

# ***Air Quality Management Plan (AQMP)***

***Rutherford Refinery – 41 Kyle St, Rutherford NSW***

***Date:*** April 2024  
***Prepared by:*** AECOM  
***Updated by:*** Cleanaway  
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**Revision History**

Rev	Date	Review Trigger	Details of changes	Certified by:	
				Name	Title
0	20/03/2007	Initial	-	Stuart Douglas	-
1	27/09/2019	2018 IEA	Re-draft of AQMP	Bart Downe	Environmental Business Partner
2	30/06/2022	2021 IEA	Update AQMP	Scott McLeod	Regional Mgr – Refineries
3	21/04/2023	2022 AEMR	Update AQMP	Scott McLeod	Regional Mgr – Refineries
4	10/04/2024	2023 AEMR	Update AQMP	Scott McLeod	Regional Manager – Refineries

# Abbreviations

Abbreviation	Term
AGA	Australian Gas Association
AQMP	Air Quality Management Plan
CO	Carbon Monoxide
Cleanaway	Cleanaway Pty Ltd
Council	Maitland City Council
DPE	Department of Planning and Environment
EMP	Environmental Management Plans
EMS	Environmental Management System
EPA	NSW Environment Protection Authority
EPL	Environment Protection Licence
ERP	Emergency Response Plan
H <sub>2</sub>	Hydrogen
H <sub>2</sub> S	Hydrogen sulphide
LGA	Local government area
MMMs	Management and mitigation measures
N <sub>2</sub>	Nitrogen
NOX	Oxides of nitrogen
NSW	New South Wales
OEMP	Operational Environmental Management Plan
PAHs	Polycyclic aromatic hydrocarbons
PIRMP	Pollution Incident Emergency Response Plan
PLC	Programmable Logic Controller
SO <sub>2</sub>	Sulphur dioxide
SO <sub>3</sub>	Sulphur trioxide
the 'Site'	Cleanaway Refinery located at 41 Kyle Street, Rutherford, NSW
tpa	Tonnes per annum
TSP	Total suspended particulates
VOCs	Volatile Organic Compounds

# 1. Introduction

This Air Quality Management Plan (AQMP) has been prepared for Cleanaway Pty Ltd (Cleanaway) to identify and provide management solutions for potential air quality impacts arising from the operation of the Cleanaway Refinery located at 41 Kyle Street, Rutherford, New South Wales (NSW) (the 'Site').

The Site was initially granted project approval PA 05\_0037 on 4 July 2006 for the construction and operation of a resource recovery and recycling facility.

Project Approval MP05\_0037 was modified on six occasions between 2006 and 2023. This included the following modifications:

- Modification 1 (MOD 1): Construction of additional plant to improve the quality of the final waste oil product, determined 16 May 2007;
- Modification 2 (MOD 2): Modification of monitoring requirements to ensure consistency with the EPL, determined 18 October 2011;
- Modification 4 (MOD 4): Replacement of the stack at monitoring point 19, determined 10 December 2014;
- Modification 5 (MOD 5): Construction and operation of new equipment (oil polishing system, multi-fuel burner, six additional oil storage tanks with total combined storage of 2.4 ML and safety and fire-fighting systems) and increase the height of the Multi-Fuel Burner Stack, to enable the facility to produce both Class I and Class II product oils, determined 9 September 2016;
- Modification (MOD 6): Construction and operation of a Mobile Oil Polishing Plant (MOPP) for a trial period of 30 months, determined 20 August 2021; and
- Modification (MOD 7): Construct an additional waste gas stack to separate emission flow from the existing stack into two distinct emission points, determined 11 October 2023.

Please note, Modification 2<sup>1</sup> for the relocation of oil storage tanks was withdrawn. Works associated with MOD 5 have not commenced, while MOD 6 is still within the trial period<sup>2</sup>.

## 1.1 Scope

The scope of this AQMP includes the operational activities undertaken by Cleanaway employees, contractors and subcontractors at the Cleanaway Rutherford site as they relate to air quality.

This AQMP forms part of the Operational Environmental Management Plan (OEMP) for the Cleanaway Rutherford site. Therefore, consideration of the following documents should occur when considering the environmental management activities undertake onsite:

- Operational Environmental Management Plan (OEMP)
- Groundwater Management Plan (GWMP)
- Stormwater Management Plan (SWMP)

## 1.2 Objectives

The main objectives of this AQMP are to:

- Outline the measures to minimise and manage air quality impacts of the project, including odour; and
- Ensure compliance with licence and approval requirements.

<sup>1</sup> It is noted that there are two separate modifications called Modification 2, as result there is no Modification 3.

<sup>2</sup> In November 2023, a 24-month extension was provided to CWY by DPE, and the trial period is effective until November 2025. This extended the initial 30-month trial period.

### **1.3 Consultation**

The previous version of this plan (i.e. Rev3) was provided to DPE, Council and EPA for further consultation in April 2023. No comments were received on the AQMP from any agencies.

Following the completion of internal reviews, this version of the AQMP (i.e. Rev4) will also be supplied to the above agencies.

## 2. Compliance Requirements

### 2.1 Conditions of Approval

This AQMP has been prepared to meet the requirements of Condition 3.6 of PA 05\_0037, to prepare and implement an AQMP for the operations at the Site. The specific requirements of this Condition are outlined in **Table 1** as are other requirements relating to air quality specified by the Conditions of Approval.

**Table 1: PA 05\_0037 Conditions of Approval relating to Air Quality**

Condition	Requirement	Reference Section
3.6	The OEMP for the project shall include the following Management Plans:	
(a)	An Air Quality Management Plan outlining the measures that would be implemented to minimise and manage air quality impacts of the proposal, particularly odour. The Plan shall include, but not necessarily be limited to:	This Report
	i) Identification of all point and diffuse sources of air quality emissions associated with the project;	Section 4
	ii) A detailed description of the mitigation methods and management practices that would be used throughout the project, particularly methods to ensure offensive odour impacts do not occur off site, and a demonstration that these measures are consistent with industry best practice;	Section 5 and Section 6
	iii) A detailed monitoring program for the project;	Section 7
	iv) Details of the contingency measures that would be implemented if non-compliance with air quality emissions criteria is detected or if offensive odour impacts occur; and	Section 10
	v) A procedure for handling complaints.	Detailed in OEMP
2.4	The Proponent shall design, construct, operate and maintain the project in a manner that prevents and/or minimises air pollution.	Section 5 and Section 6
2.5	The Proponent shall not cause or permit the emission of offensive odours from the site, as defined under Section 129 of the Protection of the Environment Operations Act 1997.  Note: Section 129 of the Protection of the Environment Operations Act 1997, provides that the Proponent must not cause or permit the emission of any offensive odour from the site, but provides a defence if the emission is in accordance with the conditions of a license as a potentially offensive odour and the odour was emitted in accordance with the conditions of a license directed at minimising odour.	Section 5 and Section 6
2.6	The Proponent shall design, operate and maintain the project in a manner that would achieve emissions compliance with the EPL. The Proponent must advise the Department of any variations to the EPL as approved by EPA.	Section 5 Section 6 Section 7 Section 8 Section 9 Section 10 Section 11

Condition	Requirement	Reference Section
2.7	The Proponent shall design, operate and maintain the project in a manner that would achieve Best Available Control Technology for toxic air pollutants specified in <i>Approved Methods for the Modelling and Assessment of Air pollutants in New South Wales</i> (August 2005).	Section 5
2.8	The Proponent shall ensure that all stack air emission points at the site are designed to: <ul style="list-style-type: none"> <li>(a) Broadly conform to the general requirements of Guidelines for Determination of Good Engineering Practice Stack Height (Technical Support Document for the Stack Height Regulations) (US EPA); and</li> <li>(b) To accommodate and be built with sampling ports that conform with TM-1 as specified in <i>Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales</i> (August 2005).</li> </ul>	Section 5
2.9	The Proponent shall ensure that the flare is designed, constructed and operated in accordance with the requirements of Clauses 38 – 41 of the Protection of the Environment (Clean Air) Amendment (Industrial and Commercial Activities and Plant) Regulation 2005.  The manufacturer's design specification for the flare must include the design destruction efficiency and must be submitted to the EPA for approval. The EPA's approval in writing must be obtained by the Proponent prior to the installation of the flare.	Section 5 and Section 6
2.10	The Proponent shall design, operate and maintain the project in a manner that complies with all requirements of the EPA as specified in the EPL for the project with respect to volatile organic liquid control equipment prescribed in Part 5 of the <i>Protection of the Environment Operations (Clean Air) Amendment (Industrial and Commercial Activities and Plant) Regulation 2005</i> .	Section 5 and Section 6
2.11	The Proponent shall not vent the flare except during start-up, shutdown and process upsets.  For the purposes of this condition, process upsets shall not exceed 2% of the process operating time per annum. This excludes the initial commissioning period of the project, which is defined as being three months from the start-up date of the project.	Section 6
2.12	Throughout the life of the project, the Proponent shall keep and maintain detailed records of each use of the flare on site, and the details of all process upsets, start-ups and shutdowns.  The records shall be made available and shall include: <ul style="list-style-type: none"> <li>(a) the flare start and stop time, and the reasons for its use;</li> <li>(b) the process start and stop time, and the reason for each process upset</li> </ul>	Section 5 Section 9
2.13	The Proponent shall not burn or use waste oil and other non-standard fuels as fuel at the site.	Section 6
2.14	Air supply to the boilers at the site may include vent air emissions from the hydrogenated oil storage, feed stock storage, light ends storage and sour water storage.	Section 5 and Section 6
MOD 5 2.14A	The sulphur composition of all fuel utilised for the project must not exceed 0.5 percent.	Section 6



