



Decision Document

Environmental Protection Act 1986, Part V

Licensee: **Kalgoorlie Consolidated Gold Mines Pty Ltd**

Licence: **L6420/1988/14**

Registered office: Kalgoorlie Consolidated Gold Mines Pty Ltd
Black Street
KALGOORLIE WA 6430

ACN: 009 377 619

Premises address: Tenements G26/15, G26/44-78, G26/82-86, G26/99-107, G26/138-150, G26/159, G26/160, G26/165, G26/166, L26/267, M26/39, M26/46, M26/83, M26/86, M26/95, M26/155, M26/266-268, M26/294, M26/308, M26/326, M26/359, M26/373, M26/377, M26/383, M26/405, M26/451, M26/454 and M26/715
KALGOORLIE WA 6430

Issue date: Thursday, 25 September 2014

Commencement date: Monday, 29 September 2014

Expiry date: Saturday, 28 September 2019

Decision

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

Decision Document prepared by: Louise Lavery
Senior Licensing Officer

Decision Document authorised by: Tim Gentle
Delegated Officer



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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 <input type="checkbox"/> New Licence <input type="checkbox"/> Licence amendment <input checked="" type="checkbox"/> Works Approval amendment <input type="checkbox"/>								
Activities that cause the premises to become prescribed premises	<table border="1"> <thead> <tr> <th>Category number(s)</th> <th>Assessed design capacity</th> </tr> </thead> <tbody> <tr> <td>5</td> <td>13 500 000 tonnes per year</td> </tr> <tr> <td>54</td> <td>110m³/day</td> </tr> <tr> <td>63</td> <td>15 000 tonnes per year</td> </tr> </tbody> </table>	Category number(s)	Assessed design capacity	5	13 500 000 tonnes per year	54	110m ³ /day	63	15 000 tonnes per year
	Category number(s)	Assessed design capacity							
	5	13 500 000 tonnes per year							
54	110m ³ /day								
63	15 000 tonnes per year								
Application verified	Date: N/A								
Application fee paid	Date: N/A								
Works Approval has been complied with	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input checked="" type="checkbox"/>								
Compliance Certificate received	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input checked="" type="checkbox"/>								
Commercial-in-confidence claim	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>								
Commercial-in-confidence claim outcome									
Is the proposal a Major Resource Project?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>								



Was the proposal referred to the Environmental Protection Authority (EPA) under Part IV of the <i>Environmental Protection Act 1986</i> ?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Referral decision No: Managed under Part V <input type="checkbox"/> Assessed under Part IV <input checked="" type="checkbox"/>
Is the proposal subject to Ministerial Conditions?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Ministerial statement No:782 EPA Report No:1273
Does the proposal involve a discharge of waste into a designated area (as defined in section 57 of the <i>Environmental Protection Act 1986</i>)?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Department of Water consulted Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Is the Premises within an Environmental Protection Policy (EPP) Area	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Goldfields (Sulfur Dioxide) EPP
Is the Premises subject to any EPP requirements?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	

3 Executive summary of proposal and assessment

Kalgoorlie Consolidated Gold Mines Ltd (KCGM) operates the Fimiston Open pit, Mt Charlotte underground mine, Fimiston mill and Gidji roaster on behalf of joint venture (JV) owners Barrick Australia Pacific Ltd (Barrick) and Newmont Asia Pacific Ltd (Newmont).

The Fimiston mill processes ore from the Fimiston open pit and also recovers gold from loaded carbon from the Gidji roaster. The Fimiston mill consists of crushing, grinding, flotation, carbon-in-leach (CIL) and gold recovery circuits.

The KCGM processing facility is a prescribed premises under Schedule 1 of the *Environmental Protection Regulations 1987* and operates under L6420/1988/14. The processing plant has a licensed throughput capacity of 13,350,000 tonnes of gold ore per year.

KCGM's Fimiston Operations are located on Mining Tenements G26/15, G26/44-78, G26/82-86, G26/99-107, G26/138-150, G26/159, G26/160, G26/165, G26/166, L26/267, M26/39, M26/46, M26/83, M26/86, M26/95, M26/155, M26/266-268, M26/294, M26/308, M26/326, M26/359, M26/373, M26/377, M26/383, M26/405, M26/451, M26/454 and M26/715. The facility is located immediately to the east of the City of Kalgoorlie-Boulder.

