



Neerabup Power Station

NPS-PS-SEMP-PR STACK EMISSIONS MANAGEMENT PLAN (SEMP)

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Standard Operating Procedure NPS-PS-SEMP-PR Stack Emissions Management Plan (SEMP)

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2.0	Revision to align with DWER licence I8356/2009/2	20 Jun 13	20 Jun 18	B Lanciano (peer review by Strategen)	P MacMahon
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Contents

1.	Element/Issue	4
2.	Current Status.....	4
2.1	Project Description.....	4
2.2	Existing Air Quality	4
3.	Potential Impacts.....	5
4.	Environmental Objectives	6
5.	Performance Indicators/Criteria	6
5.1	Atmospheric Emission Concentration Targets	6
5.2	Start-Up.....	6
5.3	Ambient Air Quality	6
6.	Implementation	7
6.1	Design/Construct	7
6.2	Operation	7
6.3	Roles and Responsibilities.....	7
6.3.1	CEO.....	7
6.3.2	Power Station and Pipeline Manager	8
6.3.3	All staff.....	8
6.3.4	Contractors.....	8
7.	Monitoring	9
7.1	Atmospheric emissions	9
7.2	Complaints.....	9
8.	Contingencies	10
9.	Stakeholder consultation.....	10
10.	Auditing.....	11
11.	Review and revision	11
12.	Reporting Annual report.....	11
12.1	Annual Report.....	11
12.2	Record Keeping.....	11
12.3	Key Management Actions Table	11
13.	References.....	12
	Appendix 1	14

1. Element/Issue

This Stack Emissions Management Plan (SEMP) relates to atmospheric emissions from the Neerabup Gas-Fired Power Station exhaust stack, excluding greenhouse gas emissions.

The key atmospheric emissions from the Neerabup Gas-Fired Power Station are oxides of nitrogen. Oxides of nitrogen consist of nitrogen dioxide and nitric oxide. Elevated levels of nitrogen dioxide can affect human health. Other minor atmospheric emissions are associated with combustion efficiency and include: carbon monoxide, volatile organic compounds (VOCs) and particulates. The requirements for the SEMPs are reproduced in Appendix 1.

Neerabup Gas-Fired Power Station operates under Environmental Protection Act 1986 environmental licence (L8356/2009/2) administered by the Department of Water and Environmental Regulation (DWER). The environmental licence was amended in November 2012 to remove the requirement for continuous emissions monitoring (CEMS) and compliance with the associated CEMS code. Removal of CEMS was necessary as the utilisation factor of the power station is very low and insufficient to enable continuous monitoring.

Shell Energy has revised the SEMPs to align monitoring requirement to the current DWER environmental licence conditions. The proposed revisions are consistent with correspondence received from Office of the Environmental Protection Authority (OEPA) on 12 December 2012 (Ref: OEPA2011/000152).

2. Current Status

2.1 Project Description

On 17 April 2008, Neerabup gained works approval to construct and operate a natural gas-fired power station with a capacity of 330 MW. The power station will consist of two 165 MW open-cycle gas turbines. The power station site is located on Lot 100 on Deposited Plan DP63371, or 45 Trandos Road Neerabup on the north-eastern edge of the Neerabup Industrial Area.

The power station incorporates low NO_x burners to minimise emissions of oxides of nitrogen. Atmospheric emissions occur from two 35-metre exhaust stacks.

2.2 Existing Air Quality

The air quality in the vicinity of the Neerabup Industrial Estate is dominated by industries, motor vehicles and domestic activities in the local area and air pollutants generated in the broader urban and industrial areas of Perth.

The National Pollution Inventory is compiled annually by the Federal Department of the Environment and Water Resources. All industries that exceed certain thresholds are required to report their annual emission rates of air pollutants. This information is published by the Department on an annual basis.

