

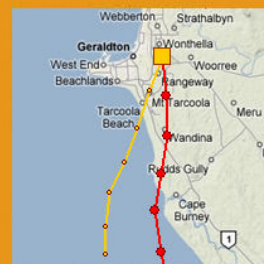
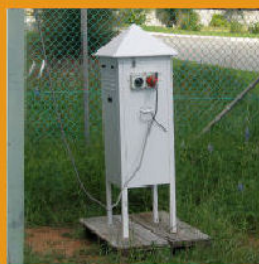
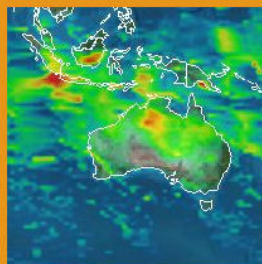


Department of  
Environment and Conservation



# 2010 Western Australia Air Monitoring Report

Written to comply with the  
National Environment Protection Measure  
(Ambient Air Quality)



July 2011

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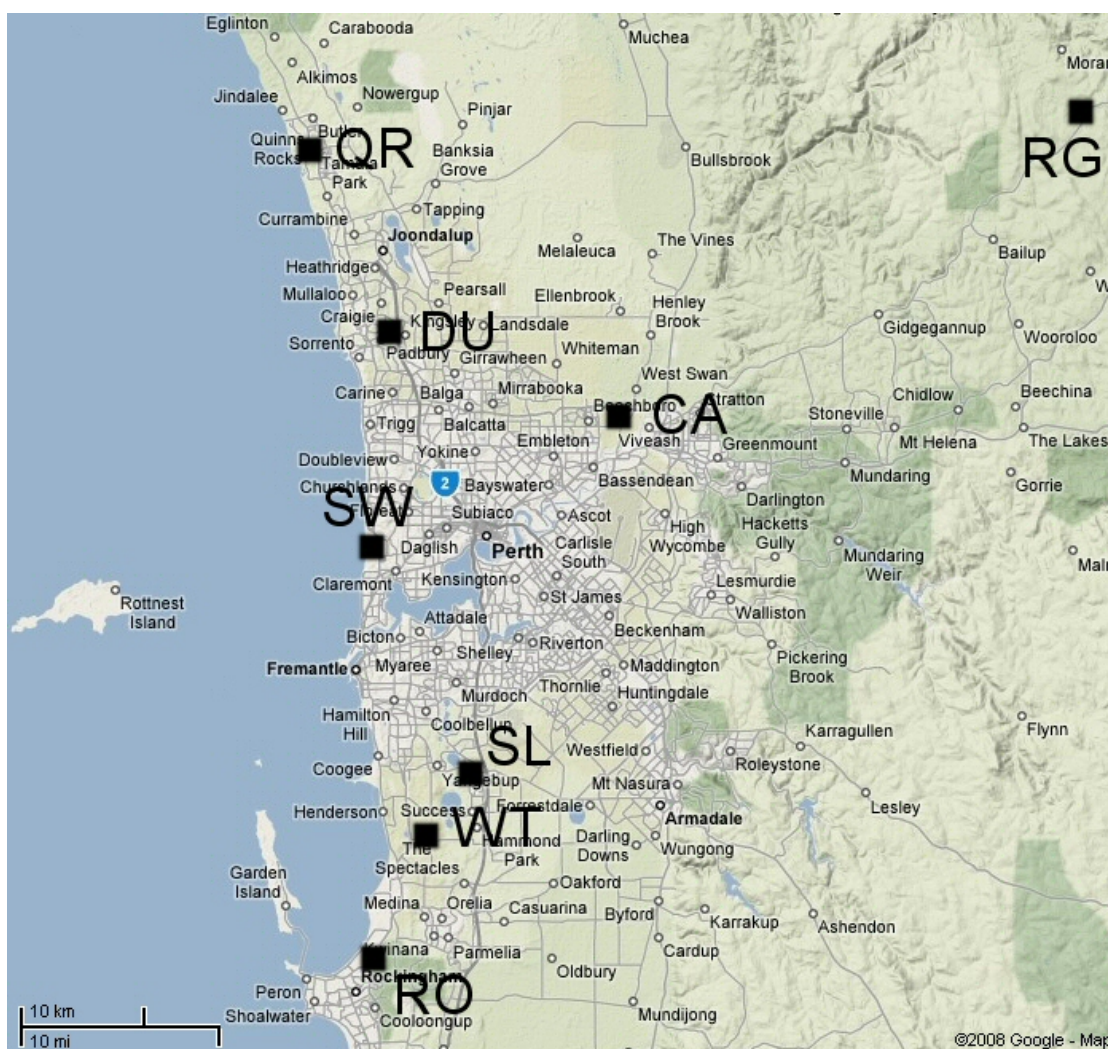
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## SECTION A - MONITORING SUMMARY

### Current monitoring stations

The Department of Environment and Conservation (DEC) monitoring network shown in Figure A1 was the subject of careful design for the purposes of the Perth Photochemical Smog Study, the Perth Haze Study and the management of sulfur dioxide in the Kwinana area. The network's design was based on the knowledge of emissions sources, pollutant chemistry and important features of the meteorology. CSIRO Atmospheric Research provided advice on monitoring site locations for the Perth Photochemical Smog Study and Perth Haze Study. The Bunbury station shown in Figure A2 was established in the south-west of the state to monitor fuel reduction burns, and stations in Busselton and Collie are also in operation for that purpose. The Geraldton station shown in Figure A3 was established in the midwest of the state to monitor wind blown crustal material and smoke from bushfires, hazard reduction or stubble burning and possibly wood-fired home heaters. A particle monitoring station was also established in Albany (Figure A4). Table A1 indicates the pollutants monitored at each site.



<b>CA Caversham</b>	<b>QR Quinns Rock</b>	<b>RG Rolling Green</b>	<b>SW Swanbourne</b>
<b>DU Duncraig</b>	<b>RO Rockingham</b>	<b>SL South Lake</b>	<b>WT Wattleup</b>

**Figure A1 - DEC air quality monitoring stations operating in the Perth metropolitan region.**









*Figure A3 - DEC air quality monitoring station operating in Geraldton*



*Figure A4 - DEC air quality monitoring station operating in Albany*

**Table A1. Air quality parameters measured at DEC monitoring stations.**

<b>Monitoring Site</b>	<b>CO</b>	<b>O<sub>3</sub></b>	<b>NO<sub>2</sub></b>	<b>SO<sub>2</sub></b>	<b>lead</b>	<b>PM<sub>10</sub> TEOM</b>	<b>PM<sub>2.5</sub> TEOM</b>
<b>AL</b> Albany						07/06 to present	
<b>BN</b> Bunbury	03/99 to 04/02					06/99 to present	04/97 to present
<b>BS</b> Busselton							11/06 to present
<b>CA</b> Caversham	08/93 to present	11/89 to present	09/90 to present			01/04 to present	03/94 to present
<b>CO</b> Collie						02/08 to present	
<b>DU</b> Duncraig	08/95 to present		08/95 to present			06/96 to present	01/95 to present
<b>GE</b> Geraldton						09/05 to present	
<b>QR</b> Quinns Rock		11/92 to present	11/92 to present				07/06 to present
<b>RO</b> Rockingham		12/95 to present	12/95 to present	07/88 to present			
<b>RG</b> Rolling Green		01/93 to present	01/93 to present				
<b>SL</b> South Lake	03/00 to present	03/00 to present	03/00 to present	03/00 to present		03/00 to present	04/06 to present
<b>SW</b> Swanbourne	01/93 to 05/95	01/93 to present	03/93 to present				06/94 to 07/95
<b>WT</b> Wattleup				01/88 to present			

The grey indicates those pollutants that are no longer monitored at that site.

On several occasions DEC has performed campaign monitoring for various projects, and while these short-term monitoring projects are not reported within this document, detailed reports and/or data can be obtained by contacting us at [airquality@dec.wa.gov.au](mailto:airquality@dec.wa.gov.au).

**Table A2. Methods used to monitor air quality at DEC monitoring stations.**

<b>Pollutant</b>	<b>Standard</b>	<b>Method</b>
Carbon monoxide	AS 3580.7.1 1992 – Methods for sampling and analysis of ambient air – Determination of carbon monoxide – Direct-reading instrumental method	Gas filter correlation spectrophotometry
Ozone	AS 3580.6.1 1990 – Methods for sampling and analysis of ambient air – Determination of ozone – Direct-reading instrumental method	Ultraviolet absorption
Nitrogen dioxide	AS 3580.5.1 1993 – Methods for sampling and analysis of ambient air – Determination of oxides of nitrogen – Chemiluminescence method	Chemiluminescence
Sulfur dioxide	AS 3580.4.1 2008 – Methods for sampling and analysis of ambient air – Determination of sulfur dioxide – Direct-reading instrumental method	Ultraviolet fluorescence
Particles as PM <sub>10</sub>	AS 3580.9.8 2008 – Methods for sampling and analysis of ambient air – Determination of suspended particulate matter – PM <sub>10</sub> continuous direct mass method using a tapered element oscillating microbalance analyser	Tapered element oscillating microbalance
Particles as PM <sub>2.5</sub>		Tapered element oscillating microbalance

**Table A3. Monitoring in Western Australia.**

<b>Site:</b>	<b>CO</b>	<b>O<sub>3</sub></b>	<b>NO<sub>2</sub></b>	<b>SO<sub>2</sub></b>	<b>PM<sub>10</sub></b>	<b>PM<sub>2.5</sub></b>
AL – Albany					C	
BN – Bunbury					C	DEC
BS – Busselton						DEC
CA – Caversham	DEC	T	T		P	DEC
CO - Collie					DEC	
DU - Duncraig	T		DEC		T	DEC
GE – Geraldton					C	
QR - Quinns Rock		DEC	DEC			DEC
RG - Rolling Green		DEC	DEC			
RO - Rockingham		DEC	DEC	DEC		
SL - South Lake	P	T	P	T	P	DEC
SW - Swanbourne		T	P		DEC	
WT - Wattleup				DEC		

Key to symbols:**P** – Performance monitoring station**C** – Campaign monitoring**T** – Trend performance monitoring station**DEC** – station will be maintained by DEC for the foreseeable future

**Table A4. Screening procedures used to demonstrate whether pollutants are consistently below standards.**

<b>Screening procedures</b>
A. Campaign monitoring at a Generally Representative Upper Bound (GRUB) monitoring location (with no significant deterioration expected over 5–10 years).
B. Use of historical data within a region which will contain one or more GRUB monitoring stations to demonstrate that the full number of stations (according to 14(1)) is not required, either to detect exceedences or gain a more representative depiction of pollutant distribution.
C. Use of modelling within a region which will contain one or more GRUB monitoring stations to demonstrate that the full number of stations (according to 14(1)) is not required, either to detect exceedences or gain a more representative depiction of pollutant distribution.
D. In a region with no performance monitoring, use of validated (1) modelling with detailed and reliable estimates of emissions and meteorological data.
E. In a region with no performance monitoring, and in the absence of emissions and detailed meteorological data, use of generic model results based on gross emissions estimates, 'worst case' meteorology estimates and other conservative assumptions.
F. In a region with no performance monitoring, comparison with a NEPM compliant region with greater population, emissions and pollution potential.
P. Performance monitoring.
T. Trend monitoring.
M. Campaign monitoring.

**Table A5. Screening procedures satisfied at each station.**

<b>Site:</b>	<b>Pop'n<sup>a</sup></b>	<b>CO</b>	<b>O<sub>3</sub></b>	<b>NO<sub>2</sub></b>	<b>SO<sub>2</sub></b>	<b>Pb</b>	<b>PM<sub>10</sub></b>
Perth and Rockingham	1,554,100				B&C	A	
Mandurah <sup>b</sup>	60,560	P	P	P	F	F	P
Albany	33,545						
Bunbury	31,638	A&F	E&F	E&F	D&F	F	
Kalgoorlie-Boulder <sup>c</sup>	30,903	M	E&F	E&F	T	F	P
Geraldton	20,333	F	E&F	E&F	D&F	F	M

a – 2006 data (www.abs.gov.au/ )

b – Mandurah station has yet to be established

c – Kalgoorlie station has yet to be established

Details of screening procedures are given in the monitoring plan available at

[http://www.dec.wa.gov.au/component/option.com\\_docman/Itemid,980/gid,1085/task.doc\\_download/](http://www.dec.wa.gov.au/component/option.com_docman/Itemid,980/gid,1085/task.doc_download/)

Shaded cells represent Performance, Trend or Campaign sites where monitoring is currently underway.



**Table A6. Stations site compliance with AS 2922—1987**

	Height above ground	Min. distance to support structures	Clear sky angle of 120°	Unrestricted airflow of 270°/360°	20m from trees	No boilers or incinerators nearby	Minimum distance from road or traffic	Sample line material	Sample line length	Comments
<b>Perth Region</b>										
Caversham	☑	☑	☑	☑	☑	☑	☑	☑	☑	
Duncraig	☑	☑	☒	☑	☒	☑	☑	☑	☑	Six metres to medium sized trees and presence of power pole.
Quinns Rocks	☑	☑	☑	☑	☒	☑	☑	☑	☑	15 metres to small to medium size trees. Surrounding area dominated by low scrub.
Rockingham	☑	☑	☑	☑	☒	☑	☑	☑	☑	12 metres to trees. Northern vector dominated by grain storage facility.
Rolling Green	☑	☑	☑	☑	☑	☑	☑	☑	☑	
South Lake	☑	☑	☑	☑	☑	☑	☑	☑	☑	
Swanbourne	☑	☑	☑	☑	☑	☑	☑	☑	☑	
Wattleup	☑	☑	☑	☑	☒	☑	☑	☑	☑	10 metres to medium to large eucalyptus trees.
<b>South West Region</b>										
Albany	☑	☑	☑	☑	☑	☑	☑	☑	☑	
Bunbury	☑	☑	☑	☑	☒	☑	☑	☑	☑	15 metres to small to medium eucalyptus trees.
Busselton	☑	☑	☑	☑	☒	☑	☑	☑	☑	Five metres to small to medium eucalyptus trees.
Collie	☑	☑	☑	☑	☑	☑	☑	☑	☑	
<b>Midwest Region</b>										
Geraldton	☑	☑	☑	☑	☑	☑	☑	☑	☑	

## Carbon monoxide

Duncraig is an upper bound site for monitoring the combined effects of emissions from vehicles on the nearby Mitchell Freeway and domestic wood fires. The site is about 200 metres from the freeway, so it is well beyond the distance of roadside measurement. By Perth's standards the site is representative of dense population. The site lies in a dunal depression through which the freeway passes, hence the effect of stable air pooling in the depression is likely to lead to elevated concentrations. This feature would be found in many other places across the coastal plain.

South Lake lies in a growing urban area and is likely to see increasing levels of CO from wood fires in particular. It is not as close as Duncraig to major roads and is therefore more typical of a population-average site.

Caversham is located in a region of low population density and so is not considered as a performance monitoring station.

In summary, during 2010, WA maintained performance monitoring of CO at Duncraig, and South Lake. Duncraig and South Lake are nominated as trend stations.

## Photochemical oxidants as ozone

Statistics for the coastal sites of Quinns Rocks, Swanbourne and Rockingham indicate there is little difference between each station over the long term. Swanbourne was selected as a performance monitoring station while maintaining monitoring stations at Quinns Rocks and at or near Rockingham for the foreseeable future, as resources allow.

Given its location, there is reason to be confident that Caversham represents an upper bound, middle distance, inland site. Accordingly Caversham was selected as a performance monitoring station site.

South Lake is the third performance monitoring station. It has the following desirable attributes:

- it provides spatial spread of stations (it will measure ozone returning on shore in the southern part of the metropolitan area)
- it is a moderate distance inland in a growing urban area, hence it is well classed as a population average station
- it may occasionally detect the interactions of O<sub>3</sub>-rich air with the NO<sub>x</sub>-rich plumes from Kwinana industry (potentially giving elevated NO<sub>2</sub> concentrations)

Caversham, Swanbourne and South Lake are all nominated as trend stations.

DEC will continue to maintain the stations at Rockingham, Quinns Rocks and Rolling Green for the foreseeable future as part of its wider ozone network.

## Nitrogen dioxide

For purposes of scientific understanding, NO<sub>2</sub> is currently being monitored at all stations where O<sub>3</sub> is monitored. Caversham, Swanbourne and South Lake were therefore chosen as performance monitoring stations for NO<sub>2</sub> as these provide a good spatial distribution.

Caversham, Swanbourne and South Lake are also trend stations.

DEC will continue to measure NO<sub>2</sub> at Quinns Rocks, Rolling Green and Duncraig for the foreseeable future as part of its wider network.

## Sulfur dioxide

DEC operates one performance monitoring station at South Lake for sulphur dioxide, while maintaining a source management network which includes Wattleup and Rockingham.

South Lake is an upper bound performance monitoring station for sulphur dioxide, and a trend station. South Lake is near the southern extent of the main urban population and downwind of Kwinana in sea breeze conditions.

## Lead

Since 1995, lead levels within the Perth CBD have been below 60 per cent of the 0.5µg/m<sup>3</sup> annual NEPM standard. In 2001, the average lead level in Perth was 0.022µg/m<sup>3</sup> µg/m<sup>3</sup>, less than five per cent of the NEPM standard. In accordance with NEPM (Ambient Air Quality) Technical Paper No. 4, Screening Procedures, and the WA Monitoring Plan, a performance monitoring station for lead has not been maintained since 2001.

## Particles as PM<sub>10</sub>

Duncraig is an upper bound performance monitoring station site for PM<sub>10</sub> caused by the combination of vehicle and domestic wood heater emissions during strongly stable meteorological conditions. Likewise, the site at South Lake measures significant PM<sub>10</sub> concentrations from wood fires.

Duncraig and South Lake are both nominated as trend stations.

Campaign monitoring stations were established at Geraldton in September 2005, Albany in July 2006 and Collie in February 2008.

## Particles as PM<sub>2.5</sub>

To make assessments against the advisory standard, four PM<sub>2.5</sub> TEOMs were installed in the greater Perth metropolitan area at Quinns Rocks, Caversham, Duncraig and South Lake and one each in Bunbury and Busselton. All will remain in use at these locations indefinitely with the intention of developing trend data.

## Status of NATA accreditation

WA has made substantial progress towards meeting its goal of receiving NATA accreditation, with all infrastructure upgrades and systems development now complete. Work on this program continues however, and so the data within this report meets Department of Environment and Conservation quality standards.

## Exceedence summary

In 2010, all exceedences were due to particle matter from smoke haze and dust. The site located at Collie did not meet the PM<sub>10</sub> NEPM goal of no more than five exceedences of 50µg/m<sup>3</sup> averaged over 24 hours in any year.

All other sites met the NEPM goal.