Condition	Requirement	Reference Section
3.2	Air quality monitoring will be undertaken in strict accordance with the requirements set out in the EPL covering the operation of the facility and the Rutherford Resource Recovery and Recycling Facility Air Quality Management Plan (AQMP) prepared by Pacific Air and Environment (PAE) dated 20 March 2007.	Section 5 Section 6 Section 7 Section 8 Section 9 Section 10 Section 11
4.2	<p>Within three months of commissioning operations at the site, the Proponent shall submit an Operational Air and Noise Validation Report for the project. This Report shall:</p> <ul style="list-style-type: none"> <li>a) Be undertaken by a suitably qualified and experienced person(s);</li> <li>b) Assess whether the project is complying with the noise criteria specified in condition 2.20 of this approval, and identify what additional measures could be implemented to ensure compliance should any non-compliance be detected;</li> <li>c) Validate that the performance of the project reflects the assumptions and conclusions made in the Preferred Project Report and the Environmental Assessment for Transpacific Refiners, Modifications to Existing Development, dated 12 April 2007;</li> <li>d) Undertake air quality validation and performance verification reporting as detailed in the AQMP prepared by PAE, dated 20 March 2007 to validate compliance with the Protection of the Environment Operations (Clean Air) Amendment (industrial and Commercial Activities and Plant) Regulation 2005 and the emissions inventory of the project as detailed in the Environmental Assessment for Transpacific Refiners, Modifications to Existing Development, dated 12 April 2007;</li> <li>e) Provide details of each round of Performance Verification Monitoring such that the monitoring frequency for all pollutants can be reviewed, as specified in the AQMP;</li> <li>f) Identify what additional measures could be implemented to ensure compliance should any non-compliance be detected; and</li> <li>g) Provide details of any complaints received relating to air quality generated by the project, and action taken to respond to those complaints.</li> </ul>	Section 5
4.3	If the Report identifies any non-compliance with the air quality limits imposed under this approval, an EPL for the development and/or does not reflect the conclusions made within the Environmental Assessment for Transpacific Refiners, Modifications to Existing Development, dated 12 April 2007, the Proponent shall detail what additional measures would be implemented to ensure compliance, clearly indicating who would implement these measures, when these measures would be implemented, and how the effectiveness of these measures would be measured and reported to the Secretary and the EPA. The Proponent shall comply will all reasonable requirements of the Secretary or the EPA in respect to the findings presented in the Report. Any such works shall be completed within such time as the Secretary or the EPA may require.	Section 5

Condition	Requirement	Reference Section
4.3A (MOD 7)	<p>Within six (6) months of the date of commencement of the modified operation for MOD 7, the Applicant must submit for approval of the Planning Secretary, an Operational Air and Odour Validation Report.</p> <p>The Report must:</p> <p>a) Be prepared by a suitably qualified and experienced person(s) in consultation with the EPA;</p> <p>b) include a revised Air Quality Impact Assessment of air quality impacts from the project ‘as constructed’ and include actual measured emissions;</p> <p>c) assess the operation of MOD 7 against the air quality and odour predictions made in the documents:</p> <ul style="list-style-type: none"> <li>• “Cleanaway Rutherford AQIA – EPL Point 19 Modification and Pilot Scale Oil Polishing Unit” prepared by AECOM Australia Pty Ltd and dated 6 May 2021;</li> <li>• “Updated Stack Height Dispersion Comparison” prepared by AECOM Australia Pty Ltd and dated 24 January 2022;</li> <li>• “EPL Point Modification and Pilot Scale Oil Polishing Unit AQIA PM2.5 addendum – Ref: MP05_0037-Mod-7” prepared by AECOM Australia Pty Ltd and dated 3 August 2023; and</li> <li>• any subsequent air quality impact assessment prepared for the facility ‘as constructed’.</li> </ul> <p>d) include an action plan that identifies and priorities any air quality and odour mitigation measures that may be necessary to reduce air quality and odour emissions; and</p> <p>e) provide details of any complaints received relating to air quality impacts generated by the project and action taken to respond to those complaints.</p>	Section 5

## 2.2 Environment Protection Licence

The site operates under an Environment Protection Licence (EPL) No.12555, issued by the NSW Environment Protection Authority (EPA) for the Scheduled Activity of “chemical storage” and “petroleum products and fuel production”. The requirements of the EPL relevant to air quality are summarised in **Table 2**.

**Table 2: EPL Conditions relevant to Air Quality**

Condition	Requirement	Reference Section
L2.1 & L2.2	Assessable pollutant load limits	Section 7.2
L3.2	Air pollutant concentration limits	Section 7.3
L6.1	Potentially offensive odour	Section 5 Section 6
O2.2	Waste oil and other non-standard fuels must not be burnt or used as fuel on site	Section 5 Section 6
O2.3	All boilers must be fuelled only by natural gas	Section 6

Condition	Requirement	Reference Section
O6.1	The flare must not operate except during start up, shutdown and permissible process upsets.	Section 6
O6.2	Process upsets must not exceed 2% of the total process operating time during any 12 month period.	Section 6
O6.3	There must be no visible emission from Point 4 other than for a total period of no more than 5 minutes in any 2 hour period.	Section 6
M2.2 and M2.4	Air monitoring requirements	Section 7
M3.1	Testing methods – concentration limits	Section 7.4
M4	Testing methods – loads limits	Section 7.4
M5	Weather monitoring	Section 7.4
M8.1	Detailed records of each use of the flare must be kept on site and made available to the EPA on request. Each record must include the flare start and stop time and the reason for its use.	Section 9
M8.2	Detailed records of all process upsets and process start-ups and shutdowns must be kept. Each record must include the process start and stop time and the reason for each process upset.	Section 9
R4.1	The licensee must notify the EPA of any process start-up, process shut-down and/or process upset which results in the concentration of hydrogen sulphide, as measured by the continuous hydrogen sulphide monitoring system exceeding 15 parts per million for a period of 30 seconds or more.	Section 9
E1	<p>E1.1 The licensee must provide to the EPA a copy of the Operational Air and Odour Validation Report, as required by Schedule 4 Condition 4.3A of development consent MP05_0037 MOD 7 issued by the Department of Planning and Environment (DPE) on 11 October 2023.</p> <p>The report must be provided to the EPA within one week of submission of the report to DPE.</p> <p>The report must be provided to the EPA by email to: <a href="mailto:info@epa.nsw.gov.au">info@epa.nsw.gov.au</a></p> <p>Note: Schedule 4 Condition 4.3A of development consent MP05_0037 MOD 7 reads as follows:</p> <p>Within six (6) months of the date of commencement of the modified operation for MOD 7, the Applicant must submit for approval of the Planning Secretary, an Operational Air and Odour Validation Report.</p> <p>The Report must:</p> <ol style="list-style-type: none"> <li>Be prepared by a suitably qualified and experienced person(s) in consultation with the EPA;</li> <li>include a revised Air Quality Impact Assessment of air quality impacts from the project ‘as constructed’ and include actual measured emissions;</li> <li>assess the operation of MOD 7 against the air quality and odour predictions made in the documents: <ul style="list-style-type: none"> <li>“Cleanaway Rutherford AQIA – EPL Point 19 Modification and Pilot Scale Oil Polishing Unit” prepared by AECOM Australia Pty Ltd and dated 6 May 2021;</li> </ul> </li> </ol>	Section 5

Condition	Requirement	Reference Section
	<ul style="list-style-type: none"> <li>• “Updated Stack Height Dispersion Comparison” prepared by AECOM Australia Pty Ltd and dated 24 January 2022;</li> <li>• “EPL Point Modification and Pilot Scale Oil Polishing Unit AQIA PM2.5 addendum – Ref: MP05_0037-Mod-7” prepared by AECOM Australia Pty Ltd and dated 3 August 2023; and</li> <li>• any subsequent air quality impact assessment prepared for the facility ‘as constructed’.</li> </ul> <p>d) include an action plan that identifies and priorities any air quality and odour mitigation measures that may be necessary to reduce air quality and odour emissions; and</p> <p>e) provide details of any complaints received relating to air quality impacts generated by the project and action taken to respond to those complaints.</p>	

### 2.3 Legislative Requirements

An overview of the legislative requirements relevant to air quality are summarised in **Table 3**.

**Table 3: Overview of Legislative Requirements**

Legislation	Overview of obligations
Protection of the Environment Operations Act 1997 (POEO Act)	<p>The POEO Act sets the statutory framework for managing air quality in NSW, including establishing the licensing scheme for major industrial premises and a range of air pollution offences and penalties.</p> <p>Part 5.4 sets out obligations to avoid air pollution including: operate and maintain plant correctly; carry out work responsibly; process, handle and store materials properly and efficiently.</p> <p>Scheduled activities must also comply with air emission standards and protect the community from odour.</p>
Protection of the Environment Operations (General) Regulation 2022	<p>The POEO General Regulation provides for the administration of the licensing scheme and provides economic incentives for licensed businesses and industry to reduce pollution, including emissions to air, through load-based licensing.</p>
Protection of the Environment Operations (Clean Air) Regulation 2022	<p>The POEO Clean Air Regulation contains provisions to regulate air emissions from industry (Part 5).</p>
National Environment Protection (Ambient Air Quality) Measure	<p>The NSW Government is a signatory to the National Environment Protection (Ambient Air Quality) Measure (Air NEPM).</p> <p>The NEPM sets standards for six key air pollutants: carbon monoxide, nitrogen dioxide, sulfur dioxide, lead, ozone and particles (particulates).</p>

## 3. Project Description

### 3.1 Site Description and Layout

The Site is located in the Rutherford Industrial Estate, approximately 5 km north/west of Maitland. The Site is located within the Maitland City Council local government area (LGA) (refer to **Figure 1**). The refinery has been operational since May 2007.

