Government of Western Australia
Department of Water and Environmental Regulation

Amendment Report

Application for Licence Amendment

Part V Division 3 of the *Environmental Protection Act 1986*

Licence Number	L8437/2010/3
Licence Holder	BHP Nickel West Pty Ltd
ACN	004 184 598
File Number	2012/000069-1~4
Premises	1. Kwinana Nickel Refinery Lot 100 on Deposited Plan 423540 Patterson Road KWINANA BEACH WA 6167 Certificate of Title Volume 4029 Folio 430 2. Baldivis Facility Lot 820 on Plan 77252 Miller Road BALDIVIS WA 6171 Certificate of Title Volume 2841 Folio 582
Date of Report	26/05/2025
Decision	Revised licence granted

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1. Decision summary

Licence L8437/2010/3 is held by BHP Nickel West Pty Ltd (licence holder; BHP NiW) for the Kwinana Nickel Refinery (the premises), located at 270 Patterson Road Kwinana Beach.

This Amendment Report documents the assessment of potential risks to the environment and public health from proposed changes to emissions and discharges during the operation of the premises relating to the following matters:

- Removal of the requirement to continuously operate the mixed sulphide precipitation circuit hydrogen sulphide (H_2S) vent flare as the existing scrubber system removes all H_2S gas under normal operating conditions.
- Removal of stack testing requirements for the mixed sulphide packaging shed scrubber and vent stack as packaging only takes place for approximately two hours a day.

As a result of this assessment, an amendment to licence L8437/2010/3 has been granted removing the requirement for continuous operation of the H_2S plant vent flare and removing the mixed sulphide packaging shed scrubber vent stack testing requirements. On 10 April 2025 BHP NiW requested to withdraw the part of the amendment application that related to the ongoing operation of the PLNSP and as such the amendments that relate to the powder leach nickel sulphate plant (PLNSP) have not been assessed as a part of this amendment report.

This amendment report details the assessment and decision making relating to the amendment application for the removal of requirements to continuously monitor the mixed sulphide vent flare and removal of the stack testing requirements for the mixed sulphide packaging shed vent stack.

2. Scope of assessment

2.1 Regulatory framework

In completing the assessment documented in this amendment report, the Department of Water and Environmental Regulation (DWER, department) has considered and given due regard to its Regulatory Framework and relevant policy documents which are available at DWER Regulatory documents | Western Australian Government (www.wa.gov.au).

2.2 Background

BHP NiW operates the Kwinana nickel refinery (KNR) located within the Kwinana Industrial Area at 270 Patterson Road, Kwinana Beach. The KNR has been in operation since 1970 and uses an ammonia leach process to covert nickel matte into premium-grade nickel briquettes and nickel powder as well as other intermediate products.

The premises also includes evaporation ponds located on Millar Road in Baldivis which receive wastewater from the KNR. The ponds are also referred to as the ‘Baldivis Facility’. The ponds are also subject to Ministerial Statement 377 (MS377). The ministerial statement is intended to manage the contamination plume from the Baldivis Facility and is not applicable to the activities at the refinery area at Kwinana Beach.

In July 2024 BHP NiW publicly announced it would temporarily suspend operation of its Nickel West operations, inclusive of the KNR, from October 2024 with a review of the suspended operating scenario to occur by early 2027.

2.3 Application summary

On 30 September 2022 BHP NiW submitted an application to the department to amend licence L8437/2010/3 under section 59 and 59B of the *Environmental Protection Act 1986* (EP Act). The application sought the following amendments:

- Amend condition 14 to remove the requirement to continuously operate the mixed sulphide precipitation circuit hydrogen sulphide (H_2S) vent flare.
- Amend condition 3(a) to remove the requirement for stack emission monitoring of the mixed sulphide packing shed scrubber and vent stack.
- Authorise the ongoing operation of the PLNSP, constructed under works approval W6117/2018/1, by addition of the plant to the licence. This part of the amendment application was withdrawn by BHP NiW on 10 April 2025 and is not further detailed or assessed in this Amendment Report.