**Table A7. Air NEPM exceedences recorded during 2010**

Site	Pollutant	Concentration	Date / Time	Reason
Albany	PM <sub>10</sub> – 24 hour	52.5µg/m <sup>3</sup>	13/03/2010	Smoke haze
Bunbury	PM <sub>10</sub> – 24 hour	96.1µg/m <sup>3</sup>	28/04/2010	Smoke haze
Bunbury	PM <sub>2.5</sub> – 24 hour	78.2µg/m <sup>3</sup>	28/04/2010	Smoke haze
Bunbury	PM <sub>10</sub> – 24 hour	134.0µg/m <sup>3</sup>	29/04/2010	Smoke haze
Bunbury	PM <sub>2.5</sub> – 24 hour	115.3µg/m <sup>3</sup>	29/04/2010	Smoke haze
Bunbury	PM <sub>2.5</sub> – 24 hour	26.5µg/m <sup>3</sup>	06/05/2010	Smoke haze
Bunbury	PM <sub>2.5</sub> – 24 hour	29.5µg/m <sup>3</sup>	07/05/2010	Smoke haze
Bunbury	PM <sub>2.5</sub> – 24 hour	30.0µg/m <sup>3</sup>	08/05/2010	Smoke haze
Bunbury	PM <sub>2.5</sub> – 24 hour	27.6µg/m <sup>3</sup>	19/10/2010	Smoke haze
Bunbury	PM <sub>2.5</sub> – 24 hour	25.3µg/m <sup>3</sup>	29/12/2010	Smoke haze
Busselton	PM <sub>2.5</sub> – 24 hour	62.5µg/m <sup>3</sup>	28/04/2010	Smoke haze
Busselton	PM <sub>2.5</sub> – 24 hour	33.5µg/m <sup>3</sup>	07/05/2010	Smoke haze
Busselton	PM <sub>2.5</sub> – 24 hour	30.5µg/m <sup>3</sup>	16/10/2010	Smoke haze
Busselton	PM <sub>2.5</sub> – 24 hour	59.4µg/m <sup>3</sup>	18/10/2010	Smoke haze
Busselton	PM <sub>2.5</sub> – 24 hour	50.8µg/m <sup>3</sup>	19/10/2010	Smoke haze
Busselton	PM <sub>2.5</sub> – 24 hour	25.9µg/m <sup>3</sup>	18/11/2010	Smoke haze
Busselton	PM <sub>2.5</sub> – 24 hour	26.0µg/m <sup>3</sup>	31/12/2010	Smoke haze
Caversham	PM <sub>2.5</sub> – 24 hour	27.3µg/m <sup>3</sup>	24/04/2010	Smoke haze
Caversham	PM <sub>10</sub> – 24 hour	63.4µg/m <sup>3</sup>	06/05/2010	Smoke haze

Site	Pollutant	Concentration	Date / Time	Reason
Caversham	PM <sub>2.5</sub> – 24 hour	45.2µg/m <sup>3</sup>	06/05/2010	Smoke haze
Caversham	PM <sub>2.5</sub> – 24 hour	27.5µg/m <sup>3</sup>	31/12/2010	Smoke haze
Collie	PM <sub>10</sub> – 24 hour	51.5µg/m <sup>3</sup>	27/04/2010	Smoke haze
Collie	PM <sub>10</sub> – 24 hour	92.0µg/m <sup>3</sup>	28/04/2010	Smoke haze
Collie	PM <sub>10</sub> – 24 hour	106.6µg/m <sup>3</sup>	29/04/2010	Smoke haze
Collie	PM <sub>10</sub> – 24 hour	65.0µg/m <sup>3</sup>	06/05/2010	Smoke haze
Collie	PM <sub>10</sub> – 24 hour	54.1µg/m <sup>3</sup>	10/05/2010	Smoke haze
Collie	PM <sub>10</sub> – 24 hour	64.4µg/m <sup>3</sup>	11/05/2010	Smoke haze
Collie	PM <sub>10</sub> – 24 hour	68.3µg/m <sup>3</sup>	12/05/2010	Smoke haze
Collie	PM <sub>10</sub> – 24 hour	75.3µg/m <sup>3</sup>	15/05/2010	Smoke haze
Collie	PM <sub>10</sub> – 24 hour	83.8µg/m <sup>3</sup>	18/05/2010	Smoke haze
Collie	PM <sub>10</sub> – 24 hour	163.0µg/m <sup>3</sup>	19/05/2010	Smoke haze
Collie	PM <sub>10</sub> – 24 hour	56.3µg/m <sup>3</sup>	20/05/2010	Smoke haze
Collie	PM <sub>10</sub> – 24 hour	57.2µg/m <sup>3</sup>	21/05/2010	Smoke haze
Collie	PM <sub>10</sub> – 24 hour	58.6µg/m <sup>3</sup>	21/09/2010	Smoke haze
Collie	PM <sub>10</sub> – 24 hour	110.3µg/m <sup>3</sup>	22/09/2010	Smoke haze
Collie	PM <sub>10</sub> – 24 hour	68.7µg/m <sup>3</sup>	23/09/2010	Smoke haze
Collie	PM <sub>10</sub> – 24 hour	60.0µg/m <sup>3</sup>	24/09/2010	Smoke haze
Duncraig	PM <sub>2.5</sub> – 24 hour	36.4µg/m <sup>3</sup>	06/05/2010	Smoke haze
Duncraig	PM <sub>2.5</sub> – 24 hour	29.0µg/m <sup>3</sup>	30/12/2010	Smoke haze
Duncraig	PM <sub>2.5</sub> – 24 hour	28.2µg/m <sup>3</sup>	31/12/2010	Smoke haze
Geraldton	PM <sub>10</sub> – 24 hour	50.2µg/m <sup>3</sup>	04/03/2010	Indeterminate
Geraldton	PM <sub>10</sub> – 24 hour	55.6µg/m <sup>3</sup>	15/11/2010	Indeterminate
Geraldton	PM <sub>10</sub> – 24 hour	52.7µg/m <sup>3</sup>	27/11/2010	Indeterminate
Geraldton	PM <sub>10</sub> – 24 hour	50.7µg/m <sup>3</sup>	30/12/2010	Indeterminate
Quinns Rocks	PM <sub>2.5</sub> – 24 hour	33.7µg/m <sup>3</sup>	06/05/2010	Smoke haze
Quinns Rocks	PM <sub>2.5</sub> – 24 hour	32.3µg/m <sup>3</sup>	30/12/2010	Smoke haze
Quinns Rocks	PM <sub>2.5</sub> – 24 hour	28.6µg/m <sup>3</sup>	31/12/2010	Smoke haze
South Lake	PM <sub>10</sub> – 24 hour	61.0µg/m <sup>3</sup>	30/01/2010	Crustal
South Lake	PM <sub>10</sub> – 24 hour	60.0µg/m <sup>3</sup>	06/05/2010	Smoke haze
South Lake	PM <sub>2.5</sub> – 24 hour	39.6µg/m <sup>3</sup>	06/05/2010	Smoke haze
South Lake	PM <sub>10</sub> – 24 hour	51.6µg/m <sup>3</sup>	26/12/2010	Crustal
South Lake	PM <sub>10</sub> – 24 hour	51.9µg/m <sup>3</sup>	30/12/2010	Smoke haze
South Lake	PM <sub>2.5</sub> – 24 hour	34.4µg/m <sup>3</sup>	30/12/2010	Smoke haze

**Key:**

Crustal	A higher proportion of larger (PM <sub>10</sub> ) particles over smaller (PM <sub>2.5</sub> ) particles.
Indeterminate	The cause was unknown due to a lack of additional data or observations.
Smoke haze	A higher proportion of smaller (PM <sub>2.5</sub> ) particles over larger (PM <sub>10</sub> ) particles.

## SECTION B - ASSESSMENT OF COMPLIANCE WITH STANDARDS AND GOALS

**Table B1. 2010 compliance summary for carbon monoxide**

						AAQ NEPM Standard 9.0ppm (8-hour average)	
Regional performance monitoring station	Data availability rates					Number of exceedences  (days)	Performance against the standards and goal
	(% of hours)						
	Q1	Q2	Q3	Q4	Annual		
<u>Perth Region</u>							
Caversham (North East Metro)	84.2	83	85.4	87.4	85	0	met
Duncraig (North Metro)	95.5	84.7	84.1	86	87.5	0	met
South Lake (South East Metro)	99.4	85.9	82.8	83.3	87.8	0	met

Performance against the standards and goal: 'met', 'not met', 'not demonstrated'

**Table B2. 2010 compliance summary for nitrogen dioxide**

AAQ NEPM Standard 0.12ppm (1-hour average) 0.03ppm (1-year average)									
Regional performance monitoring station	Data availability rates					Annual mean  (ppm)	Number of exceedences  (days)	Performance against the standards and goal	
	(% of hours)							1-hour	1-year
	Q1	Q2	Q3	Q4	Annual				
<u>Perth Region</u>									
Caversham (North East Metro)	84.1	83	85.1	87.4	84.9	0.007	0	met	met
Duncraig (North Metro)	95.5	84.7	84.1	85.9	87.5	0.007	0	met	met
Quinns Rocks (Outer North Coast)	99.6	84.4	83.9	87.4	88.8	0.004	0	met	met
Rockingham (South Coast)	99.7	84.2	83.9	87.4	88.7	0.005	0	met	met
Rolling Green (Outer East Rural)	96	82.8	84	87.4	87.5	0.002	0	met	met
South Lake (South East Metro)	99.2	85.9	82.9	83.2	87.8	0.008	0	met	met
Swanbourne (Inner West Coast)	94.8	85.9	82.5	83.2	86.6	0.006	0	met	met

Performance against the standards and goal: 'met', 'not met', 'not demonstrated'

**Table B3. 2010 compliance summary for ozone**

Regional performance monitoring station	Data availability rates (% of hours)					Number of exceedences (days)		Performance against the standards and goal	
	Q1	Q2	Q3	Q4	Annual	1-hour	4-hour	1-hour	4-hour
<b>Perth Region</b>									
Caversham (North East Metro)	84.2	83.2	84.3	86.4	84.5	0	0	met	met
Quinns Rocks (Outer North Coast)	99.7	84.5	83.7	87	88.7	0	0	met	met
Rockingham (South Coast)	99.7	84.2	82	87.1	88.2	0	0	met	met
Rolling Green (Outer East Rural)	93.3	83.5	82.5	83.2	85.6	0	0	met	met
South Lake (South East Metro)	99.5	85.9	83.6	83	88	0	0	met	met
Swanbourne (Inner West Coast)	94.9	85.9	82.8	83.1	86.6	0	0	met	met

Performance against the standards and goal: 'met', 'not met', 'not demonstrated'

**Table B4. 2010 compliance summary for sulfur dioxide**

Regional performance monitoring station	Data availability rates (% of hours)					Annual mean	Number of exceedences (days)		Performance against the standards and goal		
	Q1	Q2	Q3	Q4	Annual	(ppm)	1-hour	24-hour	1-hour	24-hour	1-year
<b>Perth Region</b>											
Rockingham (South Coast)	99.7	84.2	84.1	91.6	89.9	0.001	0	0	met	met	met
South Lake (South East Metro)	99.5	85.9	83.1	83.1	87.8	0.001	0	0	met	met	met
Wattleup (South Metro)	97.2	84.1	83	83.2	86.8	0.001	0	0	met	met	met

Performance against the standards and goal: 'met', 'not met', 'not demonstrated'



**Table B5. 2010 compliance summary for particles as PM<sub>10</sub>**

AAQ NEPM Standard 50µg/m <sup>3</sup> (24-hour average)							
Regional performance monitoring station	Data availability rates					Number of exceedences  (Days)	Performance against the standards and goal
	(% of days)						
	Q1	Q2	Q3	Q4	Annual		
<u>Perth Region</u>							
Caversham (North East Metro)	98.6	99.9	99.7	100	99.5	1	met
Duncraig (North Metro)	98.2	99.9	99.7	99.9	99.4	0	met
South Lake (South East Metro)	99.8	99.5	99.4	99.9	99.7	4	met
<u>South West Region</u>							
Albany	99.8	99.7	99.7	99.9	99.8	1	met
Bunbury	99.8	99.8	98.8	98	99.1	2	met
Collie	99.8	99.7	99.4	99.8	99.7	16	not met
<u>Midwest Region</u>							
Geraldton	99.7	99.7	92.1	99.5	97.7	4	met

Performance against the standards and goal: 'met', 'not met', 'not demonstrated'

**Table B6. 2010 compliance summary for particles as PM<sub>2.5</sub>**

AAQ NEPM Advisory Standard 25µg/m³ (24-hour average)							
Regional performance monitoring station	Data availability rates					Number of exceedences  (Days)	Performance against the standards and goal
	(% of days)						
	Q1	Q2	Q3	Q4	Annual		
<u>Perth Region</u>							
Caversham (North East Metro)	98	99.7	99	99.7	99.1	3	n/a
Duncraig (North Metro)	97.7	99.8	99.7	99.9	99.3	3	n/a
Quinns Rocks (Outer North Coast)	99.6	99.7	99.4	99.8	99.6	3	n/a
South Lake (South East Metro)	99.8	99.1	99.4	99.7	99.5	2	n/a
<u>South West Region</u>							
Bunbury	99.7	99.9	96.7	98.1	98.6	7	n/a
Busselton	98.6	99.9	99.1	99.9	99.4	7	n/a

## SECTION C - ANALYSIS OF AIR QUALITY MONITORING

### Carbon monoxide

The NEPM standard for carbon monoxide of 9.0ppm averaged over eight hours was not exceeded at any site during 2010. The NEPM goal of no more than one exceedence at each site was met. Table C1 contains the summary statistics for daily peak eight-hour CO in Western Australia.

**Table C1. 2010 summary statistics for daily peak eight-hour carbon monoxide**

Regional performance monitoring station	Data recovery rates (%)	Highest  (ppm)	AAQ NEPM Standard 9.0ppm (8-hour average)			
			Highest		2 <sup>nd</sup> Highest	2 <sup>nd</sup> Highest
			(date)	(time)	(ppm)	(date) (time)
<u>Perth Region</u>						
Caversham (North East Metro)	85	1.6	06/05/2010	2200	0.9	09/05/2010 0500
Duncraig (North Metro)	87.5	2.3	16/07/2010	0500	2.1	29/05/2010 0500
South Lake (South East Metro)	87.8	2.2	26/06/2010	0200	1.9	28/06/2010 0200

## Nitrogen dioxide

The NEPM standard for nitrogen dioxide of 0.12ppm averaged over one hour and the 0.03ppm annual average were not exceeded at any site during 2010. The NEPM goal of no more than one exceedence at each site was met. Table C2 contains the summary statistics for daily peak 1-hour NO<sub>2</sub> in Western Australia.

**Table C2. 2010 summary statistics for daily peak one-hour nitrogen dioxide**

AAQ NEPM Standard 0.12ppm (one-hour average)							
Regional performance monitoring station	Data recovery rates (%)	Highest	Highest		2 <sup>nd</sup> Highest	2 <sup>nd</sup> Highest	
		(ppm)	(date)	(time)	(ppm)	(date)	(time)
<u>Perth Region</u>							
Caversham (North East Metro)	84.9	0.054	19/01/2010	2100	0.048	07/05/2010	1800
Duncraig (North Metro)	87.5	0.038	17/01/2010	2300	0.037	20/11/2010	0100
Quinns Rocks (Outer North Coast)	88.8	0.040	07/05/2010	2200	0.036	03/08/2010	2200
Rockingham (South Coast)	88.7	0.036	04/08/2010	2000	0.033	19/10/2010	2400
Rolling Green (Outer East Rural)	87.5	0.030	23/03/2010	2200	0.024	02/03/2010	2300
South Lake (South East Metro)	87.8	0.058	19/01/2010	1800	0.048	23/12/2010	1900
Swanbourne (Inner West Coast)	86.6	0.038	21/12/2010	2300	0.036	04/08/2010	2000

## Photochemical smog as ozone

The NEPM standard for ozone of 0.10ppm averaged over one hour was not exceeded at any site during 2010. The NEPM goal of no more than one exceedence at each site was met. Table C3 contains the summary statistics for daily peak one-hour O<sub>3</sub> in Western Australia.

**Table C3. 2010 summary statistics for daily peak 1-hour ozone**

					AAQ NEPM Standard 0.10ppm (1-hour average)		
Regional performance monitoring station	Data recovery rates (%)	Highest  (ppm)	Highest		2 <sup>nd</sup> Highest  (ppm)	2 <sup>nd</sup> Highest	
			(date)	(time)		(date)	(time)
<u>Perth Region</u>							
Caversham (North East Metro)	84.5	0.082	18/02/2010	1300	0.080	14/01/2010	1400
Quinns Rocks (Outer North Coast)	88.7	0.091	25/02/2010	1500	0.070	18/11/2010	1600
Rockingham (South Coast)	88.2	0.067	17/01/2010	1500	0.066	19/01/2010	1400
Rolling Green (Outer East Rural)	85.6	0.088	18/02/2010	1600	0.085	01/02/2010	1600
South Lake (South East Metro)	88.0	0.070	19/01/2010	1200	0.068	23/12/2010	1700
Swanbourne (Inner West Coast)	86.6	0.066	25/02/2010	1500	0.060	18/11/2010	1600

The NEPM standard for ozone of 0.08ppm averaged over four hours was not exceeded at any site during 2010. The NEPM goal of no more than one exceedence at each site was met. Table C4 contains the summary statistics for daily peak four-hour O<sub>3</sub> in Western Australia.

**Table C4. 2010 summary statistics for daily peak 4-hour ozone**

AAQ NEPM Standard 0.08ppm (4-hour average)							
Regional performance monitoring station	Data recovery rates (%)	Highest  (ppm)	Highest		2 <sup>nd</sup> Highest  (ppm)	2 <sup>nd</sup> Highest	
			(date)	(time)		(date)	(time)
<u>Perth Region</u>							
Caversham (North East Metro)	84.5	0.072	08/02/2010	1500	0.067	18/02/2010	1500
Quinns Rocks (Outer North Coast)	88.7	0.065	25/02/2010	1800	0.061	19/01/2010	1900
Rockingham (South Coast)	88.2	0.064	17/01/2010	1800	0.061	19/01/2010	1700
Rolling Green (Outer East Rural)	85.6	0.080	18/02/2010	1800	0.071	24/12/2010	1600
South Lake (South East Metro)	88.0	0.061	19/01/2010	1500	0.059	18/01/2010	1400
Swanbourne (Inner West Coast)	86.6	0.055	18/02/2010	1500	0.055	21/12/2010	1600

## Sulfur dioxide

The NEPM standard for sulfur dioxide of 0.20ppm averaged over one hour was not exceeded at any site during 2010. The NEPM goal of no more than one exceedence at each site was met. Table C5 contains the summary statistics for daily peak one-hour SO<sub>2</sub> in Western Australia.

**Table C5. 2010 summary statistics for daily peak 1-hour sulfur dioxide**

Regional performance monitoring station	Data recovery rates (%)	Highest (ppm)	Highest		2 <sup>nd</sup> Highest (ppm)	2 <sup>nd</sup> Highest	
			(date)	(time)		(date)	(time)
<b>Perth Region</b>							
Rockingham (South Coast)	89.9	0.037	25/07/2010	0900	0.024	11/08/2010	2400
South Lake (South East Metro)	87.8	0.073	13/01/2010	1500	0.048	14/01/2010	1600
Wattleup (South Metro)	86.8	0.057	24/01/2010	1600	0.056	14/01/2010	1400

The NEPM standard for sulfur dioxide of 0.08ppm averaged over 24 hours was not exceeded at any site during 2010. The NEPM goal of no more than one exceedence at each site was met. Table C6 contains the summary statistics for daily peak 24-hour SO<sub>2</sub> in Western Australia.

**Table C6. 2010 summary statistics for 24-hour sulfur dioxide**

Regional performance monitoring station	Data recovery rates (%)	Highest (ppm)	Highest		2 <sup>nd</sup> Highest (ppm)	2 <sup>nd</sup> Highest	
			(date)	(time)		(date)	(time)
<b>Perth Region</b>							
Rockingham (South Coast)	89.9	0.007	11/08/2010	2400	0.005	25/07/2010	2400
South Lake (South East Metro)	87.8	0.009	13/01/2010	2400	0.007	23/02/2010	2400
Wattleup (South Metro)	86.8	0.010	11/12/2010	2400	0.009	02/12/2010	2400

The NEPM advisory standard for sulfur dioxide of 0.02ppm averaged over one year was not exceeded at any site during 2010. Table C7 contains the summary statistics for annual SO<sub>2</sub> in Western Australia.