The site topography is flat and primarily devoid of any significant vegetation with the exception of some boundary tree plantings along the western boundary. A large portion of the site is undeveloped grassland with the existing facility concentrated on the western end of the site. The site is located on Lot 223 DP 1037300.

The nearest residential area is located in Rutherford, with the closest receptors approximately 1 km from the Site.

The refinery processes up to 40,000 tonnes per annum (tpa) of re-refined waste oil. This waste oil is refined via hydrogenation into base oil for use in lube oil blending and industrial processes.

The site operates 24 hours a day, 7 days a week with a workforce of up to 35. Major components of the Site include:

- Hydrogenation plant
- Hydrogen (H<sub>2</sub>) plant
- Nitrogen (N<sub>2</sub>) plant
- Cooling towers
- Storage tanks
- Control room and office building
- Workshop
- Process store
- Truck unloading and loading bays
- Mobile Oil Polishing Plant (MOPP)

Activities and operations required for the receipt, storage, processing and supply of refined oils are outlined in the Standard Operating Procedures (SOPs) for the Site.

As part of the waste management and recycling operations, Cleanaway Rutherford forms a key part of the closed loop used oil recycling business, by providing the facilities to return oil and lubricants to base oil quality for purchase and reuse in the marketplace. Other facilities located throughout the east coast support the Rutherford site in the collection, initial cleaning/processing, and transportation of waste and base oils.

### 3.2 Surrounding Land Use

As shown in **Figure 1**, the Site is located within the Rutherford Industrial Estate which contains a number of industrial businesses. Industrial land uses immediately surrounding the site can be summarised as:

- North – Industrial land uses
- South – Industrial land uses
- West – Vacant vegetated land (Cleanaway site) and Industrial land uses; and
- East – Primarily vacant industrial land.

The nearest residential area is located at Rutherford, with the closest receptors approximately 1 km from the site.



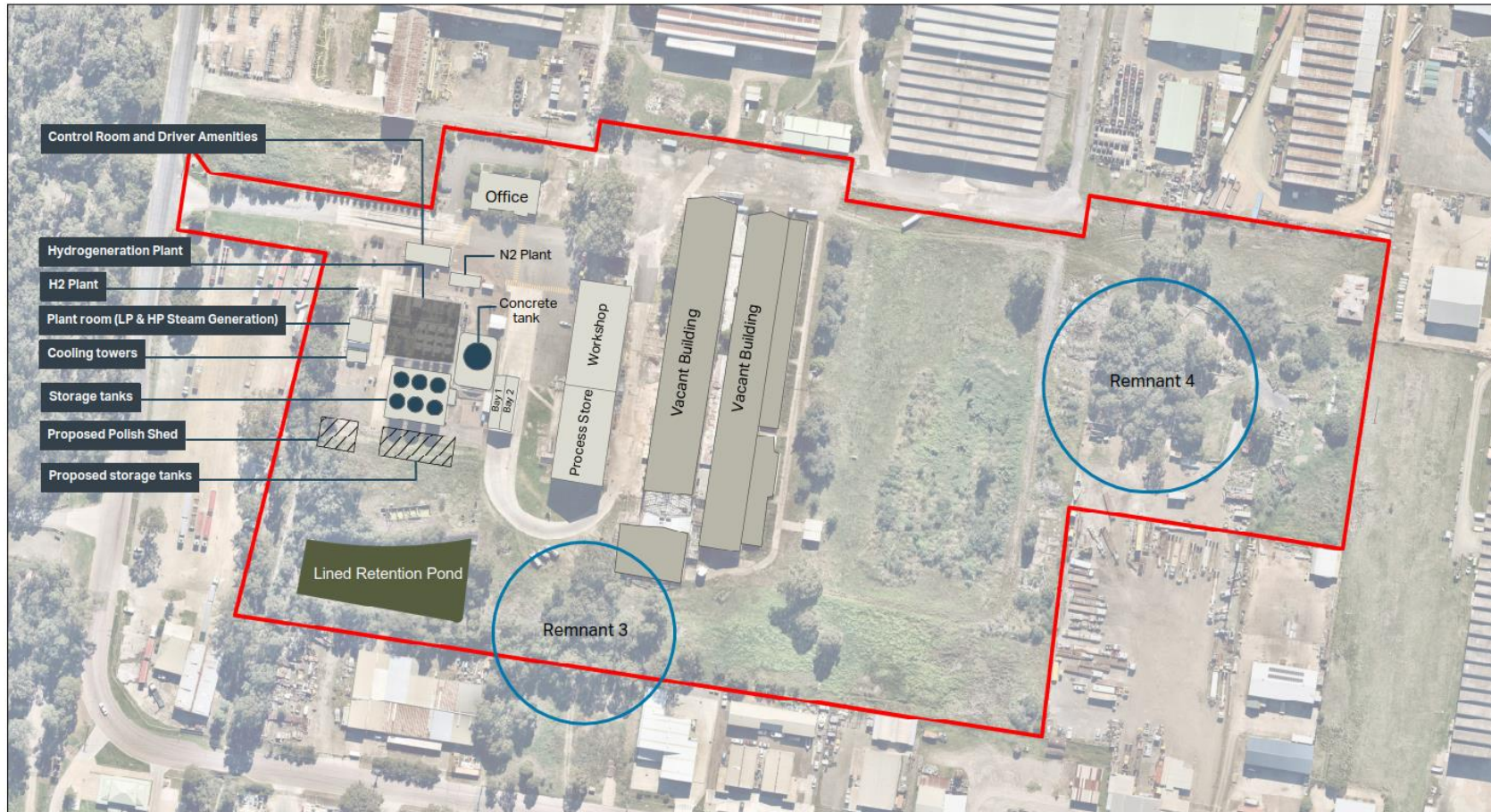
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Figure 1: Location of the Site



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Legend

Site boundary

Figure 2: Site layout (Note, “proposed” infrastructure relates to MOD 5 approval)

## 4. Air Emission Sources

This section identifies the point and diffuse sources of air quality emissions associated with the operation of the refinery. A summary of all the emitting plant infrastructure, its function and the pollutants emitted is provided in **Table 4** (including reference to the MOPP – EPA Monitoring Point 24).

It is noted that MOD 5 (determined in September 2016) approved the construction and operation of new equipment (oil polishing system, multi-fuel burner, six additional oil storage tanks with total combined storage of 2.4 ML and safety and fire-fighting systems) and increased the height of the Multi-Fuel Burner Stack, to enable the facility to produce both Class I and Class II product oils.

MOD 5 has yet to be constructed and therefore the emissions associated with MOD 5 have not been included as they are not yet applicable. This AQMP will be revised for the operation of the new equipment associated with MOD 5 once it has been constructed.

Note, information pertaining to MOD 7 (stack duplication project) has been included in the below table with these works to occur in 2024.

**Table 4: Identification of Air Emission Sources**

Plant	Function	Source Type	Major / Minor	Pollutants Emitted
3.0 MW Boiler Stack (EPA Point 2)	<ul style="list-style-type: none"> <li>Low pressure (1,000 kPa max operating pressure) water tube boiler</li> <li>Provides steam for vacuum stripper and steam ejectors</li> <li>Stack height: 8m</li> </ul>	Point	Major	<ul style="list-style-type: none"> <li>Oxides of nitrogen (NOX)</li> <li>Volatile organic compounds (VOCs)</li> <li>Total suspended particulates (TSP)</li> <li>Polycyclic aromatic hydrocarbons (PAHs)</li> </ul>
0.2 MW Boiler Stack (EPA Point 3)	<ul style="list-style-type: none"> <li>High pressure (2,000 kPa max operating pressure), natural gas fired tubeless vertical boiler</li> <li>Provides high pressure steam for use in the Hydrogen plant steam-methane reformer</li> <li>Stack height: 10m</li> </ul>	Point	Major	<ul style="list-style-type: none"> <li>NOX</li> <li>VOCs</li> <li>TSP</li> <li>Hydrogen sulphide (H<sub>2</sub>S).</li> <li>Sulphur acid mist</li> <li>PAHs</li> </ul>
Hydrogen Reformer Burner Stack (EPA Point 20)	<ul style="list-style-type: none"> <li>Provides heat for the formation of hydrogen</li> <li>Stack height: 14m</li> </ul>	Point	Major	<ul style="list-style-type: none"> <li>NOX</li> <li>VOCs</li> <li>TSP</li> <li>Sulphur dioxide and sulphur trioxide (SO<sub>2</sub> and SO<sub>3</sub>);</li> </ul>
Light end scrubber / Vapour Recovery Unit (VRU) Discharge Stack (EPA Point 5)	<ul style="list-style-type: none"> <li>Wet scrubber</li> <li>Activated carbon scrubber consisting of three 200 L drums of activated carbon positioned in series. Installed upstream of the VRU to capture VOCs and H<sub>2</sub>S prior to the gas stream reaching the wet scrubber</li> <li>Treats emissions from the light end fume collection system (flashpoint correction burner and the product storage tanks)</li> <li>Stack height: 8m</li> </ul>	Point	Major	<ul style="list-style-type: none"> <li>VOCs</li> <li>H<sub>2</sub>S.</li> <li>SO<sub>3</sub></li> <li>SO<sub>2</sub></li> <li>Carbon monoxide (CO)</li> <li>PAH</li> </ul>