The Fimiston Operations consists of:

- Fimiston Open Pit;
- Fimiston Mill;
- Fimiston I Tailings Storage Facility (TSF);
- Fimiston II TSF;
- Kaltails TSF;
- Hydrogen peroxide dosing station; and
- Wastewater treatment plant.

As a result of compliance inspection on 18 and 19 of March 2014, it was noted that the bioremediation area was located outside of the Premises boundary, as defined under schedule 1 of



the Licence. A proponent initiated amendment was carried out to include the bioremediation pad within the Premises boundary.

September 2015 Amendment

A further DER Compliance Inspection of February 2015 has identified that the bioremediation pad is no longer in use, any potential or contaminated soil is transported offsite to a licensed waste operator and that the land subject to the historical bioremediation pad (Paringa TSF) has been reported under the *Contaminated Sites Act 2003*. Consequently Table 1.3.1 has been updated, and conditions 1.3.7 and 1.3.8 removed from the Licence.

Category 54 has been added to the Licence, as the Compliance Inspection also identified that there was an operating wastewater treatment plant discharging treated effluent to the Paringa Facility. Table 1.3.1 has also been updated to reflect the status of the Paringa TSF as a containment facility for wastewater discharge and a monitoring condition has been added to the Licence as condition 3.2.1 to ensure that the quality of the effluent discharged is as per the supporting information submitted to DER.

April 2016 Amendment

The licence has been amended to authorise an increase in the height of the embankments of the Fimiston II TSF in stages to a final height of 60 m (Cells A/B, C and D), following a change to the approved proposal (Attachment 3 of Ministerial Statement 782) granted under Part IV of the Act on 17 June 2015.

Administrative changes have also been made to Table 4.2.1 and errors corrected in Map of Monitoring Locations 3 and Table 2 in Schedule 1. Redundant vegetation monitoring sites have been removed from Table 3 of Schedule 1.

Category 63 has been added to the licence to allow for operation of a class 1 landfill within the Fimiston waste rock dump. Approximately 10 000 tonnes per annum of type 1 construction and demolition waste and 5 000 tonnes per annum of type 2 waste (used tyres) are to be disposed of to the landfill.

The Prescribed Premises boundary has also been expanded to include tenements that cover the Fimiston waste rock dump.



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	L1.2.4, L1.3.1	Normal operation The February 2015 DER Compliance Inspection identified that the bioremediation pad at the Paringa TSF is not in use; all contaminated and potentially contaminated soils are now removed offsite to a licensed waste operator and that the land subject to the historical bioremediation pad has been reported under the <i>Contaminated Sites Act 2003</i> . Consequently previous conditions L1.3.7 and L1.3.8 were removed from the Licence in the September 2015 amendment. Table 1.3.1 in condition L1.3.1 was also updated in September 2015 to delete the reference to the bioremediation pad. DER's assessment and decision making is included as Appendix A.	General provisions of the <i>Environmental Protection Act 1986</i> .
Premises operation	L1.3.1 and L3.2.1	No changes are proposed for these conditions as a result of the amendment.	Application supporting documentation
	L1.3.2 – L1.3.6 L1.3.7, L1.3.8	DER's assessment and decision making is included as Appendix B.	N/A Application supporting documentation
	L1.3.9 – L1.3.12	Premises operation conditions have been applied to the amended Licence to regulate the operation of the landfill. These conditions include requirements for the types of waste permitted, trench size and location, covering regularity, security and recovering of windblown waste. These conditions mirror the requirements of the <i>Environmental Protection (Rural Landfill) Regulations 2002</i> .	Application supporting documentation Application supporting documentation <i>Environmental</i>



