



<b>Licence Number</b>	L8008/2004/3
<b>Licence Holder</b>	Ravensthorpe Nickel Operations Pty Ltd
<b>ACN</b>	092 506 584
<b>File Number:</b>	DER2014/000631
<b>Premises</b>	Ravensthorpe Nickel Operations Mining tenements M74/114, M74/115, M74/116, M74/123, M74/144, M74/145, M74/173, M74/174, M74/175. RAVENSTHORPE WA 6346
<b>Date of Amendment</b>	27 September 2019

## Amendment

The Chief Executive Officer (CEO) of the Department of Water and Environmental Regulation (DWER) has amended the above Licence in accordance with section 59 of the *Environmental Protection Act 1986* (EP Act), as set out in this Amendment Notice. This Amendment Notice constitutes written notice of the amendment in accordance with section 59B(9) of the EP Act.

**Alana Kidd**

**Manager Licensing (Resource Industries)**

an officer delegated under section 20 of the Environmental Protection Act 1986 (WA)

## 1. Amendment notice

This amendment notice is made pursuant to section 59 of the *Environmental Protection Act* 1986 (EP Act) to amend the Licence (L8008/2004/3) issued under the EP Act for a prescribed premises as set out below. This notice of amendment is given under section 59B(9) of the EP Act.

This notice is limited only to an amendment of conditions to reflect monitoring and reporting requirements during operational and non-operational periods, inclusion of definitions, and the addition of an improvement condition.

This amendment has been informed by DWER's Regulatory Framework which is available at <https://www.der.wa.gov.au/our-work/regulatory-framework>.

## 2. Amendment description

The Licence Holder lodged an application for a licence amendment on 13 April 2018 following the premises going into care and maintenance in October 2017. The application relates to changes to monitoring, reporting and notification requirements during non-operational periods.

## 3. Decision

The Delegated Officer considers that the licence amendment should be granted. The amendment alters the monitoring, reporting and notification requirements by specifying what is required during operational and non-operational periods.

The ongoing inspection and monitoring activities required during care and maintenance are considered appropriate to address the risk of emissions and discharges during this period. The Licence Holder proposed frequency for inspections of infrastructure and monitoring of ambient air quality have been accepted and are incorporated into the amendment.

The Licence Holder requested that sections 1.3.5, 2.2, 2.3, and 3.1.1(b) of the Licence be removed. These sections do not specify inspection or monitoring activities and have not been removed as they are relevant for the resumption of operations and do not place operational requirements on the Licence Holder during care and maintenance periods.

To support the separation of requirements for operational and non-operational periods, the Delegated Officer has included a definition for 'operations' and 'care and maintenance' to define each operational status.

### 3.1 Delegated Officer derived amendments

In addition to the changes to the Licence as requested by the Licence Holder, the Delegated Officer has amended the Licence requirements specific to Dam 2. The amendment includes an improvement condition and submission of a report that must be addressed prior to the recommencement of operations. The reasoning for the inclusion of the improvement condition are provided below.

## **Incident 10 April 2018 – Discharge of water from Dam 2**

The Licence Holder verbally notified DWER on 10 April 2018 of an incident involving the uncontrolled release of mine impacted water from Dam 2 to the environment. A formal notification in accordance with s 72(1) of the EP Act was provided on 8 May 2018. The notification indicated that the incident was the likely cause of vegetation decline and death downstream of Dam 2.

DWER is currently investigating this incident.

## **Preliminary and Detailed Site Investigation 18 September 2018**

Following the incident identified on 10 April 2018, the Licence Holder engaged Coffey Services Australia Pty Ltd to undertake a Preliminary and Detailed Site Investigation (PDSI) to assess the probable cause of the vegetation decline and deaths.

The PDSI concluded that the likely cause of the vegetation decline and deaths was the seepage of and/or overflow of saline water from Dam 2. The impacted areas are located adjacent to several tributaries which feed into Bandalup Creek, one of which originates near the base of Halleys waste dump. The extent of the areas of vegetation death and decline have not been fully delineated to date. Figure 1 below shows Dam 2 in relation to Halleys Pit, Halleys waste dump, tributaries, Bandalup Creek and the investigation areas considered in the PDSI.