Plant	Function	Source Type	Major / Minor	Pollutants Emitted
Thermal Oil Heater Stack (EPA Point 19)	<ul style="list-style-type: none"> <li>Used to raise the oil temperature up to approximately 300°C</li> <li>Serves the thermal oil heater which operate on natural gas and exhausts directly out of Point 19</li> </ul>	Point	Major	<ul style="list-style-type: none"> <li>NOx</li> <li>SO<sub>3</sub></li> <li>SO<sub>2</sub></li> <li>CO</li> <li>VOCs</li> <li>TSP</li> <li>H<sub>2</sub>S</li> <li>PAHs</li> </ul>
Gas Fired Heater Stack (EPA Point 25)	<ul style="list-style-type: none"> <li>Gas Fired Heater which operates on natural gas and fuel gas from the process and exhausts to a SOx scrubber to remove potential sulphur emissions before exhausting to Point 25 (TBC in 2024)</li> <li>Stack height: 26m</li> </ul>	Point	Major	<ul style="list-style-type: none"> <li>NOx</li> <li>SO<sub>3</sub></li> <li>SO<sub>2</sub></li> <li>CO</li> <li>VOCs</li> <li>TSP</li> <li>H<sub>2</sub>S</li> <li>PAHs</li> </ul>
Gas Flare (EPA Point 4)	<ul style="list-style-type: none"> <li>Only operates during start-up and shut-down operations and during process imbalances</li> <li>Has a permanent pilot burner of 20 Nm<sup>3</sup>/h,</li> <li>Maximum fuel capacity = 160 kg/hr</li> <li>Design destruction efficiency = 99.99%</li> <li>Stack height: 16m</li> </ul>	Point	Minor	<ul style="list-style-type: none"> <li>Intermittent release of products emanating from process gas and natural gas combustion</li> <li>NOx</li> <li>CO</li> </ul>
Storage Tanks	<ul style="list-style-type: none"> <li>6 x 450 m3 storage tanks</li> <li>12 x 90 m3 process tanks</li> <li>Operate at ambient temperature under nitrogen blanketing</li> </ul>	Fugitive	Minor	<ul style="list-style-type: none"> <li>VOCs</li> <li>PAHs</li> </ul>
Roadway Dust	<ul style="list-style-type: none"> <li>Access and egress roads are paved / tarmac</li> <li>Vehicle to avoid driving on unpaved / non-tarmac areas</li> <li>Traffic Management Plan in place at the site</li> </ul>	Fugitive	Minor	<ul style="list-style-type: none"> <li>Dust</li> </ul>
Vehicle Emissions	<ul style="list-style-type: none"> <li>Onsite vehicles</li> <li>Loading of light ends for distribution off-site</li> <li>Delivery of waste oils for processing</li> </ul>	Fugitive	Minor	<ul style="list-style-type: none"> <li>CO</li> <li>NOx</li> <li>VOCs</li> <li>TSP</li> <li>SO<sub>2</sub></li> </ul>
MOPP Stack (EPA Point 24)	<ul style="list-style-type: none"> <li>In-series granulated activated carbon (GAC) filters</li> <li>Treats emissions from the Mobile Oil Polishing Plant (MOPP)</li> <li>Stack height: 4m</li> </ul>	Point	Major	<ul style="list-style-type: none"> <li>TSP</li> <li>SO<sub>2</sub></li> <li>NOx</li> <li>CO</li> <li>VOC</li> </ul>

# 5. Plant Design and Validation

## 5.1 History of design and validation

The Project Approval included a number of requirements that related to the design of the plant to minimise air emissions and odour. In addition, design and validation requirements were included in the EPL either as special conditions or as Pollution Reduction Programs (PRPs). A summary of the history of the plant design and validation is provided in **Table 5** with further discussion provided in the sections that follow.

**Table 5: Timeline of Design and Validation**

Date	Design / Validation
January 2006	Air Quality Assessment prepared by PB as part of Environmental Assessment.
April 2006	Revised Air Quality Assessment prepared by PAE as part of Preferred Project Report.
July 2006	Project Approval granted including requirements relating to design of stack emission points, and flare and requiring air quality validation and performance verification reporting.
August 2007	EPL granted  Included Condition E1 which required that within 4 months of issuing of the licence, Cleanaway submit a report to the EPA which provides confirmation that all air stack emission points confirm to the requirements mirrored by Project Approval Condition 2.8 (i.e. conforming with the <i>Guidelines for Determination of Good Engineering Practice Stack Height</i> (Technical Support Document for the Stack Height Regulations) (US EPA June 1985 and TM-1 as specified in <i>Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales</i> (DEC August 2005)
December 2008	Operational Air and Noise Validation Report prepared by ENSR, December 2008 (refer Section 5.2).
August 2010	EPL variation issued and Condition E1 removed. New PRP added (U1.1) requiring the preparation of an Air Quality Impact Assessment and Mitigation Report (refer Section 5.3).
October 2011	Amendment approved for increase in particulate emission limit from EPA Point 19 from 10mg/m <sup>3</sup> to 50mg/m <sup>3</sup> . Also aligned the monitoring requirements of the Project Approval with the EPL and removed monitoring requirements for dust.
December 2014	Modification 4 approved for the replacement of Fired Heater Stack (EPL Point 19) with a taller replacement.
August 2021	Modification 6 approved for 30 month trial of MOPP. Operation of MOPP managed via the ReOil Pty Ltd managed mobile processing plant EPL.
September 2022	MOPP operational and air monitoring requirements add to EPL 12555.
October 2023	Modification 7 approved to construct an additional waste gas stack to separate emission flow from the existing stack into two distinct emission points (Point 19 and Point 25).
TBC 2024	Stack for EPA Monitoring Point 25 to be raised, commissioned and relevant reporting to DPE and EPA to occur.

## 5.2 Operational Air and Noise Validation Report - 2008

As required by Condition 4.2 of the Project Approval (original consent and early MODs), an Operational Air and Noise Validation Report was prepared post commissioning by ENSR in December 2008 (**Appendix A**). The aim of the report

was to validate that the performance of the project reflects the assumptions and conclusions made in the Environmental Impact Statement (EIS) and to undertake air quality validation and performance verification reporting to validate compliance with the *Protection of the Environment Operations (Clean Air) Amendment (Industrial and Commercial Activities and Plant) Regulation 2005* and the emissions inventory of the project as detailed in the Environmental Assessment for Transpacific Refiners, Modifications to Existing Development, dated 12 April 2007.

The air quality impact assessment was undertaken for the refinery “as built” and operating as of November 2008. Emission rates were sourced from measurements taken from stack emission reports and air dispersion modelling undertaken. The results of the dispersion modelling indicated most pollutant concentrations were below their respective assessment criteria (NO<sub>2</sub>, SO<sub>2</sub>, CO, TSP, PAH and H<sub>2</sub>SO<sub>4</sub>) however three pollutants exceeded their impact criteria (PM<sub>10</sub>(24 hour average), VOC (modelled as benzene) and H<sub>2</sub>S). This contrasted with the predictions made in the EIS which reported no exceedances beyond the property boundary. It is noted the PM<sub>10</sub> exceedance was due to the background particulate concentration being already elevated above assessment criteria.

The differences between the predicted impacts and the actual was due to the emissions from the light end scrubber which was not expected to receive such an elevated level of H<sub>2</sub>S. Subsequent to this modelling, Cleanaway implemented process alterations to improve the overall efficiency of the facility and eliminate the largest source of VOCs and H<sub>2</sub>S. The report concluded that validation of the process alterations be undertaken by the scheduled quarterly stack testing – since changed to annual stack testing in consultation with DPE and EPA.

### 5.3 Air Quality Impact Assessment and Mitigation Report - 2010

On the 30 August 2010 a PRP was included in the EPL (Condition U1) to prepare an Air Quality Impact Assessment and Mitigation Report. The aim of the study is reproduced as follows:

*U1.1 The aim of this condition is to benchmark air emission control performance and demonstrate that the current emission controls are performing to a level that achieves compliance with the current licence emission concentration limits and the EPA’s air quality impact assessment criteria. Where current emissions controls are found to be inadequate, this condition requires investigation and implementation of additional control measures that will ensure compliance with the relevant criteria.*

1. *The licensee must complete an air quality impact assessment and mitigation study (“the Study”)*
2. *The Study must be completed in strict accordance with the methodologies set out in the following documents or as otherwise approved in writing by the EPA:*
  - a) *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales (DEC, August 2005)*
  - b) *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales (DEC, 2005)*
3. *The Study must include:*
  - a) *Identification of all emission sources of complex mixtures of odorous substances, speciated volatile organic compounds (e.g. individual air toxics and individual odorous substances), hydrogen sulphide, solid particles and sulphuric acid mist at the premises and their maximum air pollutant emission concentrations/rates determined by sampling in accordance with the methods detailed in 2b.*
  - b) *Identification of all air pollutant control equipment associated with the emission sources in 3a. The operational performance of each item of control equipment must be determined based on actual performance as determined in 3a. Performance of each item of equipment must be benchmarked against best management practice.*
  - c) *Based on the results of 3a and 3b, a determination by the Licensee as to whether emissions of these air pollutants comply with the requirements of the Protection of the Environment Operations (Clean Air) Regulation 2002 (“the Regulation”) and the licence. If the emission concentrations do not comply with the requirements of the Regulation and the licence, the Licensee must advise the EPA Regional Manager Hunter immediately when the results become known.*
  - d) *A dispersion modelling study which predicts the ground level concentrations of air pollutants specified in 3a. Modelling must be conducted in strict accordance with the methods detailed in 2a and using the data collected in 3a. To remove any doubt, where TAPM meteorology is used to predict atmospheric dispersion from the site, on-site wind measurements must be incorporated into the TAPM model for assimilation. Emissions modelled must be based on maximum measured emission concentrations; and*

- e) A comparison of the ground level concentrations predicted by the model against the appropriate impact assessment criteria detailed in 2a. Ground level concentration predictions at both nearby industrial and residential receptors must be presented in the comparison. To remove any doubt, the appropriate criteria for odour and hydrogen sulphide to be adopted by the Study are:
- i) Odour – 2OU at residential receptors and 4OU at industrial receptors; and
  - ii) Hydrogen sulphide –  $1.38\mu\text{g}/\text{m}^3$  at residential receptors and  $2.76\mu\text{g}/\text{m}^3$  at industrial receptors
- f) A review of the current flare design and operation and comparison with the flare design approved by the EPA in a letter dated 7 December 2006.
4. Using the results from 3, if the premises, does not comply with the relevant impact assessment criteria, emission concentration limits and the approved flare design, a technical review of all practical options for mitigating or controlling the emission concentration and rate of air pollutants and improving the flare design and operation must be completed and included in the Study. The technical review must include:
- a) Qualitative evaluation and modelling where appropriate of the potential reduction in the emission concentration and rate and air quality impacts associated with each mitigation option.
  - b) A cost/benefit analysis of a range of air quality mitigation and the flare design options must be completed
  - c) Using the results of 3, 4a and 4b the Licensee must identify emission control and management practices that ensure that the relevant impact assessment criteria detailed in 2a above, the licence emission concentration limits and the requirements of the Regulation are met
  - d) Detail a timetable to implement all necessary emission controls and flare modifications (as necessary)
  - e) Detail a timeframe and validation framework to demonstrate compliance following implementation of emission control from 4c and 4d; and
5. By no later than 1 October 2010, the Licensee must submit the findings of 3 and 4 to the EPA's Regional Manager, Hunter in a formal report that has been prepared in strict accordance with the requirements detailed in 2a.

