Description</u> *Emission:* Tantalum concentrate particulate emissions to air from dryer. The concentrate contains amounts of uranium and thorium in excess of activity of 1 Bq/g. The dryer will operate for approximately 48 hours per month. *Impact:* Potential health impacts from inhalation of particulates. The dryer is located away from the main plant and offices and the nearest receptor, the residential camp is located 670 metres away. The nearest homestead is 9.8 km away. *Controls:* Water bath exhaust gas scrubber to collect any particulate matter or water soluble gases. The location of the dryer plant is isolated from the main process plant and offices. <u>Risk Assessment</u> *Consequence:* Insignificant	Application form to amend W5759/2014/1

DECISION TABLE			
Works Approval / Licence section	**Condition number W = Works Approval L= Licence**	**Justification (including risk description & decision methodology where relevant)**	**Reference documents**
		Likelihood: Unlikely *Risk Rating:* Low No further regulatory controls are required for this case. **Abnormal Operations** <u>Emission Description</u> *Emission:* Tantalum concentrate particulate emissions to air from dryer due to poor performance or failure of the gas scrubber. The concentrate contains amounts of uranium and thorium in excess of activity of 1 Bq/g. *Impact:* Potential health impacts from inhalation of particulates. The dryer is located away from the main plant and offices and the nearest receptor, the residential camp is located 670 metres away. The nearest homestead is 9.8 km away. *Controls:* The location of the dryer plant is isolated from the main process plant and offices. The dryer will operate for approximately 48 hours per month. <u>Risk Assessment</u> *Consequence:* Minor *Likelihood:* Possible *Risk Rating:* Moderate <u>Regulatory Controls</u> A licence condition in regard to completing a regular maintenance program and testing of effectiveness of the gas scrubber is recommended for inclusion on Licence L8830/2014/1 following construction and commissioning of the dryer and associated infrastructure. Section 72 of the Act requires the Licensee to notify DER in the event of the failure of the gas scrubber.	

DECISION TABLE			
Works Approval / Licence section	**Condition number W = Works Approval L= Licence**	**Justification (including risk description & decision methodology where relevant)**	**Reference documents**
		Residual Risk *Consequence:* Minor *Likelihood:* Unlikely *Risk Rating:* Moderate	
Point source emissions to surface water including monitoring	W – no conditions	**Construction and operation** There are to be no point source emissions to surface water during the works authorised. Therefore no conditions relating to surface water or monitoring of emissions to surface water are included in this Works Approval. The Project area is generally flat with a relief of less than one to two metres and therefore, surface flow is overland following the topography which is generally south towards Salt Creek and ultimately to Lake Cowan, 5 km to the south-west (Al Maynard and Associates 2014).	Application supporting documentation General Provisions of the *Environmental Protection Act 1986*
Point source emissions to groundwater including monitoring	W – no conditions	**Construction and operation** There are to be no point source emissions to groundwater during works authorised. No conditions relating to point source emissions to groundwater or monitoring of emissions to surface water are included in this Works Approval. Groundwater in the vicinity of the Project is hypersaline, (>39 000 mg chlorides/L), has a TDS generally >60 000 mg/L, a TSS generally >2 mg/L and an average pH of 5.8 (Al Maynard and Associates 2014), therefore water is unsuitable for pastoral use.	Application supporting documentation
Emissions to land including monitoring	W – no conditions	**Construction and operation** There are no emissions to land authorised under this Works Approval. No	N/A

DECISION TABLE			
Works Approval / Licence section	**Condition number W = Works Approval L= Licence**	**Justification (including risk description & decision methodology where relevant)**	**Reference documents**
		conditions relating to emissions to land are included in this Works Approval.	
Fugitive emissions	W – no conditions Previous L2.6.1 Previous L2.6.2	**Construction and operation** <u>Emission Description</u> *Emission:* Dust emissions may be generated at the Premises by: construction activities, mining activities, materials handling, open areas, the processing plant including the shaking tables, clearing works, transfer/haulage of ore in trucks and operation of vehicles on haul roads. *Impact:* Dust emissions can be harmful to human health and can smother vegetation. *Controls:* To minimise dust emissions the following control measures are proposed by AMA: • Utilise water carts onsite to suppress dust on roads, during clearing works, within the pits, around the Processing Plant; • Utilise water sprays to maintain wet processing within the Processing Plant (including crushing); • Enclose conveyors and transfer points within the mobile crusher; • Conduct a risk assessment to assess geochemical and health risk of using crushed material on roads; • Apply crushed rock to roads to harden and cover dusty surfaces; • Apply Polymer Emulsions to roads where crushed rock and water carts are not effective; • Manage the TSF in accordance with the TSF Operation Manual to minimise dust generation from tailings; • Enforce a haul road speed limit of 50 km/hr. <u>Risk Assessment</u>	Application supporting documentation General provisions of the *Environmental Protection Act 1986* DER (2015) *Guidance Statement: Setting Conditions*, October 2015.

