Government of Western Australia
Department of Water and Environmental Regulation

Amendment Report

Application for a licence amendment

Division 3, Part V *Environmental Protection Act 1986*

Licence Number	L6161/1988/13
Licence Holder	Iluka Resources Ltd
ACN	008 675 018
File Number	DER2016/000794
Premises	Yoganup Extended Mineral Sands Mine Hyder Road THE PLAINS WA 6271 Legal description – Part of mining lease M70/93 and M70/478, within Lot 1 on Diagram 29330, Lot 3 & 4 on Diagram 41602, Lot 3833 on Plan 159644, Lot 4988 on Plan 171968 and part of Boyanup State Forest
Date of Report	7 May 2020
Decision	Amendment granted

Amendment description

This amendment is made pursuant to section 59 of the *Environmental Protection Act 1986* (EP Act) to amend the licence issued under the EP Act for a prescribed premises as set out below. Notice of amendment is hereby given under section 59B(9) of the EP Act.

The guidance statements which have informed the decision made on this amendment are listed in Appendix 1.

Purpose and scope of assessment

This amendment relates to a proposal to dispose a new mineral sands tailings stream at the Yoganup Extended mine site.

Background

'Yoganup Extended' is an inactive heavy mineral sands mine located near Capel on the southern Perth Basin, around 200 km south of Perth. It was active during the period 1972 – 2007, producing heavy mineral concentrate as feed for the licence holder's dry mills. The site is being progressively rehabilitated with the long term aim of achieving final completion criteria for site closure.

Following the cessation of active mining in 2007, the site has continued to be used as a backfill site for wastes arising from the processing of minerals remote from the site and other mining-related wastes from process, maintenance, rehabilitation, decontamination and decommissioning activities where radioactive materials have been produced, stored, used or dispersed. These materials are being deposited within part of the main pit void, also known as the '90-foot pit', as part of site rehabilitation.

Proposed amendment

The licence holder is seeking approval to dispose of a new mineral sands waste stream, derived from the processing of minerals sourced from its current active mine at Cataby, around 150 km north of Perth.

The proposal involves disposing around 14,000 tonnes per year of Cataby non-conductor tailings into the 90-foot pit over the next 10 or so years (140,000 tonnes). The approximate area of deposition is around 0.7 to 0.9 hectares (ha); the licence holder does not expect the infilling of the new waste stream to have a significant effect on the geometry of the pit and associated hydrological processes.

The Cataby non-conductor tailings are a waste product of physical separation using magnets and electrostatic methods only. Waste characterisation and a source term assessment conducted for the Cataby tailings material (CDM Smith, 2019) indicates the material is very similar to historical wastes deposited within the 90-foot pit.

Based on hydrogeological and geochemical conceptualisation of the 90-foot pit and aquifer using available data, CDM Smith (2019) considers there to be a low risk of impacts based on the likelihood that any solutes from the Cataby tailings material would need to leach into the pit at a greater rate than current deposits, migrate out of the pit and then pass through an aquifer with strong attenuation capacity, and move far enough to reach a receptor. And that the existing groundwater monitoring network is designed and well placed to capture the flow path through the pit in multiple aquifers.

Modelling data

Human health and ecological risk assessment

The licence holder has conducted a human health and ecological risk assessment (HHERA) to support the application, which assesses the potential impacts associated with the disposal of historical wastes and the proposed disposal of Cataby tailings material into the 90-foot pit (CDM Smith, 2019).

Chemicals of interest were categorised from previous environmental assessments and waste characterisation reports, with contaminants of potential concern shortlisted through a screening process. An estimated groundwater concentration was then made within the groundwater study area (defined by the model domain of the predictive groundwater model developed for the project) for each contaminant of potential concern, based on groundwater flow and conservative mass transport modelling, combined with an estimate of the release rate for each contaminant from the 90-foot pit.

Estimates were then determined for a 'reasonable' exposure scenario (i.e. reasonable worst-case estimate) and an 'extreme' exposure scenario (exceeds worst-case modelling) for each contaminant of potential concern.

Results

For the Cataby tailings material, the contaminants of potential concern include aluminium, boron, cerium, chromium, lanthanum, uranium and zinc.

The findings of the HHERA indicate that potential impacts are low and acceptable for most contaminants of interest and beneficial uses of groundwater. For ecosystems, zinc is rated as medium risk, indicating the risk is acceptable, generally subject to controls such as a groundwater monitoring program.