Note: If indicated as necessary by the findings of U1, it is the EPA's intention to require the licensee to complete necessary works to ensure that to the maximum extent possible:

- a) The gas velocity at Point 5 conforms to TM-1 (AS4323.1) such that the gas exit velocity at Point 5 is greater than 3m/s; and
- b) The height of the stack at Point 5 is at least 2.5 times the height of nearby structures in accordance with the document "Guideline for Determination of Good Engineering Stack Height" (Technical Support Document for the Stack Height Regulation) US EPA June 1985

The Air Quality Impact Assessment and Mitigation Study Report was prepared by PAEHolmes in September 2010 (**Appendix B**). The main findings of the Study were:

#### Operational Performance

- EPA Points 2, 3, 5 and 20 perform well below the POEO Clean Air (Plant and Equipment) Regulation Limits and EPL limits.
- EPA Point 19 exceeded some of the limits for hydrogen sulphide, sulphuric acid mist, sulphur trioxide and solid particle emissions.

#### Benchmarking Performance

- The plant generally complies with best management practice for key pollutants of concern from a refining activity, such as odour and VOC, however the plant has some unique features in its design that cannot be reasonably benchmarked.
- The scrubber has been benchmarked with the original equipment manufacturers specification and shown to be operating within these specifications.

- Point 4 is an enclosed design type flare. Enclosed design flares provide higher combustion temperatures and longer residence time, which is important for a high level of destruction of VOC. The flare cannot be tested during operation due to the intensity of the heat produced which has obvious safety implications.
- The flare type and flare design is consistent with best practice and is specified to operate with a destruction efficiency of 99.99%, within the range of 800 to 1000 degrees centigrade with a residence time of 1.2 seconds in the high heat zone.

#### Hydrogen sulphide and sulphuric acid mist

- Extensive efforts have been made to date in regard to the operation of the facility, and specifically to remove the potential for odour emissions (e.g. Point 5 VRU) and also to reduce / resolve issues with particulate emissions from emission point 19, including the SO<sub>x</sub> scrubber operation. Investigations have been conducted on the scrubber and issues with de-mister operation resolved.
- The modifications at the site have essentially brought about best practice management of odour, VOC and greenhouse gas emissions by re-directing emissions to the fired heater and ensuring SO<sub>x</sub> scrubber operation is as designed.
- It is not reasonable or feasible to undertake any major re-fit or revision to the plant operations or pollution control equipment.

#### Solid Particles

- The licence limit of 10 mg/m<sup>3</sup> would be applicable to a natural gas fired heater or boiler but is not considered to reflect best practice levels of emission from a heater operated on fuel gas and exhausting via a SO<sub>x</sub> scrubber. It is noted that the natural gas fired equipment on-site would meet a level of 10 mg/m<sup>3</sup> for solid particle emissions.
- Overall, it is considered that the levels of combustion particles emitted are likely to be low and consistent with best practice, however the complicating factor of having to test for particulate matter in the outlet of a SO<sub>x</sub> scrubber makes measurement unreliable.
- There is a strong case to increase the licence limit at Discharge Point 19 from 10 mg/m<sup>3</sup> to 50 mg/m<sup>3</sup>.

#### Conclusions and Recommendations

- Through conservative modelling, the off-site ground level pollutant concentration levels were shown to be well below impact assessment criteria.
- Maximum plant emissions have no environmental impact beyond the boundary of the site.
- Particulate emission limits for Discharge Point 19 should be revised to reflect the operation of fuel-gas fired plant, or be removed altogether.
- H<sub>2</sub>S and sulphuric acid mist emissions have exceeded limits, albeit by a relatively small degree and only on one occasion in the last four rounds of testing.
- It is recommended to monitor Point 19 closely over a year in regard to sulphur related emissions and parameters, with a view to revealing whether there is any underlying issue or not.

The EPL was varied on the 10 February 2012 to increase the solid particle emission limit for Discharge Point 19 from 10 mg/m<sup>3</sup> to 50 mg/m<sup>3</sup>, being the prescribed standard of concentration for the activity 'petrochemical production', Group 6, *Protection of the Environment Operations (Clean Air) Regulation 2010*. Condition U1 was removed from the EPL by licence variation dated 23 September 2015.

## 5.4 Further plant modifications – 2011 & 2014

As approved under MOD 4, the Fired Heater Stack (EPL Point 19) was replaced in 2014. The old stack had corroded internally due to sulphuric acid condensing on its internal wall. The new stack was designed to comply with Australian Standards current in 2014. It had a protective coating applied to the internal wall to prevent corrosion from reoccurring. The new stack is 10 metres taller than the old stack (total height of 26m). The air quality assessment that accompanied the Environmental Assessment for the Modification application included air emission modelling which found that the increase in stack height was likely to improve the dispersion of emissions for all pollutants; most notably for hydrogen sulphide mist.

In 2011 Cleanaway installed a carbon scrubber upstream of the VRU to ensure the capture of VOC's and hydrogen sulphide prior to the gas stream reaching the VRU. Points of note about the operation of the carbon scrubber are as follows:

- There are three carbon drums positioned in series receiving VOC and hydrogen sulphide contaminated process air.
- Process lines are regularly tested to enable the effectiveness of each of the individual carbon drums.
- When the middle drum show signs of breakthrough, the lead drum is replaced, and the remaining two drums moved through with the new drum being placed as the tail drum.
- The drums are all prepared on site and have been prepared in a manner to ensure they are waterproof and airtight. The drums are pressure tested prior to use to ensure there are no leaks from the system.

## 5.5 MOD 5 Operational Air and Odour Validation Report - 2016

In September 2016, Condition 4.3A was updated via MOD 5. Condition 4.3A of the Project Approval required that an Operational Air and Odour Validation Report be prepared within six months of the date of commencement of the modified operation. Cleanaway would have been required to engage air quality consultants to perform this validation once modifications associated with MOD5 had commenced operation.

Note, as of February 2024 these works have not occurred at the Rutherford Refinery site and this condition has been replaced in MOD 7 (see Section 5.6 below for more information) – the above requirements, as of MOD7 and REV4 of the AQMP, therefore are no longer applicable to the site and this work has therefore not been undertaken.

## 5.6 MOD 7 Operational Air and Odour Validation Report - 2023

In October 2023, Condition 4.3A was updated via MOD 7. The new Condition 4.3A of the Project Approval requires that an Operational Air and Odour Validation Report be prepared within six months of the date of commencement of the modified operation. Cleanaway will seek to engage air quality consultants to perform this validation once modifications associated with MOD7 have commenced operation – namely, the below assessment will occur:

*4.3A Within six (6) months of the date of commencement of the modified operation for MOD 7, the Applicant must submit for approval of the Planning Secretary, an Operational Air and Odour Validation Report. The Report must:*

- a) Be prepared by a suitably qualified and experienced person(s) in consultation with the EPA;*
- b) include a revised Air Quality Impact Assessment of air quality impacts from the project 'as constructed' and include actual measured emissions;*
- c) assess the operation of MOD 7 against the air quality and odour predictions made in the documents:*
  - *"Cleanaway Rutherford AQIA – EPL Point 19 Modification and Pilot Scale Oil Polishing Unit" prepared by AECOM Australia Pty Ltd and dated 6 May 2021;*
  - *"Updated Stack Height Dispersion Comparison" prepared by AECOM Australia Pty Ltd and dated 24 January 2022;*
  - *"EPL Point Modification and Pilot Scale Oil Polishing Unit AQIA PM2.5 addendum – Ref: MP05\_0037-Mod-7" prepared by AECOM Australia Pty Ltd and dated 3 August 2023; and*
  - *any subsequent air quality impact assessment prepared for the facility 'as constructed'.*
- d) include an action plan that identifies and priorities any air quality and odour mitigation measures that may be necessary to reduce air quality and odour emissions; and*
- e) provide details of any complaints received relating to air quality impacts generated by the project and action taken to respond to those complaints.*

Note, as of April 2024 these works have not been completed at the Rutherford Refinery site. But these works are planned for 2024 and as a result this the AQMP has been proactively updated to reflect this.

## 6. Air Quality Management and Mitigation Measures

Air quality management will include a combination of engineering controls (e.g. automated control systems), operational control measures and contingency measures. Detailed descriptions of source-specific control measures are presented in **Table 6**. Contingency measures are discussed in **Section 10**.