There are three significant industrial sources of air pollutants in the City of Wanneroo that report to the NPI, they are:

- Wanneroo Feedmill owned by Inghams Enterprises Pty Ltd. Located approximately 8 km to the south of the proposed power station and is a source of oxides of nitrogen, sulphur dioxide, PM10 and carbon monoxide.
- Tamala Park Power Station owned by Landfill Gas and Power Pty Ltd. Located approximately 8 km to the southwest of proposed power station and is a source of oxides of nitrogen and carbon monoxide.
- Pinjar Gas Turbine Station owned by Western Power Corporation. Located approximately 12.5 km north-northwest of the proposed power station and is a source of oxides of nitrogen, sulphur dioxide, PM10 and carbon monoxide.

- The emission rates of oxides of nitrogen, PM10, sulphur dioxide and carbon monoxide that each of these facilities as reported to the NPI are reproduced in Table 1. Wesbeam Holdings Limited, a company that manufactures Laminated Veneer Lumber products is also located in the area. Emissions information for the Wesbeam facility was unavailable. However, emissions from such a facility are expected to be small and unlikely to adversely affect air quality on a regional scale.

The emission rates of oxides of nitrogen, PM10, sulphur dioxide and carbon monoxide that each of these facilities as reported to the NPI are reproduced in Table 1. Wesbeam Holdings Limited, a company that manufactures Laminated Veneer Lumber products is also located in the area.

Emissions information for the Wesbeam facility was unavailable. However, emissions from such a facility are expected to be small and unlikely to adversely affect air quality on a regional scale.

Table 1 - Major sources of pollutants within the City of Wanneroo for the year 2006

Substance	Facility Name	ANZSIC Class Name	Latitude	Longitude	Total (kg)
Oxides of Nitrogen	Pinjar Gas Turbine Station	Electricity Supply	-31.56	115.82	1,900,000
	Tamala Park Power Station	Electricity Supply	-31.71	115.73	170,000
	Wanneroo Feedmill	Poultry Farming (Meat)	-31.74	115.80	1,200
Particulate Matter as PM10	Pinjar Gas Turbine Station	Electricity Supply	-31.56	115.82	28,000
	Wanneroo Feedmill	Poultry Farming (Meat)	-31.74	115.80	4,400
Sulphur dioxide	Pinjar Gas Turbine Station	Electricity Supply	-31.56	115.82	8,000
	Wanneroo Feedmill	Poultry Farming (Meat)	-31.74	115.80	6.5
Carbon monoxide	Pinjar Gas Turbine Station	Electricity Supply	-31.56	115.82	300,000
	Tamala Park Power Station	Electricity Supply	-31.71	115.73	51,000
	Wanneroo Feedmill	Poultry Farming (Meat)	-31.74	115.80	1,000

The Pinjar Gas Turbine Power Station is located approximately 12.5 km to the north of the Neerabup Gas-Fired Power Station site. Peak emissions from the Pinjar Power Station supplied in the DWER emissions inventory indicate the station to be a significant source of oxides of nitrogen in the region.

On an airshed wide basis, the Perth Airshed Inventory (DEP, 2002) found that the major sources of oxides of nitrogen are motor vehicles (42%) followed by industrial activities (32%). Sulphur dioxide emissions are dominated by industrial activities (86%). However, inventory data shows that sulphur dioxide emissions have declined and this is supported by data from long-term ambient monitoring stations that show that sulphur dioxide has declined substantially since the 1970's.

The OEPA operates ambient air quality monitoring stations across the Perth airshed. The nearest monitoring station to the Neerabup Gas-Fired Power Station is at Quinns Rock.

3. Potential Impacts

Exhaust gases from the two gas-fired turbines are emitted to the atmosphere from two 35-metre stacks. These emissions to the atmosphere could adversely affect air quality if not managed adequately.

4. Environmental Objectives

The objectives of this SEM are as follows:

- Ensure that emissions do not adversely affect environmental values or the health, welfare and amenity of people and land users by meeting statutory requirements and acceptable standards.
- Ensure that best available practicable and efficient technologies are used to minimise and monitor air emissions from the power station.