Key findings:

1. The risk of depositing Cataby NCT material into the 90-foot pit, appears to be acceptable with additional groundwater monitoring, management and contingency measures in place.
2. The licence holder has submitted a HHERA (CDM Smith, 2019) which indicates there is low risk of groundwater impacts from historically deposited wastes.

Risk assessment

The below table describes the risk events associated with the amendments consistent with the *Guidance Statement: Risk Assessments*. The table identifies whether the emissions present a material risk to public health or the environment, requiring regulatory controls.

Risk assessment

Risk Event				Consequence rating[1]	Likelihood rating[1]	Risk[1]	Reasoning	Regulatory controls (refer to conditions of the granted instrument)
Source/ Activities	**Potential emissions**	**Potential receptors, pathway and impact**	**Licence holder controls**					
PROPOSED AMENDMENT								
Disposal of Cataby NCT within the 90-foot pit	Release of contaminants into groundwater	Dairy located around 1 km downgradient of the 90-foot pit, other beneficial uses of groundwater within 1-5 km of the pit Migration of leached contaminants through groundwater pathways, causing contamination of potable water supplies	Ongoing chemical characterisation (total and leachable) content Risk-based in-pit water quality and groundwater monitoring Management plant to include trigger levels and contingency planning	Mid-level on-site impacts, low level off-site impacts on local scale **Moderate**	Will probably not occur in most circumstances **Unlikely**	**Medium** Acceptable, subject to regulatory controls	Based on the relatively small amount of Cataby NCT material that would be backfilled and the separation to receptors in the immediate vicinity of the pit, the proposal is likely to be acceptable providing sufficient monitoring and contingency measures are put in place to protect groundwater quality.	- Increased monitoring of pH in pit water to monthly; - New bores around pit added to gw monitoring suite (YX025, 026, 028, 029); - Addition of major ions and metals/metalloids (including radium) to routine monitoring suite; - Monitoring of water quality within Scott's Dam as off-site receptor

Note 1: Consequence ratings, likelihood ratings and risk descriptions are detailed in the Guidance Statement: Risk Assessments (DER, 2017a).

Decision

The delegated officer has determined the proposal to dispose of Cataby NCT within the 90-foot pit is unlikely to result in a material change to the overall risk profile of the site.

This determination is based on the following:

- the relatively small amount of Cataby tailings material that would be backfilled into the pit, compared to historical tailings disposal;
- the Cataby tailings material having similar characteristics to historical tailings already deposited within the pit;
- current separation to downgradient groundwater receptors (low risk of migration given aquifer properties); and
- existing groundwater monitoring that will enable early detection of changes in groundwater quality.

To address the potential for immediate impacts to groundwater that may result from the proposal, and to enable proactive management to protect downgradient groundwater receptors, the following controls have been added to the existing licence:

- increased monitoring of pH within the 90-foot pit to monthly, to enable control of disequilibrium if pH drops below 5.5. To ensure the pH records are representative of the entire pit, this control requires adequate sampling at different locations and depths within the pit to demonstrate any potential variation in both a horizontal and vertical direction;
- increased monitoring of pH within existing groundwater bores to monthly;
- new bores added to the groundwater monitoring program (YXP025 – 029);
- the existing licence requires monitoring of physical parameters (including acidity, alkalinity and major ions) and metals and metalloids only in the event the pH of pit water drops below 4.5 – monitoring of these parameters in bores in the vicinity of the pit is now required on a quarterly and annual basis, respectively;
- monitoring of radium isotopes added to the monitoring suite for bores in proximity to the 90-foot pit; and
- monitoring of water quality within Scott's Dam as a downgradient, off-site receptor.

Key decision points:

1. The backfilling of Cataby NCT material into the 90-foot pit is unlikely to result in a material change to the overall risk profile of the site.

   As such, the delegated officer has determined not to impose any significant changes as part of this amendment.

Consolidation

As part of this amendment package DWER has consolidated the licence by incorporating changes made to the 90-foot pit disposal area in a previous amendment notice. No additional assessment has been conducted as part of this consolidation. The decision relating to the consolidated licence is published in amendment notice 1, and in accordance with section 59(1) of the EP Act, incorporating these changes into a single amendment licence is not appealable.