**Table 6: Specific Air Quality Management and Mitigation Measures at the Air Emissions Sources**

Air Emission Point Source	Air Quality Management and Mitigation Measures
3.0 MW Boiler	The boiler is a registered boiler and has an Australian Gas Association (AGA) approved natural gas feed system fitted, complete with all required safety shut-off approved components.
	The consumption and composition of the fuel gas / fuel will be monitored. The boiler will be fed with natural gas fuel only (no waste oil or non-standard fuels are to be used to fire the boiler). However, it is noted that following modification of the project (PA 05_0037 MOD 5), the natural gas burner on the LP Steam Boiler would be replaced with a multi-fuel burner, such that process gases, tank vapours and low sulphur oil could be used as fuel to the boiler. This would result in some changes to air emissions from the site. The licence requirements, including air quality assessments, management and mitigation measures would be reviewed during plant modification works associated with MOD 5.
	When non-standard fuel is used in the boiler, measures will be put in place to ensure that the sulphur composition of the fuel does not exceed 0.5 per cent.
	Preventive maintenance programs will be implemented where appropriate.
	Ongoing monitoring (by sampling and obtaining results by analysis) of air emissions from the boiler stack will be conducted to assess compliance with the EPL.
	Additional control measures e.g. combustion tuning will be performed quarterly on the boiler in accordance with AS2593 - <i>Boilers - Safety management and supervision systems</i> to ensure compliance with the relevant emission standards.
0.2 MW Boiler	The boiler is a registered boiler and has an AGA approved natural gas feed system fitted, complete with all required safety shut-off approved components.
	The consumption and composition of the fuel gas / fuel will be monitored. The boiler will be fed with natural gas fuel only (no waste oil or non-standard fuels are to be used to fire the boiler).
	Preventive maintenance programs will be implemented where appropriate.
	Ongoing monitoring (by sampling and obtaining results by analysis) of air emissions from the boiler stack will be conducted to assess compliance with the EPL.
	Additional control measures e.g. combustion tuning will be performed quarterly on the boiler in accordance with AS2593 - <i>Boilers - Safety management and supervision systems</i> to ensure compliance with the relevant emission standards.



Air Emission Point Source	Air Quality Management and Mitigation Measures
Hydrogen Reformer Burner	The hydrogen reformer burner has an AGA approved natural gas feed system fitted, complete with all required safety shut off and approved components.
	The consumption and composition of the fuel gas / fuel will be monitored. The burner will be fed with natural gas fuel or by-product gas.
	Preventive maintenance programs will be implemented where appropriate.
	Ongoing monitoring (by sampling and obtaining results by analysis) of air emissions from the stack will be conducted to assess compliance with the EPL.
	Additional control measures e.g. combustion tuning will be undertaken yearly in accordance with <i>AS2593 - Boilers - Safety management and supervision systems</i> . Should the Performance Verification Monitoring indicate that the burner has variable emissions, the frequency of the tuning will be modified.
Light end scrubber / Vapour Recovery Unit (VRU) including Activated Carbon System	Regular testing of process lines on the activated carbon system (upstream of the VRU) will be conducted to ensure effective operation of the charcoal system.
	Ongoing monitoring and maintenance of the activated carbon system will be conducted.
	Ongoing monitoring (by sampling and obtaining results by analysis) of air emissions from the stack will be conducted to assess compliance with the EPL.
	Preventive maintenance programs will be implemented where appropriate
Gas Fired Heaters (Point 19 & 25)	<p>The consumption and composition of the fuel gas / fuel will be monitored.</p> <p>The heaters will be fed with natural gas (thermal oil heater) and natural gas and fuel gas (Fired Heater) only.</p> <p>No waste oil or non-standard fuels are to be used to fire the heaters.</p>
	<p>Includes a wet scrubber within the stack for removal of SO<sub>x</sub>. The purpose of the scrubber system is to promote the conversion of the SO<sub>x</sub> gas to soluble sodium salts, which are then removed in a liquid effluent stream. Off-gases from the SO<sub>x</sub> scrubber discharge through the gas fired heater stack (EPA Point 25).</p> <p>Operation of the SO<sub>x</sub> scrubber will be monitored and controlled.</p>
	Ongoing monitoring (by sampling and obtaining results by analysis) of air emissions from the fired heater stack will be conducted to assess compliance with the EPL.
	Preventive maintenance programs will be implemented where appropriate.

Air Emission Point Source	Air Quality Management and Mitigation Measures
	<p>Additional control measures e.g. combustion tuning undertaken yearly in accordance with <i>AS2593 - Boilers - Safety management and supervision systems</i>. Should the Performance Verification Monitoring indicate that the unit has variable emissions, the frequency of the tuning will be modified.</p>
Gas Flare Stack	<p>The operation of the flare will be monitored by the programmable logic controller in the control room. Visual inspection by site operators will be conducted to determine if there are visible plumes.</p> <p>A formal process for tracking and reviewing process upsets and flaring will be implemented. SCADA enhancements, manual tracking and documentation of calculations involved will be conducted to ensure process upsets do not exceed 2% of the process operating time per annum.</p> <p>A flare log which includes the date, time flaring started, time flaring finished, duration of flaring, stack appearance (visible plume or no visible plume) and reason for flaring will be kept onsite and maintained. Hard copies will be backed up and included in plant KPI reports. There must no visible emission from the flare exceeding 5 minutes in any 2 hour period.</p> <p>The flare has 2 permanent pilot burners of 20 Nm<sup>3</sup>/h (combined), a maximum fuel capacity of 160 kg/hr and a design destruction efficiency of 99.99%. The flare potentially may be fed by:</p> <ul style="list-style-type: none"> <li>Pressure Relief Valves – Process gas from pressure vessels and piping;</li> <li>Off gas Drum – Process Gas; and</li> <li>Pilot light – natural gas.</li> </ul> <p>The flare stack will only be operated during start-up and shut-down operations and on occasion during process imbalances.</p>
Storage Tanks	<p>Ensure storage tanks are equipped with nitrogen blanketing systems, vacuum pressure breaks and balancing lines for vapour suppression for the purpose of emission reduction as required.</p> <p>Any fugitive VOC emissions from the plant (i.e. from storage tanks) will be vented through a VOC scrubber (see VRU above) – this relates to process tanks No.1–6.</p>
Tanker Loading and Unloading	<p>Vapour recovery lines are required to be fitted to tank vehicles and the vented head space will be piped back to the VRU when tankers are loading light ends for distribution off-site.</p>
Vehicle and Fugitive Emissions	<p>Visual monitoring for dust will be conducted during routine inspections and dust control implemented (e.g. street sweeper) as required.</p>

Air Emission Point Source	Air Quality Management and Mitigation Measures
	It is noted the requirement to monitor depositional dust was removed from the Project Approval by Modification 3 in October 2011.
MOPP Stack	Ongoing monitoring and maintenance of the activated carbon system will be conducted.
	Ongoing monitoring (by sampling and obtaining results by analysis) of air emissions from the stack will be conducted to assess compliance with the EPL.
	Preventive maintenance programs will be implemented where appropriate.

# 7. Air Quality Monitoring Program

## 7.1 Air Emission Licensed Discharge Points

The location of the points identified in the EPL 12555 for the purposes of monitoring and/or the setting of limits for the emissions of pollutants to the air are shown in **Figure 3** and summarised in **Table 7**. It is noted the weather monitoring station and the flare are not shown in **Figure 3**.



**Figure 3:** Location of air emission licensed discharge points

**Table 7:** Description of monitoring/discharge points for air emissions

EPA Identification No	Type of Monitoring Point	Type of Discharge Point	Location Description
2	Discharge to air Air emission monitoring	Discharge to air Air emission monitoring	3.0 MW Boiler Stack
3	Discharge to air Air emission monitoring	Discharge to air Air emission monitoring	0.2 MW Boiler Stack
4	Discharge to air	Discharge to air	Flare
5	Air emission monitoring	Air emission monitoring	Emissions from light ends scrubber (Vapour Recovery Unit)
19	Discharge to air	Discharge to air	Stack serving the Thermal Oil Heater
20	Discharge to air	Discharge to air	Hydrogen Reformer Burner

EPA Identification No	Type of Monitoring Point	Type of Discharge Point	Location Description
21	Weather Monitoring	Weather monitoring	Rooftop near southwest corner of the control room
24	Discharge to air Air emissions monitoring	Discharge to air Air emissions monitoring	Stack discharge point for the Mobile Oil Regeneration Plant
25	Discharge to air Air emissions monitoring	Discharge to air Air emissions monitoring	Stack serving the Fire Heater (TBC in 2024)

## 7.2 Load Limits

Conditions L2.1 and L2.2 of the EPL set load limits for assessable pollutants discharged from the premises that must not be exceeded. It is noted that load limits apply to the entire site. **Table 8** shows the assessable pollutants and their corresponding load limits.

Load limits will be calculated in accordance with the relevant load calculation protocol. The calculation method will be provided within the Annual Return for each of the assessable pollutants.

**Table 8: Assessable Pollutants and Load Limits (Source: EPL 12555)**

Assessable Pollutant	Load Limit (kg)
Arsenic (Air)	-
Benzene (Air)	26.00
Benzo(a)pyrene (equivalent) (Air)	4.60
Fine Particulates (Air)	1,360.00
Hydrogen Sulphide (Air)	64.00
Lead (Air)	-
Mercury (Air)	-
Nitrogen Oxides (Air)	10,000.00
Sulphur Oxides (Air)	46,000.00
Volatile Organic Compounds (Air)	850.00

The EPA's Load Calculation Protocol, Table 35 Petroleum and fuel production: Petroleum products and fuel production – Acceptable load calculation methods, indicates that Source Monitoring is an acceptable method for all the above assessable air pollutants.

Cleanaway engages specialist consultants to undertake its stack testing and calculate its assessable pollutant load.

## 7.3 Concentration Limits

Condition L3.1 and L3.2 presents the concentration of pollutants discharged which must not be exceeded. As required by the EPL 12555, concentrations of pollutants are measured and monitored at each discharge point specified in **Table 9**. This is done through monitoring (by sampling and obtaining results by analysis) of air emissions from the specified discharge points by specialist consultants.