5. Performance Indicators/Criteria

5.1 Atmospheric Emission Concentration Targets

Emissions of air pollutants from the Neerabup Gas-Fired Power Station shall be below the targets specified in Table 2.

Table 2 - Atmospheric emission concentration targets

Gas-turbine	Air pollutant	Operational Condition ¹	Emission concentration Target ^{2, 3}	Averaging period
Unit 1 and 2	Oxides of nitrogen	All	25 ppmv or 51 mg/Nm ³	1-hour
Unit 1 and 2	Carbon monoxide	All	10 ppmv or 12.6 mg/Nm ³	1-hour

Table Note
¹Excluding start-up, shutdown, initial commissioning and other times when the units are operating below 60% maximum load.
²Corrected to 15% O₂ basis.
³mg/Nm³, corrected to 101.3 KPa, 273 K.

Targets will be reviewed annually and different targets may be adopted if requested by Shell Energy and approved by the Chairman of the Environmental Protection Authority (EPA).

5.2 Start-Up

To minimise emissions during start-up, the duration of the start-up cycle shall be minimised as far as possible in accordance with manufacturer's specifications. A normal cold start cycle should be about 30 minutes.

5.3 Ambient Air Quality

Ambient concentrations of air pollutants as a result of emissions from the Neerabup Power Station should not exceed the standards specified in Table 3.

Table 3 - Ambient air quality standards

Air pollutant	Averaging period	Standard-1 (converted values shown in parenthesis)
Nitrogen dioxide	1-hour	0.12 ppm (246 µg/m)
	Annual	0.03 ppm (60 µg/m ³)
Carbon monoxide	8-hour	9 ppm (11 mg/m ³)
PM10	24-hour	50 µg/m ³

Air pollutant	Averaging period	Standard-1 (converted values shown in parenthesis)
Table Note: 1National Environment Protection (Ambient Air Quality) Measure		

6. Implementation

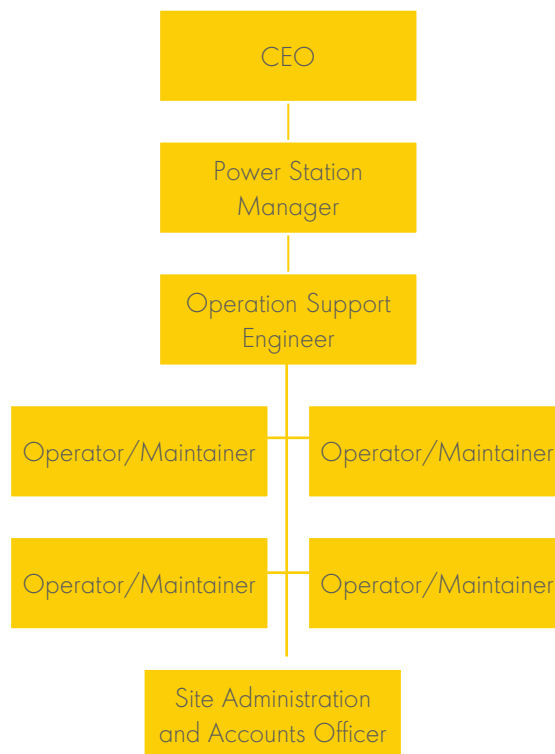
6.1 Design/Construct

The power station shall be designed and constructed to comply with the emission concentration targets specified in Section 5.1. The power station will utilise low NOx burners to ensure that emissions of oxides of nitrogen are minimised as far as is practicable.

6.2 Operation

The power station shall be maintained and operated in a proper and efficient manner and in accordance with the manufacturer’s operation and maintenance manual to ensure compliance is achieved with the emission concentration targets specified in Section 5.1.

6.3 Roles and Responsibilities



6.3.1 CEO

- Responsible for ensuring of compliance with this SEMPP through the audit process
- Responsible for ensuring that appropriate licences are held for the generation site
- Responsible for ensuring ongoing effective communication with Power Station and Pipeline Manager.