**Table C7. 2010 summary statistics for annual sulfur dioxide**

Regional performance monitoring station	AAQ NEPM Advisory Standard 0.02ppm (annual average)	
	Data Recovery Rates (%)	annual average (ppm)
<b>Perth Region</b>		
Rockingham (South Coast)	89.9	0.001
South Lake (South East Metro)	87.8	0.001
Wattleup (South Metro)	86.8	0.001

## Particles as PM<sub>10</sub>

The NEPM standard for particles as PM<sub>10</sub> of 50µg/m<sup>3</sup> averaged over 24 hours was exceeded once at Albany and Caversham, twice at Bunbury, four times at Geraldton and South Lake and 16 times at Collie during 2010. The NEPM goal of no more than five exceedences was met at all sites except Collie where the goal was not met. Table C8 contains the summary statistics for daily peak 24-hour PM<sub>10</sub> in Western Australia.

**Table C8. 2010 summary statistics for 24-hour particles as PM<sub>10</sub>**

Regional performance monitoring station	Data Recovery Rates (%)	Highest (µg/m <sup>3</sup> )	Highest		6 <sup>th</sup> Highest (µg/m <sup>3</sup> )	6 <sup>th</sup> Highest	
			(date)	(time)		(date)	(time)
<b>Perth Region</b>							
Caversham <sup>1</sup> (North East Metro)	99.5	<b>63.4</b>	06/05/2010	2400	40.3	31/12/2010	2400
Duncraig <sup>1</sup> (North Metro)	99.4	47.9	06/05/2010	2400	32.1	02/03/2010	2400
South Lake <sup>1</sup> (South East Metro)	99.7	<b>61.0</b>	30/01/2010	2400	43.6	07/05/2010	2400
<b>South West Region</b>							
Albany <sup>1</sup>	99.8	<b>52.5</b>	13/03/2010	2400	35.1	12/03/2010	2400
Bunbury <sup>1</sup>	99.1	<b>134.0</b>	29/04/2010	2400	36.7	30/12/2010	2400
Collie <sup>1</sup>	99.7	<b>163.0</b>	19/05/2010	2400	<b>75.3</b>	15/05/2010	2400
<b>Midwest Region</b>							
Geraldton <sup>1</sup>	97.7	<b>55.6</b>	15/11/2010	2400	48.7	31/12/2010	2400

1 – Tapered Element Oscillating Microbalance (TEOM) operating continuously (unadjusted for temperature).



## Particles as PM<sub>2.5</sub>

The NEPM advisory standard for particles as PM<sub>2.5</sub> of 25 micrograms per cubic metre averaged over 24 hours was exceeded twice at South Lake, three times at Caversham, Duncraig and Quinns Rocks, and seven times at Bunbury and Busselton during 2010. Table C9 contains the summary statistics for daily peak 24-hour PM<sub>2.5</sub> in Western Australia.

**Table C9. 2010 summary statistics for 24-hour particles as PM<sub>2.5</sub>**

AAQ NEPM Advisory Standard 25µg/m <sup>3</sup> (24-hour average)							
Regional performance monitoring station	Data recovery rates (%)	Highest  (µg/m <sup>3</sup> )	Highest  (date)      (time)		6th Highest  (µg/m <sup>3</sup> )	6th Highest  (date)      (time)	
<u>Perth Region</u>							
Caversham <sup>1</sup> (North East Metro)	99.1	<b>45.2</b>	06/05/2010	2400	17.9	08/05/2010	2400
Duncraig <sup>1</sup> (North Metro)	99.3	<b>36.4</b>	06/05/2010	2400	18.6	20/05/2010	2400
Quinns Rocks <sup>1</sup> (Outer North Coast)	99.6	<b>33.7</b>	06/05/2010	2400	16.5	20/05/2010	2400
South Lake <sup>1</sup> (South East Metro)	99.5	<b>40.0</b>	06/05/2010	2400	21.1	29/04/2010	2400
<u>South West Region</u>							
Bunbury <sup>1</sup>	98.6	<b>115.3</b>	29/04/2010	2400	<b>26.5</b>	06/05/2010	2400
Busselton <sup>1</sup>	99.4	<b>62.5</b>	28/04/2010	2400	<b>26.0</b>	31/12/2010	2400

1 - Tapered Element Oscillating Microbalance (TEOM) operating continuously (unadjusted for temperature) with Const A set to 3.000 and Const B set to 1.030.

The NEPM advisory standard for particles as PM<sub>2.5</sub> of 8 micrograms per cubic metre averaged over one year was exceeded at Caversham, Duncraig, South Lake, Bunbury and Busselton during 2010. Table C10 contains the summary statistics for annual PM<sub>2.5</sub> in Western Australia.

**Table C10. 2010 summary statistics for annual particles as PM<sub>2.5</sub>**

AAQ NEPM Advisory Standard 8µg/m <sup>3</sup> (annual average)		
Regional performance monitoring station	Data recovery rates (%)	annual average (µg/m <sup>3</sup> )
<u>Perth Region</u>		
Caversham <sup>1</sup> (North East Metro)	99.1	<b>8.2</b>
Duncraig <sup>1</sup> (North Metro)	99.3	<b>8.2</b>
Quinns Rocks <sup>1</sup> (Outer North Coast)	99.6	7.8
South Lake <sup>1</sup> (South East Metro)	99.5	<b>8.7</b>
<u>South West Region</u>		
Bunbury <sup>1</sup>	98.6	<b>9.2</b>
Busselton <sup>1</sup>	99.4	<b>8.5</b>

1 - Tapered Element Oscillating Microbalance (TEOM) operating continuously (unadjusted for temperature) with Const A set to 3.000 and Const B set to 1.030.

## SECTION D - DATA ANALYSIS

### Maxima and percentiles by pollutant in 2010

**Table D1. 2010 percentiles of daily peak 8-hour carbon monoxide concentrations**

AAQ NEPM Standard 9.0ppm (8-hour average)								
Regional performance monitoring station	Data availability rates (%)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)	75th percentile (ppm)	50th percentile (ppm)
<u>Perth Region</u>								
Caversham (North East Metro)	85	1.6	0.8	0.7	0.6	0.5	0.3	0.1
Duncraig (North Metro)	87.5	2.3	2.0	1.8	1.5	1.1	0.4	0.2
South Lake (South East Metro)	87.8	2.2	1.6	1.5	1.2	0.9	0.5	0.3

**Table D2. 2010 percentiles of daily peak 1-hour nitrogen dioxide concentrations**

Table D2: 2016 percentile of daily peak 1-hour nitrogen dioxide concentrations								
Regional performance monitoring station	Data availability rates (%)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	AAQ NEPM Standard		
						0.12ppm (one-hour average)		
						90th percentile (ppm)	75th percentile (ppm)	50th percentile (ppm)
<u>Perth Region</u>								
Caversham (North East Metro)	84.9	0.054	0.040	0.037	0.032	0.029	0.024	0.018
Duncraig (North Metro)	87.5	0.038	0.035	0.033	0.030	0.028	0.024	0.019
Quinns Rocks (Outer North Coast)	88.8	0.040	0.032	0.032	0.030	0.027	0.020	0.014
Rockingham (South Coast)	88.7	0.036	0.032	0.030	0.028	0.026	0.021	0.012
Rolling Green (Outer East Rural)	87.5	0.030	0.022	0.019	0.017	0.016	0.012	0.007
South Lake (South East Metro)	87.8	0.058	0.045	0.040	0.036	0.030	0.026	0.021
Swanbourne (Inner West Coast)	86.6	0.038	0.033	0.032	0.031	0.029	0.023	0.016

**Table D3. 2010 percentiles of daily peak 1-hour ozone concentrations**

						AAQ NEPM Standard 0.10ppm (1-hour average)		
Regional performance monitoring station	Data availability rates (%)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)	75th percentile (ppm)	50th percentile (ppm)
<u>Perth Region</u>								
Caversham (North East Metro)	84.5	0.082	0.069	0.059	0.055	0.046	0.037	0.031
Quinns Rocks (Outer North Coast)	88.7	0.091	0.061	0.058	0.054	0.048	0.039	0.034
Rockingham (South Coast)	88.2	0.067	0.060	0.057	0.052	0.044	0.037	0.033
Rolling Green (Outer East Rural)	85.6	0.088	0.077	0.070	0.056	0.046	0.036	0.031
South Lake (South East Metro)	88	0.070	0.067	0.062	0.052	0.045	0.037	0.031
Swanbourne (Inner West Coast)	86.6	0.066	0.059	0.056	0.050	0.044	0.037	0.033

**Table D4. 2010 percentiles of daily peak 4-hour ozone concentrations**

Regional performance monitoring station	Data availability rates (%)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	AAQ NEPM Standard 0.08ppm (4-hour average)		
						90th percentile (ppm)	75th percentile (ppm)	50th percentile (ppm)
<u>Perth Region</u>								
Caversham (North East Metro)	84.5	0.072	0.056	0.052	0.047	0.041	0.034	0.030
Quinns Rocks (Outer North Coast)	88.7	0.065	0.056	0.052	0.048	0.042	0.037	0.033
Rockingham (South Coast)	88.2	0.064	0.054	0.053	0.046	0.041	0.035	0.031
Rolling Green (Outer East Rural)	85.6	0.080	0.065	0.056	0.049	0.042	0.034	0.030
South Lake (South East Metro)	88	0.061	0.055	0.053	0.046	0.042	0.034	0.029
Swanbourne (Inner West Coast)	86.6	0.055	0.053	0.050	0.044	0.040	0.035	0.032

**Table D5. 2010 percentiles of daily peak 1-hour sulfur dioxide concentrations**

AAQ NEPM Standard 0.20ppm (1-hour average)								
Regional performance monitoring station	Data availability rates (%)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)	75th percentile (ppm)	50th percentile (ppm)
<u>Perth Region</u>								
Rockingham (South Coast)	89.9	0.037	0.022	0.019	0.013	0.009	0.004	0.002
South Lake (South East Metro)	87.8	0.073	0.036	0.033	0.025	0.017	0.007	0.002
Wattleup (South Metro)	86.8	0.057	0.049	0.043	0.036	0.023	0.012	0.005

**Table D6. 2010 percentiles of daily peak 24-hour sulfur dioxide concentrations**

**AAQ NEPM Standard  
0.08ppm (24-hour average)**

Regional performance monitoring station	Data availability rates (%)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)	75th percentile (ppm)	50th percentile (ppm)
<u>Perth Region</u>								
Rockingham (South Coast)	89.9	0.007	0.004	0.003	0.002	0.002	0.001	0.001
South Lake (South East Metro)	87.8	0.009	0.005	0.004	0.003	0.002	0.001	0.001
Wattleup (South Metro)	86.8	0.010	0.008	0.006	0.005	0.003	0.002	0.001

**Table D7. 2010 percentiles of daily peak 24-hour particles as PM<sub>10</sub> concentrations**

**AAQ NEPM Standard  
50µg/m<sup>3</sup> (24-hour average)**

Regional performance monitoring station	Data availability rates (%)	Max conc. (µg/m <sup>3</sup> )	99 <sup>th</sup> percentile (µg/m <sup>3</sup> )	98 <sup>th</sup> percentile (µg/m <sup>3</sup> )	95 <sup>th</sup> percentile (µg/m <sup>3</sup> )	90 <sup>th</sup> percentile (µg/m <sup>3</sup> )	75 <sup>th</sup> percentile (µg/m <sup>3</sup> )	50 <sup>th</sup> percentile (µg/m <sup>3</sup> )
<u>Perth Region</u>								
Caversham (North East Metro)	99.5	<b>63.4</b>	40.7	36.1	30.5	26.3	20.5	15.7
Duncraig (North Metro)	99.4	47.9	33.1	30.8	25.1	22.7	18.9	14.9
South Lake (South East Metro)	99.7	<b>61.0</b>	46.7	39.8	33.9	28.5	21.9	17.2
<u>South West Region</u>								
Albany	99.8	<b>52.5</b>	36.1	33.2	27.3	25.3	19.1	14.5
Bunbury	99.1	<b>134.0</b>	37.6	36.0	29.3	25.3	19.9	15.9
Collie	99.7	<b>163.0</b>	86.7	67.3	46.1	34.9	26.1	19.9
<u>Midwest Region</u>								
Geraldton	97.7	<b>55.6</b>	49.3	47.8	41.6	37.9	27.5	19.4

**Table D8. 2010 percentiles of daily peak 24-hour particles as PM<sub>2.5</sub> concentrations****AAQ NEPM Advisory Standard  
25µg/m<sup>3</sup> (24-hour average)**

Regional performance monitoring station	Data availability rates (%)	Max conc. (µg/m <sup>3</sup> )	99 <sup>th</sup> percentile (µg/m <sup>3</sup> )	98 <sup>th</sup> percentile (µg/m <sup>3</sup> )	95 <sup>th</sup> percentile (µg/m <sup>3</sup> )	90 <sup>th</sup> percentile (µg/m <sup>3</sup> )	75 <sup>th</sup> percentile (µg/m <sup>3</sup> )	50 <sup>th</sup> percentile (µg/m <sup>3</sup> )
<u>Perth Region</u>								
Caversham (North East Metro)	99.1	<b>45.2</b>	21.9	16.2	13.7	12.1	9.4	7.3
Duncraig (North Metro)	99.3	<b>36.4</b>	20.1	15.9	13.7	12.0	9.7	7.7
Quinns Rocks (Outer North Coast)	99.6	<b>33.7</b>	17.6	14.5	12.0	10.9	8.8	7.1
South Lake (South East Metro)	99.5	<b>40.0</b>	22.0	19.2	15.9	13.2	10.4	8.0
<u>South west Region</u>								
Bunbury	98.6	<b>115.3</b>	28.4	24.2	14.8	12.2	10.0	7.8
Busselton	99.4	<b>62.5</b>	31.6	22.9	15.7	11.6	9.0	7.4

## Maxima and percentiles by site 2001 to 2010

**Table D9. Daily peak 8-hour carbon monoxide at Caversham (2001–2010)**

Trend station/region: Caversham

AAQ NEPM Standard  
9.0ppm (8-hour average)

Year	Data Recovery (%)	No. of exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
2001	99.6	0	1.5	1.3	1.2	1.0	0.9
2002	98.1	0	1.3	1.0	0.9	0.8	0.7
2003	95.7	0	1.1	0.9	0.8	0.7	0.6
2004	96.2	0	1.3	0.9	0.9	0.7	0.5
2005	98.3	0	1.3	0.9	0.8	0.7	0.6
2006	99.7	0	1.8	0.9	0.9	0.6	0.5
2007	98.2	0	0.9	0.6	0.6	0.5	0.4
2008	99.5	0	0.8	0.7	0.7	0.6	0.5
2009	99.2	0	1.0	0.6	0.5	0.4	0.4
2010	85.0	0	1.6	0.8	0.7	0.6	0.5

**Table D10. Daily peak 8-hour carbon monoxide at Duncraig (2001–2010)**

Trend station/region: Duncraig

AAQ NEPM Standard  
9.0ppm (8-hour average)

Year	Data Recovery (%)	No. of exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
2001	99.5	0	5.9	4.7	4.2	3.1	2.6
2002	96.6	0	5.4	3.7	3.6	2.6	1.8
2003	97.8	0	4.1	3.1	2.8	2.0	1.5
2004	99.1	0	4.5	3.2	2.7	2.1	1.2
2005	98.5	0	3.3	2.7	2.2	1.7	1.2
2006	99.3	0	3.4	2.8	2.3	1.8	1.3
2007	99.5	0	2.0	1.6	1.4	1.2	0.8
2008	99.0	0	3.1	1.9	1.7	1.4	1.0
2009	98.2	0	2.6	1.7	1.4	1.0	0.7
2010	87.5	0	2.3	2.0	1.8	1.5	1.1



**Table D11. Daily peak 8-hour carbon monoxide at South Lake (2001–2010)**

Trend station/region: South Lake

AAQ NEPM Standard  
9.0ppm (8-hour average)

Year	Data recovery (%)	No. of exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
2001	99.6	0	4.0	3.5	3.1	2.3	1.7
2002	97.6	0	3.2	2.8	2.4	1.9	1.3
2003	98.9	0	3.1	2.5	2.3	1.7	1.3
2004	99.5	0	3.5	2.3	2.1	1.5	1.0
2005	96.9	0	2.9	2.5	2.0	1.6	1.1
2006	98.6	0	2.5	2.4	2.2	1.6	1.0
2007	99.3	0	1.7	1.4	1.2	1.0	0.8
2008	99.6	0	2.0	1.6	1.4	1.2	0.9
2009	99.3	0	1.8	1.4	1.1	0.9	0.7
2010	87.8	0	2.2	1.6	1.5	1.2	0.9

**Table D12. Daily peak 1-hour nitrogen dioxide at Caversham (2001–2010)**

Trend station/region: Caversham

AAQ NEPM Standard  
0.12ppm (1-hour average)

Year	Data recovery (%)	No. of exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
2001	99.4	0	0.045	0.037	0.033	0.029	0.027
2002	99.5	0	0.055	0.035	0.033	0.031	0.028
2003	95.7	0	0.043	0.037	0.034	0.031	0.028
2004	98.9	0	0.046	0.036	0.033	0.029	0.028
2005	98.3	0	0.048	0.040	0.034	0.031	0.027
2006	98.3	0	0.084	0.037	0.034	0.031	0.028
2007	98.5	0	0.044	0.037	0.033	0.028	0.026
2008	99.5	0	0.036	0.033	0.032	0.028	0.026
2009	99.3	0	0.044	0.034	0.033	0.028	0.026
2010	84.9	0	0.054	0.040	0.037	0.032	0.029

**Table D13. Daily peak 1-hour nitrogen dioxide at Duncraig (2001–2010)**

Trend station/region: Duncraig

AAQ NEPM Standard  
0.12ppm (1-hour average)

Year	Data recovery (%)	No. of exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
2001	99.5	0	0.041	0.038	0.035	0.032	0.030
2002	97.1	0	0.049	0.040	0.037	0.034	0.031
2003	97.4	0	0.057	0.042	0.037	0.033	0.031
2004	94.5	0	0.043	0.037	0.035	0.031	0.029
2005	96.7	0	0.051	0.039	0.036	0.032	0.030
2006	99.5	0	0.056	0.037	0.036	0.032	0.030
2007	99.6	0	0.053	0.034	0.032	0.030	0.028
2008	97.7	0	0.038	0.034	0.030	0.029	0.027
2009	98.5	0	0.042	0.037	0.034	0.030	0.027
2010	87.5	0	0.038	0.035	0.033	0.030	0.028

**Table D14. Daily peak 1-hour nitrogen dioxide at Quinns Rocks (2001–2010)**

Trend station/region: Quinns Rocks

AAQ NEPM Standard

0.12ppm (1-hour average)

Year	Data recovery (%)	No. of exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
2001	96.4	0	0.036	0.033	0.031	0.027	0.026
2002	99.5	0	0.037	0.031	0.030	0.028	0.026
2003	97.4	0	0.035	0.032	0.030	0.027	0.025
2004	90.8	0	0.041	0.032	0.030	0.028	0.025
2005	96.9	0	0.041	0.031	0.030	0.027	0.024
2006	96.9	0	0.065	0.051	0.042	0.035	0.029
2007	99.5	0	0.035	0.031	0.029	0.028	0.025
2008	96.1	0	0.037	0.033	0.032	0.028	0.025
2009	99.0	0	0.034	0.032	0.031	0.027	0.024
2010	88.8	0	0.040	0.032	0.032	0.030	0.027