2.4 Mixed sulphide precipitation circuit hydrogen sulphide vent flare overview

BHP NiW has requested the removal of the requirement to continuously operate the mixed sulphide precipitation circuit H_2S vent flare on the basis that the installed scrubber system, comprising a vapour condenser and a packed column scrubber, removes all H_2S emissions during normal operation with only nitrogen and water vapour remaining within gases directed to the flare. BHP NiW advised that the continuous operation of the flare results in unnecessary emissions of carbon dioxide (CO_2) and use of natural gas.

BHP NiW submitted a dispersion model for the average H_2S emissions from the precipitation circuit vent post treatment by the scrubber system (ETA 2022). The results are summarised in Table 1.

The model results indicate that average H_2S emissions from the precipitation circuit vent are predicted to result in ground level concentrations (GLC) of less than 0.5% of all relevant ambient air guideline values (AGV) at the nearest sensitive residential receptors at North Rockingham (R1 and R2) and less than 2% at the nearest commercial receptor being Wells Park (R12).

Table 1: Summary of dispersion model for mixed sulphide precipitation circuit H_2S emissions

Source	Stack Height	Emission Rate g/s	Averaging time	R1 and R2 Residential		R12 Wells Park	
				µg/m³	% of AGV	µg/m³	% of AGV
Mixed sulphide precipitation circuit H_2S vent	30 m	Above average emission rate 0.028	1-hour	1.25	0.05%	1.64	0.06%
			24-hr	0.08	0.06%	0.21	0.15%
			Annual Average	0.07	0.39%	0.029	1.61%

Noting that the odour threshold for H_2S is 0.01 ppm or 14 µg/m³, odour from the mixed sulphide precipitation circuit vent is unlikely to impact sensitive receptors.

The licence currently requires ambient monitoring of H_2S around the precipitation circuit with sensors required to alarm at 10 ppm. Eight H_2S sensors are established in the area which are set to alarm at 5 ppm and if greater that 20 ppm is detected for more than five minutes the circuit shuts down.

2.5 Mixed sulphide packing shed scrubber and vent stack overview

Packaging of mixed sulphides produced from the precipitation circuit is undertaken within a mixed sulphide packing shed at the KNR. L8437/2010/3 currently requires the licence holder to undertake biannual stack monitoring and analysis for total particulate matter (TPM) and metals at the mixed sulphide packing shed scrubber and vent stack.

BHP NiW advised that the mixed sulphide packing shed scrubber and vent stack is rarely used as packaging only takes place for one to two hours a day and most of the time the scrubber is not required. The scrubber was installed for occupational health and safety purposes, to manage fugitive emissions in the shed during packing. It is often not operational other than for stack testing to comply with the licence requirements. Figure 1 shows the historical particulate and nickel sampling results from monitoring of the stack.