The PDSI identified that in addition to saline mine water, Dam 2 receives seepage water from Halleys waste dump. The water seeps from the northern face of the unvegetated portion of Halleys waste dump, flowing on surface soils and discharging into Dam 2.

Halleys waste dump contains reject ore from the beneficiation plant that is exposed to magnesium sulphate enriched process water. Sampling of the water within Dam 2 on 22 May 2018 confirmed that Dam 2 contained saline water with aluminium, chromium, nickel, magnesium, calcium, potassium, sodium, chloride and sulphate detected. The PDSI noted a strong correlation in the water chemistry in Dam 2 and the surface water located within the areas of vegetation decline and deaths (investigation areas), indicating that the water contained within Dam 2 had entered the environment.

The levels of aluminium, chromium and nickel in Dam 2 exceed the consequence criteria based on the Australian Water Quality Guidelines for Fresh and Marine Water Quality ANZECC & ARMCANZ (2000) for slightly–moderately disturbed ecosystems (95% protection level trigger values). The levels of the consequence criteria are exceeded by:

- 1.4x for aluminium;
- 9x for chromium; and
- 7x for nickel.

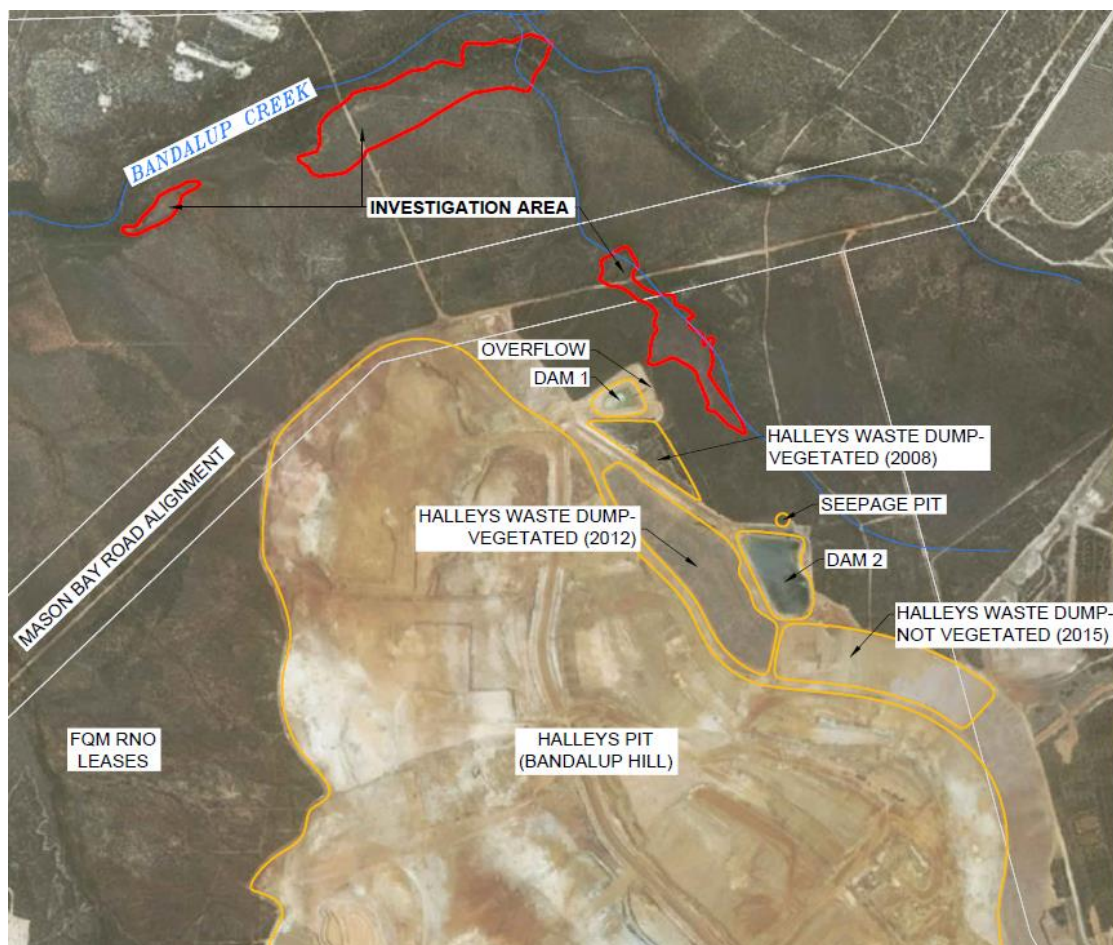
The water emissions from Dam 2 have resulted in contamination and death and decline of vegetation within and surrounding the premises. The levels of metals in surface water samples taken from the areas with vegetation decline and deaths showed significant exceedances of the 95% protection level trigger values with exceedances of aluminum up to 165x, manganese up to 1.6x and nickel up to 9x.