**Table 9: Concentration Limits at discharge/monitoring points**

Discharge /Monitoring Point	Pollutant	Units of measure	100 percentile concentration limit
2	Volatile organic compounds	mg/m <sup>3</sup>	10
	Nitrogen Oxides	mg/m <sup>3</sup>	350
	Solid Particles	mg/m <sup>3</sup>	10
3	Volatile organic compounds	mg/m <sup>3</sup>	10
	Nitrogen Oxides	mg/m <sup>3</sup>	350
	Solid Particles	mg/m <sup>3</sup>	10
5	Volatile organic compounds	mg/m <sup>3</sup>	20
19 & 25	Solid Particles	mg/m <sup>3</sup>	50
	Hydrogen Sulphide	mg/m <sup>3</sup>	5
	Volatile organic compounds	mg/m <sup>3</sup>	10
	Nitrogen Oxides	mg/m <sup>3</sup>	350
	Sulphuric acid mist and sulphur trioxide (as SO <sub>3</sub> )	mg/m <sup>3</sup>	100
	Sulphur dioxide	mg/m <sup>3</sup>	1,360
20	Volatile organic compounds	mg/m <sup>3</sup>	10
	Nitrogen Oxides	mg/m <sup>3</sup>	350
	Solid Particles	mg/m <sup>3</sup>	10
24	Solid Particles	mg/m <sup>3</sup>	10
	Sulphur dioxide	mg/m <sup>3</sup>	100
	Nitrogen Oxides	mg/m <sup>3</sup>	350
	Volatile organic compounds	mg/m <sup>3</sup>	20
	Carbon monoxide	mg/m <sup>3</sup>	125

### 7.4 Air Quality Monitoring

Concentrations of pollutants at the discharge points will be monitored by sampling and the results will be obtained by analysis to determine compliance to licence requirements. The sampling methods and frequency of monitoring will be based on methods specified in the EPL. Furthermore, monitoring results must be adjusted to the units of measure and reference conditions specified in the EPL (where applicable). It is noted from the EPL 12555 that monitoring for the concentration of an air pollutant must be done in accordance with:

- any methodology which is required by or under the Act to be used for the testing of the concentration of the pollutant; or
- if no such requirement is imposed by or under the Act, any methodology which a condition of this licence requires to be used for that testing; or
- if no such requirement is imposed by or under the Act or by a condition of this licence, any methodology approved in writing by the EPA for the purposes of that testing prior to the testing taking place.

Monitoring requirements have changed over time in consultation with the EPA. **Table 10** summarises the current monitoring program as required by the EPL.

**Table 10:** Air monitoring requirements at discharge points

Discharge Point	Pollutant/Parameter	Units of measure	Frequency	Reference Condition	Sampling Method
2 & 3	Dry gas density	kg/m <sup>3</sup>	Yearly		TM-23
	Moisture	percent	Yearly		TM-22
	Molecular weight of dry stack gases	g/g-mole	Yearly		TM-23
	Nitrogen Oxides	mg/m <sup>3</sup>	Yearly		TM-11
	Oxygen (O <sub>2</sub> )	percent	Yearly		TM-25
	Solid Particles	mg/m <sup>3</sup>	Yearly		TM-15
	Temperature	degrees Celsius	Yearly		TM-2
	Velocity	metres per second	Yearly		TM-2
	Volatile organic compounds	mg/m <sup>3</sup>	Yearly		TM-34
	Volumetric flowrate	Normalised m <sup>3</sup> /s	Yearly		TM-2
	Hydrogen Sulphide	mg/m <sup>3</sup>	Yearly – LBL Req	Dry, 273K, 101.3kPa, 8% O <sub>2</sub>	
	Nitrogen dioxide (NO <sub>2</sub> ) or nitric oxide (NO) or both	mg/m <sup>3</sup>	Yearly – LBL Req	Dry, 273K, 101.3kPa, 8% O <sub>2</sub>	
	Solid Particles	mg/m <sup>3</sup>	Yearly – LBL Req	Dry, 273K, 101.3kPa, 8% O <sub>2</sub>	
	Formaldehyde	mg/m <sup>3</sup>	Yearly – LBL Req	Dry, 273K, 101.3kPa, 8% O <sub>2</sub>	
	Sulphuric acid mist and sulphur trioxide (as SO <sub>3</sub> )	mg/m <sup>3</sup>	Yearly – LBL Req	Dry, 273K, 101.3kPa, 8% O <sub>2</sub>	
Sulphur dioxide	mg/m <sup>3</sup>	Yearly – LBL Req	Dry, 273K, 101.3kPa, 8% O <sub>2</sub>		
5	Moisture	percent	Yearly		TM-22
	Odour	odour units	Yearly		OM-7
	Polycyclic aromatic hydrocarbons	mg/m <sup>3</sup>	Yearly	Dry, 273K, 101.3kPa	OM-6
	Temperature	degrees Celsius	Yearly		TM-2

Discharge Point	Pollutant/Parameter	Units of measure	Frequency	Reference Condition	Sampling Method
	Volatile organic compounds	mg/m <sup>3</sup>	Yearly		TM-34
	Volumetric flowrate	Normalised m <sup>3</sup> /s	Yearly		TM-2
	Volatile organic compounds (VOC) 1	mg/m <sup>3</sup>	Yearly – LBL Req	Dry, 273K, 101.3kPa	
	Hydrogen Sulphide	mg/m <sup>3</sup>	Yearly – LBL Req	Dry, 273K, 101.3kPa	
	Nitrogen dioxide (NO <sub>2</sub> ) or nitric oxide (NO) or both	mg/m <sup>3</sup>	Yearly – LBL Req	Dry, 273K, 101.3kPa	
	Solid Particles	mg/m <sup>3</sup>	Yearly – LBL Req	Dry, 273K, 101.3kPa	
	Formaldehyde	mg/m <sup>3</sup>	Yearly – LBL Req	Dry, 273K, 101.3kPa	
	Sulphuric acid mist and sulphur trioxide (as SO <sub>3</sub> )	mg/m <sup>3</sup>	Yearly – LBL Req	Dry, 273K, 101.3kPa	
	Sulphur dioxide	mg/m <sup>3</sup>	Yearly – LBL Req	Dry, 273K, 101.3kPa	
19 & 25	Dry gas density	kg/m <sup>3</sup>	Yearly		TM-23
	Formaldehyde	mg/m <sup>3</sup>	Yearly	Dry, 273K, 101.3kPa, 8% O <sub>2</sub>	Special Method 1
	Hydrogen Sulphide	mg/m <sup>3</sup>	Yearly	Dry, 273K, 101.3kPa, 8% O <sub>2</sub>	TM-5
	Moisture	percent	Yearly		TM-22
	Molecular weight of stack gases	g/g-mole	Yearly		TM-23
	Nitrogen oxides	mg/m <sup>3</sup>	Yearly	Dry, 273K, 101.3kPa, 8% O <sub>2</sub>	TM-11
	Odour	odour units	Yearly		OM-7
	Oxygen (O <sub>2</sub> )	percent	Yearly		TM-25
	Solid Particles	mg/m <sup>3</sup>	Yearly	Dry, 273K, 101.3kPa, 8% O <sub>2</sub>	TM-15
	Sulphuric acid mist and sulphur trioxide (as SO <sub>3</sub> )	mg/m <sup>3</sup>	Yearly	Dry, 273K, 101.3kPa, 8% O <sub>2</sub>	TM-3
	Sulphur dioxide	mg/m <sup>3</sup>	Yearly	Dry, 273K, 101.3kPa, 8% O <sub>2</sub>	TM-4
	Temperature	degrees Celsius	Yearly		TM-2



Discharge Point	Pollutant/Parameter	Units of measure	Frequency	Reference Condition	Sampling Method
	Velocity	metres per second	Yearly		TM-2
	Volatile organic compounds	mg/m <sup>3</sup>	Yearly		TM-34
	Volatile organic compounds (VOC) 1	mg/m <sup>3</sup>	Yearly – LBL Req	Dry, 273K, 101.3kPa, 8% O <sub>2</sub>	
	Volumetric flowrate	Normalised m <sup>3</sup> /s	Yearly		TM-2
20	Dry gas density	kg/m <sup>3</sup>	Yearly		TM-23
	Hydrogen Sulphide	mg/m <sup>3</sup>	Yearly	Dry, 273K, 101.3kPa, 4% O <sub>2</sub>	TM-5
	Moisture	percent	Yearly		TM-22
	Molecular weight of stack gases	g/g-mole	Yearly		TM-23
	Nitrogen oxides	mg/m <sup>3</sup>	Yearly	Dry, 273K, 101.3kPa, 4% O <sub>2</sub>	TM-11
	Odour	odour units	Yearly		OM-7
	Oxygen (O <sub>2</sub> )	percent	Yearly		TM-25
	Solid Particles	mg/m <sup>3</sup>	Yearly	Dry, 273K, 101.3kPa, 4% O <sub>2</sub>	TM-15
	Temperature	degrees Celsius	Yearly		TM-2
	Velocity	metres per second	Yearly		TM-2
	Volatile organic compounds	mg/m <sup>3</sup>	Yearly		TM-34
	Volatile organic compounds (VOC) 1	mg/m <sup>3</sup>	Yearly – LBL Req	Dry, 273K, 101.3kPa, 4% O <sub>2</sub>	
	Volumetric flowrate	Normalised m <sup>3</sup> /s	Yearly		TM-2
	Polycyclic aromatic hydrocarbons	mg/m <sup>3</sup>	Yearly – LBL Req	Dry, 273K, 101.3kPa, 4% O <sub>2</sub>	
	Formaldehyde	mg/m <sup>3</sup>	Yearly – LBL Req	Dry, 273K, 101.3kPa, 4% O <sub>2</sub>	
	Sulphuric acid mist and sulphur trioxide (as SO <sub>3</sub> )	mg/m <sup>3</sup>	Yearly – LBL Req	Dry, 273K, 101.3kPa, 4% O <sub>2</sub>	
Sulphur trioxide	mg/m <sup>3</sup>	Yearly – LBL Req	Dry, 273K, 101.3kPa, 4% O <sub>2</sub>		