6.3.2 Power Station and Pipeline Manager

- Responsible for maintaining a master list of all consents held by Neerabup relating to the generation site
- Responsible for the renewal of licences for the generation site
- Ensure contract documentation specifies the responsibilities of contractors in regard for the requirements of this SEMF
- Assist with the overall review of compliance with this SEMF through the audit process
- Responsible for ensuring that environmental licence monitoring and reporting requirements are met
- Responsible for compliance with legislative requirements
- Liaison with the administering authority and stakeholders as required.
- Responsible for ensuring that all staff and contractors are familiar with this SEMF
- Responsible for ensuring compliance with the administering authority
- Responsible for the development of appropriate work procedures and ensuring that staff are trained in their use
- Responsible for ensuring that staff are trained to competently conduct required tasks, in the requirements of this SEMF, appropriate licences and other legal requirements.
- Responsible for ensuring those instances of breach or potential breach of any legislation or licence conditions are identified and reported
- Responsible for ensuring that potential environmental hazards are identified and reported
- Review instances of breach or potential breach of any legislation or licence conditions and potential environmental hazards, and take action where appropriate
- Responsible for ensuring ongoing effective communication with staff and contractors.

6.3.3 All staff

- Every Neerabup staff member has a general environmental duty that will be discharged through appropriate training, work practices and event reporting
- Instances of breach or potential breach of any legislation or licence conditions shall be identified and reported. It is the responsibility of every generation staff member to report such events
- Comply with this SEMF
- Ensure that contractors and other persons working at the Neerabup Power Station undertake such works in accordance with this SEMF.

6.3.4 Contractors

- Shall comply with this SEMF as if they were Neerabup staff members.

7. Monitoring

7.1 Atmospheric emissions

Sampling and analysis of air pollutants, specified in Table 4 below, shall be undertaken and reported as provided by Section 4.2 of Australian Standard AS4323.1.

Table 4 - Emission monitoring parameters, Units 1 and 2

Pollutant/parameter	Units of measure	Method	Frequency
Oxides of nitrogen	ppmvd@15% O ₂ or mg/Nm ³	USEPA Method 7E	Annually
Carbon monoxide	ppmvd@15% O ₂ or mg/Nm ³	USEPA Method 10	Annually
Stack Gas Velocity	m/s	USEPA Method 2 or 2C	Annually
Stack Gas Temperature	°C	USEPA Method 2 or 2C	Annually
Stack volumetric flow rate	m ³ /s	USEPA Method 2 or 2C	Annually
Moisture content	%	USEPA Method 4	Annually
Dry gas density or molecular weight	Kkg/m ³ g/gmol	USEPA Method 3	Annually
Oxygen	%	USEPA Method 3A	Annually

Note: Table 4 has been revised in accordance correspondence received from the OEPA 12 December 2012 (Ref: OEPA2011/000152)

The frequency of sampling may be amended if an application to the Chairman of the EPA is approved.

7.2 Complaints

A complaints procedure shall be established to receive complaints from the community associated with air emissions from the power station. The following information about each complaint shall be recorded:

- Name of complainant (anonymous if preferred)
- Address/general location of complainant when incident occurred
- Nature of incident (e.g. odour, dust, fallout)
- Detailed description of incident (e.g. if odour, what did the odour smell like?)
- Date/time
 - a. When complaint logged
 - b. When incident occurred
 - c. If ongoing, frequency and duration of incidents.

The power station operator shall investigate all complaints and, where the power station is found to be the cause of the incident, the operator shall take actions to ensure that the cause is rectified and implement measures to ensure that there is minimal risk of the incident recurring.