It is highlighted in the PDSI that a permeability issue was identified at Dam 2 in 2013 which was allowing seepage water to escape. In an attempt to capture the seepage, a pit was excavated along the northern boundary of Dam 2 to allow it to be pumped back into Dam 2 on an as needs basis. The photo log provided with the PDSI indicates that the vegetation in the immediate vicinity of the seepage collection pit exhibited signs of stress.

In an email to DWER on 27 September 2018, the Licence Holder committed to undertake actions in 2019 to meet the recommendations of the PDSI which included:

- Engage a third party to undertake a geotechnical investigation to understand the source of the Halleys waste dump seepage and report on findings with recommendations;
- Engage third party to review dam design and make recommendations; and
- Develop a Site Management Plan to be finalised when the first two actions are completed and recommendations from those considered.

To date, DWER is not aware of what actions have been undertaken.



**Figure 1: Dam 2 location in relation to Halleys waste dump, tributaries, Bandalup Creek and areas of vegetation death and decline**

### 3.1.2 Risk Rating: Containment infrastructure - Dam 2

Dam 2, referred to in the Licence as 'Mine Drainage- North' – 'Map Reference 25' was purpose built in 2007 to capture surface water run off originating from Halleys Pit. The captured water is used for dust suppression activities at the pit during operations.

The Licence permits the storage of saline water in Dam 2. It specifies that the clay liner must be maintained in an intact and unperforated state with a seepage rate of  $10^{-9}$ m/s or less and a freeboard of at least 800mm maintained.

DWER Officers attended the Premises on 25 July 2019. Vegetation stress/death was noted by Officers in the vicinity of Dam 2.

The information provided within the PDSI indicates that Dam 2:

- is not fit for purpose; and
- is not being used for the purposes it was intended for.

The PDSI indicates that rather than solely storing surface water runoff (saline water), Dam 2 is receiving water enriched with magnesium sulphate and other analytes associated with beneficiation plant reject ore material.

The PDSI indicates that the lining material of Dam 2 is likely compromised, with historical and ongoing seepage from the embankment wall captured in a purpose built seepage capture drain (pit). Seepage through the embankment wall, along with the potential of overflow from Dam 2 is indicated as the primary way in which the water from Dam 2 was released to the environment. The state of the Dam 2 clay lining and the permeability it is achieving is not determined.

The quantity and velocity of the seepage through the embankment wall is not known and there is potential that the seepage has compromised the soil material of the embankment (structural stability).

Based on the information provided in the PDSI and visual observations from the site visit, the risk rating has been determined for the sensitive receptors located nearby to Dam 2. The risk rating was determined in accordance with the risk rating matrix and risk criteria set out *Guidance Statement: Risk Assessments*.

The risk to the Bandalup Creek and associated tributaries and surrounding vegetation, has been assessed as extreme. This is due to the consequence being assessed as severe and the likelihood being considered possible/likely based on the following risk criteria.

The consequence of the discharge from Dam 2 to the environment is considered to be severe. Sampling confirmed that specific consequence criteria (for environment) have been significantly exceeded at the receptor. In accordance with the *Guidance Statement: Environmental Siting*, the Bandalup Creek system is defined as an area of high conservation value or special significance. There is potential that the discharge will have mid to long term or permanent impact on the affected areas. The discharge appears to have had off-site impacts of a high level, on a local scale. DWER's mapping system indicates the presence of threatened priority flora and threatened fauna within 150m of the tributary closest to Dam 2.