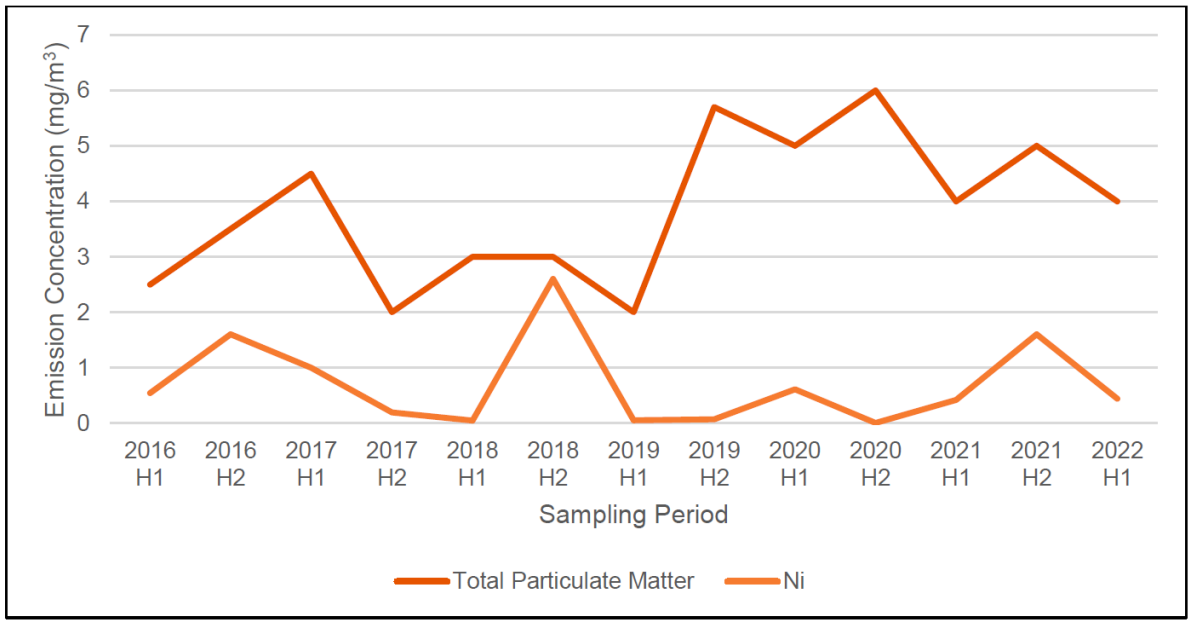

Figure 1: Historical monitoring of the mixed sulphide packaging shed (Extract from application supplementary Information report (BHP 2022))

2.6 Licence holder consultation

Table 2 provides a summary of the consultation undertaken with the licence holder relating to the amendment application.

Table 2: Consultation with the licence holder

Consultation method	Comments/information received	Department response
Request for further information letter 3/11/2022 (DWER Ref A2135645)	- Raw modelling data - Ambient Nickel monitoring results - H_2S Consequence modelling for H_2S - Information on the controls for the Mixed sulphide packaging shed - Information on the H_2S Scrubber and controls	Information provided in requests for further information has been taken into account during the assessment as documented in this amendment report.

Consultation method	Comments/information received	Department response
	Response 17/11/2022 (DWER Ref DWERDT688221)	
BHP NiW providing additional information on mixed sulphide precipitation circuit vent flare and noise report	- Location of H_2S sensors - Confirmation the 0.028 g/s for H_2S emissions assumes no consumption of H_2S within the K2D-38 tank, which in reality is not likely. This assumption is therefore likely to be a higher rate than actual emissions - Email from Talis that the R2 sound location was not impacted by the broken seal so all data from R2 was used in the noise validation Information received 22/12/2022 (DWER Ref A2148601)	
Licence holder was provided with a draft amendment report and amended licence on 16 May 2025	The licence holder responded on 23 May 2025 with no comments, requesting the remainder of the 21 day comment period be waived.	NA

3. Risk assessment

The department assesses the risks of emissions from prescribed premises and identifies the potential source, pathway and impact to receptors in accordance with the *Guideline: Risk assessments* (DWER 2020).

To establish a risk event there must be an emission, a receptor which may be exposed to that emission through an identified actual or likely pathway, and a potential adverse effect to the receptor from exposure to that emission.

3.1 Source-pathways and receptors

3.1.1 Emissions and controls

The key emissions and associated actual or likely pathway during premises operation which have been considered in this amendment report are detailed in Table 3 below.

Table 3 also details the proposed control measures the licence holder has proposed to assist in controlling these emissions, where necessary.

Table 3: Licence holder controls

Emission	Sources	Potential pathways	Proposed controls
Existing KNR Operation			
H_2S	Mixed sulphide precipitation circuit	Air/windborne pathway	- Scrubber system, comprising a vapour condenser and a packed column scrubber, to remove all H_2S emissions during normal operation. - Licence requires ambient monitoring of H_2S around the precipitation circuit with sensors required to alarm at 10 ppm.
Particulate matter (including nickel and compounds)	Mixed sulphide packing shed		- Scrubber and vent stack installed but is rarely used (occupational hygiene control for fugitive emissions). - Packing occurs within an enclosed shed.