The following information shall be recorded about the operator's response to the complaint:

- Details of the activities undertaken at the time of the incident (e.g. normal operations at X% capacity, shutdown, upset)
- Details of the nature of any abnormal activities or operational conditions
- Results of on-site observations and investigations made to investigate the incident

- Results of on-site observations of wind speed, wind direction and cloud cover
- Details of actions taken on site, if any required, to alter activities to alleviate or mitigate the effects of the incident
- Operator's conclusion as to the cause of the incident:
 - a. Is the incident likely to be due to on-site activities?
 - b. If the incident is likely to be due to on-site activities, detail the specific activities responsible and mitigation measures that will be implemented to reduce the risk of the incident recurring.
- Steps taken to notify complainant of the outcomes of the operator's investigations.

8. Contingencies

The following mechanisms will be established to identify actual and apparent non-conformance with the SEMF:

- a. Routine preventative maintenance will be undertaken in accordance with the manufacturer's operation and maintenance manual.
- b. Sampling and analysis of carbon monoxide, oxides of nitrogen (and other exhaust parameters) on an annual campaign basis in accordance with the requirements specified in Section 7.1 to support this SEMF and provide a secondary check on operations and maintenance.
- c. Implementation and ongoing maintenance of complaints reporting, management system and investigation system.

9. Stakeholder consultation

Shell Energy consulted with the following stakeholders during the impact assessment phase:

- Department of Environment and Conservation
- Environmental Protection Authority
- Western Australian Planning Commission
- Department of Water
- Department for Planning and Infrastructure
- Local Member Dianne Guise
- City of Wanneroo
- Western Power Corporation
- Conservation Council of Western Australia
- Forest Products Commission
- Residents and Landowners.

In accordance with OEPA correspondence dated 15 February 2011 (Ref: OEPA2010/001038-1) Shell Energy will:

1. Post a copy of the revised SEMF on the Shell Energy website for the life of the project:
<https://shellenergy.com.au/regulatory/>
2. Make all historical documents required to be made publicly available obtainable upon request to Shell Energy.

3. Within fourteen days from the date of making documents publicly available, provide evidence to the Proposal Implementation Monitoring Branch (PIMB) to confirm that the document has been posted on the Shell Energy website.

10. Auditing

Annual internal audits and annual external audits will be conducted as specified in the Operational Environmental Management Plan. These audits will assess compliance with this SEMPI.

11. Review and revision

This SEMPI will be reviewed on an annual basis to ensure that all aspects of operation management and maintenance comply with Government requirements and current best practice.

12. Reporting Annual report

12.1 Annual Report

An annual report will be submitted within three months of completion of the financial year (30th Sept annually), that:

- Summarises compliance with SEMPI conditions
- Provides details of any incidents of non-compliance with SEMPI conditions
- Summarises air pollution monitoring data collected as part of this SEMPI
- Summarises complaints
- Summarises outcomes of auditing.

The report will be prepared in accordance with Department of Environment guidelines for performance and compliance reporting. The annual report will be made publicly available through posting on the Shell Energy website.

12.2 Record Keeping

The following records are to be kept on site and made available to any DWER, EPA or OEPA representative on request.

- External reporting to OEPA, including annual reports
- Emissions monitoring reports and data
- All environmental complaints - maintain complaints register

12.3 Key Management Actions Table

Table - 5 Key management actions

Ref #	Timing/Phase	Key Management Action	DWER Reporting/Evidence
SEMPI	Post-commissioning	Monitor emissions from the exhaust stack as specified in Section 7.1 Table 4	Results submitted to DWER

Ref #	Timing/Phase	Key Management Action	DWER Reporting/Evidence
SEMP2	Ongoing	Monitor NOx emissions from the exhaust stack as specified in Section 7.1 Table 4	Notification letter sent to DWER in the event of an exceedance, summarise performance in annual report, logged data available on request.
SEMP3	Ongoing	Monitor and respond to community complaints, record actions as specified in Section 7.2	Summarise performance in annual report, logged data available on request.
SEMP4	Annual	Monitor carbon monoxide, and other stack parameters as specified in Section 7.1 Table 4	Summarise performance in annual report, logged data available on request.
SEMP5	Annual	Prepare annual compliance report	Analyse monitoring results, submit to DWER with annual report
SEMP6	Ongoing	Preventative maintenance	Complete maintenance log, logged data available on request

13. References

Australian Standard AS 4323.2-1995 "Stationary source emissions: Method 2: Determination of total particulate matter".

