



# **NEWGEN POWER STATION KWINANA**

## **STACK EMISSIONS MONITORING PLAN (SEMP)**

October 2006



## CONTENTS:

1.	Element/Issue .....	5
2.	Current Status .....	5
2.1	Project description .....	5
2.2	Existing air quality .....	5
3.	Potential Impacts .....	6
4.	Environmental Objectives .....	6
5.	Performance Indicators/Criteria .....	6
5.1	Atmospheric emission limits .....	6
5.2	Start-up .....	7
5.3	Ambient air quality .....	7
6.	Implementation .....	7
6.1	Design/construct .....	7
6.2	Operation .....	8
6.3	Roles and responsibilities .....	8
7.	Monitoring .....	10
7.1	Atmospheric emissions .....	10
7.2	Operational parameters .....	10
7.3	Complaints .....	11
8.	Contingencies .....	11
9.	Stakeholder consultation .....	12
10.	Auditing .....	13
11.	Review and revision .....	13
12.	Reporting .....	13
12.1	Annual report .....	13
12.2	Record keeping .....	14
13.	Key Management Actions Table .....	14
14.	References .....	15
15.	Acknowledgements .....	16



**TABLES:**

Table 1:	Atmospheric emission limits .....	7
Table 2:	Ambient air quality standards .....	7
Table 3:	Emission monitoring parameters .....	10
Table 4:	Key management Actions.....	14



## **1. Element/Issue**

Atmospheric emissions from NewGen Power's Kwinana Gas-Fired Power Station exhaust stack excluding greenhouse gas emissions.

The key atmospheric emissions 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 particles.

## **2. Current Status**

### **2.1 Project description**

In November 2005, NewGen Power received Ministerial Statement 698 which contained approval to construct and operate a 320 MW natural gas-fired power station on a site off Leath and Barter Roads on the western edge of the Kwinana Industrial Area.

The power station will have a combined cycle gas turbine (CCGT) with low NO<sub>x</sub> burners to minimise emissions of oxides of nitrogen.

Atmospheric emissions occur from a single 60-metre exhaust stack.

### **2.2 Existing air quality**

The air quality in the vicinity of the Kwinana Industrial Area is dominated by industrial emissions and to a lesser extent by motor vehicles and other domestic activities in the local area and from the city of Perth. A large proportion of industrial emissions that occur in the Perth airshed are due to industries that are located in the Kwinana Industrial Area.

The Perth Airshed Inventory (DEP 2002a) found that the major sources of oxides of nitrogen in the Perth airshed are motor vehicles (42%) followed by industrial activities (37%).

The DoE and Kwinana Industry Council operate ambient air quality monitoring stations at various locations within the Perth metropolitan area. Four of these sites, namely, Hope Valley (DoE: NO<sub>2</sub>, SO<sub>2</sub>), Wattleup (KIC: SO<sub>2</sub>), Abercrombie Road (KIC: SO<sub>2</sub>) and



Rockingham (DoE: NO<sub>2</sub>, Ozone, SO<sub>2</sub>) are close to the Kwinana Industrial area and provide useful information for establishing the existing levels of air pollutants.

There have been no exceedances of the NEPM standard for nitrogen dioxide of 246 µg/m<sup>3</sup> at Hope Valley in the period from 1990 to 2002 or at Rockingham in the period from 1996 to 2002. At Hope Valley the peak 1-hour average nitrogen dioxide concentration in 1996 was about 90 µg/m<sup>3</sup>, which is 38% of the NEPM standard. In all years since 1996, the peak 1-hour average concentration at this site is lower. In 2002, the peak 1-hour average concentration of nitrogen dioxide was about 80 µg/m<sup>3</sup>, some 33% of the NEPM standard. Similar peaks have been measured at Rockingham, though the highest level since 1996 (100 µg/m<sup>3</sup>) occurred during 2000.

The 95<sup>th</sup> percentile concentrations (representing the highest 5% of all measurements) of nitrogen dioxide at Hope Valley and Rockingham are less than 70 µg/m<sup>3</sup> and 75 µg/m<sup>3</sup>, respectively. Annual averages at these sites are about 10 µg/m<sup>3</sup>, well below the NEPM standard of 60 µg/m<sup>3</sup>.

