



Application for Works Approval

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

Works Approval Number	W6563/2021/1
Applicant	BP Refinery (Kwinana) Pty Ltd
ACN	008 689 763
File number	DER2021/000345
Premises	BP Refinery Kwinana Lot 18 Mason Road Kwinana Legal description Lot18 on Deposited Plan 17311
Date of report	10/09/2021
Decision	Works approval granted

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Manager, Process Industries

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

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1. Decision summary

This decision report documents the assessment of potential risks to the environment and public health from emissions and discharges during the construction and operation of two natural gas-fired steam boilers at the Premises. As a result of this assessment, works approval W6365/2021/1 has been granted.

2. Scope of assessment

2.1 Regulatory framework

In completing the assessment documented in this decision report, the Department of Water and Environmental Regulation (the department; DWER) has considered and given due regard to its regulatory framework and relevant policy documents which are available at <https://dwer.wa.gov.au/regulatory-documents>.

2.2 Application summary and overview of premises

On 4 June 2021, the applicant applied for a works approval to the department under section 54 of the *Environmental Protection Act 1986* (EP Act).

The application is to construct and operate two natural gas-fired steam boilers at the Premises for the generation of low pressure steam to use in the fuel terminal. The Premises are located on Mason Road in Kwinana, within the Kwinana Industrial Area.

While the applicant applied for categories on its existing licence (category 34, 61, 61A and 81), the Delegated Officer determined that the proposed steam boilers relate to category 87 (fuel burning). The two boilers will involve burning of a gaseous fuel in a boiler for the supply of steam. The two boilers will be 7 MW and 5 MW with a maximum fuel consumption of 553 Kg/hr and 395 Kg/h respectively which in aggregate is within the more than 500 kg/hr but less than 2000 kg/hr in aggregate fuel consumption threshold which applies to category 87.

The applicant's expected annual site demand for steam is 6MW. Two boilers will allow continuous operation while allowing for breakdowns and scheduled maintenance.

2.3 Background

The applicant has operated an oil refinery on the Premises since the 1950s and is subject to licence L5938/1967/12, however oil refining ceased in February 2021 and the Premises are to be reorganised as a fuel import terminal. The applicant has lodged a concurrent licence amendment application relating to decommissioning of infrastructure at the Premises. The licence amendment application is being assessed by DWER independently of this works approval application.

Steam was formerly generated by waste heat from the refinery and a co-generation plant. The applicant needs a solution for generating low pressure steam for the operation of the fuel terminal. Without steam, the terminal would be unable to safely handle high pour point products such as fuel oils, road crudes and some lubricating oils.

2.4 Applicant's air emissions assessment

The applicant calculated maximum emission rates of pollutants from boiler stacks by calculation using vendor data for NO₂ and National Pollutant Inventory (NPI) Emission Factors (EFs) for other pollutants consistent with the NPI Estimation Technique Manual for Combustion in Boilers (2011).

There were no EFs for the discharge of carbonyl compounds such as formaldehyde and acetaldehyde in exhaust emissions which may occur in gas-fired tubes and gas engines due to

partial combustion. However, the applicant took the view that for the steam boiler burners this would be an unlikely to occur due to its optimised burner management system (BMS) ensuring complete combustion of any volatile organic compounds (VOCs) and little or no carbon monoxide formation.

The applicant used the maximum calculated air emissions for identified key pollutants as per the below extract from its application shown in Table 1. Not that the Delegated Officer has not further considered carbon dioxide emissions in this assessment as it is a greenhouse gas and outside the scope of assessment and regulation under Part V of the EP Act.