DECISION TABLE

Works Approval / Licence section	Condition number W = Works Approval L = Licence	Justification (including risk description & decision methodology where relevant)	Reference documents
Emissions general	L2.1.1	Descriptive limits will be set through the licence and therefore condition regarding recording and investigation of exceedances of limits has been included.	<i>Protection (Rural Landfill) Regulations 2002.</i> General provisions of the <i>Environmental Protection Act 1986.</i> N/A
Point source emissions to air including monitoring	L1.2.3 L2.2.1	The September 2015 amendment identified that there are three existing point source emissions to air that were previously not on the Licence: emissions through stacks from the carbon regeneration kilns 3 and 4 and emissions through a stack from the gold furnace. The Emissions Reduction Project (ERP) is currently in progress at Firmiston to install and commission offgas treatment for all these emission points, and to also add a new carbon regeneration kiln '5' and associated emission point. This work is currently being completed subject to Works Approval W5532/2013/1. Once the work is completed, then Table 2.2.1 will be updated and monitoring will be specified under a new condition in section 3 of the Licence.	Schedule 4 of <i>NSW Protection of the Environment Operations (Clean Air) Regulations 2010</i> Application supporting documentation Works Approval W5532/2013/1 N/A
Point source emissions to surface water including monitoring	N/A	No point source emissions to surface water occur at the Premises and no conditions are included in this section.	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
Point source emissions to groundwater including monitoring	N/A	No point source emissions to groundwater occur at the Premises and no conditions are included in this section.	N/A
Emissions to land including monitoring	N/A	No significant emissions to land occur at the Premises and there are no conditions in this section.	N/A
Fugitive emissions	N/A	Air quality conditions, including dust monitoring, are specified for the Premises under a Part IV <i>Environmental Protection Act 1986</i> approval.	Ministerial Statement 782 Condition 7
Odour	N/A	No significant odour emissions occur at the Premises and there are no conditions included in this section.	N/A
Noise	N/A	Noise conditions are specified for the Premises under a Part IV <i>Environmental Protection Act 1986</i> approval.	Ministerial Statement 782 Conditions 8 and 9
Monitoring general	L3.1.1 - L3.1.5	These conditions provide general requirements for conduct of the monitoring programs and related equipment in section 3 of the Licence. These conditions are unchanged from previous Licence, with the exception of an administrative correction to include reference to AS 5667.	General provisions of the <i>Environmental Protection Act 1986</i>
Monitoring of inputs and outputs	L3.2.1	DER's assessment and decision making is included as Appendix A.	Application supporting documentation
Process monitoring	N/A	No process monitoring conditions are specified.	N/A
Ambient quality	L3.3.1, L3.3.2.	Normal Operations	Memo dated 4/9/15 from



DECISION TABLE

Works Approval / Licence section	Condition number W = Works Approval L = Licence	Justification (including risk description & decision methodology where relevant)	Reference documents
monitoring	L3.3.3, L3.3.4, Schedule 1.	<p>KCGM is required to carry out ground water sampling of the monitoring bores for Standing Water Level (SWL), pH, Total dissolved solids (TDS), Electrical conductivity (EC), Cyanide-free(CN-free), Cyanide-WAD, Cyanide-total under the existing Licence (L6420/1988/14).</p> <p>KCGM has an extensive groundwater management and monitoring program in place which comprises 86 monitoring bores and 129 production or recovery bores around its Fimiston TSFs. Seepage recovery also includes four interception trenches from which water is collected and transferred to the processing plant. At the Kaltails TSF there are 33 monitoring bores, and 22 recovery bores. Current seepage recovery at the Fimiston TSFs is working well, with standing water levels in bores stabilising or deepening.</p> <p>September 2015 Amendment</p> <p>A number of administrative changes have been made to this condition and the accompanying maps and Table 1 and 2 in Schedule 1 to improve clarity. As the reference to production bores was removed in the September 2014 licence re-issue, the accompanying maps will also be deleted from the Licence as part of this amendment.</p> <p>One change has been made to the compliance monitoring bore network for Kaltails TSF to remove MBK51 following advice received from KCGM. This is in response to hydrogeological advice obtained by KCGM that MBK51 was producing anomalous data inconsistent with other monitoring bores. It was noted that this bore is slotted at depth in the palaeochannel sand system and not in the ferricrete system where seepage is located, and hence its removal would not materially effect the ability of monitoring network to monitor seepage.</p> <p>April 2016 Amendment</p> <p>An administrative error identified by KCGM in relation to the map for Kaltails TSF</p>	KCGM to DER