Discharge Point	Pollutant/Parameter	Units of measure	Frequency	Reference Condition	Sampling Method
21	Wind direction	Degrees	Continuous		AM-2 & AM-4
	Wind speed	metres per second	Continuous		AM-2 & AM-4
24	Dry gas density	kg/m3	6-Monthly <sup>3</sup>		TM-23
	Moisture	percent			TM-22
	Molecular weight of stack gases	g/g-mole			TM-23
	Nitrogen oxides	mg/m3		Dry, 273K, 101.3kPa	TM-11
	Solid Particles	mg/m3		Dry, 273K, 101.3kPa	TM-15
	Oxygen (O2)	percent			TM-25
	Volatile organic compounds	mg/m3		Dry, 273K, 101.3kPa	TM-34
	Sulphur dioxide	mg/m3		Dry, 273K, 101.3kPa	TM-4
	Temperature	degrees Celsius			TM-2
	Velocity	metres per second			TM-2

Note 1: 1 – VOC as n – propane equivalent

Note 2: Averaging period used for weather monitoring (wind direction and wind speed ) must be 15 minutes

<sup>3</sup> CWY in discussion with EPA to reduce the monitoring to Annual in alignment with previous agreements and due to ongoing compliant results.

## 8. Inspections

The maintenance program will include daily, weekly and monthly inspection checklists to ensure proper and functional operation of plant and equipment. The following environmental inspections and records will be undertaken and maintained by the Site.

**Table 11:** *Environmental inspections and records for reporting*

Checklist	Environmental controls / checks	Frequency	Responsibility
Flare Log	<ul style="list-style-type: none"> <li>Date and duration (time start and finish) of flaring;</li> <li>The reason for flaring (e.g.; plant start-up, plant shutdown, emergency event, equipment fault or maintenance, etc).</li> <li>Appearance of the plume from the flare stack (e.g. if a visible plume is seen).</li> </ul>	Whenever the flare operates (PIC 1026 becomes 'active')	Engineer
Hydrogen Plant Log Sheet	Check operation of refinery plant and equipment.	Daily	
Hydrogenation Plant Outside Log Sheet	Check operation of refinery plant and equipment.	Daily	
Environmental Workplace Inspection Form	Includes checks relevant to air quality, including: <ul style="list-style-type: none"> <li>Vapour recovery system maintenance checks</li> <li>Tank vent checks</li> <li>Assessment of odour</li> <li>Assessment of dust</li> <li>Monthly % of time flare used calculated</li> <li>Record of odour complaints</li> </ul>	Monthly	
MOPP Inspection Form	Operational integrity such as noises, leaks, temperatures and emissions.	Weekly/Monthly	ReOil Qualified Personnel

## 9. Record Keeping and Reporting

Records of all environmental monitoring undertaken for the Site will include:

- The date(s) on which a sample was taken
- The time(s) at which a sample was taken
- The point at which the sample was taken; and
- The name of the person who collected the sample

All records will be kept in a legible form for at least four years and be made available to any authorised officer for the EPA who asks to see them as required by the EPL.

In addition to the general monitoring recording requirements outlined above, the following specific records and reports will be kept / produced as required (**Table 12**).

**Table 12:** Air quality recording and reporting

Requirement	Recording / Reporting	Frequency / date
PA 05_0037, Condition 4.2	An Operational Air and Noise Validation Report will be prepared within three months of commissioning operations	Completed – dated 10.12.08
MP 05_0037_MOD 5, Condition 4.3A <b>(No longer applicable as removed by MOD7)</b>	An Operational Air and Odour Validation Report will be prepared and submitted for approval of the Secretary within six months of the date of commencement of the modified operation	Within six months of the date of commencement of MP 05_0037_MOD 5 operations <sup>4</sup> <b>(No longer applicable as removed by MOD7)</b>
MP 05_0037_MOD 7, Condition 4.3A	An Operational Air and Odour Validation Report will be prepared and submitted for approval of the Secretary within six months of the date of commencement of the modified operation	Within six months of the date of commencement of MP 05_0037_MOD 7 operations
EPL M8.1	Detailed records of each flare use will be kept on site and made available to the EPA on request. Each record will include the flare start and stop time and the reason for its use.	Ongoing
EPL M8.2	Detailed records of all process upsets and process start-ups and shutdowns will be kept. Each record will include the process start and stop time and the reason for each process upset.	Ongoing
EPL R4.1	The EPA will be notified of any process start-up, process shut-down and/or process upset which results in the concentration of hydrogen sulphide, as measured by the continuous hydrogen sulphide	As required

<sup>4</sup> MOD 5 works yet to be constructed onsite

Requirement	Recording / Reporting	Frequency / date
	monitoring system exceeding 15 parts per million for a period of 30 secs or more. The notification must be made within 24 hours.	
EPL L2.2	Assessable pollutant load calculations. The Annual Return requires the Actual Load (calculation method) to be provided for each of the assessable pollutants.	Annually
R1.2	The Annual Return will include a summary of the air quality monitoring data in the form required by the EPA.	Annually

# 10. Contingency measures and community complaints

## 10.1 Contingency Measures

The site is controlled by a Programmable Logic Control (PLC) system which is used to manage the facility's automated systems.

The PLC system enforces a series of trips and lockouts based on "Cause and Effect" scenarios to impose contingency measures on the management of the plant. The "Cause and Effect" matrix places interlocks on certain pieces of equipment imposing pre- and post-operating conditions on the equipment in question and consequently affected equipment.

Where monitoring results indicate an exceedance of air quality limits, the contingency measures outlined in **Table 14** will be followed.

**Table 13:** Contingency measures

Issue	Management and Mitigation Measure	Responsibility	Timing
Monitoring result/s exceed EPL limits	Provide air quality monitoring results to the EPA (if notifiable exceedance identified)	Cleanaway	Within one week of receiving air quality monitoring results
	Investigate potential source/s of exceedances	Cleanaway	Within one week of receiving air quality monitoring results
	In discussion with the EPA, review air quality monitoring program including: <ul style="list-style-type: none"> <li>Consider increasing sampling frequency to monitor further decline in air quality</li> </ul>	Cleanaway	Within one month of receiving air quality monitoring results
	In discussion with the EPA, consider if further controls are required	Cleanaway	As required

## 10.2 Community Complaints

Cleanaway maintains the following methods for receiving community complaints:

- (i) a 24-hour telephone number (1800 158 447)
- (ii) a postal address – 'PO Box 246, Rutherford NSW 2320'
- (iii) Cleanaway Facebook Page: [www.facebook.com/CleanawayAU](http://www.facebook.com/CleanawayAU)
- (iv) General Enquiry Form – via Cleanaway Corporate website

It is noted that PA 05\_0037 requires an email address to be advertised. Cleanaway maintains the Facebook page as a means of meeting the requires of an email address complaint method.

The phone details are displayed on a sign near the entrance to the site, in a position that is clearly visible to the public and on Cleanaway's internet site.

The telephone number, post address and email address (or Facebook page) will be maintained throughout the life of the development.

Complaints are recorded in a Cleanaway ‘*Incident Non-Conformance Report*’ and transferred to the MyOSH incident recording system. The following information is recorded:

- a) The date and time of the complaint;
- b) The method by which the complaint was made (telephone, mail or email);
- c) Any personal details of the complainant that were provided, or if no details were provided, a note to that effect;
- d) The nature of the complaint;
- e) The action(s) taken by Cleanaway in relation to the complaint, including any follow-up contact with the complainant; and
- f) If no action was taken in relation to the complaint, the reason(s) why no action was taken.

Records of a complaints must be kept for at least 4 years after the complaint was made. The complaints recorded in the MyOSH will be made available for inspection by the DPE and EPA upon request.

The management measures for community complaints will be followed as outlined in **Table 14** will be followed.

**Table 14:** *Contingency measures*

Issue	Management and Mitigation Measure	Responsibility	Timing
Odour complaints received	Discuss complaint with complainant and gather as much information as possible on the source of the odour	Cleanaway	As soon as possible after receiving complaint
	Investigate the complaint. Review: <ul style="list-style-type: none"> <li>• what activities were occurring on site at the time of the complaint;</li> <li>• the weather conditions - what were the prevailing winds; and</li> <li>• potentiality undertake an odour survey.</li> </ul>	Cleanaway	As soon as possible after receiving complaint
	Respond to complainant (if requested) to provide results of investigation into complaint and close out where possible	Cleanaway	Within 24 hours if possible
	Record complaint in a Cleanaway ‘ <i>Incident Non-Conformance Report</i> ’ and transfer to the Myosh incident recording system as outlined in the OEMP.	Cleanaway	Within one week of receiving air quality monitoring results

# 11. Review and Revision Process

The AQMP will be reviewed by site personnel and the Environmental Business Partner (or their delegate) once a year or when the following occurs:

- The operations at the Site significantly change, for example following a modification to PA 05\_0037 or a significant variation to the EPL;
- Opportunities for improvement, or deficiencies in the existing system are identified through Audit Reports, Incident / Non-conformance Reports, and / or-site observations; or
- Within three months of an independent environment audit, in consultation with the EPA and Council, to the satisfaction of the DPE.



# 12. Appendix A - Operational Air and Noise Validation Report (2008)

# 13. Appendix B - Air Quality Impact Assessment and Mitigation Study

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***End of Document***

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