**Table D15. Daily peak 1-hour nitrogen dioxide at Rockingham (2001–2010)**

Trend station/region: Rockingham

AAQ NEPM Standard

0.12ppm (1-hour average)

Year	Data Recovery (%)	No. of exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
2001	98.9	0	0.046	0.040	0.038	0.035	0.033
2002	99.6	0	0.042	0.039	0.038	0.035	0.032
2003	98.4	0	0.051	0.040	0.036	0.034	0.032
2004	99.4	0	0.055	0.043	0.039	0.035	0.031
2005	99.1	0	0.045	0.038	0.036	0.032	0.030
2006	98.9	0	0.054	0.040	0.036	0.034	0.031
2007	99.4	0	0.040	0.034	0.030	0.028	0.025
2008	99.3	0	0.031	0.028	0.027	0.025	0.024
2009	98.6	0	0.031	0.029	0.028	0.026	0.024
2010	88.7	0	0.036	0.032	0.030	0.028	0.026

**Table D16. Daily peak 1-hour nitrogen dioxide at Rolling Green (2001–2010)**

Trend station/region: Rolling Green

AAQ NEPM Standard

0.12ppm (1-hour average)

Year	Data Recovery (%)	No. of exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
2001	99.1	0	0.026	0.021	0.020	0.017	0.015
2002	97.6	0	0.025	0.022	0.020	0.017	0.015
2003	94.0	0	0.032	0.020	0.017	0.016	0.015
2004	95.6	0	0.025	0.023	0.021	0.018	0.016
2005	97.9	0	0.029	0.025	0.023	0.020	0.017
2006	98.0	0	0.026	0.020	0.019	0.017	0.015
2007	98.8	0	0.020	0.019	0.018	0.016	0.014
2008	99.3	0	0.023	0.020	0.019	0.016	0.015
2009	99.5	0	0.035	0.023	0.019	0.017	0.015
2010	87.5	0	0.030	0.022	0.019	0.017	0.016

**Table D17. Daily peak 1-hour nitrogen dioxide at South Lake (2001–2010)**

Trend station/region: South Lake

AAQ NEPM Standard

0.12ppm (1-hour average)

Year	Data Recovery (%)	No. of exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
2001	99.2	0	0.039	0.032	0.030	0.029	0.027
2002	95.5	0	0.048	0.035	0.032	0.030	0.028
2003	98.9	0	0.048	0.039	0.038	0.030	0.028
2004	98.4	0	0.043	0.038	0.036	0.032	0.029
2005	87.1	0	0.052	0.043	0.039	0.033	0.028
2006	98.0	0	0.045	0.039	0.037	0.032	0.029
2007	99.1	0	0.057	0.041	0.038	0.032	0.029
2008	99.6	0	0.044	0.040	0.038	0.033	0.030
2009	99.3	0	0.048	0.039	0.036	0.033	0.029
2010	87.8	0	0.058	0.045	0.040	0.036	0.030

**Table D18. Daily peak 1-hour nitrogen dioxide at Swanbourne (2001–2010)**

Trend station/region: Swanbourne

AAQ NEPM Standard

0.12ppm (1-hour average)

Year	Data Recovery (%)	No. of exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
2001	87.4	0	0.037	0.034	0.032	0.031	0.030
2002	92.1	0	0.051	0.040	0.036	0.031	0.029
2003	99.2	0	0.048	0.036	0.034	0.031	0.029
2004	70.2	0	0.042	0.039	0.035	0.032	0.028
2005	96.2	0	0.039	0.037	0.033	0.029	0.026
2006	99.5	0	0.043	0.034	0.033	0.031	0.028
2007	98.7	0	0.038	0.033	0.032	0.030	0.027
2008	98.2	0	0.035	0.034	0.033	0.031	0.029
2009	99.2	0	0.037	0.034	0.032	0.028	0.026
2010	86.6	0	0.038	0.033	0.032	0.031	0.029

**Table D19. Daily peak 1-hour ozone at Caversham (2001–2010)**

Trend station/region: Caversham

AAQ NEPM Standard

0.10ppm (1-hour average)

Year	Data recovery (%)	No. of exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
2001	99.6	0	0.099	0.072	0.067	0.051	0.044
2002	99.6	0	0.091	0.074	0.065	0.057	0.048
2003	93.8	0	0.083	0.070	0.062	0.052	0.044
2004	98.9	0	0.079	0.070	0.062	0.052	0.045
2005	99.3	0	0.094	0.078	0.063	0.054	0.043
2006	99.6	0	0.080	0.072	0.067	0.058	0.049
2007	98.6	0	0.085	0.073	0.066	0.059	0.047
2008	99.5	0	0.083	0.067	0.066	0.053	0.046
2009	99.3	1	<b>0.104</b>	0.072	0.067	0.056	0.050
2010	84.5	0	0.082	0.069	0.059	0.055	0.046

**Table D20. Daily peak 1-hour ozone at Quinns Rocks (2001–2010)**

Trend station/region: Quinns Rocks

AAQ NEPM Standard  
0.10ppm (1-hour average)

Year	Data recovery (%)	No. of exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
2001	99.5	0	0.073	0.065	0.058	0.049	0.042
2002	99.5	0	0.079	0.069	0.060	0.055	0.046
2003	86.1	0	0.086	0.060	0.057	0.049	0.045
2004	97.9	0	0.079	0.064	0.060	0.056	0.046
2005	98.0	0	0.095	0.068	0.063	0.055	0.045
2006	99.0	0	0.085	0.065	0.063	0.052	0.045
2007	98.8	0	0.081	0.061	0.057	0.050	0.045
2008	99.4	0	0.083	0.073	0.060	0.052	0.043
2009	94.3	0	0.070	0.063	0.061	0.053	0.045
2010	88.7	0	0.091	0.061	0.058	0.054	0.048

**Table D21. Daily peak 1-hour ozone at Rockingham (2001–2010)**

Trend station/region: Rockingham

AAQ NEPM Standard  
0.10ppm (1-hour average)

Year	Data recovery (%)	No. of exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
2001	99.1	0	0.076	0.057	0.050	0.042	0.037
2002	99.6	0	0.079	0.067	0.057	0.050	0.043
2003	98.4	0	0.064	0.053	0.050	0.045	0.039
2004	99.1	1	<b>0.102</b>	0.067	0.059	0.048	0.040
2005	99.1	0	0.081	0.064	0.056	0.044	0.040
2006	98.9	0	0.072	0.061	0.056	0.050	0.041
2007	99.5	0	0.084	0.065	0.056	0.049	0.042
2008	99.4	0	0.077	0.063	0.053	0.045	0.038
2009	99.0	0	0.078	0.064	0.054	0.048	0.041
2010	88.2	0	0.067	0.060	0.057	0.052	0.044

**Table D22. Daily peak 1-hour ozone at Rolling Green (2001–2010)**

Trend station/region: Rolling Green

AAQ NEPM Standard  
0.10ppm (1-hour average)

Year	Data recovery (%)	No. of exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
2001	99.0	0	0.097	0.080	0.068	0.051	0.044
2002	99.6	0	0.091	0.080	0.068	0.059	0.049
2003	94.3	0	0.087	0.076	0.071	0.059	0.049
2004	97.9	1	<b>0.101</b>	0.076	0.071	0.060	0.049
2005	97.9	0	0.079	0.071	0.064	0.058	0.050
2006	98.6	0	0.093	0.075	0.072	0.060	0.053
2007	98.9	0	0.095	0.081	0.078	0.062	0.053
2008	99.5	0	0.087	0.080	0.071	0.056	0.047
2009	99.5	1	<b>0.103</b>	0.081	0.069	0.059	0.052
2010	85.6	0	0.088	0.077	0.070	0.056	0.046

**Table D23. Daily peak 1-hour ozone at South Lake (2001–2010)**

Trend station/region: South Lake

AAQ NEPM Standard  
0.10ppm (1-hour average)

Year	Data recovery (%)	No. of exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
2001	99.6	0	0.079	0.062	0.054	0.044	0.038
2002	99.5	0	0.067	0.062	0.054	0.049	0.043
2003	99.1	0	0.071	0.061	0.055	0.048	0.041
2004	99.0	0	0.076	0.061	0.057	0.047	0.041
2005	97.0	0	0.080	0.062	0.056	0.049	0.041
2006	99.6	0	0.066	0.057	0.054	0.045	0.040
2007	99.4	0	0.067	0.056	0.053	0.047	0.040
2008	99.6	0	0.082	0.061	0.056	0.044	0.037
2009	99.4	0	0.065	0.057	0.053	0.045	0.039
2010	88.0	0	0.070	0.067	0.062	0.052	0.045

**Table D24. Daily peak 1-hour ozone at Swanbourne (2001–2010)**

Trend station/region: Swanbourne

AAQ NEPM Standard  
0.10ppm (1-hour average)

Year	Data recovery (%)	No. of exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
2001	98.7	0	0.074	0.064	0.059	0.048	0.040
2002	95.9	0	0.081	0.063	0.057	0.051	0.046
2003	99.7	0	0.082	0.060	0.052	0.045	0.041
2004	99.4	0	0.077	0.065	0.059	0.049	0.042
2005	96.4	0	0.076	0.066	0.061	0.051	0.043
2006	99.7	0	0.075	0.066	0.060	0.050	0.044
2007	99.3	0	0.077	0.064	0.057	0.051	0.044
2008	98.2	0	0.076	0.067	0.060	0.048	0.042
2009	99.6	0	0.068	0.063	0.059	0.053	0.044
2010	86.6	0	0.066	0.059	0.056	0.050	0.044

**Table D25. Daily peak 4-hour ozone at Caversham (2001–2010)**

Trend station/region: Caversham

AAQ NEPM Standard  
0.08ppm (4-hour average)

Year	Data recovery (%)	No. of exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
2001	99.6	0	0.079	0.062	0.055	0.045	0.039
2002	99.6	0	0.068	0.065	0.058	0.049	0.042
2003	93.8	0	0.069	0.058	0.054	0.046	0.039
2004	98.9	0	0.067	0.057	0.052	0.047	0.040
2005	99.3	0	0.069	0.055	0.052	0.046	0.039
2006	99.6	0	0.072	0.063	0.058	0.049	0.043
2007	98.6	0	0.073	0.062	0.058	0.049	0.042
2008	99.5	0	0.076	0.061	0.056	0.047	0.041
2009	99.3	1	<b>0.092</b>	0.067	0.057	0.051	0.043
2010	84.5	0	0.072	0.056	0.052	0.047	0.041

**Table D26. Daily peak 4-hour ozone at Quinns Rocks (2001–2010)**

Trend station/region: Quinns Rocks

AAQ NEPM Standard  
0.08ppm (4-hour average)

Year	Data recovery (%)	No. of exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
2001	99.5	0	0.066	0.057	0.051	0.044	0.039
2002	99.5	0	0.069	0.057	0.053	0.048	0.041
2003	86.1	0	0.071	0.055	0.051	0.043	0.040
2004	97.9	0	0.068	0.059	0.055	0.048	0.041
2005	98.0	0	0.070	0.058	0.057	0.047	0.041
2006	99.0	0	0.074	0.059	0.055	0.046	0.041
2007	98.8	0	0.075	0.056	0.053	0.046	0.041
2008	99.4	0	0.073	0.061	0.055	0.046	0.041
2009	94.3	0	0.062	0.056	0.054	0.048	0.040
2010	88.7	0	0.065	0.056	0.052	0.048	0.042

**Table D27. Daily peak 4-hour ozone at Rockingham (2001–2010)**

Trend station/region: Rockingham

AAQ NEPM Standard  
0.08ppm (4-hour average)

Year	Data recovery (%)	No. of exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
2001	99.1	0	0.071	0.053	0.045	0.039	0.036
2002	99.6	0	0.071	0.058	0.050	0.047	0.039
2003	98.4	0	0.059	0.049	0.048	0.041	0.037
2004	99.1	0	0.079	0.060	0.052	0.045	0.038
2005	99.1	0	0.075	0.061	0.052	0.042	0.038
2006	98.9	0	0.067	0.056	0.051	0.046	0.038
2007	99.5	0	0.079	0.057	0.052	0.046	0.038
2008	99.4	0	0.072	0.058	0.049	0.042	0.036
2009	99.0	0	0.066	0.058	0.051	0.045	0.039
2010	88.2	0	0.064	0.054	0.053	0.046	0.041

**Table D28. Daily peak 4-hour ozone at Rolling Green (2001–2010)**

Trend station/region: Rolling Green

AAQ NEPM Standard  
0.08ppm (4-hour average)

Year	Data Recovery (%)	No. of exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
2001	99.0	2	<b>0.094</b>	0.067	0.058	0.046	0.038
2002	99.6	0	0.071	0.065	0.061	0.052	0.043
2003	94.3	0	0.075	0.063	0.060	0.053	0.043
2004	97.9	0	0.077	0.064	0.061	0.051	0.042
2005	97.9	0	0.068	0.060	0.058	0.049	0.044
2006	98.6	0	0.079	0.065	0.059	0.053	0.046
2007	98.9	0	0.080	0.070	0.066	0.053	0.046
2008	99.5	0	0.075	0.065	0.062	0.051	0.043
2009	99.5	2	<b>0.083</b>	0.064	0.057	0.051	0.043
2010	85.6	0	0.080	0.065	0.056	0.049	0.042

**Table D29. Daily peak 4-hour ozone at South Lake (2001–2010)**

Trend station/region: South Lake

AAQ NEPM Standard  
0.08ppm (4-hour average)

Year	Data recovery (%)	No. of exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
2001	99.6	0	0.076	0.053	0.048	0.039	0.035
2002	99.5	0	0.058	0.053	0.050	0.044	0.039
2003	99.1	0	0.063	0.052	0.048	0.043	0.037
2004	99.0	0	0.064	0.053	0.049	0.042	0.035
2005	97.0	0	0.070	0.053	0.052	0.042	0.037
2006	99.6	0	0.063	0.051	0.049	0.041	0.036
2007	99.4	0	0.059	0.051	0.048	0.042	0.037
2008	99.6	0	0.067	0.051	0.046	0.040	0.034
2009	99.4	0	0.057	0.053	0.048	0.040	0.036
2010	88.0	0	0.061	0.055	0.053	0.046	0.042

**Table D30. Daily peak 4-hour ozone at Swanbourne (2001–2010)**

Trend station/region: Swanbourne

AAQ NEPM Standard  
0.10ppm (1-hour average)

Year	Data recovery (%)	No. of exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
2001	98.7	0	0.069	0.055	0.049	0.041	0.037
2002	95.9	0	0.066	0.056	0.054	0.047	0.041
2003	99.7	0	0.066	0.054	0.047	0.041	0.037
2004	99.4	0	0.067	0.057	0.054	0.044	0.038
2005	96.4	0	0.066	0.058	0.052	0.044	0.039
2006	99.7	0	0.069	0.060	0.052	0.045	0.040
2007	99.3	0	0.067	0.054	0.051	0.048	0.042
2008	98.2	0	0.070	0.060	0.053	0.045	0.039
2009	99.6	0	0.063	0.058	0.054	0.046	0.039
2010	86.6	0	0.055	0.053	0.050	0.044	0.040

**Table D31. Daily peak 1-hour sulfur dioxide at Rockingham (2001–2010)**

Trend station/region: Rockingham

AAQ NEPM Standard  
0.20ppm (1-hour average)

Year	Data recovery (%)	No. of exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
2001	99.2	0	0.028	0.023	0.019	0.010	0.006
2002	99.6	0	0.035	0.021	0.017	0.009	0.006
2003	98.3	0	0.026	0.020	0.016	0.010	0.006
2004	99.4	0	0.039	0.021	0.018	0.011	0.006
2005	99.2	0	0.041	0.024	0.022	0.017	0.010
2006	98.9	0	0.040	0.031	0.022	0.013	0.008
2007	98.6	0	0.041	0.025	0.020	0.013	0.008
2008	98.3	0	0.079	0.026	0.019	0.015	0.008
2009	98.7	0	0.032	0.022	0.017	0.010	0.007
2010	89.9	0	0.037	0.022	0.019	0.013	0.009

**Table D32. Daily peak 1-hour sulfur dioxide at South Lake (2001–2010)**

Trend station/region: South Lake

AAQ NEPM Standard

0.20ppm (1-hour average)

Year	Data Recovery (%)	No. of exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
2001	99.6	0	0.046	0.027	0.023	0.018	0.013
2002	97.4	0	0.043	0.036	0.026	0.020	0.015
2003	98.9	0	0.038	0.028	0.026	0.020	0.015
2004	99.5	0	0.042	0.028	0.024	0.019	0.013
2005	96.9	0	0.046	0.033	0.030	0.022	0.017
2006	99.5	0	0.060	0.044	0.032	0.028	0.022
2007	99.4	0	0.040	0.032	0.028	0.019	0.012
2008	99.6	0	0.046	0.025	0.020	0.014	0.010
2009	98.4	0	0.036	0.033	0.029	0.018	0.015
2010	87.8	0	0.073	0.036	0.033	0.025	0.017

**Table D33. Daily peak 1-hour sulfur dioxide at Wattleup (2001–2010)**

Trend station/region: Wattleup

AAQ NEPM Standard

0.20ppm (1-hour average)

Year	Data recovery (%)	No. of exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
2001	99.7	0	0.074	0.032	0.027	0.021	0.017
2002	99.0	0	0.081	0.039	0.030	0.023	0.019
2003	97.5	0	0.062	0.032	0.028	0.023	0.018
2004	97.7	0	0.076	0.044	0.041	0.030	0.021
2005	99.7	0	0.120	0.058	0.045	0.037	0.026
2006	99.0	0	0.062	0.046	0.043	0.035	0.028
2007	93.3	0	0.060	0.045	0.040	0.034	0.025
2008	89.6	0	0.077	0.034	0.028	0.022	0.016
2009	95.6	0	0.059	0.039	0.036	0.029	0.022
2010	86.8	0	0.057	0.049	0.043	0.036	0.023

**Table D34. Daily peak 24-hour sulfur dioxide at Rockingham (2001–2010)**

Trend station/region: Rockingham

AAQ NEPM Standard

0.08ppm (24-hour average)

Year	Data recovery (%)	No. of exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
2002	99.6	0	0.006	0.002	0.002	0.002	0.001
2003	98.3	0	0.005	0.003	0.003	0.002	0.001
2004	99.4	0	0.006	0.003	0.003	0.002	0.001
2005	99.2	0	0.009	0.006	0.004	0.003	0.002
2006	98.9	0	0.007	0.004	0.004	0.002	0.002
2007	98.6	0	0.012	0.005	0.004	0.003	0.002
2008	98.3	0	0.007	0.005	0.004	0.002	0.001
2009	98.7	0	0.008	0.003	0.002	0.001	0.001
2010	89.9	0	0.007	0.004	0.003	0.002	0.002
2002	99.6	0	0.006	0.002	0.002	0.002	0.001



**Table D35. Daily peak 24-hour sulfur dioxide at South Lake (2001–2010)**

Trend station/region: South Lake

AAQ NEPM Standard

0.08ppm (24-hour average)