DECISION TABLE

Works Approval / Licence section	Condition number W = Works Approval L = Licence	Justification (including risk description & decision methodology where relevant)	Reference documents
		monitoring bores (Map of monitoring locations 3) and corresponding Table 2 has been corrected.	
Meteorological monitoring	N/A	No meteorological conditions are required for the Licence.	N/A
Improvements	N/A	No improvement conditions are specified.	N/A
Information	L4.1 – L4.3	DER has added conditions (L4.2.3 & L4.2.4) in regard to the submission of a compliance document for each stage of the Fimiston II embankment construction works.	N/A
Licence Duration		Licence expires September 2019. No changes to the licence duration are proposed.	



5 Advertisement and consultation table

Date	Event	Comments received/Notes	How comments were taken into consideration
14/03/2016	Proponent sent a copy of draft instrument	Administrative edits requested. Edit to text in Table 1.3.5 and 1.3.6 in regard to landfill conditions suggested. Suggested removal of text in condition 4.2.3 to allow for ongoing commissioning works consistent with condition 1.3.7. Updated Premises map supplied. Correction made to the number of groundwater monitoring and production bores.	All comments adopted and Premises map updated.
14/03/2016	Draft instrument sent to: <ul style="list-style-type: none">• Office of the Environmental Protection Authority• Department of Mines and Petroleum• Williamstown Residents' Committee• City of Kalgoorlie-Boulder	No comments received.	



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 – Effluent Discharge to Containment Infrastructure

Normal Operations

Emission Description

Emission: Discharge of treated effluent to Paringa Facility, a historic TSF

Impact: A baseline analysis of the treated effluent water quality was provided in the application supporting document as summarised below:

Baseline Water Quality Results	
Parameters	Discharge Point on WWTP
5 day Biochemical Oxygen Demand (BOD)	<2 mg/L
Total Suspended Solids	<5 mg/L
Total Nitrogen	20.7 mg/L
Total Phosphorus	16.5 mg/L
E. coli (cfu/100mL)	2 cfu/100mL

In comparison with the Department of Water's Water Quality Protection Note 22 (WQPN 22) 'Irrigation with nutrient-rich wastewater' the phosphorus concentration above in is excess of the recommended amount (16.5 mg/L as compared to 7.5 mg/L). It is noted that the criteria in WQPN 22 is recommended in relation to preventing eutrophication risk. As the effluent is being discharged to a disturbed site (a historic tailings facility) it is considered that this level of protection is not relevant. It is noted that the BOD level in the discharge is very low. WQPN 22 uses a BOD of 150mg/L limit as a concentration in which further treatment (chemical or biological stabilisation) should be used.

Controls: The wastewater treatment plant has been designed in accordance with AS/NZ 1546.3 and wastewater is treated by a five stage process including:

- Primary solids separation and anaerobic decomposition;
- Aerobic decomposition and oxidation;
- Secondary solids separation and recycle/waste;
- A chlorine disinfection system; and
- Treated effluent pump out.

Minimal infiltration to the TSF is expected due to the annual evaporation rates of approximately 2500 mm per annum. In the highly unlikely event that infiltration through the tailings occurs (via a preferred pathway) any leachate would be captured by the active seepage recovery system in place for the Fimiston TSFs. Seepage is returned to the process water system and recycled through to the Processing Plant.

Risk Assessment

Consequence: Insignificant

Likelihood: Rare

Risk rating: Low

No regulatory controls are proposed for normal operations.



Abnormal Operations

Emission Description

Emission: Discharge of effluent not treated as design to the Paringa (TSF) Facility from poorly performing wastewater treatment plant

Impact: Impact to avifauna if they drink the effluent from poor water quality. Potential for contaminated surface water runoff during large precipitation events (at least 100mm in a 72 hour period).

Controls: The annual evaporation rate for Kalgoorlie is approximately 2500 mm so effluent is likely to evaporate quickly. The Paringa Facility is a historic TSF, approximately 33 years old and was decommissioned in 1987. The deposition to a tailings facility represents a discharge to a contaminated site and hence soil contamination is not a concern. In the eventuality of a large rainfall event, dilution of the effluent will likely reduce any potential impact.