DECISION TABLE			
Works Approval / Licence section	**Condition number W = Works Approval L= Licence**	**Justification (including risk description & decision methodology where relevant)**	**Reference documents**
		Consequence: Moderate *Likelihood:* Possible *Risk Rating:* Moderate **September 2016 Amendment** Conditions 2.6.1 and 2.6.2 will be modified or removed from the Licence, as per the DER *Guidance Statement: Setting Conditions*, October 2015, it is considered these generic conditions are not adequately risk –based and more substantive enforceable prohibitions for dust emissions that result in pollution or environmental harm are available in the *Environmental Protection Act 1986.*	
Odour	W – no conditions	**Construction and operation** There are no odour impacts expected during the works authorised. A shearing out-station is located on the Madoonia Downs Station but is not anticipated to be impacted by the operation. Widgiemooltha, the nearest town to the site, located 50 km to the west is reportedly abandoned. No specified conditions relating to odour are included in the Works Approval.	N/A
Noise	W – no conditions	**Construction and operation** Noise emissions during construction may be expected due to vehicle movement and earthmoving equipment. However these are not expected to be significant and are expected to be no more significant than current operational noise. No additional conditions are required to be added to this Works Approval. A shearing out-station is located on the Madoonia Downs Station but is not	Application supporting documentation *Environmental Protection (Noise) Regulations 1997*

DECISION TABLE			
Works Approval / Licence section	**Condition number W = Works Approval L= Licence**	**Justification (including risk description & decision methodology where relevant)**	**Reference documents**
		anticipated to be impacted by the operation. Widgiemooltha, the nearest town to the site, located 50 km to the west is reportedly abandoned.	
Monitoring general	W – no conditions	No monitoring is required to be added to this Works Approval since monitoring conditions are stipulated in the Licence. The additional monitoring bores that will be constructed under this Works Approval (MW_TSF01, MW_TSF02 and MW_TSF03) will be added to Licence requirements under an amendment. The locations of these additional bores are shown on the Premises map in Schedule 1. **September 2016 Amendment** Five additional groundwater monitoring bores (GMB01 – GMB05) will be constructed surrounding the Boreline In-Pit TSF and Boreline Extended In-pit TSF. Refer to Figure 3 in Schedule 1 for indicative locations of the new bores.	N/A
Monitoring of inputs and outputs	W – no conditions	No monitoring of inputs or outputs is required under this Works Approval.	N/A
Process monitoring	W – no conditions	No process monitoring is required under this Works Approval.	N/A
Ambient environmental quality monitoring	W – no conditions L3.3.1	No ambient environmental quality monitoring is required under this Works Approval since Licence L8830/2014/1 is active and conditions the operation. **September 2016 Amendment** DER's assessment and decision making in relation to impacts to ambient groundwater from operation of the In-Pit TSFs are detailed in Appendix A. Note previous versions of this document assessed impacts to groundwater	Application supporting documentation General Provisions of the *Environmental Protection Act 1986*

DECISION TABLE			
Works Approval / Licence section	**Condition number W = Works Approval L= Licence**	**Justification (including risk description & decision methodology where relevant)**	**Reference documents**
		from operation of the above ground TSF, TSF1. Following the construction of the In-pit TSFs, TSF1 will not be used for tailings deposition and hence the risk assessment has been removed from this decision document. It has been replaced with the risk assessment for Boreline In-pit TSF and Boreline Extended In-pit TSF.	
Meteorological monitoring	W – no conditions	No specific meteorological monitoring is required.	N/A
Improvements	Previous W2.1.1	A Tailings Storage Facility (TSF) Operation Manual was not available in a finalised format at the time of the original March 2015 Works Approval assessment and therefore condition 2.1.1 was included to ensure that this will be provided with the compliance document submission. This requirement was included to ensure the TSF is operated to the freeboard specified in Licence L8830/2014/1 which is a minimum top of embankment freeboard of 500mm or a 1 in 100 year/72 hour storm event (whichever is greater). Subsequently, a Tailings Operation Procedure was submitted to DER for operation of the voids on TSF1. This specified the requirements for managing freeboard on the voids of TSF1 (AMAL 2015). **September 2016 Amendment** The submitted Design Report for the In-pit TSFs (Golder 2016a) details the freeboard available for both In-pit TSFs and also the operating procedures to manage the surface water and the supernatant ponds. The schedule and scope of periodic inspections of the In-pit TSFs includes daily inspection of the freeboard at the perimeter embankments. Accordingly the requirement of previous condition W2.1.1 to manage TSF	Alliance Mineral Assets Limited (2015) *Tails Storage Facility Operating Procedure,* Document no OP-TSF-PRO-OO1-A Golder (2016a) *Bald Hill Tantalum Mine. Works Approval Application - Design Report for In-pit Tailings Disposal at Boreline Pit and Boreline Extended Pit*, Report No. 147645020-022-R-