The likelihood of the risk event occurring again is considered to be possible/likely. The compromised integrity of the liner and receipt of surface run off from sources the Dam was not designed to capture (Halley's waste dump run off) indicate that Dam 2 is likely to release mine impacted water to the environment. The creek system is in close proximity and down gradient of Dam 2.

### **Licence requirements for Dam 2**

This risk to the environment from Dam 2 is unacceptable and cannot not be tolerated.

The Licence Holder must demonstrate how they will manage the risk posed by Dam 2. The requirement to investigate and report on the integrity and use of the dam has therefore been added to the Licence as an improvement condition.

## 4. Amendment history

Table 1 provides the amendment history for L8008/2004/3 since 2017.

**Table 1: L8008/2004/3 amendments**

Instrument	Issued	Amendment
L8008/2004/3	03/02/2017	Amendment Notice 1 – Licence Holder initiated Use of the limonite pond of the Sands Reject Storage Facility as an additional evaporation pond for tailings decant water
L8008/2004/3	27/09/2019	Amendment Notice 2 – Licence Holder initiated <ul style="list-style-type: none"> <li>• Definition of monitoring, reporting and notification requirements for operational and non-operational periods.</li> <li>• Requirement for investigation into integrity and use of Dam 2 ('Mine Drainage- North' – 'Map Reference 25').</li> </ul>

## 5. Licence Holder's comments

The Licence Holder was provided with the draft Amendment Notice 2 on 8 August 2019. Comments received from the Licence Holder have been considered by the Delegated Officer as shown in Appendix 2.

## 6. Amendment

1. Definitions of the Licence are amended by the insertion of the bold text shown in underline below:

**'Operation's' means the period during mining operations as defined in the Mining Act 1978.**

**'Care and maintenance' means the period during the suspension of mining operations as defined in the Mining Act 1978.**

2. Tables 1.3.2, 3.2.1, 3.3.1, 3.4.1, 3.5.1, 4.2.1, and 4.3.1 of the Licence are amended by the deletion of the text shown in strikethrough below and the insertion of the bold text shown in underline below:

Table 1.3.2

<b>Table 1.3.2: Inspection of infrastructure</b>		
<b>Scope of inspection</b>	<b>Type of inspection</b>	<b>Frequency of inspection</b>
<del>Tailings pipelines</del>	<del>Visual integrity</del>	<del>Daily</del> <b><u>during operations</u></b>
<del>Return water lines</del>	<del>Visual integrity</del>	
<del>Embankment freeboard</del>	<del>Visual to confirm required freeboard capacity is available</del>	<b><u>Weekly during care and maintenance</u></b>
<del>Tailings decant/supernatant ponds</del>	<del>Visual assessment of pond size and position</del>	<del>Daily</del>
<del>Evaporation ponds/ wastewater treatment ponds/ buffer ponds</del>	<del>Visual assessment of freeboard</del>	<del>Daily</del>

Table 3.2.1

<b>Table 3.2.1: Monitoring of point source emissions to air</b>					
<b>Emission point reference</b>	<b>Parameter</b>	<b>Units<sup>1</sup></b>	<b>Averaging Period</b>	<b>Frequency<sup>2</sup></b>	<b>Method</b>
A1 (Acid Plant Main Stack)	Volumetric flowrate	Nm <sup>3</sup> /s	60 minute	Six monthly <u>during operations</u>	USEPA Method 2
	Sulfuric acid mist (H <sub>2</sub> SO <sub>4</sub> )	kg (expressed as SO <sub>3</sub> )/ tonne of 100% acid or equivalent	mg/m <sup>3</sup>	g/s <u>during operations</u>	USEPA Method 6 <sub>3</sub>
	Sulfur dioxide (SO <sub>2</sub> )	kg/tonne of 100% acid or equivalent	mg/m <sup>3</sup>	g/s <u>during operations</u>	USEPA Method 6