### **3. Potential Impacts**

Exhaust gases from the gas-fired turbine and the supplementary duct firing system are emitted to the atmosphere from a 60 metre stack. These emissions to the atmosphere could adversely affect air quality if they are not managed adequately.

### **4. Environmental Objectives**

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.

### **5. Performance Indicators/Criteria**

#### **5.1 Atmospheric emission limits**

Emissions of air pollutants from the NewGen Power Station stack shall be below the limit specified in Table 1.



**Table 1: Atmospheric emission limits**

Air pollutant	Operational condition <sup>1</sup>	Emission concentration limit <sup>2,3</sup>	Averaging period
Oxides of nitrogen	With duct firing ≈ 320 MW	31 ppmv or 64 mg/Nm <sup>3</sup>	1-hour
	Without duct firing	25 ppmv or 51 mg/Nm <sup>3</sup>	1-hour
Carbon monoxide	All	50 ppmv or 63 mg/Nm <sup>3</sup>	1-hour
VOCs n-propane equivalent	All	10 ppmv or 20 mg/Nm <sup>3</sup>	1-hour

Note:

<sup>1</sup>Excluding start-up and shutdown.

<sup>2</sup>Corrected to 15% O<sub>2</sub> basis.

<sup>3</sup>mg/Nm<sup>3</sup>, corrected to 101.3 KPa, 273 K, average.

## 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 150 minutes.

## 5.3 Ambient air quality

Ambient concentrations of air pollutants as a result of emissions from the NewGen Power Station should not exceed the standards specified in Table 2.

**Table 2: Ambient air quality standards**

Air pollutant	Averaging period	Standard <sup>1</sup>
Nitrogen dioxide	1-hour	246 µg/m <sup>3</sup>
	Annual	60 µg/m <sup>3</sup>
Carbon monoxide	8-hour	11 mg/m <sup>3</sup>

Note <sup>1</sup>National Environment Protection (Ambient Air Quality) Measure.

## 6. Implementation

### 6.1 Design/construct

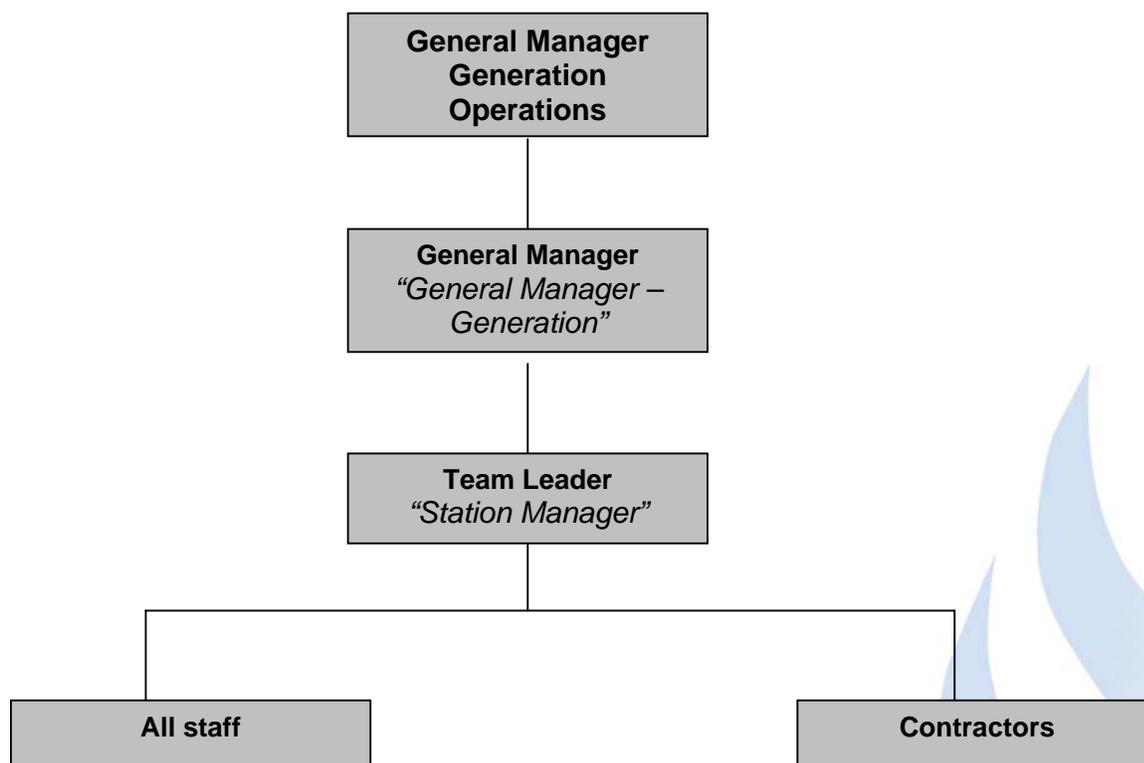
The power station shall be designed and constructed to comply with the emission concentration limits specified in 5.1.