DECISION TABLE			
Works Approval / Licence section	**Condition number W = Works Approval L= Licence**	**Justification (including risk description & decision methodology where relevant)**	**Reference documents**
		freeboards is met by the commitments given in the Design Report and W2.1.1 is removed from the Works Approval.	Rev0, May 2016.
Information	W5	Conditions relating to submission of a compliance report are included as standard.	N/A
Licence Duration	N/A	The original Works Approval duration was determined as 3 years. **September 2016 Amendment** Given the major alteration to tailings deposition strategy, the works approval period has been extended to expire after 5 years.	N/A

5 Advertisement and consultation table

Date	Event	Comments received/Notes	How comments were taken into consideration
15/12/2014	Application advertised in West Australian (or other relevant newspaper)	None received.	N/A
09/12/2014	Application referred to interested parties listed: Department of Mines and Petroleum	Mining Approval for the extension of an existing Open cut pit at the Bald Hill Tantalite Project, including the processing of ore on M15/400 was granted under Registration ID 45573 on 23 September 2014. The DMP has no further comment on this application.	N/A
19/01/2014	Proponent sent a copy of draft instrument	21/01/2015 AMA advised that the camp proposed is a 42-man camp, not 36-man as originally proposed in the Works Approval Supporting Documentation. AMA advised DER that the footprint of the camp still remains within the tenement boundaries and all the necessary support infrastructure has been allowed for. Department of Health Approval to construct or install an apparatus for the treatment of sewage allows a maximum wastewater volume of 5600L/day (A856537). 04/02/2015 AMA advised that a Regrind Ball Mill (RBM) needs to be included as part of the Processing Plant Circuit to reduce ore material from 1-3 mm to 150 micron (A863956). The RBM is an addition to the infrastructure included in the works approval application.	The Works Approval Application stated that the sewage treatment system will be able to treat approximately 50 m^3 per year. Since this treatment capacity falls below the threshold requiring licensing, the sewage facility has not been added to the Works Approval or to Licence L8830/2014/1. DER has amended the Works Approval summary text from a 36-man camp to a 42-man camp. Since the RBM will be placed on the foundations in the plant, within a bunded area and that the RBM involves a wet-process, DER considers that the potential environmental impacts from the proposed RBM can be adequately managed under this Works Approval. Therefore DER has added the correspondence from AMA on the RBM under construction requirements

Date	Event	Comments received/Notes	How comments were taken into consideration
			of the Works Approval.
14/01/2016	Proponent sent a copy of draft amendment (January 2016 Amendment to install the Rotary Dryer)	No comments received.	Minor cross referencing errors identified by DER and corrected in final version.
22/08/2016	Proponent sent a copy of draft amendment (September 2016 amendment to construct the In-pit TSFs at Boreline and Boreline Extended Pits and associated infrastructure).	No comments received.	N/A

6 Risk Assessment

Note: This matrix is taken from the DER Corporate Policy Statement No. 07 - Operational Risk Management

Table 1: Emissions Risk Matrix

Likelihood	Consequence				
	Insignificant	Minor	Moderate	Major	Severe
Almost Certain	Moderate	High	High	Extreme	Extreme
Likely	Moderate	Moderate	High	High	Extreme
Possible	Low	Moderate	Moderate	High	Extreme
Unlikely	Low	Moderate	Moderate	Moderate	High
Rare	Low	Low	Moderate	Moderate	High

Appendix A

Premises Operation – Boreline and Boreline In-pit TSFs

Alliance Mineral Assets Limited, at their Bald Hill Tantalite Project, is proposing to deposit tailings to two open pits, Boreline Pit and Boreline Extended Pit, located 2 km south of the process plant. Drainage in this area slopes south towards Lake Cowan.