Risk Assessment

Consequence: Insignificant

Likelihood: Unlikely

Risk rating: Low

Regulatory Controls

Quarterly monitoring of the effluent discharge at the Paringa Facility has been prescribed as condition L3.2.1 as a check to ensure that the wastewater treatment facility is operating as designed.

Residual Risk

Consequence: Insignificant

Likelihood: Unlikely

Risk Rating: Low



Appendix B

Premises Operation – Fimiston II Tailings Storage Facility (TSF)

Operation of the Fimiston II TSF, along with operation of the Fimiston I TSF and adjacent Kaltails TSF has resulted in seepage of tailings liquor to the groundwater underlying these facilities, over a long period of time. Consequently localised mounding of groundwater has occurred, raising the standing water levels (SWLs) of groundwater and altering the groundwater quality by increasing its metal concentrations and introducing cyanide into the groundwater.

KCGM, in cooperation with DER, has managed this impact by firstly monitoring the ambient groundwater levels and quality in the groundwater, developing a Seepage and Groundwater Management Plan for the Fimiston TSFs and a separate Seepage and Groundwater Management Plan for Kaltails TSF and then by implementing management strategies as detailed in the Management Plans. As this licence amendment is in relation to increasing the embankment heights for Fimiston II TSF, discussion below is restricted to consideration of this TSF alone.

History

Fimiston II TSF was commissioned in 1991. Initially it comprised an above ground paddock style TSF of two cells A and B. These were later merged to form one cell 'A/B' and two additional cells C and D were added in 1994. The original Notices of Intent (NOI) issued by the then Department of Consumer Employment Protection (now Department of Mines and Petroleum (DMP)) allowed the height of the embankments to 30m for A/B and cell D and to 32 m for Cell C. In 2005 an Addendum to the Notice of Intent was submitted, with the former Department of Industry and Resources (current DMP) allowing an increase in height of embankments to 45m for cell A/B, 44m for cell C and 42.2m for cell D.

The 2005 NOI was referred to the EPA for assessment and the EPA chose not to assess but instead decided the proposal could be managed under Part V of the *Environmental Protection Act 1986*. This decision was the subject of ten appeals and subsequently the first lift (embankment raise) was limited to 3m in height and subject to a Works Approval, with each 3m lift to be subject to a Works Approval.

Groundwater monitoring conducted under the Premises' Part V Licence L6420/1988 detected mounding under the TSFs and also changes to groundwater quality.

In 2004 the then Department of Environment (current DER) requested KCGM complete a Seepage and Groundwater Management Plan for the Fimiston TSFs. This became the Fimiston Seepage and Groundwater Management Plan (FSGMP) as referred to in the Premises' Licence. Under the plan KCGM operates four seepage interception drains to collect seepage from the toe of the Fimiston II TSF and direct seepage to the collection ponds. A series of production bores are operated to dewater the aquifer in what is referred to as the Eastern Borefield and thus lower the standing water levels (SWLs) in the underlying groundwater, as measured in the Premises groundwater monitoring bore network. KCGM has 81 monitoring bores in operation, in addition to 129 production bores for groundwater abstraction.

The FGSMP is a requirement of the Premises' Licence, in addition to annual independent auditing of its performance.

In 2014 KCGM sought amendment of its Ministerial Statement 782 under section 45c of the *Environmental Protection Act 1986* to remove the 45m height restriction on the Fimiston II TSF and increase the height to a total of 60m. The amendment was granted in 17 June 2015, with the authorised extent of the proposal as listed in Table 2 of Attachment 3 to the Ministerial Statement 782



being amended to remove the height restriction, with the note that this aspect is regulated under Part V of the Act (through this Licence).

Normal Operations

Emission Description

Emission: Seepage of tailings liquor from Fimiston II TSF. Tailings liquor has approximate total cyanide concentrations of between 20 mg/L – 60 mg/L with WAD CN concentrations of ~2 – 10 mg/L (Golder Associates 2005).