3.1.2 Receptors

In accordance with the *Guideline: Risk assessments* (DWER 2020), the delegated officer has excluded employees, visitors and contractors of the licence holder from its assessment. Protection of these parties often involves different exposure risks and prevention strategies, and is provided for under other state legislation.

Table 4 below provides a summary of potential human and environmental receptors that may be impacted as a result of activities upon or emissions and discharges from the prescribed premises *(Guideline: Environmental siting* (DWER 2020)).

Table 4: Sensitive human and environmental receptors and distance from prescribed activity

Human receptors	Distance from prescribed activity
Wells Park (R12)	600 m west of the premises
Bottle shop adjacent to Wells Park (R12)	600 m west of the premises
Residential premises in North Rockingham (R1 & R2)	1.6 km south-southwest of the premises
Residential premises in Hillman West	2.7 km south of the premises
Residential premises in Calista	3.3 km east of the premises
Industrial premises	Several within 1 km including premises adjacent to the KNR
Environmental receptors	**Distance from prescribed activity**
Cockburn Sound	750m west of the premises

Figure 2: Distance to receptors

Licence: L8437/2018/1

3.2 Risk ratings

Risk ratings have been assessed in accordance with the *Guideline: Risk Assessments* (DWER 2020) for those emission sources which are proposed to change and takes into account potential source-pathway and receptor linkages as identified in Section 3.1. Where linkages are in-complete they have not been considered further in the risk assessment.

Where the licence holder has proposed mitigation measures/controls (as detailed in Section 3.1), these have been considered when determining the final risk rating. Where the delegated officer considers the licence holder's proposed controls to be critical to maintaining an acceptable level of risk, these will be incorporated into the licence as regulatory controls.

Additional regulatory controls may be imposed where the licence holder's controls are not deemed sufficient. Where this is the case the need for additional controls will be documented and justified in Table 5.

The revised licence L8437/2018/1 that accompanies this amendment report does not authorize the operation or emissions associated with the operation of the PLNSP. The conditions in the revised licence have been determined in accordance with *Guidance Statement: Setting Conditions* (DER 2015).

Table 5. Risk assessment of potential emissions and discharges from the Premises during operation

Risk Event					Risk rating[1] C = consequence L = likelihood	Licence holder's controls sufficient?	Conditions[2] of licence	Reasoning
Source/Activities	**Potential emission**	**Potential pathways and impact**	**Receptors**	**Licence holder's controls**				
Existing KNR Operation								
Mixed sulphide precipitation circuit	H_2S	Air/windborne pathway causing impacts to health and amenity	Wells Park 600 m west of the premises Residential premises (nearest 1.6 km south of the premises)	Refer to Section 3.1.1	C = Slight L = Rare **Low Risk**	Y	**Condition 17 and 18**	Based on the information provided in the application the delegated officer considers removal of the requirement to continuously operate the mixed sulphide precipitation circuit H_2S vent flare will not change the risk profile of the emission as the emission is adequately controlled by the installed wet scrubbing system. The delegated officer considered it necessary to include conditions requiring the treatment of waste gases from the circuit via the scrubbing system to ensure the assessed level of risk remains low as per the assessment.
Mixed sulphide packing shed	Particulate matter (including nickel and compounds)					Y	NA – removed from condition 3(a)	Based on the information provided in the application the delegated officer considers removal of the requirement to monitor stack emissions from the mixed sulphide packing shed scrubber and vent stack is acceptable and will not increase the risk of emissions from the source on the basis of the infrequent and limited duration use of this equipment.

Note 1: Consequence ratings, likelihood ratings and risk descriptions are detailed in the *Guideline: Risk assessments* (DWER 2020).

Note 2: Proposed licence holder's controls are depicted by standard text. **Bold and underline text** depicts additional regulatory controls imposed by department.