Year	Data recovery (%)	No. of exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
2001	99.6	0	0.006	0.004	0.003	0.002	0.002
2002	97.4	0	0.006	0.005	0.004	0.003	0.002
2003	98.9	0	0.006	0.005	0.004	0.003	0.002
2004	99.5	0	0.005	0.004	0.004	0.003	0.002
2005	96.9	0	0.007	0.006	0.004	0.004	0.002
2006	99.5	0	0.009	0.006	0.005	0.004	0.003
2007	99.4	0	0.006	0.004	0.003	0.002	0.002
2008	99.6	0	0.005	0.003	0.003	0.002	0.001
2009	98.4	0	0.006	0.005	0.003	0.003	0.002
2010	87.8	0	0.009	0.005	0.004	0.003	0.002

**Table D36. Daily peak 24-hour sulfur dioxide at Wattleup (2001–2010)**

Trend station/region: Wattleup

AAQ NEPM Standard

0.08ppm (24-hour average)

Year	Data recovery (%)	No. of exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
2001	99.7	0	0.009	0.005	0.004	0.003	0.003
2002	99.0	0	0.008	0.005	0.005	0.004	0.003
2003	97.5	0	0.006	0.005	0.005	0.004	0.003
2004	97.7	0	0.009	0.007	0.005	0.004	0.003
2005	99.7	0	0.014	0.008	0.006	0.005	0.004
2006	99.0	0	0.009	0.007	0.006	0.004	0.004
2007	93.3	0	0.010	0.008	0.007	0.005	0.004
2008	89.6	0	0.011	0.005	0.004	0.003	0.002
2009	95.6	0	0.008	0.005	0.005	0.004	0.003
2010	86.8	0	0.010	0.008	0.006	0.005	0.003

**Table D37. Daily peak 24-hour particles as PM<sub>10</sub> at Caversham (2001–2010)**

Trend station/region: Caversham

AAQ NEPM Standard

50µg/m<sup>3</sup> (24-hour average)

Year	Data recovery (%)	No. of exceedences (days)	Max conc. (µg/m <sup>3</sup> )	99th percentile (µg/m <sup>3</sup> )	98th percentile (µg/m <sup>3</sup> )	95th percentile (µg/m <sup>3</sup> )	90th percentile (µg/m <sup>3</sup> )
2001	0.0	0					
2002	0.0	0					
2003	0.0	0					
2004	93.2	1	<b>58.0</b>	39.0	34.4	29.7	25.4
2005	98.2	1	<b>76.8</b>	41.4	37.1	32.2	28.1
2006	97.3	0	42.6	38.4	35.3	29.3	26.4
2007	98.4	1	<b>58.8</b>	39.7	35.9	30.3	26.1
2008	99.3	0	39.1	37.0	32.5	26.1	22.5
2009	99.4	0	45.7	37.2	32.4	29.0	25.8
2010	99.5	1	<b>63.4</b>	40.7	36.1	30.5	26.3

**Table D38. Daily peak 24-hour particles as PM<sub>10</sub> at Duncraig (2001–2010)**

Trend station/region: Duncraig

AAQ NEPM Standard

50µg/m<sup>3</sup> (24-hour average)

Year	Data recovery (%)	No. of exceedences (days)	Max conc. (µg/m <sup>3</sup> )	99th percentile (µg/m <sup>3</sup> )	98th percentile (µg/m <sup>3</sup> )	95th percentile (µg/m <sup>3</sup> )	90th percentile (µg/m <sup>3</sup> )
2001	99.5	1	<b>53.6</b>	34.3	31.9	27.5	23.4
2002	97.6	1	<b>54.0</b>	37.5	30.8	26.4	24.2
2003	99.1	1	<b>66.7</b>	33.7	31.0	28.3	25.5
2004	99.0	0	45.1	30.9	30.2	27.6	24.1
2005	98.5	1	<b>59.2</b>	34.8	30.7	26.7	23.9
2006	99.1	0	40.6	32.9	30.5	27.3	24.0
2007	99.7	0	40.3	31.8	29.4	25.8	22.0
2008	99.2	0	46.9	34.4	31.1	25.8	21.9
2009	99.2	0	45.5	36.2	30.4	24.5	22.6
2010	99.4	0	47.9	33.1	30.8	25.1	22.7

**Table D39. Daily peak 24-hour particles as PM<sub>10</sub> at South Lake (2001–2010)**

Trend station/region: South Lake

AAQ NEPM Standard

50µg/m<sup>3</sup> (24-hour average)

Year	Data recovery (%)	No. of exceedences (days)	Max conc. (µg/m <sup>3</sup> )	99th percentile (µg/m <sup>3</sup> )	98th percentile (µg/m <sup>3</sup> )	95th percentile (µg/m <sup>3</sup> )	90th percentile (µg/m <sup>3</sup> )
2001	99.1	1	<b>56.7</b>	37.3	33.2	27.7	25.3
2002	99.3	2	<b>82.6</b>	45.8	38.8	32.8	27.9
2003	95.8	0	44.5	40.1	36.3	32.4	28.2
2004	98.8	1	<b>50.5</b>	35.8	32.8	30.2	26.2
2005	98.8	3	<b>98.8</b>	46.1	39.6	33.6	28.7
2006	97.0	0	45.3	39.8	37.0	34.4	29.0
2007	97.9	1	<b>56.7</b>	37.7	36.0	32.9	26.7
2008	99.6	1	<b>55.0</b>	39.9	36.1	30.3	25.8
2009	99.5	0	49.0	38.7	34.3	30.8	27.5
2010	99.7	4	<b>61.0</b>	46.7	39.8	33.9	28.5

**Table D40. Daily peak 24-hour particles as PM<sub>10</sub> at Bunbury (2001–2010)**

Trend station/region: Bunbury

AAQ NEPM Standard

50µg/m<sup>3</sup> (24-hour average)

Year	Data recovery (%)	No. of exceedences (days)	Max conc. (µg/m <sup>3</sup> )	99th percentile (µg/m <sup>3</sup> )	98th percentile (µg/m <sup>3</sup> )	95th percentile (µg/m <sup>3</sup> )	90th percentile (µg/m <sup>3</sup> )
2001	99.6	1	<b>57.6</b>	41.0	37.5	29.3	26.8
2002	99.5	0	42.5	38.9	32.9	29.5	27.1
2003	99.2	1	<b>54.5</b>	34.2	33.3	30.2	26.3
2004	92.4	4	<b>99.5</b>	51.8	38.2	29.9	26.3
2005	99.1	3	<b>63.3</b>	37.9	33.3	27.5	24.9
2006	99.2	3	<b>123.5</b>	45.6	38.8	28.3	25.8
2007	99.6	0	46.5	32.8	29.6	27.1	24.5
2008	99.4	0	39.1	31.4	30.3	27.3	23.7
2009	99.5	1	<b>53.8</b>	40.3	36.0	29.5	25.4
2010	99.1	2	<b>134.0</b>	37.6	36.0	29.3	25.3

**Table D41. Daily peak 24-hour particles as PM<sub>10</sub> at Albany (2001–2010)**

Trend station/region: Albany

AAQ NEPM Standard

50µg/m<sup>3</sup> (24-hour average)

Year	Data recovery (%)	No. of exceedences (days)	Max conc. (µg/m <sup>3</sup> )	99th percentile (µg/m <sup>3</sup> )	98th percentile (µg/m <sup>3</sup> )	95th percentile (µg/m <sup>3</sup> )	90th percentile (µg/m <sup>3</sup> )
2001	0.0	0					
2002	0.0	0					
2003	0.0	0					
2004	0.0	0					
2005	0.0	0					
2006	52.4	0	39.4	35.4	33.0	26.6	24.6
2007	99.8	1	<b>55.7</b>	31.3	28.0	24.7	22.1
2008	99.2	2	<b>56.3</b>	34.1	32.8	26.1	22.7
2009	97.7	0	36.7	32.3	28.7	24.5	21.4
2010	99.8	1	<b>52.5</b>	36.1	33.2	27.3	25.3

**Table D42. Daily peak 24-hour particles as PM<sub>10</sub> at Geraldton (2001–2010)**

Trend station/region: Geraldton

AAQ NEPM Standard

50µg/m<sup>3</sup> (24-hour average)

Year	Data Recovery (%)	No. of exceedences (days)	Max conc. (µg/m <sup>3</sup> )	99th percentile (µg/m <sup>3</sup> )	98th percentile (µg/m <sup>3</sup> )	95th percentile (µg/m <sup>3</sup> )	90th percentile (µg/m <sup>3</sup> )
2001	0.0	0					
2002	0.0	0					
2003	0.0	0					
2004	0.0	0					
2005	27.7	2	<b>61.3</b>	52.9	47.0	34.8	31.6
2006	99.4	4	<b>78.0</b>	48.6	45.8	40.0	35.4
2007	99.7	10	<b>116.3</b>	87.2	67.9	44.7	36.4
2008	98.9	10	<b>150.7</b>	105.2	58.1	45.9	38.6
2009	99.6	14	<b>128.9</b>	69.2	58.6	48.5	40.3
2010	97.7	4	<b>55.6</b>	49.3	47.8	41.6	37.9

**Table D43. Daily peak 24-hour particles as PM<sub>10</sub> at Collie (2001–2010)**

Trend station/region: Collie

AAQ NEPM Standard

50µg/m<sup>3</sup> (24-hour average)

Year	Data Recovery (%)	No. of exceedences (days)	Max conc. (µg/m <sup>3</sup> )	99th percentile (µg/m <sup>3</sup> )	98th percentile (µg/m <sup>3</sup> )	95th percentile (µg/m <sup>3</sup> )	90th percentile (µg/m <sup>3</sup> )
2001	0.0	0					
2002	0.0	0					
2003	0.0	0					
2004	0.0	0					
2005	0.0	0					
2006	0.0	0					
2007	0.0	0					
2008	87.6	7	<b>85.9</b>	56.7	50.1	37.4	30.5
2009	99.5	3	<b>80.4</b>	47.3	46.2	38.0	31.3
2010	99.7	16	<b>163.0</b>	86.7	67.3	46.1	34.9

**Table D44. Daily peak 24-hour particles as PM<sub>2.5</sub> at Caversham (2001–2010)**

Trend station/region: Caversham

AAQ NEPM Advisory Standard

25µg/m<sup>3</sup> (24-hour average)

Year	Data recovery (%)	No. of exceedences (days)	Max conc. (µg/m <sup>3</sup> )	99th percentile (µg/m <sup>3</sup> )	98th percentile (µg/m <sup>3</sup> )	95th percentile (µg/m <sup>3</sup> )	90th percentile (µg/m <sup>3</sup> )
2001	97.2	1	<b>31.8</b>	15.9	15.1	12.9	11.3
2002	99.6	1	<b>25.7</b>	16.2	15.0	13.4	12.0
2003	98.6	1	<b>27.3</b>	16.3	14.4	13.4	11.6
2004	5.3	0	16.5	15.7	14.9	12.6	10.4
2005	98.6	1	<b>27.3</b>	16.3	14.4	13.4	11.6
2006	63.8	1	<b>34.0</b>	18.6	15.6	13.4	12.0
2007	98.4	0	24.5	15.1	14.0	12.1	10.7
2008	99.4	1	<b>26.3</b>	15.2	14.0	11.7	10.6
2009	99.5	2	<b>25.5</b>	19.4	17.3	12.9	11.0
2010	99.1	3	<b>45.2</b>	21.9	16.2	13.7	12.1

**Table D45. Daily peak 24-hour particles as PM<sub>2.5</sub> at Duncraig (2001–2010)**

Trend station/region: Duncraig

AAQ NEPM Advisory Standard

25µg/m<sup>3</sup> (24-hour average)

Year	Data recovery (%)	No. of exceedences (days)	Max conc. (µg/m <sup>3</sup> )	99th percentile (µg/m <sup>3</sup> )	98th percentile (µg/m <sup>3</sup> )	95th percentile (µg/m <sup>3</sup> )	90th percentile (µg/m <sup>3</sup> )
2001	93.8	4	<b>27.0</b>	25.5	22.6	16.1	13.4
2002	98.9	1	<b>28.3</b>	20.3	17.4	15.7	13.3
2003	98.4	1	<b>25.2</b>	19.2	16.1	14.9	13.1
2004	99.2	0	24.4	17.9	15.6	14.1	11.6
2005	98.6	3	<b>40.6</b>	17.3	15.0	13.1	11.4
2006	99.0	2	<b>33.4</b>	18.7	16.2	13.4	11.9
2007	99.6	0	19.6	14.2	13.5	11.6	10.1
2008	99.3	1	<b>38.3</b>	18.0	15.9	12.6	11.1
2009	99.4	3	<b>32.7</b>	22.1	17.5	13.2	11.5
2010	99.3	3	<b>36.4</b>	20.1	15.9	13.7	12.0

**Table D46. Daily peak 24-hour particles as PM<sub>2.5</sub> at Quinns Rocks (2001–2010)**

Trend station/region: Quinns Rocks

AAQ NEPM Advisory Standard

25µg/m<sup>3</sup> (24-hour average)

Year	Data recovery (%)	No. of exceedences (days)	Max conc. (µg/m <sup>3</sup> )	99th percentile (µg/m <sup>3</sup> )	98th percentile (µg/m <sup>3</sup> )	95th percentile (µg/m <sup>3</sup> )	90th percentile (µg/m <sup>3</sup> )
2001	0.0	0					
2002	0.0	0					
2003	0.0	0					
2004	0.0	0					
2005	0.0	0					
2006	55.3	1	<b>63.9</b>	17.0	14.3	13.2	11.0
2007	99.7	0	19.9	15.4	13.7	12.1	10.1
2008	99.3	1	<b>53.3</b>	17.3	15.4	12.8	11.3
2009	99.8	2	<b>31.3</b>	20.7	15.2	12.7	11.3
2010	99.6	3	<b>33.7</b>	17.6	14.5	12.0	10.9

**Table D47. Daily peak 24-hour particles as PM<sub>2.5</sub> at South Lake (2001–2010)**

Trend station/region: South Lake

AAQ NEPM Advisory Standard

25µg/m<sup>3</sup> (24-hour average)

Year	Data recovery (%)	No. of exceedences (days)	Max conc. (µg/m <sup>3</sup> )	99th percentile (µg/m <sup>3</sup> )	98th percentile (µg/m <sup>3</sup> )	95th percentile (µg/m <sup>3</sup> )	90th percentile (µg/m <sup>3</sup> )
2001	0.0	0					
2002	0.0	0					
2003	0.0	0					
2004	0.0	0					
2005	0.0	0					
2006	76.7	1	<b>30.5</b>	21.5	17.2	14.6	12.8
2007	98.9	0	21.2	15.6	12.9	11.8	10.5
2008	99.4	1	<b>45.2</b>	18.2	14.1	12.7	11.2
2009	99.3	3	<b>32.0</b>	22.8	19.1	14.1	11.7
2010	99.5	2	<b>40.0</b>	22.0	19.2	15.9	13.2

**Table D48. Daily peak 24-hour particles as PM<sub>2.5</sub> at Bunbury (2001–2010)**

Trend station/region: Bunbury

AAQ NEPM Advisory Standard

25µg/m<sup>3</sup> (24-hour average)

Year	Data recovery (%)	No. of exceedences (days)	Max conc. (µg/m <sup>3</sup> )	99th percentile (µg/m <sup>3</sup> )	98th percentile (µg/m <sup>3</sup> )	95th percentile (µg/m <sup>3</sup> )	90th percentile (µg/m <sup>3</sup> )
2001	92.7	2	<b>47.3</b>	19.6	17.4	15.4	13.1
2002	99.5	4	<b>36.1</b>	24.5	20.2	15.7	14.0
2003	98.9	3	<b>37.6</b>	20.7	18.3	15.7	13.1
2004	98.0	5	<b>94.8</b>	31.7	21.5	15.8	13.2
2005	99.0	5	<b>64.2</b>	26.9	19.1	15.4	12.1
2006	99.3	8	<b>113.5</b>	32.4	26.0	14.8	13.0
2007	99.4	3	<b>34.5</b>	21.2	17.8	13.2	10.7
2008	99.7	2	<b>27.8</b>	21.0	18.6	13.2	11.4
2009	99.5	7	<b>40.0</b>	26.6	22.3	16.9	12.6
2010	98.6	7	<b>115.3</b>	28.4	24.2	14.8	12.2

**Table D49. Daily peak 24-hour particles as PM<sub>2.5</sub> at Busselton (2001–2010)**

Trend station/region: Busselton

AAQ NEPM Advisory Standard

25µg/m<sup>3</sup> (24-hour average)

Year	Data recovery (%)	No. of exceedences (days)	Max conc. (µg/m <sup>3</sup> )	99th percentile (µg/m <sup>3</sup> )	98th percentile (µg/m <sup>3</sup> )	95th percentile (µg/m <sup>3</sup> )	90th percentile (µg/m <sup>3</sup> )
2001	0.0	0					
2002	0.0	0					
2003	0.0	0					
2004	0.0	0					
2005	0.0	0					
2006	16.7	0	12.7	11.9	11.3	10.8	10.1
2007	99.4	2	<b>51.1</b>	15.6	14.3	11.7	9.9
2008	99.3	3	<b>35.6</b>	20.5	15.5	11.9	10.5
2009	99.8	12	<b>69.0</b>	45.0	31.6	17.7	14.0
2010	99.4	7	<b>62.5</b>	31.6	22.9	15.7	11.6

## Maxima by pollutant 2001-2010

**Table D50. Annual daily peak 8-hour carbon monoxide concentrations (ppm) for 2001–2010**

AAQ NEPM Standard  
9.0ppm (8-hour average)

Regional performance monitoring station	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
<u>Perth Region</u>										
Caversham (North East Metro)	1.5	1.3	1.1	1.3	1.3	1.8	0.9	0.8	1.0	1.6
Duncraig (North Metro)	5.9	5.4	4.1	4.5	3.3	3.4	2.0	3.1	2.6	2.3
South Lake (South East Metro)	4.0	3.2	3.1	3.5	2.9	2.5	1.7	2.0	1.8	2.2

Highlighted cells indicate NEPM exceedences.

**Table D51. Annual daily peak 1-hour nitrogen dioxide concentrations (ppm) for 2001–2010**

AAQ NEPM Standard  
0.12ppm (1-hour average)

Regional performance monitoring station	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
<u>Perth Region</u>										
Caversham (North East Metro)	0.045	0.055	0.043	0.046	0.048	0.084	0.044	0.036	0.044	0.054
Duncraig (North Metro)	0.041	0.049	0.057	0.043	0.051	0.056	0.053	0.038	0.042	0.038
Quinns Rocks (Outer North Coast)	0.036	0.037	0.035	0.041	0.041	0.065	0.035	0.037	0.034	0.040
Rockingham (South Coast)	0.046	0.042	0.051	0.055	0.045	0.054	0.040	0.031	0.031	0.036
Rolling Green (Outer East Rural)	0.026	0.025	0.032	0.025	0.029	0.026	0.020	0.023	0.035	0.030
South Lake (South East Metro)	0.039	0.048	0.048	0.043	0.052	0.045	0.057	0.044	0.048	0.058
Swanbourne (Inner West Coast)	0.037	0.051	0.048	0.042	0.039	0.043	0.038	0.035	0.037	0.038

Highlighted cells indicate NEPM exceedences.