## 6.2 Operation

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

## 6.3 Roles and responsibilities



### General Manager (Generation Operations)

- Conduct overall review of compliance with this SEMP through the audit process.
- Responsible for maintaining a master list of all consents held by NewGen relating to the generation site.
- Responsible for ensuring that appropriate licences are held for the generation site.
- Responsible for the renewal of licences for the generation site.



- Responsible for ensuring ongoing effective communication with Generation Manager.

#### **Generation Manager**

- Ensure contract documentation specifies the responsibilities of contractors in regard for the requirements of this SEMP.
- Assist with the overall review of compliance with this SEMP through the audit process.
- Responsible for ensuring that environmental licence monitoring and reporting requirements are met.
- Responsible for compliance with legislative requirements.
- Responsible for ensuring ongoing effective communication with Team Leaders.
- Liaison with the administering authority and stakeholders as required.

#### **Station Manager**

- Responsible for ensuring that all staff and contractors are familiar with this SEMP.
- 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 SEMP, 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.

#### **All staff**

- Every NewGen 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 SEMP.
- Ensure that contractors and other persons working at NewGen sites undertake such works in accordance with this SEMP.



### Contractors

- Shall comply with this SEMP as if they were NewGen staff members.

## 7. Monitoring

### 7.1 Atmospheric emissions

Sampling and analysis of air pollutants shall be undertaken to determine the emission parameters specified in Table 3 below. Sampling will be undertaken in the power station exhaust stack at a location established in accordance with the requirements of Australian Standard AS4323.1 – 1995.

**Table 3: Emission monitoring parameters**

Pollutant/parameter	Units of measure	Method	Frequency
Oxides of nitrogen	mg/m <sup>3</sup>	USEPA (1997) Performance Specification 2	Post commissioning and continuous
Carbon monoxide	mg/m <sup>3</sup>	USEPA (1997) Method 10	Post commissioning and annual
Velocity, temperature and volumetric flow rate	m/s, °C, m <sup>3</sup> /s	USEPA (1997) Method 2 or 2C	Post commissioning and annual
Moisture content	%	USEPA (1997) Method 4	Post commissioning and annual
Dry gas density, molecular weight	kg/m <sup>3</sup> , g/gmol	USEPA (1997) Method 3	Post commissioning and annual
Carbon dioxide, oxygen	%	USEPA (1997) Method 3A	Post commissioning and annual
VOCs n-propane equivalent	mg/m <sup>3</sup>	USEPA (1997) Method 18	Post commissioning and annual

### 7.2 Operational parameters

NewGen Power will continuously monitor power station operational parameters in accordance with the manufacturer's operation and maintenance manual.



### 7.3 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 likely 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 following a complaint:

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

### 8. Contingencies

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



- (a) Routine preventative maintenance will be undertaken in accordance with the manufacturer's operation and maintenance manual.
- (b) Post commissioning testing for oxides of nitrogen, carbon monoxide, VOCs and other exhaust parameters in accordance with the requirements set out in 7.1 will be undertaken to establish compliance with manufacturer's specifications and approval conditions.
- (c) Continuous monitoring of emissions of oxides of nitrogen in accordance with the requirements set out in 7.1 with data supplied to the operator/control room in real-time. High level alarms will be employed to trigger action to investigate elevated readings before a non-compliance occurs.
- (d) Continuous monitoring of process parameters to ensure combustion efficiency and power station efficiencies are maintained at optimum levels. Alarms will be employed to trigger action to investigate sub-optimal conditions before a non-compliance occurs.
- (e) Sampling and analysis of carbon monoxide and VOCs (and other exhaust parameters) on a campaign basis in accordance with the requirements specified in 7.1 to supplement and support the continuous monitoring of process parameters and provide a secondary check on operations and maintenance.
- (f) Complaints reporting, management system and investigation system.