Impact: Increase in SWLs of groundwater in excess of 4 mbgl such that there is a recordable impact to vegetation health, from groundwater inundation in the root zone (waterlogging).

The seepage assessment conducted for the proposed embankment raise to 60m indicated that there is expected to be a slight progressive increase in the seepage rate for each cell with the increase in height (Golder Associates 2014).

Specifically the model for Cell AB indicated that at the maximum crest height of 405m AHD (60 m) in 2024, water flux (that is, change in seepage) through the base of the TSF will progressively increase to approximately 20% greater than expected for the current licenced height of 45m. For Cell C the model shows that the average maximum water fluxes through the base of the TSF at the final height of 409.5 AHD (60m) in 2024 will be consistent with those previously predicted and no significant change in seepage is anticipated. For Cell D, however, limited geological borehole information was available to complete the model, so estimates of seepage were based on Cells AB and C. The Cell D rate of seepage is expected to slightly increase over its life to 2024 (Golder Associates 2014).

Controls: KCGM has developed and implemented a Fimiston Seepage and Groundwater Management Plan (FSGMP), active since 2004 and subject to annual review as a condition of Licence L6420/1988/14 (see below). Seepage control measures include four interception trenches to recover seepage from the toe of the facility, and installation and operation of 129 groundwater production bores to abstract groundwater in an area adjacent to Fimiston II TSF, known as the Eastern Borefield. Availability of the production bores overall must be above 90% per month according to targets set in the FSGMP.

The FSGMP also references the internal target to maintain the supernatant pond size to less than 15% of the area of each of the cells in order to minimise the hydraulic pressure that can contribute to seepage. This pond size is estimated in a daily visual inspection and also with fortnightly surveys. KCGM also conducts annual vegetation monitoring of areas that could be subject to impacts from rising groundwater levels. This is conducted for KCGM using photographic monitoring and Landscape Function Analysis, which compares vegetation health to a comparable analogue site (control site) so as to detect changes that may be due to influences other than climate.

Performance over the five year period from 2010 to 2014 has shown that KCGM has met targets for utilisation of the production bores, achieved groundwater quality limits as prescribed by the Licence and met requirements to maintain the groundwater levels in excess of 6 mbgl for the area outside of the operational area of the TSFs. A small number of exceedances of the 6 mbgl target have been recorded during this period, but always rectified, with either additional production bores installed and operated or pumping capacities (total amount of groundwater abstracted) in production bores increased (ENVIRON 2014). No exceedances of the 4 mbgl limit imposed by Licence condition L3.3.1 have been recorded during the last two audit periods.

Recent (over the period from quarter 4 2013 to quarter 4 2014) WAD CN levels recorded in groundwater monitoring bores typically range from <0.04 mg/L (below detectable level) to 0.10 mg/L.



For the period 2010 to 2014, no impacts to vegetation have been recorded as a result of groundwater changes. Any changes in health were consistent with changes to analogue sites.

Golder Associates (2014) has indicated that whilst there is a slight increase in the rate of seepage of expected over the life of the embankment raises to a final height of 60m (in 2024), the FSGMP will be able to manage this seepage increase, with the installation of additional production bores as required. The Licensee has given a commitment to continue to operate in accordance with its FSGMP and to increase the number of groundwater production bores where required to maintain the groundwater levels to above 6 mbgl outside the Operating Area of the TSF (Ramboll 2015).

Risk Assessment

Consequence: Moderate

Likelihood: Unlikely; past experience of the use of the FSGMP, combined the annual audit of its performance has proven that seepage recovery is well managed and responsive to changes in groundwater levels.

Risk Rating: Moderate

Regulatory Controls

Under the Premises' Licence L6420/1988/14, the FSGMP is required by condition L1.3.5. An independent audit of the performance of the FSGMP is required by condition L1.3.6. This audit is also required to make recommendations on whether the objectives under the FSGMP are appropriate.

The groundwater monitoring program to assess groundwater levels and groundwater quality is specified by condition L3.3.1. In the event of adverse groundwater monitoring results, management actions are prescribed by condition L3.3.2. Licence condition L3.3.3 also allows the CEO to require the Licensee to take further measures to reduce groundwater levels if required.