Table 1: Applicant’s modelled maximum air emission rates for identified key pollutants

Discharge parameter	Discharge rate (g/s at STP)		Calculation method
	B1103 stack	B1104 stack	
Oxides of nitrogen (NO _x as NO ₂)	0.14	0.15	<i>Vendor EN676 max. LNB data using max. boiler fuel flow.</i>
Carbon monoxide (CO)	0.36	0.26	<i>NPI EF for boilers using max. boiler fuel flow.</i>
Sulphur dioxide (SO ₂)	0.0047	0.0034	<i>NPI EF for boilers using max. boiler fuel flow.</i>
Total Volatile Organic Compounds (TVOC)	0.023	0.017	<i>NPI EF for boilers using max. boiler fuel flow.</i>
Carbon dioxide (CO ₂)	449.8	321.3	<i>NGER natural gas EFs using max. boiler fuel flow</i>

The applicant undertook a screening analysis as per methodologies in DWER’s *draft Guideline: Air emissions* which is a very conservative worst case screening process to determine whether emissions are not insignificant and require further more detailed assessed. The applicant identified that maximum 1-hour NO_x (as NO₂) was the only criteria pollutant classed as not insignificant.

The applicant undertook a simple conservative model or calculation approach to substantiate its view that the risk of NO_x emissions is low. The Applicant considered three scenarios involving one of the boilers operating at maximum capacity and both operating simultaneously at maximum capacity. Maximum calculated ground level concentrations (GLC’s) for NO_x occurred within the Premises and for all distances assessed, the NO_x concentrations were below 10% of the 246 ug/m³ criteria in the *draft Guideline: Air emissions*. The nearest neighbouring premises is 530m north east and returned a predicted maximum GLC of 10.41 ug/m³. All sensitive receptors are more than 2 km with a negligible maximum predicted GLC of 5 ug/m³.

The Delegated Officer notes that the above approach and conclusions are very conservative worst case. It is also noted that the oil refinery at the Premises ceased in February 2021 and has resulted in a substantial decrease in NO_x emissions from the broader Premises. The applicant advised that the maximum predicted cumulative NO_x emission rate from the boiler stacks is 0.29 g/s compared with the 2020 refinery total baseline of 25 g/s. While the applicant still has a licence to operate the oil refinery, including emission of associated NO_x, it is acknowledge DWER is currently determining a licence amendment application relating to the decommissioning of the oil refinery and associated emission points to air.

During assessment of the works approval application, the applicant provided DWER with additional more detailed predictive dispersion modelling of NO_x using DISPMOD and AERMOD models. In a scenario with both boilers operating at maximum capacity, the highest ground level

concentration of NO_x was predicted to be 25% of the National Environmental Protection Measure (NEPM) 1-hour average criteria and approximately 2% of the NEPM annual criteria. The cumulative impact of neighbouring sites is modelled at 33% of the NEPM guideline, however likely to be very conservative with the cessation of oil refining activities.

As the results were not inconsistent with the simple conservative model or calculation results, the Delegated Officer determined that further analysis of the detailed modelling was not required.

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 construction and operation which have been considered in this decision report are detailed in Table 2 below. Table 2 also details the control measures the applicant has proposed to assist in controlling these emissions, where necessary.

Table 2: Proposed applicant controls

Emission	Sources	Potential pathways	Proposed controls
Construction			
Dust	Construction machinery	Air / windborne pathway	Minimal dust construction on hardstand large internal buffer to neighbouring industries and 2 km to sensitive receptors.
Noise	Construction machinery	Air / windborne pathway	Day time construction and large separation distance to sensitive receptors
Operation			
Boilers	Air emissions	Air / windborne pathway	Low NO _x burners, Burner management system continuous measure of O ₂ with automatic damper control

3.1.2 Receptors

In accordance with the *Guideline: Risk Assessment* (DWER 2020), the Delegated Officer has excluded the applicant's employees, visitors, and contractors from its assessment. Protection of these parties often involves different exposure risks and prevention strategies, and is provided for under other state legislation.

Table 3 below provides a summary of potential human and environmental receptors that may be impacted as a result of activities upon or emission and discharges from the prescribed premises (*Guideline: Environmental Siting* (DWER 2020)).