Table 3.3.1

<b>Table 3.3.1: Monitoring of emissions to land</b>				
<b>Emission point reference</b>	<b>Parameter</b>	<b>Units</b>	<b>Averaging Period</b>	<b>Frequency</b>
WWTP pond	Volumetric flow rate (cumulative)	m <sup>3</sup>	Monthly	Continuous <u>during operations</u>
	pH		Spot sample	Monthly <u>during operations</u>
	Total suspended solids (TSS)	mg/L		
	Total dissolved solids (TDS)	mg/L		
	Biochemical Oxygen Demand	mg/L		
	Total nitrogen	mg/L		
	Total Phosphorus	mg/L		
	Electrical conductivity	dS/m		

Table 3.4.1

<b>Table 3.4.1: Process monitoring</b>				
<b>Process description</b>	<b>Parameter</b>	<b>Units</b>	<b>Frequency</b>	<b>Method</b>
Tailings deposition	Volumes of tailings deposited into the TSF1 East Cell, TSF 1 West Cell and TSF2	m <sup>3</sup>	Cumulative Monthly <u>during operations</u>	None specified
	Volumes of decant water recovered from the TSF1 and TSF2	m <sup>3</sup>	Cumulative Monthly <u>during operations</u>	

Table 3.5.1

<b>Table 3.5.1: Monitoring of ambient air quality</b>						
<b>Monitoring point reference and location</b>	<b>Parameter</b>	<b>Target</b>	<b>Units</b>	<b>Averaging period</b>	<b>Frequency</b>	<b>Method</b>
DDG1, DDG2 DDG3, DDG4, DDG5, DDG6, DDG7, DDG8, DDG9, DDG10, DDG11, DDG12	Particulate matter (Total Insoluble Solids)	4	g/m <sup>2</sup> /month	Monthly <u>during operations and three monthly when in care and maintenance</u>	Continuous	AS/NZS 3580.10.1

Table 4.2.1

<b>Table 4.2.1: Annual Environmental Report</b>		
<b>Condition or table (if relevant)</b>	<b>Parameter</b>	<b>Format or form<sub>1</sub></b>
-	Summary of any failure or malfunction of any pollution control equipment and any environmental incidents that have occurred during the annual period and any action taken	None specified
1.3.8	Annual assessment of groundwater mounding due to seepage in the vicinity of TSF1 and TSF2	Groundwater plume contour map
Table 2.3.2	Annual average loads of each contaminant in the effluent discharged from the WWTP to the irrigation area <u>during operations</u>	None specified
Table 3.2.1	Monitoring of acid plant point source emissions to air <u>during operations</u>	
Table 3.3.1	Monitoring of emissions to land	
Table 3.4.1	Monitoring of tailings deposition and decant water recovered <u>during operations</u>	
Table 3.5.1	Monitoring of ambient air quality	
Table 3.5.2	Ambient groundwater monitoring	
Table 3.6.1	Meteorological monitoring	
4.1.2	Compliance	Annual Audit Compliance Report (AACR)
4.1.3	Complaints summary	None specified

Table 4.3.1

<b>Table 4.3.1: Notification requirements</b>			
<b>Condition or table (if relevant)</b>	<b>Parameter</b>	<b>Notification requirement<sub>1</sub></b>	<b>Format or form<sub>2</sub></b>
2.1.1	Breach of any limit specified in the Licence	Part A: As soon as practicable but no later than 5pm of the next usual working day.  Part B: As soon as practicable	N1
1.3.1	Any failure or suspected failure of the integrity of a clay or HDPE liner for any containment pond		
1.3.11	Any event where the sulfuric acid plant is	<u>Not required during care and</u>	



<b>Table 4.3.1: Notification requirements</b>			
	required to be shut-down according to 1.3.11.	<u><b>maintenance</b></u>	
3.5.2	Exceedance report in response to Table 3.5.1 target exceedance	Within 28 days of becoming aware of the exceedance	None specified

3. Condition 5.1 is added to the Licence, as shown in bold underline text below:

**5.1 On or before March 31<sup>st</sup> 2020, the Licence Holder must submit to the CEO, a report in relation to 'Mine Drainage - North' (Dam 2) that:**