Annual vegetation monitoring of the adjacent vegetation is required by condition L3.3.4.

Residual Risk

Consequence: Minor

Likelihood: Unlikely

Risk Rating: Moderate

By applying regulatory controls DER is satisfied that that the risk has been reduced to an acceptable level.

References

Golder Associates (2005) *Addendum to Notice of Intent: Proposed Increase in Storage Capacity of the Fimiston II Tailings Storage Facility at KCGM*, September 2005

ENVIRON (2014) *Fimiston II TSF Embankment Raise Works Approval Application (for W5775/2015/1)*, November 2014

KCGM (2014) *Fimiston Seepage and Groundwater Management Plan*, October 2014 (included as Appendix A to Ramboll Environ 2015)

Peter Clifton and Associates (2014) *Annual Audit Fimiston I and Fimiston II Tailings Storage Facilities Seepage and Groundwater Management Plan*, prepared for Kalgoorlie Consolidated Gold Mines, July 2014



Ramboll Environ (2015) *Fimiston II Tailings Storage Facility Height Increase – Mining Proposal*, September 2015

Emergency Operation

Emission Description

Emission: Release of supernatant liquors or tailings from Fimiston II TSF from overtopping during high rainfall event.

Impact: Tailings solids and liquors containing elevated metals and cyanide released to land and potentially to the adjacent ephemeral creek which drains to Hannan's Lake, located to the south of the Premises. Estimated total cyanide concentration in tailings is ~20 mg/L – 60 mg/L with WAD CN concentrations of ~2 -10 mg/L (Golder Associates, 2005). Potential impact to avifauna from cyanide contamination. Potential to also impact adjacent vegetation and contaminate Hannan's Lake.

Controls: KCGM's TSF Operating Manual imposes a limit for the supernatant pond size to a maximum of 15% of the total surface area of the TSF cell. The freeboard assessment conducted by Golder Associates (2014) indicated that the Fimiston II TSF design at the final height, provides sufficient freeboard to meet the requirements of either:

- 1:1000 Annual Exceedence Probability (AEP) 72 hour duration flood; or
- a 12 hour Probable Maximum Precipitation (PMP) event;

providing the maximum operating pond is kept to the internal 15% limit: equating to 1.51m for cell AB, 1.46 m cell C and 1.39m cell D (Golder Associates, 2014). The freeboard calculation also takes a conservative approach in that the calculation assumes that all precipitation is converted to run-off, with no infiltration and the decant facility is not operating during the rainfall event.

A series of 6 hourly, daily and weekly periodic inspections of the Fimiston II TSF will be conducted by KCGM as detailed in section 8.6 of Golder Associates (2014). The 6 hourly check will include checks of the embankment integrity and the tailings level versus the embankment crest. An annual operational review of the TSF will be carried out by a suitably qualified engineer in accordance with the Department of Minerals and Energy's (now DMP) *Guidelines on the safe design and operating standards for tailings storage* (1999).

Risk Assessment

Consequence: Major

Likelihood: Rare; capacity for a 12 hour PMP event has been allowed for in the design.

Risk Rating: Moderate

Regulatory Controls

Existing licence conditions L1.3.3 (minimum freeboard) and L1.3.4 (requirement to conduct daily visual inspect freeboard and pond sizes of tailings cells) are included on the Licence.

Residual Risk Assessment

Consequence: Major

Likelihood: Rare

Risk Rating: Moderate

References

Australian National Committee on Large Dams (ANCOLD) (2012) *Guidelines on Tailings Dams: Planning, Design, Construction, Operation and Closure*, May 2012.

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Department of Mines and Petroleum (2013) *Tailings Storage Facilities in Western Australia – Code of Practice*, 2013.

Golder Associates (2005) *Addendum to Notice of Intent: Proposed Increase in Storage Capacity of the Fimiston II Tailings Storage Facility at KCGM*, September 2005

Golder Associates (2014) *Fimiston II TSF Height Increase – Tailings Management and Design Analyses*, February 2014

Ramboll Environ (2015) *Fimiston II Tailings Storage Facility Height Increase – Mining Proposal*, September 2015