4. Decision

4.1 Remove requirement to continuously operate the mixed sulphide precipitation circuit H_2S vent flare (condition 14 a and b)

The delegated officer assessed the information provided in the application (as summarised in section 2.4) and determined that amending condition 14 such that the mixed sulphide precipitation circuit H_2S vent flare is not required to operate continuously will not change the risk profile of emission and discharges from the premises and amended the condition accordingly. In reaching this conclusion the delegated officer considered the following:

- Modelling indicates emissions from the circuit are unlikely to impact air quality at the nearest residential receptors or members of the public at Wells Park.
- Prior to being discharged, emissions from the circuit are subject to treatment via a wet scrubbing system which effectively removes H_2S leaving primarily nitrogen and water vapour.

The delegated office determined to include additional conditions 17 and 18 requiring the licence holder to capture emissions from the mixed sulphide precipitation tank and direct them to the scrubbing system prior to discharge, and to ensure this system is in operation when the tank is in use. These conditions are necessary to ensure H_2S emissions are treated prior to discharge so that emission rates are aligned with those on which the modelling and assessment was based and the assessed risk remains low.

4.2 Remove requirement for stack emission monitoring of the mixed sulphide packing shed scrubber and vent stacks (condition 3a)

The delegated officer assessed the information provided in the application (as summarised in section 2.5) and determined that amending condition 3a to remove the requirement for stack emission monitoring of the mixed sulphide packing shed scrubber and vent stack will not change the risk profile of emission and discharges from the premises. In reaching this conclusion the delegated officer considered the following:

- The mixed sulphide packing shed scrubber and vent stack was installed for occupational health and safety purposes rather than as and emission control;
- The scrubber and vent stack is rarely used as packaging only takes place for up to two hours a day and the scrubber is seldom needed.

The delegated office revised condition 3(a) accordingly by removing the requirement to monitor the mixed sulphides packaging emission point 28.

5. Conclusion

5.1 Amendments Granted

Based on the assessment in this amendment report, the delegated officer has determined that an amended licence will be granted which includes amendments that relate only to:

- removal of the requirement to continuously operate the mixed sulphide precipitation circuit H_2S vent flare; and
- removal of the requirement to conduct stack monitoring at the mixed sulphide packing shed scrubber and vent stack.

The amended licence is subject to conditions commensurate with the determined controls and necessary for administration and reporting requirements.

5.1.1 Summary of amendments

Table 6 provides a summary of the proposed amendments and will act as record of implemented changes. The proposed changes specified in the table have been incorporated into the revised licence as part of the amendment process.

Table 6: Summary of licence amendments

Condition no.	Proposed amendments
3(a)	Removal of requirement to conduct biannual stack testing at the mixed sulphides packing shed emission point.
14 (a) and (b) 17 and 18	Changes to 14 (a) and (b) such that they no longer apply to the mixed sulphide precipitation circuit H_2S vent flare. Inclusion of condition 17 to ensure all waste gases from the mixed sulphide precipitation tank are captured and treated by the scrubbing system prior to discharge. Inclusion of condition 18 to ensure the ventilation and scrubbing system is in operation whenever the mixed sulphide precipitation tank is in use.

References

1. Department of Environment Regulation (DER) 2015, *Guidance Statement: Setting Conditions*, Perth, Western Australia.
2. Department of Water and Environmental Regulation (DWER) 2019, *Guideline: Decision Making*, Perth, Western Australia.
3. DWER 2020, *Guideline: Risk Assessments*, Perth, Western Australia
4. DWER 2020, *Guideline: Environmental Siting*, Perth, Western Australia
5. BHP Nickel West 2022 Kwinana Licence Amendment Application Supplementary Information – Powder Leach Nickel Sulphate Plant

BHP Nickel West 2025 Kwinana, Email requesting the withdrawal of the amendments that relate to the on going operation of the Powder Leach Nickel Sulfate Plant Dated 10 April 2024 (DWER Reference A2349004)