Table 3: Sensitive human and environmental receptors and distance from the Premises

Human receptors	Distance from prescribed activity
Residents in Kwinana	~2 km from the Premises
Industrial premises	Adjacent to the Premises
Environmental receptors	Distance from activity / prescribed premises
Cockburn Sound	Adjacent to the Premises

3.2 Risk ratings

Risk ratings have been assessed in accordance with the *Guideline: Risk Assessments* (DWER 2020) for each identified emission source 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 applicant 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 applicant's proposed controls to be critical to maintaining an acceptable level of risk, these will be incorporated into the works approval as regulatory controls.

Additional regulatory controls may be imposed where the applicant's controls are not deemed sufficient. Where this is the case the need for additional controls will be documented and justified in Table 4.

Works approval W6563/2021/1 that accompanies this decision report authorises construction. The conditions in the issued works approval, as outlined in Table 4 have been determined in accordance with *Guidance Statement: Setting Conditions* (DER 2015).

Table 4: Risk assessment of potential emissions and discharges from the premises during construction, and operation

Risk events					Risk rating ¹	Applicant controls sufficient?	Conditions ² of works approval	Reasoning
Sources / activities	Potential emission	Potential pathways and impact	Receptors	Applicant controls	C = consequence L = likelihood			
Construction								
Construction of boiler building and stacks, and, installation of boilers	Dust	Air / windborne pathway causing impacts to health and amenity	Residences 2 km south east	Refer to Section 3.1	C = minor L = Rare Low Risk	Y	NA	Additional dust controls not required because internal buffer sufficient and the low level of potential dust emissions.
	Noise			Refer to Section 3.1	C = Minor L = Rare Low Risk	Y	NA	Separation distance to sensitive receptors sufficient to ensure minimal impact.
Commissioning/Operation								
Operation of the boilers	Air emissions from combustion of natural gas	Air / windborne pathway causing impacts to health and amenity	Neighboring industries Residents at 2km	Refer to Section 3.1	C = Slight L = Unlikely Low Risk	Y	Condition 1	Stack testing will be required to confirm that emission rates are as per the application.

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

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

4. Consultation

Table 5 provides a summary of the consultation undertaken by the delegated officer.

Table 5: Consultation

Consultation method	Comments received	Delegated Officer's response
Application advertised on the department's website on 12 July 2021	None received	N/A
Applicant provided with draft documents 2/9/2021	Applicant pointed out that works approval states designed for maximum NOx emission of 52 mg/m ³ whereas manufactures design criteria in application was 50 ppm.	On review the Delegated Officer identified an assessment calculation error. A NOx concentration of 50ppm converts to 103 mg/m ³ at standard temperature and pressure. Condition 1 was updated

5. Decision

Based on the assessment in this decision report, the delegated officer has determined that a works approval will be granted, subject to conditions commensurate with the determined controls and necessary for administration and reporting requirements. In coming to this decision the delegated officer has considered the modelling predictions of maximum ground level concentrations are well below the short and long-term NEPM ambient standards for NOx, including cumulative scenarios.

The Delegated Officer also had regard to the fact that the oil refinery activities ceased in February 2021 and DWER is concurrently assessing a licence amendment application to related to decommissioned infrastructure including air emission points.

The applicant will be required to undertake a validation stack test for NOx from the boilers during an environmental commissioning phase to confirm the performance of the burners and burner management system. The applicant will be able to time limited operate under the works approval. As per DWER's *Guide to Licensing*, the application will need to apply to amend the licence to include category 87 on its existing licence. The Delegated Officer does not expect any ongoing need for operational phase conditions.

Where the applicant no longer holds a licence, the applicant is able to apply for a registration for category 87, in place of a licence.

Time limited operations will be authorised in the works approval to allow for amending the licence to include the boiler stacks as authorised emission points and the inclusion of Category 87 Fuel burning on the prescribed premises list.