In consolidating the licence, the CEO has:

- updated the format and appearance of the licence;
- revised condition numbers, and removed any redundant conditions and realigned condition numbers for numerical consistency; and
- corrected clerical mistakes and unintentional errors.

The previously issued amendment notice will remain on the DWER website for future reference and will act as a record of DWER's decision making.

Consultation

Discussion of HHERA

A meeting was held on 31 March 2020 where CDM Smith and Jacobs, on behalf of the licence holder, presented the findings of the HHERA and an independent peer review (by Jacobs) to representatives of DWER and DMIRS. The main points of discussion included the analyses of radium isotopes, the risk of leaching (of radium) and potential impacts to human and environmental receptors, and environmental factors (other than acidic conditions) that could lead to increased risk of mobilisation, e.g. increasing salinity (caused by evapoconcentration) and anoxic conditions.

At the conclusion of the meeting the licence holder sought feedback on the HHERA and whether further information was required. Both departments considered the HHERA presented a substantial body of work, and that additional time would be required in order to provide an informed and collaborative response.

Licence holder review

The licence holder was provided with drafts of the revised licence and this amendment report on 16 April 2020. A summary of comments and DWER's response is provided in Appendix 2.

Conclusion

This assessment of the risks of activities on the premises has been undertaken with due consideration of a number of factors, including the documents and policies specified in this amendment report (summarised in Appendix 1).

Based on this assessment, it has been determined that a licence amendment will be granted, subject to conditions commensurate with the determined controls and necessary for administration and reporting requirements.

Summary of amendments

The below table provides a summary of the proposed amendments and will act as a record of implemented changes. All proposed changes have been incorporated into the revised licence as part of the amendment process.

Reference	Proposed amendments
Cover page	Restructured to clearly indicate what prescribed activities have been risk assessed.
Registered business address	Updated to current business address – 240 St Georges Tce.
Premises details	Premises road name changed from 'Cain Rd' to 'Hyder Rd', which is the main access to the 90-foot pit.
Introduction	Previous 'introduction' section has been removed, consistent with current DWER licence template. This guidance is now available in DWER's *Guide to Licensing* (June 2019).
Interpretation	Updated, consistent with current DWER template (based on recent legal advice). Replaces existing conditions 1.1.3 and 1.1.4.
Table 1	Provision for disposal of Cataby NCT added.
2.1.1	Redundant condition, has been removed.
Table 2 – Point source emissions to surface water	Emission point reference changed to align with licence holder terminology.
Table 3 – Emission limits to surface water	Monitoring point reference changed to align with licence holder terminology.

Table 4 – Emissions to surface water monitoring	Monitoring point reference changed to align with licence holder terminology.
Table 5 – Process monitoring	Requirement to monitor pit water quality moved to Table 6.
Table 6 – surface water monitoring	Monitoring point references changed to align with licence holder terminology.
	Requirement to monitor pit water quality added.
	Requirement to monitor water quality within Scott's Dam added.
	Requirement to monitor pH of pit water increased to monthly.
	Requirement for sampling of pit water to demonstrate variation in both a horizontal and vertical direction across the pit.
Table 3.4.2	Previous requirement to monitor total acidity, total alkalinity, major ions, metals and metalloids in selected bores if pit water drops below pH 4.5 replaced by routine monitoring of these parameters (see Table 7).
Table 7 – Groundwater monitoring	Monitoring point references changed to align with licence holder terminology.
	Additional bores in vicinity of 90-foot pit added to monitoring program – YX025 – 029.
	Requirement to monitor pH increased to monthly in all bores.
	Requirement to monitor total acidity, total alkalinity, major ions (quarterly), metals and metalloids (annually) in all bores surrounding the 90-foot pit.
	Requirement to monitor radium isotopes (six-monthly) in two background bores (YX028, 029) and downgradient bores (YX024, 025) from the 90-foot pit.
Condition 13	Replaces existing condition 4.1.2 for annual audit compliance reports.
4.2.3, 4.3.1	Redundant conditions, have been removed (duplicates existing part of EP Act)
Definitions	Definition for 'CEO' updated.
	Definitions removed: 'Schedule 1', 'Schedule 2' – conditions which contained these references have been removed as part of this amendment.
	Definitions replaced: 'Act' with 'EP Act', 'Licensee' with 'licence holder'.
	Definitions added: 'AACR', 'books', 'condition', 'Cataby NCT', 'Department', 'discharge', 'emission', 'EP Regulations', 'prescribed premises'.