- (a) **provides the certified results of liner integrity testing by a suitably qualified person for Dam 2 which includes an upgrade plan to be implemented detailing how any identified damage to the liner will be repaired before operation to meet hydraulic conductivity requirements of less  $1.0 \times 10^{-9}$  m/s; or**
- (b) **outlines how the Dam 2 will be relined before operation to meet the hydraulic conductivity requirements of less than  $1.0 \times 10^{-9}$  m/s;**
- (c) **details what purpose Dam 2 will be used for during operation;**
- (d) **outlines the quality of water proposed to be stored in Dam 2 during operation including results in mg/L for total dissolved solids, ammonia as N, total nitrogen, reactive phosphorus as P, calcium, magnesium, iron, potassium, sodium, chloride, sulphate, aluminium, arsenic, cadmium, chromium, manganese and nickel;**
- (e) **outlines the contingency measures in place to prevent overflow or seepage from Dam 2 to the environment during operation;**
- (f) **demonstrates how the capacity of Dam 2 will be managed to contain received inputs and how the capacity will be managed to ensure the operational freeboard of 800mm is maintained at all times while operating; and**
- (g) **includes a water balance model that calculates the estimated volumes of water to be directed into Dam 2 that identifies:**
  - **the period the water balance model relates to;**
  - **where all water is sourced from;**
  - **how the water is used, recycled and disposed of; and**
  - **the effect of climatic changes on the water balance model.**

## Appendix 1: Key documents

	Document title	In text ref	Availability
1	Licence L8008/2004/3 – Ravensthorpe Nickel Operations Pty Ltd issued on 1 September 2016	L8008/2004/3	accessed at <a href="http://www.dwer.wa.gov.au">www.dwer.wa.gov.au</a>
2	Amendment Notice 1 (L8008/2004/3) – Ravensthorpe Nickel Operations Pty Ltd issued on 3 February 2017		
3	Licence Amendment Application – Ravensthorpe Nickel Operations Pty Ltd dated 12 April 2018	Application	DWER records A1652881
4	Licence Application supporting documents dated 13 April 2018		DWER reference CEO410/18
5	Email from Applicant dated 12 April 2018 with documents attached		DWER record fA233878
6	<i>S72 Environmental Protection Act 1986</i> waste discharge notification for seepage from Halley's West dam dated 20 April 2018	NA	DWER record A1669192 ICMS49133
7	Coffey Services Australia Pty Ltd, 18 September 2018, <i>First Quantum Minerals Preliminary and Detailed Site Investigation for Ravensthorpe Nickel Project</i> reference 754-PEREN218056-R01-Rev0-PDSI	Preliminary and Detailed Site Investigation (PDSI)	DWER record A1767201
<b>Other documents</b>			<b>Availability</b>
<b>Document Title</b>			
DER, July 2015. <i>Guidance Statement: Regulatory Principles</i> . Department of Environment Regulation, Perth.		NA	accessed at <a href="https://www.der.wa.gov.au/our-work/regulatory-framework">https://www.der.wa.gov.au/our-work/regulatory-framework</a>
DER, October 2015. <i>Guidance Statement: Setting Conditions</i> . Department of Environment Regulation, Perth.			
DER, February 2017. <i>Guidance Statement: Risk Assessments</i> . Department of Environment Regulation, Perth.			
DER, February 2017. <i>Guidance Statement: Decision Making</i> . Department of Environment Regulation, Perth.			

## Appendix 2: Summary of Licence Holder comments

The Licence Holder was provided with a draft Amendment Notice on 8 August 2019 for review and comment. The Licence Holder responded on 16 August 2019. The Licence Holder was provided with a subsequent draft Amendment Notice on 20 September 2019 following changes to the condition based on the Licence Holder comments. The Licence Holder responded on 25 September 2019. The comments and how the Delegated Officer considered them are summarised below.