References

1. Department of Environment Regulation (DER) 2015, *Guidance Statement: Setting Conditions*, Perth, Western Australia.
2. Department of Water and Environmental Regulation (DWER) 2020, *Guideline: Environmental Siting*, Perth, Western Australia.
3. DWER 2020, *Guideline: Risk Assessments*, Perth, Western Australia.
4. BP Refinery (Kwinana) Pty Ltd application for works approval

Appendix 1: Application validation summary

SECTION 1: APPLICATION SUMMARY		
Application type		
Works approval	<input checked="" type="checkbox"/>	
Date application received	4 June 2021	
Applicant and Premises details		
Applicant name/s (full legal name/s)	BP Refinery (Kwinana) Pty Ltd	
Premises name	BP Refinery Kwinana	
Premises location	Lot 18 Mason Road, Kwinana	
Local Government Authority	City of Kwinana	
Application documents		
HPCM file reference number:	DWERDT461264	
Key application documents (additional to application form):	-	
Scope of application/assessment		
Summary of proposed activities or changes to existing operations.	Works approval Construction/placement of two packaged steam boilers.	
Category number/s (activities that cause the premises to become prescribed premises)		
Table 1: Prescribed premises categories		
Prescribed premises category and description	Proposed design capacity of the boilers	
Category 34, 61, 61A and 81 (on licence still)	1x5MW (~10,955 kg/hr of steam) 1x7MW boiler (~7,825 kg/hr of steam)	
Legislative context and other approvals		
Has the applicant referred, or do they intend to refer, their proposal to the EPA under Part IV of the EP Act as a significant proposal?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Referral decision No: Managed under Part V <input type="checkbox"/> Assessed under Part IV <input type="checkbox"/>
Does the applicant hold any existing Part IV Ministerial Statements relevant to the application?	Yes <input type="checkbox"/> No <input type="checkbox"/>	Ministerial statement No: EPA Report No:
Has the proposal been referred and/or assessed under the EPBC Act?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Reference No:

Has the applicant demonstrated occupancy (proof of occupier status)?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Certificate of title <input type="checkbox"/> General lease <input type="checkbox"/> Expiry: Mining lease / tenement <input type="checkbox"/> Expiry: Other evidence <input type="checkbox"/> Expiry:
Has the applicant obtained all relevant planning approvals?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input checked="" type="checkbox"/>	Approval: Expiry date: If N/A explain why?
Has the applicant applied for, or have an existing EP Act clearing permit in relation to this proposal?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	CPS No: N/A No clearing is proposed.
Has the applicant applied for, or have an existing CAWS Act clearing licence in relation to this proposal?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Application reference No: N/A Licence/permit No: N/A No clearing is proposed.
Has the applicant applied for, or have an existing RIWI Act licence or permit in relation to this proposal?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Application reference No: Licence/permit No: Licence / permit not required.
Does the proposal involve a discharge of waste into a designated area (as defined in section 57 of the EP Act)?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Name: N/A Type: Has Regulatory Services (Water) been consulted? Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/> Regional office:
Is the Premises situated in a Public Drinking Water Source Area (PDWSA)?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Name: N/A Priority: P1 / P2 / P3 / N/A Are the proposed activities/landuse compatible with the PDWSA (refer to <u>WQPN 25</u>)? Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>
Is the Premises subject to any other Acts or subsidiary regulations (e.g. <i>Dangerous Goods Safety Act 2004</i> , <i>Environmental Protection (Controlled Waste) Regulations 2004</i> , <i>State Agreement Act xxxx</i>)	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
Is the Premises within an Environmental Protection Policy	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Environmental Protection (Kwinana) (Atmospheric Wastes)

(EPP) Area?		Policy 1999
Is the Premises subject to any EPP requirements?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Site is subject to SO ₂ requirements of Kwinana EPP.
Is the Premises a known or suspected contaminated site under the <i>Contaminated Sites Act 2003</i> ?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	All managed with contaminated sites.