Department of Environmental Protection (DEP) 2002, Perth Airshed Emissions Inventory Update, Perth, Western Australia.

Katestone Environmental email communication dated 23 November 2007 to Shell Energy & NewGen Power, 'EPA Condition 10-1'.

Katestone Environmental 2007, Air quality assessment of the proposed NewGen 330 MW gas-fired power station". Report to Shell Energy Pty. Ltd.

Standards Association of Australia 1995, AS 4323.1-1995: Stationary source emission Method 1 - selection of sampling positions. Homebush, NSW.

US Environmental Protection Agency 1997, Code of Federal Regulations, Title 40, Part 60, Appendix B, Performance Specification 2 - Specifications and test procedures for SO2 and NOx continuous emission monitoring systems in stationary sources. US Government Printing Office, Washington, DC.

US Environmental Protection Agency 1997. Code of Federal Regulations, Title 40, Part 60, Method 10 - Determination of carbon monoxide emissions from stationary sources. US Government Printing Office, Washington DC.

US Environmental Protection Agency. 1997. Code of Federal Regulations, Title 40, Part 60, Appendix A, Method 2: Determination of stack gas velocity and volumetric flow rate (type S pitot tube). US Government Printing Office, Washington, DC.

US Environmental Protection Agency. 1997. Code of Federal Regulations, Title 40, Part 60, Appendix A, Method 2C: Determination of stack gas velocity and volumetric flow rate from small stacks or ducts (standard pitot tube). US Government Printing Office, Washington, DC.

US Environmental Protection Agency. 1997. Code of Federal Regulations, Title 40, Part 60, Appendix A, Method 4: Determination of moisture content in stack gases. US Government Printing Office, Washington, DC.

US Environmental Protection Agency. 1997. Code of Federal Regulations, Title 40, Part 60, Appendix A, Method 3: Gas analysis for the determination of dry molecular weight. US Government Printing Office, Washington, DC.

US Environmental Protection Agency. 1997. Code of Federal Regulations, Title 40, Part 60, Appendix A, Method 3A: Determination of oxygen and carbon dioxide concentrations in emissions from stationary sources (instrumental analyser procedure). US Government Printing Office, Washington, DC.

Appendix 1

Statement No. 759, STATEMENT THAT A PROPOSAL MAY BE IMPLEMENTED (PURSUANT TO THE PROVISIONS OF THE ENVIRONMENTAL PROTECTION ACT 1986) 330 MW GAS-FIRED POWER STATION, NEERABUP CITY OF WANNEROO, Published on 21 January 2008

9 Stack Emissions

9-1 Prior to submitting a Works Approval application, the proponent shall provide a report to the CEO for approval which:

1. confirms the engineering design details for the emission of gaseous and particulate pollutants, including stack heights, stack diameters, exit temperatures and exit velocities; and
2. estimates the concentration of nitrogen oxides and other gaseous and particulate pollutants, under normal and worst-case conditions, including start-up and upset emissions.

9-2 At least three months prior to commencement of operations, the proponent shall prepare a Stack Emissions Management Plan to the requirements of the Minister for the Environment. The objective of this Plan is to ensure that best available practicable and efficient technologies are used to minimise and monitor air emissions from the power station.

This Plan shall include:

- proposed targets and standards;
- a stack emissions monitoring programme, which includes nitrogen oxides and other gaseous and particulate pollutants; and
- annual reporting.

9-3 The proponent shall implement the Stack Emissions Management Plan required by condition 9-2.

9-4 The proponent shall make the Stack Emissions Management Plan required by condition 9-2 publicly available in a manner approved by the CEO.



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