Tailings will be discharged at a rate of approximately 58 tonnes per hour with a solids concentration of 40% by mass. The combined In-pit TSFs will provide storage for about 8 months of process plant operation (Golder 2016a).

The In-pit TSFs will occupy a combined footprint area of approximately 27 400m^2 and store up to 244 500 m^3 of tailings at height RL 272 m. The groundwater table in the vicinity of the TSFs has been estimated at about RL 270 m. Tailings deposition will likely occur below the groundwater table during the initial stages and could progress above the groundwater table at the end of the TSFs' life. Golder (2016a) estimates that the pits will act as sinks for the majority of the duration of their operation. Localised seepage will emanate from the pit once deposition reaches and exceeds the groundwater table at RL 270 m. Golder estimates seepage to be approximately 1m^3 per day at the end of deposition (representing less than 1% of the estimated total outflow).

The key risks for operation of the In-pit TSFs are:

- Tailings seepage to groundwater increasing metal concentrations and creating a groundwater mound which may impact on invertebrate biota associated with Lake Cowan, as the Premises is located adjacent to a surrounding clay pan. Depth to groundwater is between 2 and 6 m below ground level and the gradient is in the direction of Lake Cowan (Lake Cowan is 5 km to the south-west of the Premises);
- Overtopping of the TSFs and release of tailings solids or liquids onto land; and
- Rupture/failure of tailings delivery pipelines or decant return pipelines releasing tailings or tailings decant to land (refer to Figure 2 for indicative pipeline locations.)

Note DER does not risk assess the likelihood of structural failure as it is addressed by geotechnical assessment by DMP under the *Mines Safety and Inspection Act 1994*.

Normal Operation - Tailings seepage

Emission Description

Emission: Seepage into groundwater from tantalite tailings deposited to Boreline Pit and Boreline Extended Pit.

Impact: A short term geochemical leach test on a tailings sample indicated that the metal and metalloid concentrations in the leachate (seepage) are comparable to the background groundwater quality. The pH of the leachate was near-neutral (7.6 – 8.4) with high electrical conductivities (EC) in the more concentrated leachates (at a low liquid/solid ratio of 0.2 L/kg, EC was 9190 mS/m). It is expected that the impact from seepage on groundwater quality will be low (Golder 2016b).

As the pits are expected to act as sinks for the majority of their operational life, seepage is restricted to occurring in the period where the pits are operating above the groundwater table at RL 270 m. Hence mounding of groundwater in the vicinity of the in-pit TSFs is not expected occur.

Controls: The Licensee will install a further 5 groundwater bores surrounding the pits to allow the groundwater quality and depth to be regularly monitored. In the event of adverse monitoring results installation of recovery bores can occur.

Daily inspections of the supernatant pond size and water levels will occur and these requirements will be detailed in a Tailings Operating Manual.

Risk Assessment
Consequence: Minor: water quality of the seepage from the tantalite tailings is consistent with the surrounding groundwater quality. The groundwater quality in the vicinity of the tantalum deposits is hypersaline and naturally elevated in trace metals (notably selenium, cadmium, cobalt, chromium, lithium, boron, nickel amongst others). Background groundwater and seepage also contains soluble radionuclides, at similar concentrations.
Likelihood: Rare: the pits will act as sinks for most of their operational life. Estimated seepage post deposition at RL 270 m is estimated at $1m^3$ per day for the remaining operational period. The total deposition life is estimated at 8 months for both pits.
Risk Rating: Low

Regulatory Controls
Licence condition 3.3.1 will include the new groundwater monitoring bores surrounding the In-Pit TSFs in the ambient groundwater monitoring program. No further regulatory controls are imposed.

Residual Risk
Consequence: Minor
Likelihood: Rare
Risk Rating: Low

Abnormal Operation - Overtopping of In-pit TSFs

Emission Description
Emission: Release of tailings including tailings decant water to land; from overtopping of In-pit TSFs during operations due to a storm event or poor operator control.
Impact: Tantalite tailings are hypersaline and contain trace metals (notably selenium, cadmium, cobalt, chromium, lithium, boron, nickel amongst others) and trace amounts of thorium and uranium (AMAL 2015).
Bald Hill is located within a drainage system at the north-eastern extent of Lake Cowan. A discharge of tailings would impact on the immediate clay pan/saltbush environment but would be unlikely to migrate far given the low processing rates and consequent low tailings deposition volumes.