Tim Gentle

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Date: 2020.05.07 15:31:06 +08'00'

Tim Gentle
MANAGER, RESOURCE INDUSTRIES
REGULATORY SERVICES

An officer delegated by the CEO under section 20 of the EP Act

Appendix 1: Key documents

Document title	In text ref	Availability
Iluka, November 2019. Yoganup Extended Mineral Sands Mine – Proposed amendments to Licence L6161/1988/13	Application	DWER records (DWERDT262113)
CDM Smith, November 2019. Human Health and Ecological Risk Assessment, Radioactive Waste Disposal Pit (90-foot Pit), Yoganup Extended Mine, Western Australia. Prepared for Iluka Resources by CDM Smith.	CDM Smith, 2019	DWER records (Part 1 - A1849627) DWER records (Part 2 - A1849628)
DER, July 2015. *Guidance Statement: Regulatory principles.* Department of Environment Regulation, Perth.	DER, 2015a	accessed at www.der.wa.gov.au
DER, October 2015. *Guidance Statement: Setting Conditions.* Department of Environment Regulation, Perth.	DER, 2015b	
DER, February 2017. *Guidance Statement: Risk Assessments*. Department of Environment Regulation, Perth.	DER, 2017a	
DER, February 2017. *Guidance Statement: Decision Making*. Department of Environment Regulation, Perth.	DER, 2017b	
DWER, June 2019. *Industry Regulation Guide to Licensing*. Department of Water and Environmental Regulation, Perth.	DWER, 2019	
Licence L6161/1988/13 – Yoganup Extended Mineral Sands Mine.	Existing licence	

Appendix 2: Summary of comments

Section	Licence holder comment	DWER response
General	We request that any future license amendment documentation comes with clear tracked changes.	Noted.
General	Further to our meeting on 23rd April, Iluka concur with proposal to remove technical comment on the HHERA (Human Health and Ecological Risk Assessment) pending further consultation.	Noted and removed. For discussion separate to this application.
General	We request a more targeted approach to the radium monitoring rather than a blanket imposition of most nearby monitoring bores to 90ft Pit. This is partly because of the relatively expensive analysis of radium samples ($340ea) and a more targeted, risk based approach is requested. This is further discussed in point 10. As recommended by the HHERA Iluka is committed to development of a risk based monitoring program which is currently being prepared by specialist consultants.	Noted, upon advice from DMIRS, monitoring has been amended to reflect the two upgradient and two downgradient bores, closest to the pit.
General	Iluka request that consideration be given to a DWER approved Quality Assurance Plan (QAP) for Mineral Separation Plant (MSP) tailings going to 90ft Pit. DWER may also have some ideas allowing a more flexible license? As suggested by DWER, compliance to CT1 may not be suitable and currently provides limited operational flexibility for MSP tailings. For example if we were to maximize ilmenite production at present the Cataby NCT would already be altered and be subject to another License Amendment. Continuing to run the plant to the Cataby NCT specification is currently wasting valuable ilmenite resource estimated at around $1m / annum lost.	For consideration separate to this application.
General	Summary of Amendments table (page 8) is not an accurate representation of the amendments proposed within the draft amended license.	Noted, table has been updated.
General	Appendix 1, the first document listed refers to Keysbrook Minerals Sands Mine, please change to Yoganup Extended Mineral Sands Mine	Noted, corrected.
Interpretation	The inclusion of new text to the Interpretation section has not been highlighted within the draft Licence nor detailed adequately within the Summary of Amendments table. For example, t*he words 'including', 'includes' and 'include' in conditions mean "including but not limited to", and similar, as appropriate.*	The licence format has been updated to the current DWER licence template, where interpretation text supersedes previous licences.
Table 1	Iluka request that be applicable to Inert Waste Type 1 only. DWER has indicated that landfill guidelines are not appropriate for this site and it is inferred that they are not appropriate to define MSP Final tailings. Iluka agree with this view in that where CT1 criteria requires a leach test, and where a contaminant has no applicable value, the Landfill Waste Classification and Waste Definitions guideline states that the Department is to provide clarification on a case by case basis.	For consideration separate to this application.