**Table D52. Annual daily peak 1-hour ozone concentrations (ppm) for 2001–2010**AAQ NEPM Standard  
0.10ppm (1-hour average)

Regional performance monitoring station	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
<u>Perth Region</u>										
Caversham (North East Metro)	0.099	0.091	0.083	0.079	0.094	0.080	0.085	0.083	0.104	0.082
Quinns Rocks (Outer North Coast)	0.073	0.079	0.086	0.079	0.095	0.085	0.081	0.083	0.070	0.091
Rockingham (South Coast)	0.076	0.079	0.064	0.102	0.081	0.072	0.084	0.077	0.078	0.067
Rolling Green (Outer East Rural)	0.097	0.091	0.087	0.101	0.079	0.093	0.095	0.087	0.103	0.088
South Lake (South East Metro)	0.079	0.067	0.071	0.076	0.080	0.066	0.067	0.082	0.065	0.070
Swanbourne (Inner West Coast)	0.074	0.081	0.082	0.077	0.076	0.075	0.077	0.076	0.068	0.066

Highlighted cells indicate NEPM exceedences.

**Table D53. Annual daily peak 4-hour ozone concentrations (ppm) for 2001–2010**AAQ NEPM Standard  
0.08ppm (4-hour average)

Regional performance monitoring station	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
<u>Perth Region</u>										
Caversham (North East Metro)	0.079	0.068	0.069	0.067	0.069	0.072	0.073	0.076	0.092	0.072
Quinns Rocks (Outer North Coast)	0.066	0.069	0.071	0.068	0.070	0.074	0.075	0.073	0.062	0.065
Rockingham (South Coast)	0.071	0.071	0.059	0.079	0.075	0.067	0.079	0.072	0.066	0.064
Rolling Green (Outer East Rural)	0.094	0.071	0.075	0.077	0.068	0.079	0.080	0.075	0.083	0.080
South Lake (South East Metro)	0.076	0.058	0.063	0.064	0.070	0.063	0.059	0.067	0.057	0.061
Swanbourne (Inner West Coast)	0.069	0.066	0.066	0.067	0.066	0.069	0.067	0.070	0.063	0.055

Highlighted cells indicate NEPM exceedences.

**Table D54. Annual daily peak 1-hour sulfur dioxide concentrations (ppm) for 2001–2010**AAQ NEPM Standard  
0.20ppm (1-hour average)

Regional performance monitoring station	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
<u>Perth Region</u>										
Rockingham (South Coast)	0.028	0.035	0.026	0.039	0.041	0.040	0.041	0.079	0.032	0.037
South Lake (South East Metro)	0.046	0.043	0.038	0.042	0.046	0.060	0.040	0.046	0.036	0.073
Wattleup (South Metro)	0.074	0.081	0.062	0.076	0.120	0.062	0.060	0.077	0.059	0.057

Highlighted cells indicate NEPM exceedences.

**Table D55. Annual daily peak 24-hour sulfur dioxide concentrations (ppm) for 2001–2010**  
 AAQ NEPM Standard  
 0.08ppm (24-hour average)

Regional performance monitoring station	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
<u>Perth Region</u>										
Rockingham (South Coast)	0.009	0.006	0.005	0.006	0.009	0.007	0.012	0.007	0.008	0.007
South Lake (South East Metro)	0.006	0.006	0.006	0.005	0.007	0.009	0.006	0.005	0.006	0.009
Wattleup (South Metro)	0.009	0.008	0.006	0.009	0.014	0.009	0.010	0.011	0.008	0.010

Highlighted cells indicate NEPM exceedences.

**Table D56. Annual daily peak 24-hour particles as PM<sub>10</sub> concentrations (µg/m<sup>3</sup>) for 2001–2010**  
 AAQ NEPM Standard  
 50µg/m<sup>3</sup> (24-hour average)

Regional performance monitoring station	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
<u>Perth Region</u>										
Caversham (North East Metro)	-	-	-	58.0	76.8	42.6	58.8	39.1	45.7	63.4
Duncraig (North Metro)	53.6	54.0	66.7	45.1	59.2	40.6	40.3	46.9	45.5	47.9
South Lake (South East Metro)	56.7	82.6	44.5	50.5	98.8	45.3	56.7	55.0	49.0	61.0
<u>South West Region</u>										
Bunbury	57.6	42.5	54.5	99.5	63.3	123.5	46.5	39.1	53.8	134.0
Collie	-	-	-	-	-	-	-	85.9	80.4	163.0
Albany	-	-	-	-	-	39.4	55.7	56.3	36.7	52.5
<u>Mid West Region</u>										
Geraldton	-	-	-	-	61.3	78.0	116.3	150.7	128.9	55.6

Highlighted cells indicate NEPM exceedences.

**Table D57. Annual daily peak 24-hour particles as PM<sub>2.5</sub> concentrations (µg/m<sup>3</sup>) for 2001–2010**  
 AAQ NEPM Advisory Standard  
 25µg/m<sup>3</sup> (24-hour average)

Regional performance monitoring station	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
<u>Perth Region</u>										
Caversham (North East Metro)	31.8	25.7	27.3	16.5	27.3	34.0	24.5	26.3	25.5	45.2
Duncraig (North Metro)	27.0	28.3	25.2	24.4	40.6	33.4	19.6	38.3	32.7	36.4
Quinns Rocks (Outer North Coast)	-	-	-	-	-	63.9	19.9	53.3	31.3	33.7
South Lake (South East Metro)	-	-	-	-	-	30.5	21.2	45.2	32.0	40.0
<u>South West Region</u>										
Bunbury	47.3	36.1	37.6	94.8	64.2	113.5	34.5	27.8	40.0	115.3
Busselton	-	-	-	-	-	12.7	51.1	35.6	69.0	62.5

Highlighted cells indicate NEPM exceedences.



**Table D58. Annual averaged particles as PM<sub>2.5</sub> concentrations (µg/m<sup>3</sup>) for 2001–2010**  
 AAQ NEPM Advisory Standard  
 8µg/m<sup>3</sup> (annual average)

Regional performance monitoring station	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
<u>Perth Region</u>										
Caversham (North East Metro)	7.6	8.1	8.0	7.6	8.0	8.1	7.5	7.1	7.8	8.2
Duncraig (North Metro)	8.6	9.2	8.9	7.9	7.8	8.2	7.3	7.7	8.2	8.2
Quinns Rocks (Outer North Coast)	-	-	-	-	-	7.8	6.9	7.2	7.8	7.8
South Lake (South East Metro)	-	-	-	-	-	8.7	7.6	7.7	8.2	8.7
<u>South West Region</u>										
Bunbury	8.7	9.0	8.6	9.2	8.6	8.7	7.8	7.6	8.3	9.2
Busselton	-	-	-	-	-	6.9	7.4	7.3	9.0	8.5

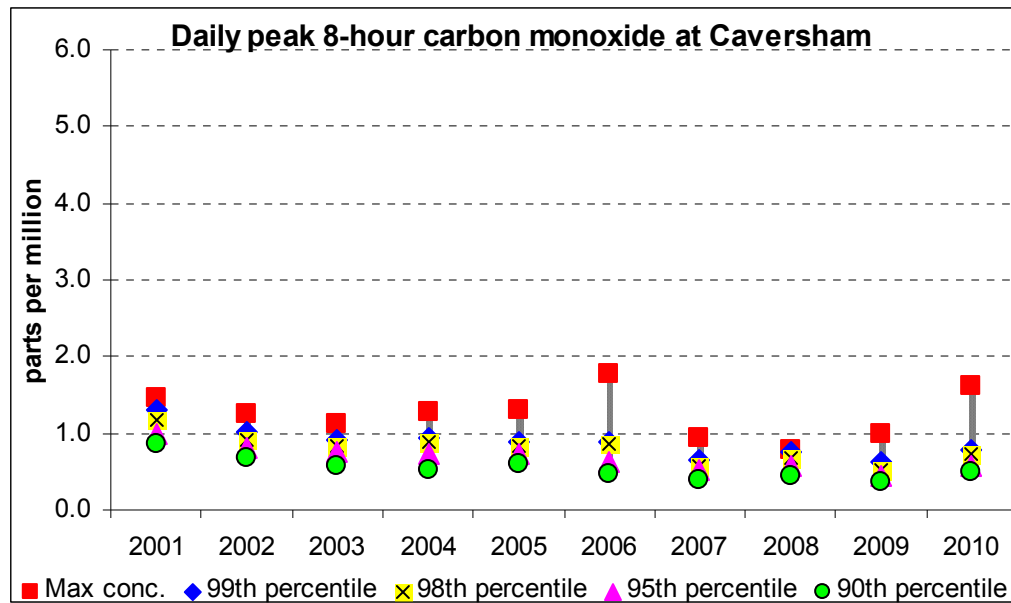
Highlighted cells indicate NEPM exceedences.

## ATTACHMENT 1 - Graphical trends

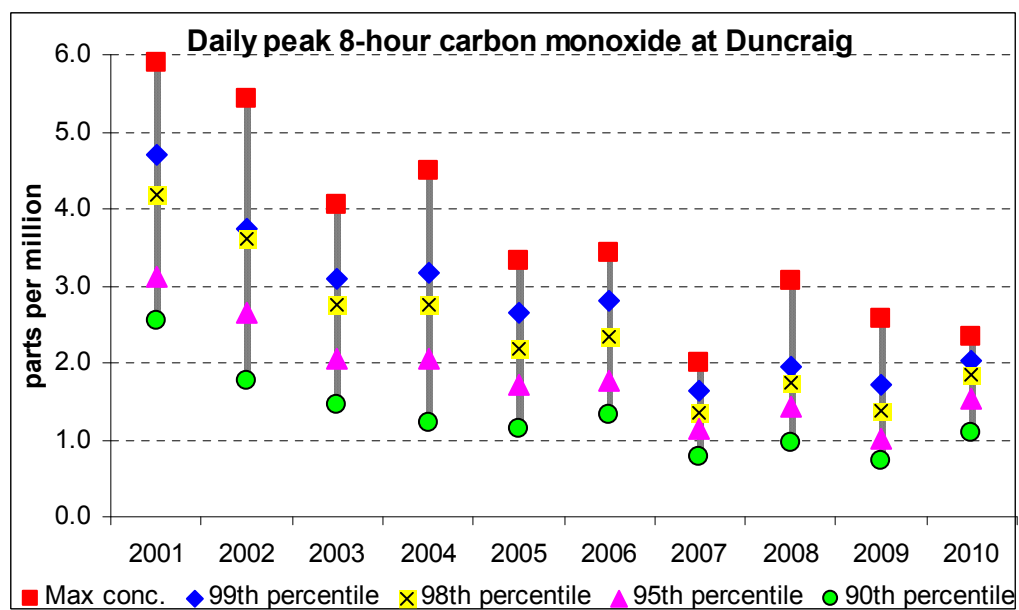
This attachment provides graphical representations of tables D8 to D44 of Section D. Each graph show the maximum, 99<sup>th</sup> percentile, 98<sup>th</sup> percentile, 95<sup>th</sup> percentile and 90<sup>th</sup> percentile of daily maximum concentration for all pollutants monitored by the Department of Environment and Conservation in Western Australia. The nominated percentiles can also be expressed as an Nth highest concentration. Based on 100 per cent data recovery and a normal year (i.e. 365 days), the following table gives each percentile an equivalent Nth highest ordinal value. The bracketed numbers represent the exact (as calculated) value of the ordinal number.

Percentile	Nth highest
100	1 (maximum)
99	5 (4.65)
98	8 (8.3)
95	19 (19.25)
90	38 (37.5)

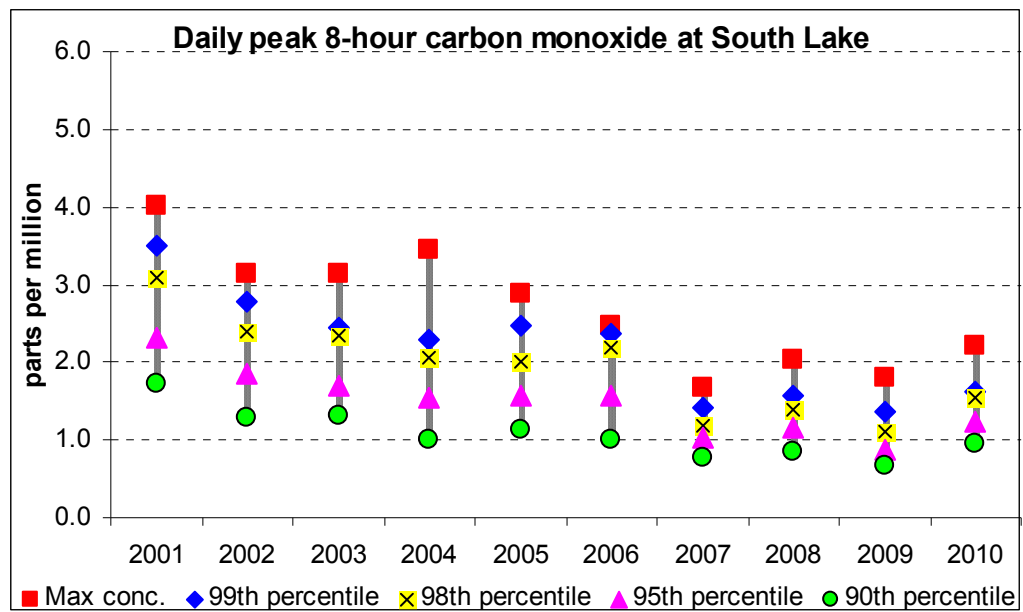
## Carbon monoxide



*Figure A1-1 - 8-hour carbon monoxide at Caversham*

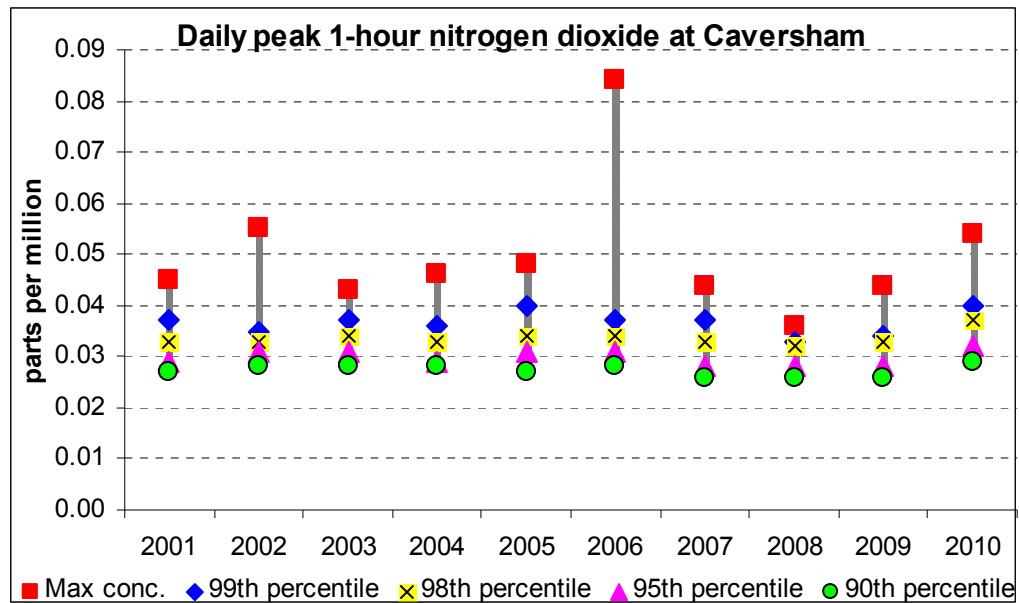


*Figure A1-2 - 8-hour carbon monoxide at Duncraig*

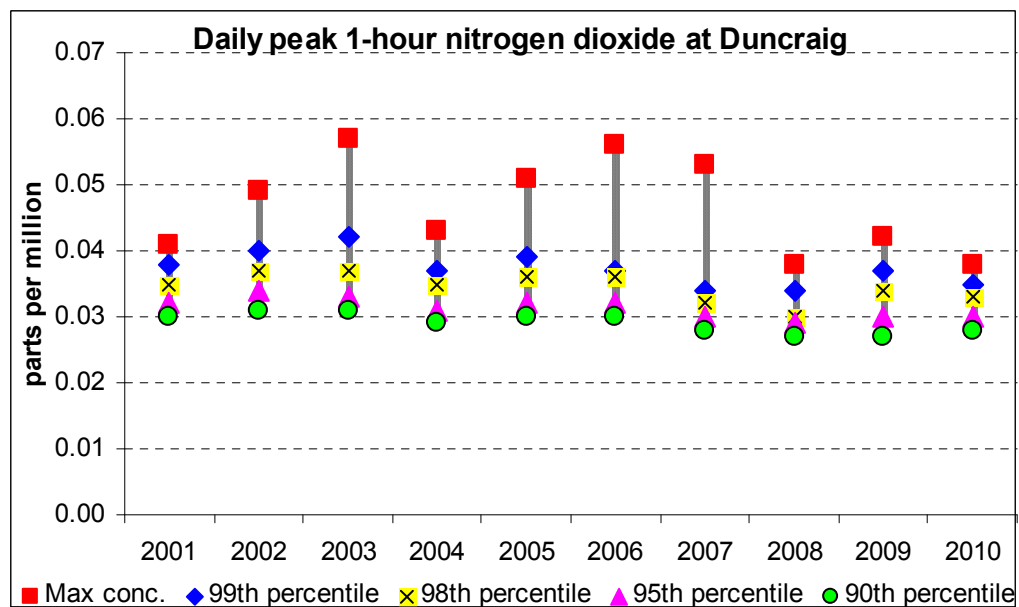


*Figure A1-3 - 8-hour carbon monoxide at South Lake*

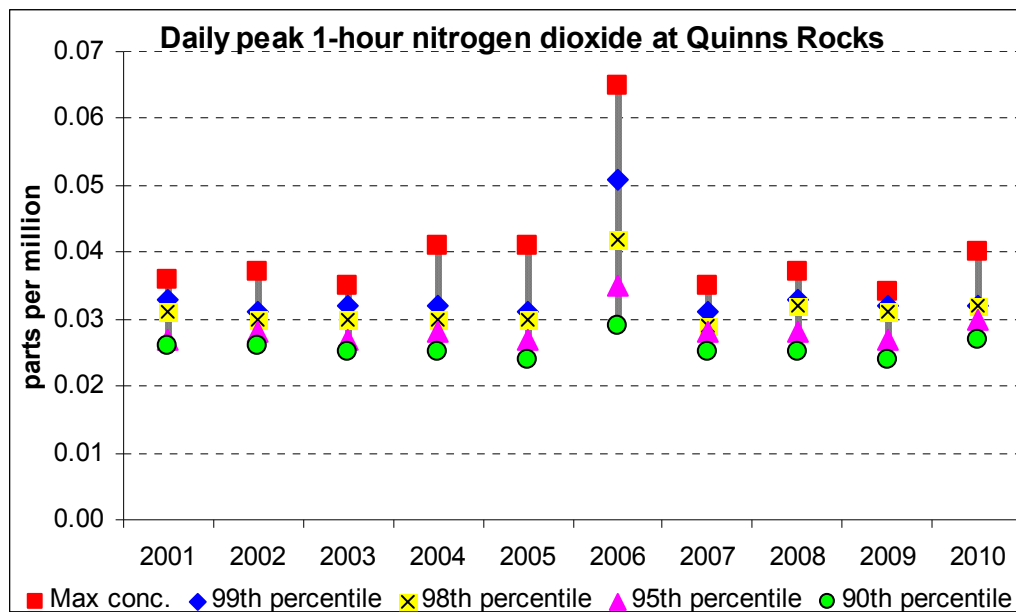
## Nitrogen dioxide



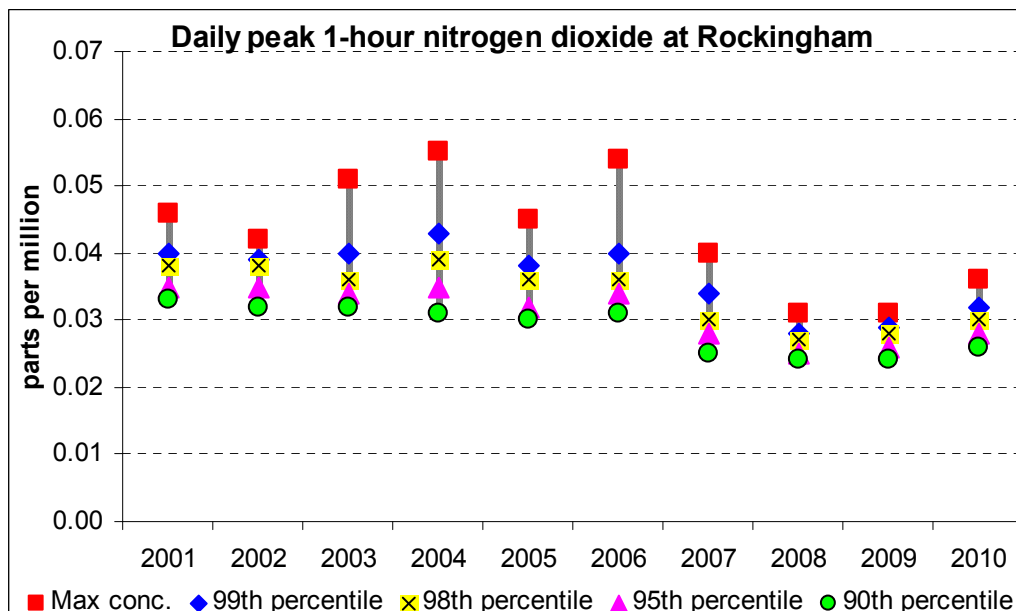
*Figure A1-4 - 1-hour nitrogen dioxide at Caversham*