## **9. Stakeholder consultation**

Comments received from stakeholders have been incorporated into this SEMP. The Kwinana Progress Association and the KABZ Community Group stated that in-line NO<sub>x</sub> monitoring should be done and this has been included in the power station design. These comments were published in NewGen Power's Environmental Protection Statement July 2005.

The SEMP will be made publicly available. This will include the following:

- Free copies of the SEMP, when approved by the DoE for release, will be provided to – the DoE library (2 copies), Town of Kwinana public library (2 copies), and JS Battye library (2 copies);



- The SEMP will be sent to Kwinana Progress Association, the KABZ Community Group, and the Kwinana Industry Council;
- The SEMP will be posted on the NewGen Power website [www.newgenpower.com.au](http://www.newgenpower.com.au) ;
- DoE will be requested to advertise the availability of the SEMP in the “West Australian” newspaper.

NewGen Power will respond directly to all comments received from stakeholders on the SEMP and will report on stakeholder communications in its annual report.

## **10. Auditing**

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

## **11. Review and revision**

This SEMP 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**

### **12.1 Annual report**

An annual report will be prepared within three months of completion of the first year of operation and annually thereafter, that:

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

The report will be prepared in accordance with the Department of Environment’s guidelines for performance and compliance reporting. The annual report will be made publicly available.



## 12.2 Record keeping

The following records are to be kept on site and made available to an EPA representative on request.

- Emissions monitoring reports and data;
- All environmental complaints – maintain complaints register;
- External reporting to EPA, including annual reports; and
- Daily checklists.

## 13. Key Management Actions Table

**Table 4: Key management Actions**

Ref #	Timing/Phase	Key Management Action	DoE Reporting/Evidence	Status
SEMP1	Post-commissioning	Monitor emissions from the exhaust stack as specified in EMP S7.1	Result submitted to DoE in post-commissioning compliance report	
SEMP2	Ongoing	Monitor NO <sub>x</sub> emissions from the exhaust stack as specified in S7.1	Notification letter sent to DoE in the event of an exceedance, summarise performance in annual report, logged data available on request.	
SEMP3	Ongoing	Monitor power plant operational parameters as specified in S7.2	Summarise performance in annual report, logged data available on request.	
SEMP4	Ongoing	Monitor and respond to community complaints, record actions as specified in S7.3	Summarise performance in annual report, logged data available on request.	
SEMP5	Annual	Monitor carbon monoxide, VOCs and other stack parameters as specified in S7.1	Summarise performance in annual report, logged data available on request.	
SEMP6	Annual	Prepare annual compliance report	Analyse monitoring results, submit to DoE with annual report	
SEMP7	Ongoing	Preventative maintenance	Complete maintenance log, logged data available on request	



## 14. References

Katestone Environmental 2005, Air Quality Impact Assessment for the Proposed NewGen Gas-Fired Power Station, Kwinana. Report from Katestone Environmental to ELP – Appendix D NewGen Power Station Kwinana Environmental Protection Statement, July 2005.

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 SO<sub>2</sub> and NO<sub>x</sub> 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.

## 15. Acknowledgements

This document has been prepared for NewGen Power by Katestone Environmental Pty Ltd and Environmental and Licensing Professionals Pty Ltd.

<b>Job Number:</b> KE0512397	<b>Date:</b> 26/10/2006
<b>Title:</b> NewGen Power Kwinana Station Stack Emissions Management Plan SEMP	
<b>Client:</b> ERM Group	
<b>Document reference:</b> Stack emissions management plan.doc	

<b>Revision No.</b>	<b>Prepared by:</b>	<b>Reviewed by:</b>	<b>Approved by:</b>	<b>Date</b>
Rev 0.2	Simon Welchman	Lena Jackson	Simon Welchman	29/06/06