	Hence the need for a Licence amendment for the Cataby Non-conductor tail. Iluka request consideration of an approved Quality Assurance Plan for MSP final tailings to replace reference to CT1. If this will result in delays to the approval then request future consideration.	
Condition 3	Replace the text '*greater than*" to "*outside the limits specified*	Text has been reverted.
Condition 5(c)	6-monthly monitoring is to be undertaken at least 4 months apart, existing license conditions is 5 months. This change is not detailed within the Summary of Amendments table.	Text has been reverted
Table 4	Units of measurement for EC, TSS and metals included g/day in the current license. The g/day has been removed from the amended draft license with no explanation or reference within the Summary of Amendments table. Iluka request the units of measurement for EC to be in uS/cm.	Text has been reverted
Table 6	Infers that spatial distribution sampling is to apply to the 90-foot Pit and Scott's dam, however the Summary of Amendments tables refers to the spatial distribution sampling applying to the Pit only. Is it intended that Scott's dam be included for "spatial distribution? It has a maximum depth of 2 m. Iluka request that any reference to spatial distribution sampling of Scott's Dam be removed from the draft Licence	Spatial distribution sampling is only required for the 90-foot pit. Updated to reflect.
	Footnote 3, request removal of the word "entire". Spatial distribution monitoring should be sufficient to provide representative variation in horizontal and vertical direction across the pit.	Word removed.
Table 7	Please note the following in regards to monitoring points: - Please clarify the monitoring point depth specifications for the monitoring points. Some locations have a shallow and deep bores (being 18, 17, 13, 12, 11, 10). Or both shallow and deep bores? - Some bores can be inaccessible in wet months due to ground conditions and subject to landholder access. All efforts are made to access. Please add a note stating "subject to accessibility". - YXP009 was decommissioned in 2006, please remove from license; - YXP012 is no longer viable due damage, please remove from license. This bore has been replaced by YXP011 and YXP029.	Monitoring is required in both nested bores where available. All bores are required to be monitored at the stated frequency. Should bores not be accessible, this will need to be justified as a potential non-compliance. Noted – bore YXP09 removed. Noted – bore YXP012 removed
	Summary of amendments tables states "*Requirement to monitor total acidity, total alkalinity, major ions, metals and metalloids (including radium isotopes) annually in all bores surrounding the 90-foot pit*." This is inconsistent with changes made to Table 7 in the draft license, being: - Total acidity, total alkalinity, major ions has been requested quarterly;	Noted, table updated to reflect changes.

	- Radium 226 and Radium 228 has been requested six-monthly.	
	The addition of Radium-226 and Radium-228 at 11 monitoring points (and possibly shallow and deep piezos) is a costly imposition and most likely excessive to confirm that radium still isn't an issue. We understand this request for more radium monitoring has come from DMIRS but it appears to be a "blanket" piezometer approach rather than risk based logical approach taking into consideration groundwater movement (upstream and downstream), proximity to the pit and other piezometers. With radium analysis at $340 per sample this condition could add around $10k per annum to an already comprehensive monitoring program and is not considered to be commensurate with the risk, keeping in mind there has been no issues with radium to date.	See above comment. Upon advice from DMIRS, monitoring has been amended to reflect the two upgradient and two downgradient bores, closest to the pit.
	Please consider regular radium monitoring for indicator piezometers immediately downstream and in close proximity of the pit. If radium levels rise, then more regular testing of upstream and downstream can and should occur.	
	We also request that when the risk based groundwater monitoring is completed it be considered to supersede the current. We are currently working on the scope of this work with suitable consultants	Noted.
Definitions	Iluka wish to make note of the following points: - Cataby NCT – Cataby non-conductor tails. Iluka offer the following addition: - Non-conductor Tails is an MSP final tails and defined. - Inert Waste Type 1, please reinstate the full definition as per the current license. - MSP final tailings - Definition from the existing license has been amended. - Draft amendment license: means mineral separation plant final tailing, being a combination of reject mags and non-mags sourced from the North Capel dry mill. - Current Licence: means Mineral Separation Plant final tailings, being a combination of reject mags and non-mags sourced from the company's licensed mineral separation plants.	Definition added for 'Cataby NCT' acronym Definition for 'MSP final tailings' amended to reflect Cataby NCT Definitions for 'Inert waste' and 'MSP final tailings' reverted.
Monitoring locations	YEDP location is incorrect. YEDP is located further north along Elgin drain.	Corrected.

Attachment 1: Amended licence L6161/1988/13