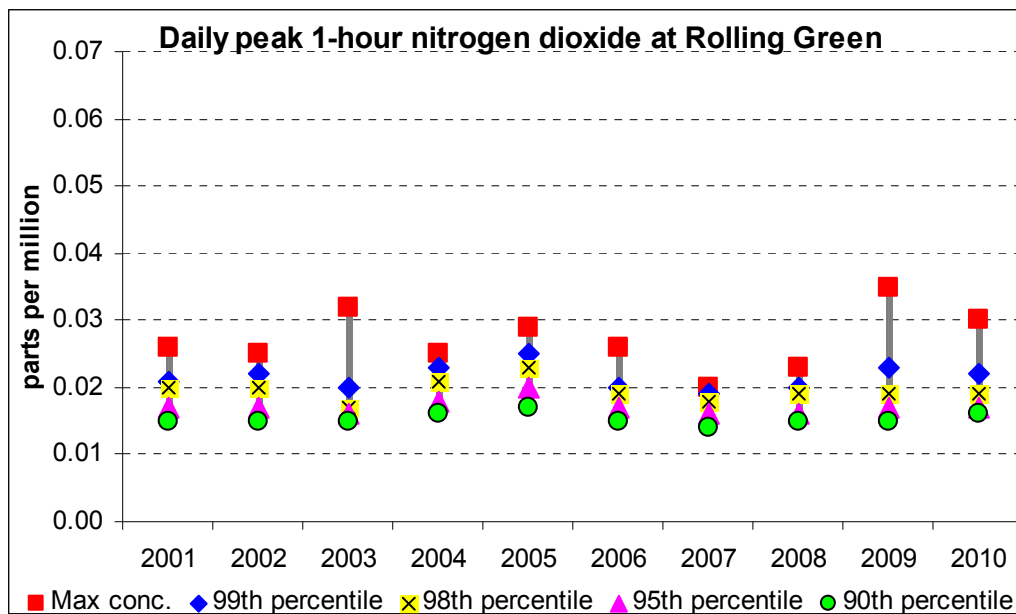
*Figure A1-5 - 1-hour nitrogen dioxide at Duncraig*



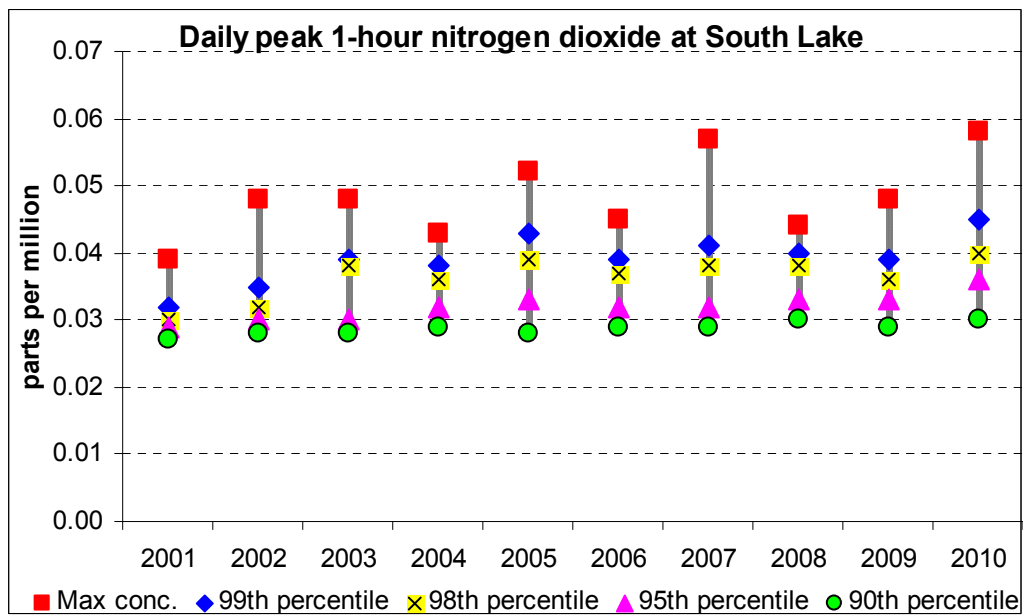
*Figure A1-6 - 1-hour nitrogen dioxide at Quinns Rocks*



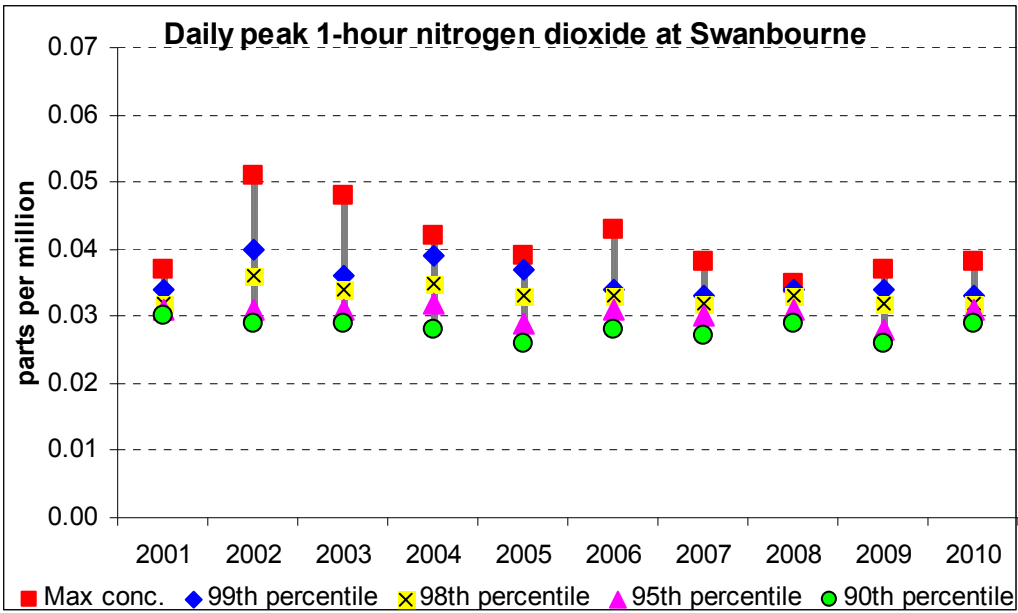
*Figure A1-7 - 1-hour nitrogen dioxide at Rockingham*



*Figure A1-8 - 1-hour nitrogen dioxide at Rolling Green*



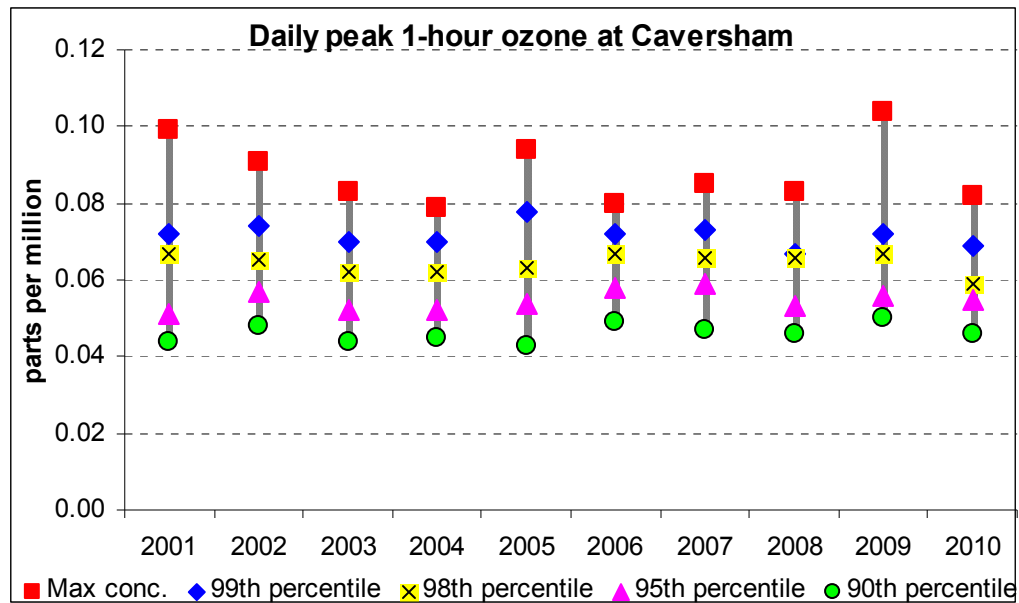
*Figure A1-9 - 1-hour nitrogen dioxide at South Lake*



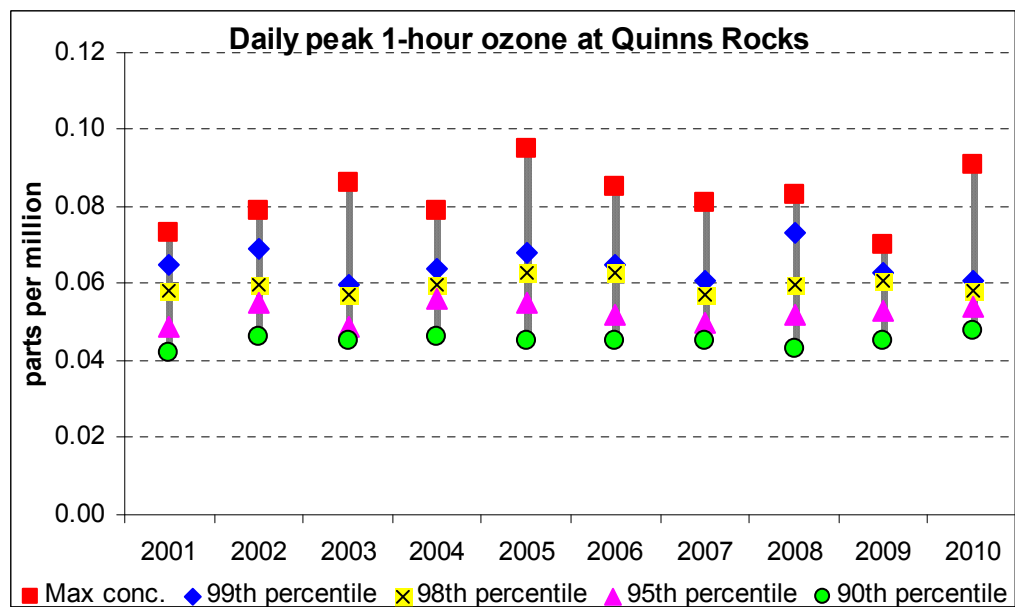
*Figure A1-10 - 1-hour nitrogen dioxide at Swanbourne*



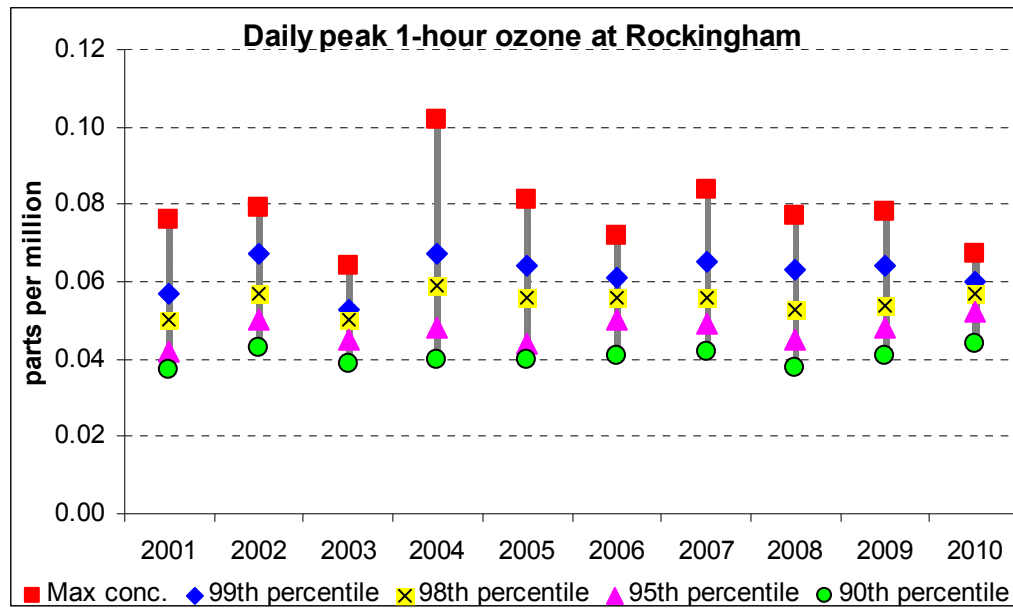
## Ozone



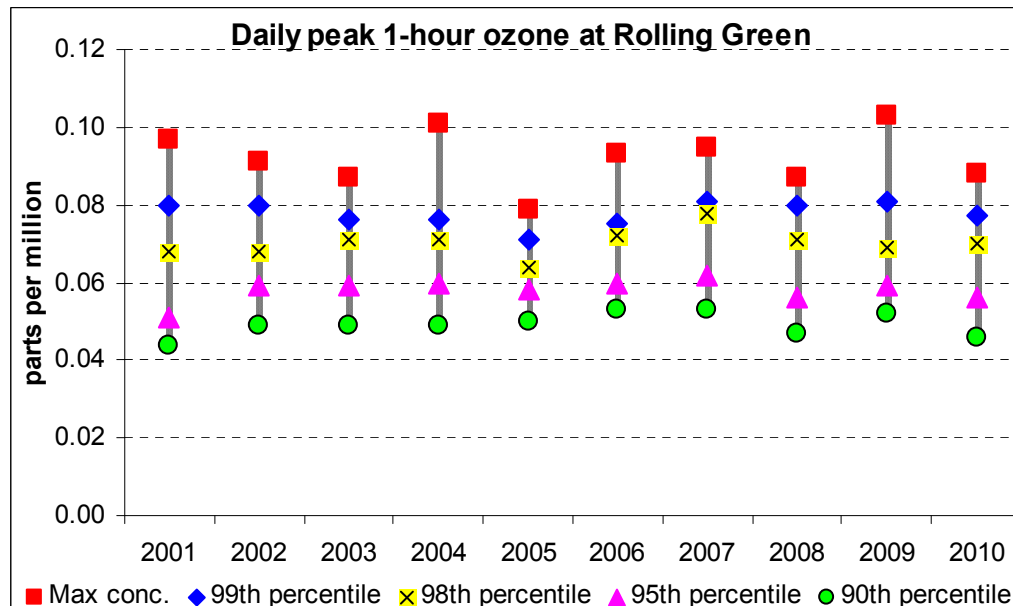
*Figure A1-11 - 1-hour ozone at Caversham*



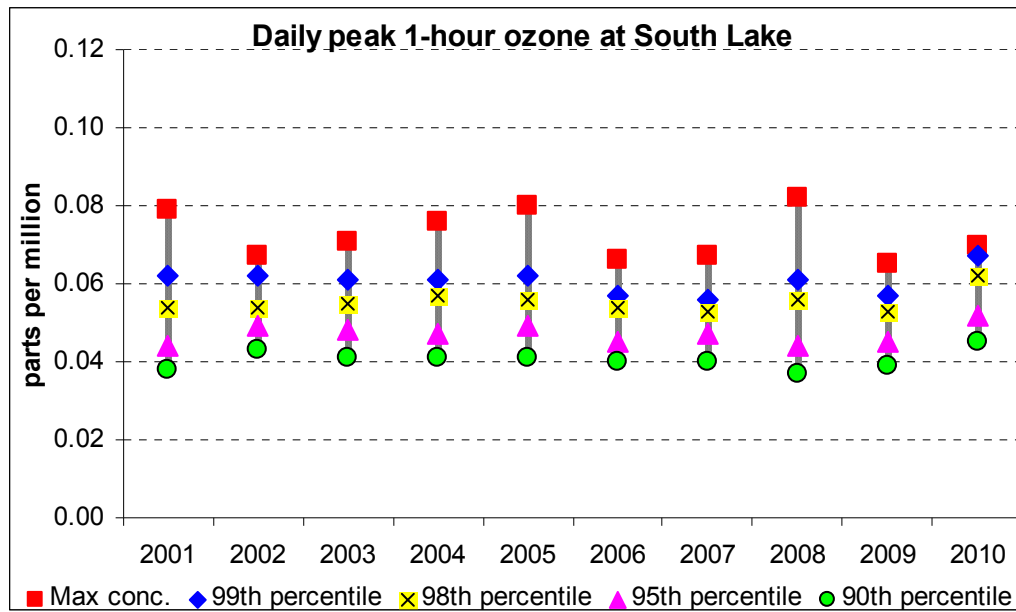
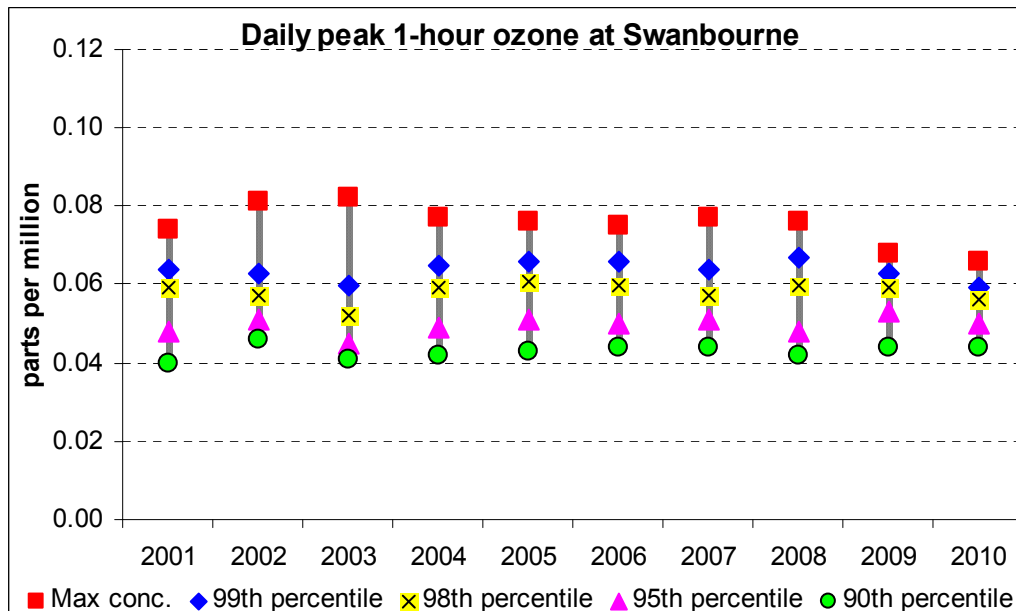
*Figure A1-12 - 1-hour ozone at Quinns Rocks*