Controls: Golder (2016a) states that AMAL will complete daily inspections of freeboard at the perimeter embankments of the In-pit TSFs. Daily inspections will also include inspection of the decant system, decant pump operation, supernatant pond water levels and pond areas.

Golder (2016a) completed a freeboard assessment of the pits and calculated that the maximum operating level for the supernatant pond in each pit should not be less than 0.8m below the lowest point of the pit rim. This provides storage for a 1 in 100 AEP (Annual Exceedance Probability) 72 hour storm event which equate to rainfall of 170mm plus the DMP requirement of an additional 0.5 m freeboard. The additional 0.5 m freeboard also makes provision for the 1 in 10 AEP wind run up freeboard allowance of 0.3m.

A contingency plan has been developed for when the In-pit TSFs are operating towards the end of their life, where freeboard cannot meet the capacity for a 1 in 100 AEP 72 hour rainfall event. In the contingency plan excess supernatant will be pumped to other inactive open pits for storage to provide additional freeboard.

Risk Assessment
Consequence: Moderate: a discharge of tailings would result in impact to land and potentially migrate to Salt Creek; potential impact on invertebrate fauna.
Likelihood: Rare: the TSFs have the capacity to contain a 1 in 100 AEP, 72 hour duration rainfall event for most of their operational lives. Operational controls ensure that the decant pond size will be minimised and freeboards and pond sizes inspected daily. These measures reduce the likelihood of the TSFs overtopping.
Risk Rating: Moderate

Regulatory Controls
Works approval condition 1.2.1 requires the In-pit TSFs to be constructed as per the submitted design documents (Golder 2016a). Works approval conditions 2.1.1 and 2.1.2 require a compliance document to be submitted following the In-pit TSFs and related infrastructure construction works.

Prior to operation licence condition 1.3.2 of L8830/2014/1 will be modified to include the In-pit TSFs on the table of containment infrastructure. Accordingly licence condition 1.3.4 will then apply requiring a minimum freeboard for the In-pit TSFs to be maintained. Existing licence condition 1.3.3 requires regular inspections of freeboard of the TSF1 embankments. This condition will be modified to require inspections of the in-pit TSF freeboards.

Residual Risk
Consequence: Moderate
Likelihood: Rare
Risk Rating: Moderate

Abnormal Operation – In-pit TSF tailings delivery and return water pipelines

Emission description
Emission: Discharge of decant water and/or tailings from ruptured/failed HDPE pipelines.

Impact: Potential contamination of surrounding soils and damage to vegetation. Localised alteration of the environment would occur due to the hypersaline nature of the tailings constituents released (including selenium, cadmium, lithium, antimony, uranium and thorium).
Controls: Adequate siting, design and maintenance of pipelines. Golder (2016a) states that daily inspections of pipeline integrity will be completed.

Risk Assessment
Consequence: Minor, bunding will be provided to contain spills and the pipelines have shut off valves installed to allow the flow to be stopped in the event of a pipeline failure.
Likelihood: Unlikely
Risk Rating: Moderate

Regulatory Controls
Works approval condition L1.2.1 requires the Licensee to install the pipelines as per the design (Golder 2016a). The design states that pipelines will be bunded and shut off valves will be installed on each line to control flow.

Licence condition L1.3.1 ensures that tailings and decant water pipelines are either bunded and/or include process controls to shut off flow in the event of a loss of flow.

Licence condition L1.3.3 requires the Licensee to conduct daily inspections of pipeline infrastructure.

Residual Risk
Consequence: Minor
Likelihood: Unlikely
Risk Rating: Moderate

References

ANCOLD (2012) *Guidelines on Tailings Dams Planning, Design, Construction, Operation and Closure*, May 2012

Alliance Mineral Assets Limited (2015) *Supporting Document for amendment to Works Approval 5759/2014*, 1 October 2015.

Department of Minerals and Energy (1999) *Safe Design and Operating Standards for Tailings Storage Facilities*

Golder (2016a) *Bald Hill Tantalum Mine. Works Approval Application - Design Report for In-pit Tailings Disposal at Boreline Pit and Boreline Extended Pit*, Report No. 147645020-022-R-Rev0, May 2016.

Golder (2016b) Technical Memorandum: Geochemical Assessment of Bald Hill Tailings Sample, Document No. 14765020-024-M-Rev0, 5 May 2016.