Condition	Summary of Licence Holder comment	Delegated Officer consideration
<b>Draft Amendment Notice – 8 August 2019</b>		
5.1 (a), (b) and (c)	No concerns	Noted. Condition 5.1(c) has been revised based on Licence Holder comments on 5.1(e) indicating that Dam 2 is intended to be used to capture seepage water from the waste rock dump. 5.1(c) requires that the Licence Holder advise in detail the purposes Dam 2 will be used for. The Licence Holder will need to clearly outline and confirm their intentions for the change in use of the infrastructure (Dam 2) and how they intend to manage the risks to the environment from it. This will allow DWER to consider and assess the proposed change of use and management of Dam 2. Refer to the comments for condition 5.1(e) below.
5.1 (d)	The comments raised concerns about accurately quantifying the seepage water from Halleys waste dump.	Condition 5.1(d) has been revised based on Licence Holder comments on 5.1(e). Refer to the Delegated Officer comments for 5.1(e) below.  Condition 5.1(d) has been revised with conditions 5.1 (e), (f) and (g) modified to support the changes. Conditions 5.1 (d), (f) and (g) are structured to refer to inputs into Dam 2 rather than seepage from the waste rock dump. These conditions: <ul style="list-style-type: none"> <li>i. require the quality of the water received by Dam 2 to be characterised;</li> <li>ii. require that management options to ensure the capacity of Dam 2 is maintained is are identified; and</li> <li>iii. require that a water balance for Dam 2 be completed identify if the sizing of Dam 2 is sufficient.</li> </ul>
5.1 (e)	The comments outlined that the Licence Holder intends on using Dam 2 for the collection of the seepage water from the waste rock dump:  <i>“preventing seepage water from the waste rock dump</i>	The Licence Holder comments on this condition have confirmed they intend on using Dam 2 to capture the seepage water from the waste rock dump. Condition 5.1(e) has been altered in accordance with Licence Holder suggestion and 5.1 (c), (d), (e), (f) and (g) have been revised/added.

Condition	Summary of Licence Holder comment	Delegated Officer consideration
	<p><i>entering Dam 2 is contrary to the approach that is proposed to be adopted. We need to collect the seepage in a suitably lined dam and direct this back to the process plant, therefore I propose this condition read "that outlines how seepage water from Halley's waste dump will be managed to prevent it entering the environment"</i>.</p>	<p>As identified in section 3.1.2, Dam 2 was not designed or built for the purpose of receiving seepage water from the waste dump and currently doing so presents an unacceptable risk to the environment.</p> <p>The revision/addition of 5.1 (c), (d), (e), (f) and (g) requires that the Licence Holder outline in a report the intended purpose, inputs and management of Dam 2.</p>
5.1 (f)	<p>The comments noted that an understanding the geotechnical deficiencies has already been investigated and reported on in the PDSI. The comments highlight that the clay liner is insufficient to prevent seepage therefore it is proposed to redesign the pond with HDPE liner which is covered under a) &amp; b).</p>	<p>The PDSI was limited to a desktop study to determine the likely cause of the vegetation death and did not involve geotechnical investigations. In addition to this, one of the PDSI recommendations that the Licence Holder committed to was the completion of geotechnical investigations to inform dam repair and design.</p> <p>The condition has been removed and the issue referred to the Department of Mines and Industry Regulation for consideration.</p> <p>The new Condition 5.1(f) relates to 5.1(d), refer to the Delegated Officer comments for 5.1(d) above.</p>
<b>Draft Amendment Notice – 20 September 2019</b>		
5.1	<p>The Licence Holder highlighted that the operational status of the premises, specifically if the premises is operational or in care and maintenance, that it does not impact or change the inputs that Dam 2 receives. On this basis, the Licence Holder requested that rather than the condition requiring submission of the report six months prior to the commencement of operations that the report be submitted by 20 March 2020. The premises is expected to recommence operations in July 2020.</p>	<p>The proposed change has been accepted.</p> <p>Based on the information provided by the Licence Holder that Dam 2 will not receive additional inputs associated with operational activities, the requirement to submit the report prior to the recommencement of operations is not required. The risk from Dam 2 is not linked to the operational status of the premises, hence the report submission by 20 March 2020 is accepted.</p>