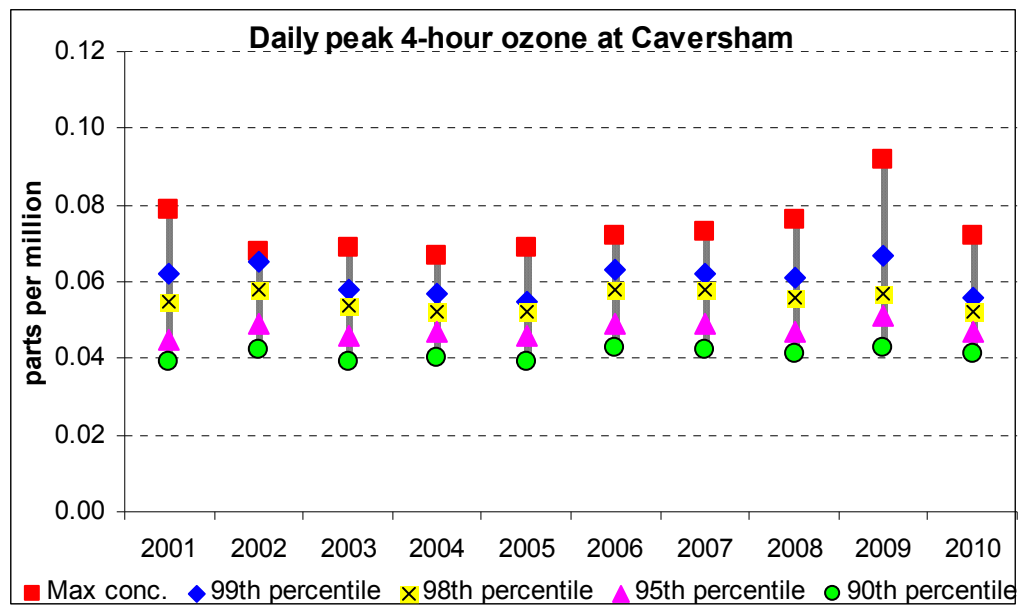


*Figure A1-13 - 1-hour ozone at Rockingham*

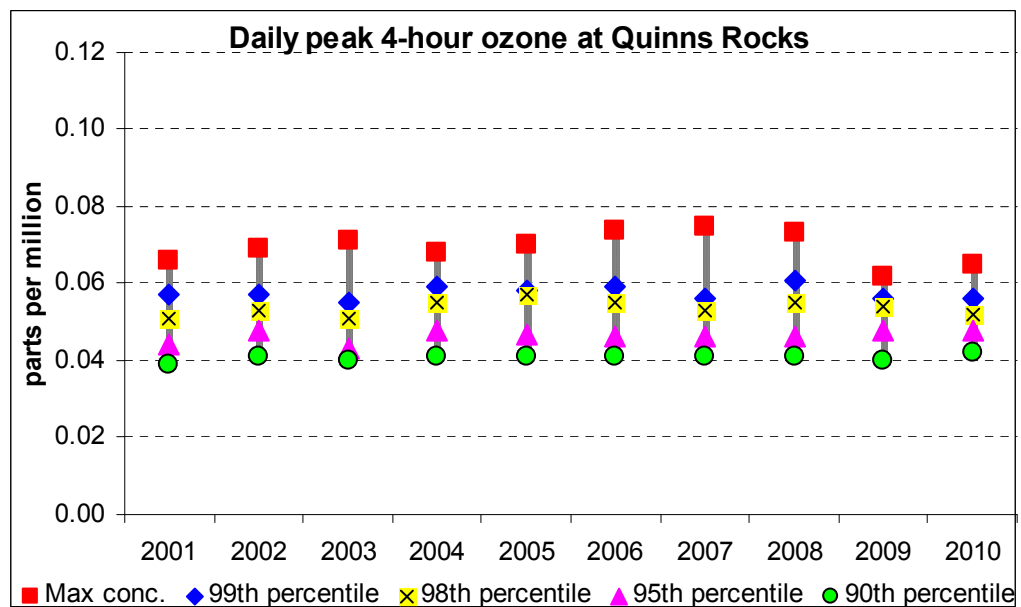


*Figure A1-14 - 1-hour ozone at Rolling Green*

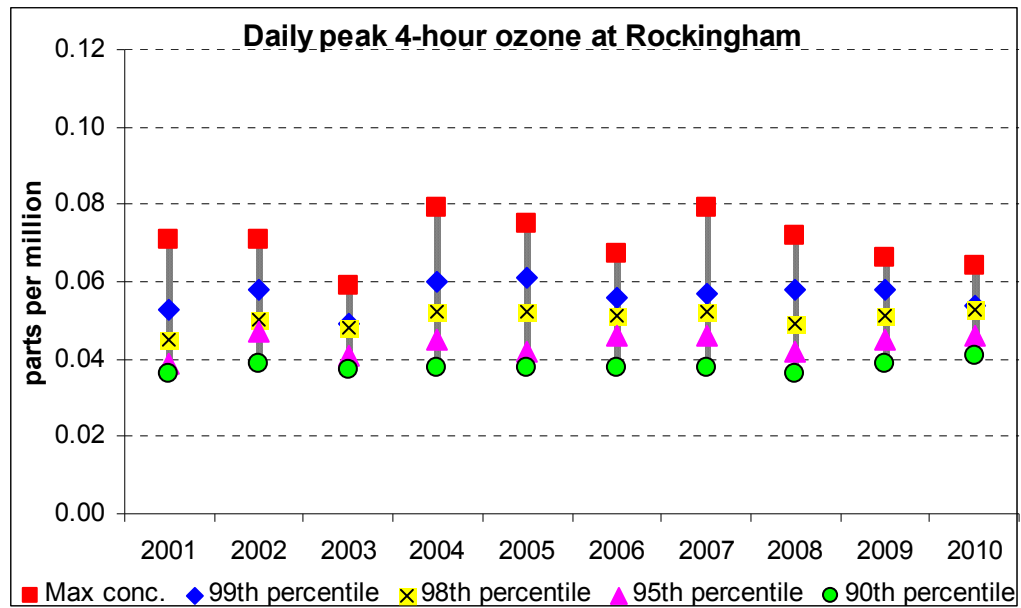
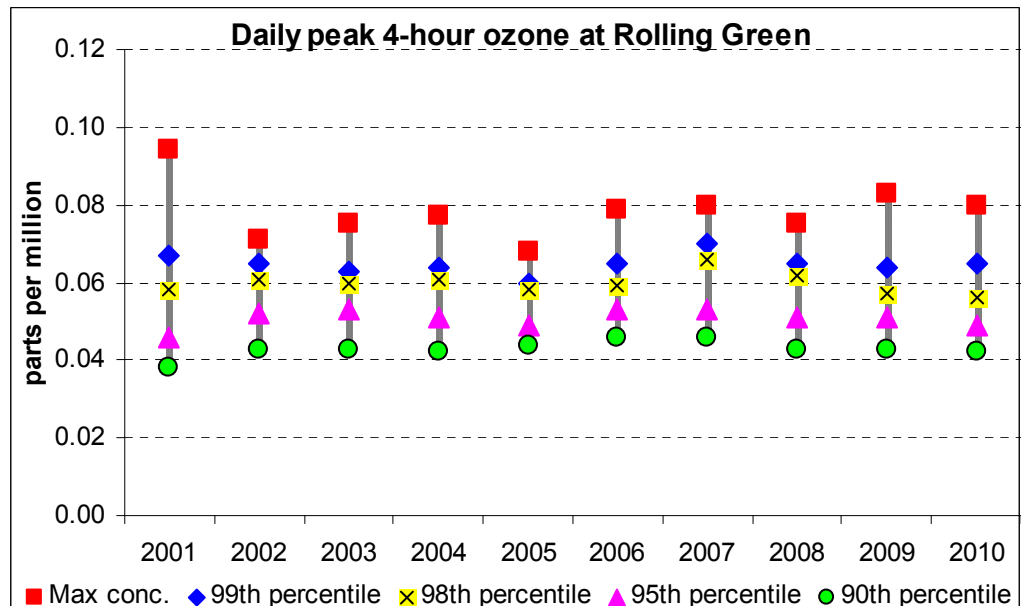
*Figure A1-15 - 1-hour ozone at South Lake**Figure A1-16 - 1-hour ozone at Swanbourne*

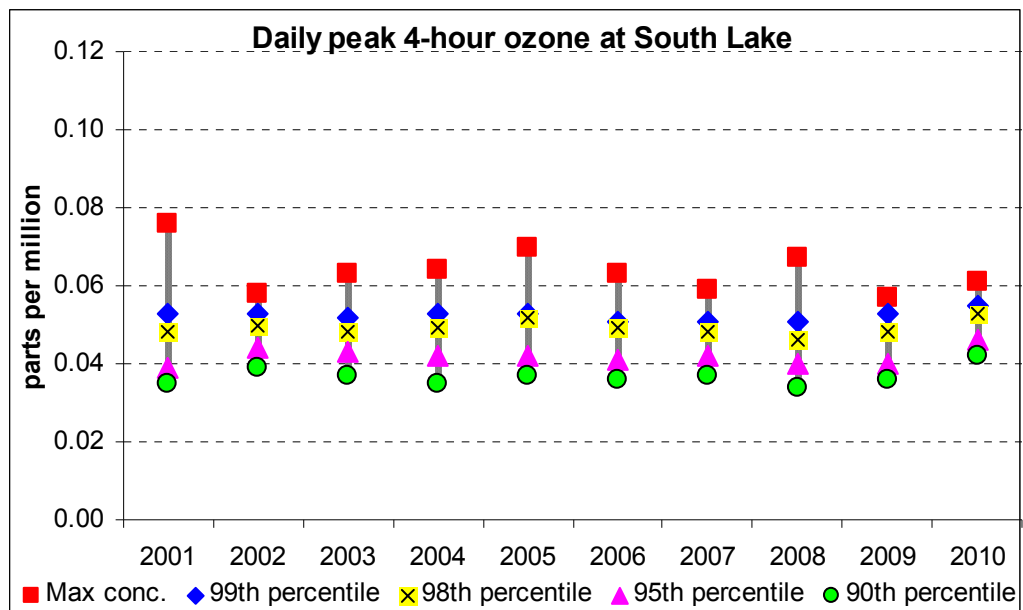
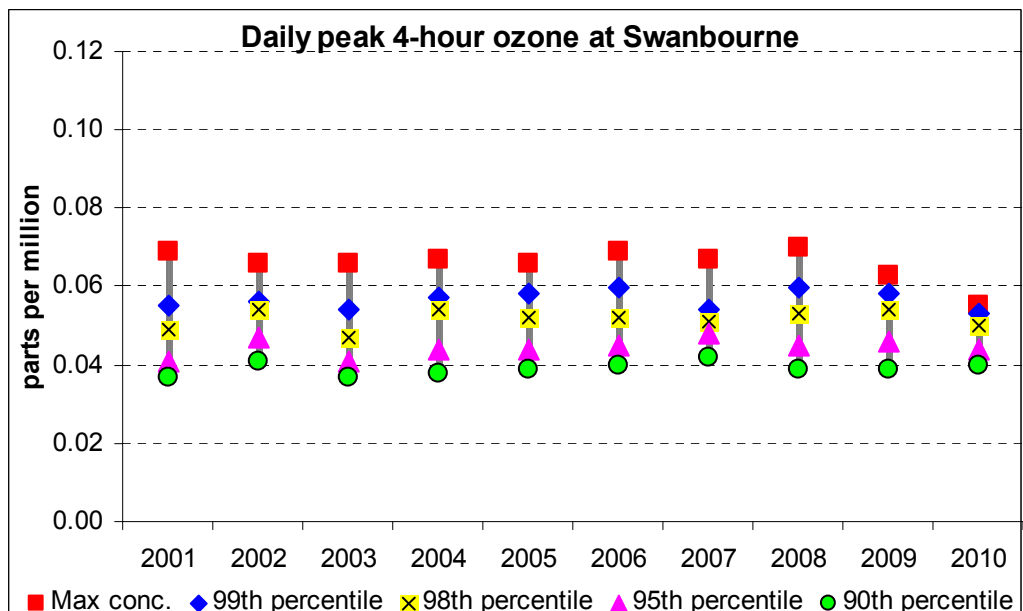


*Figure A1-17 - 4-hour ozone at Caversham*

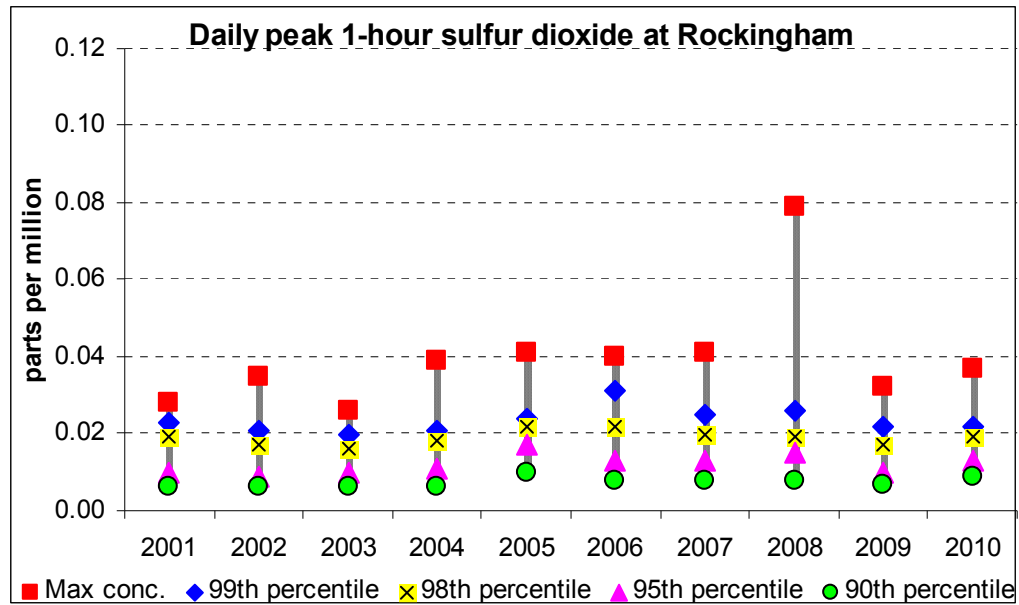


*Figure A1-18 - 4-hour ozone at Quinns Rocks*

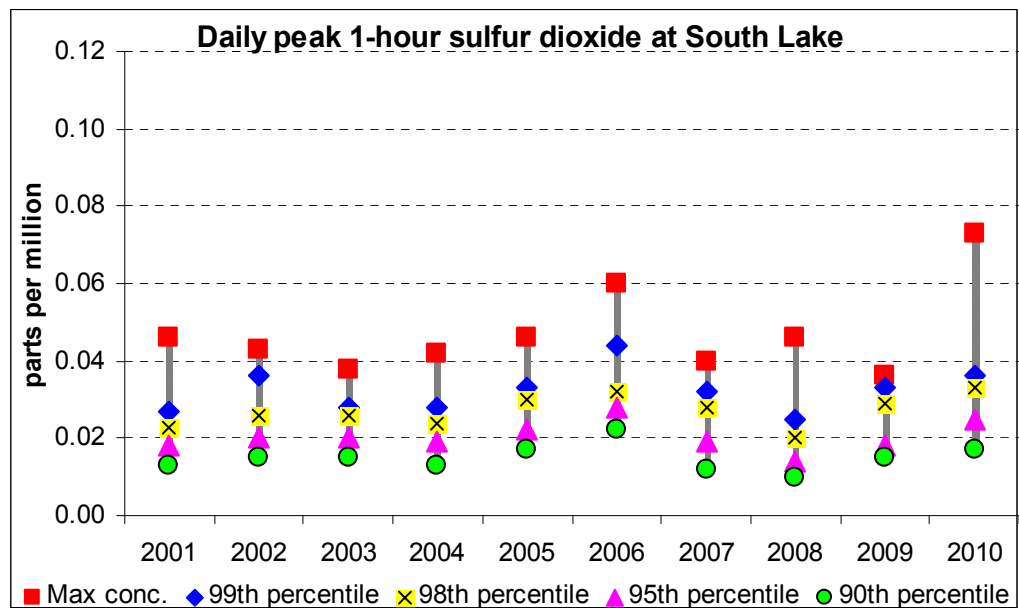
*Figure A1-19 - 4-hour ozone at Rockingham**Figure A1-20 - 4-hour ozone at Rolling Green*

*Figure A1-21 - 4-hour ozone at South Lake**Figure A1-22 - 4-hour ozone at Swanbourne*

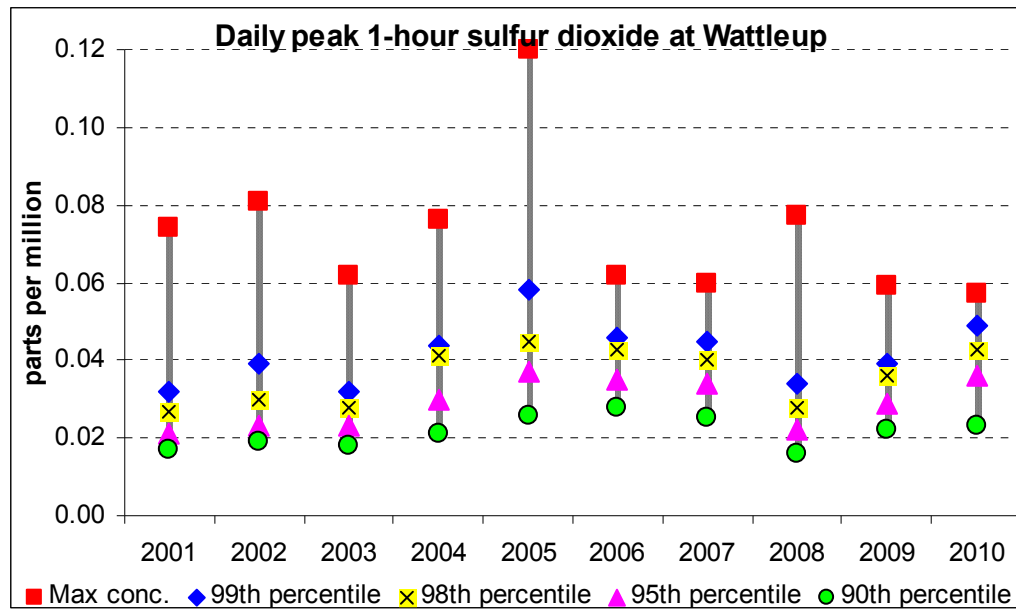
## Sulfur dioxide



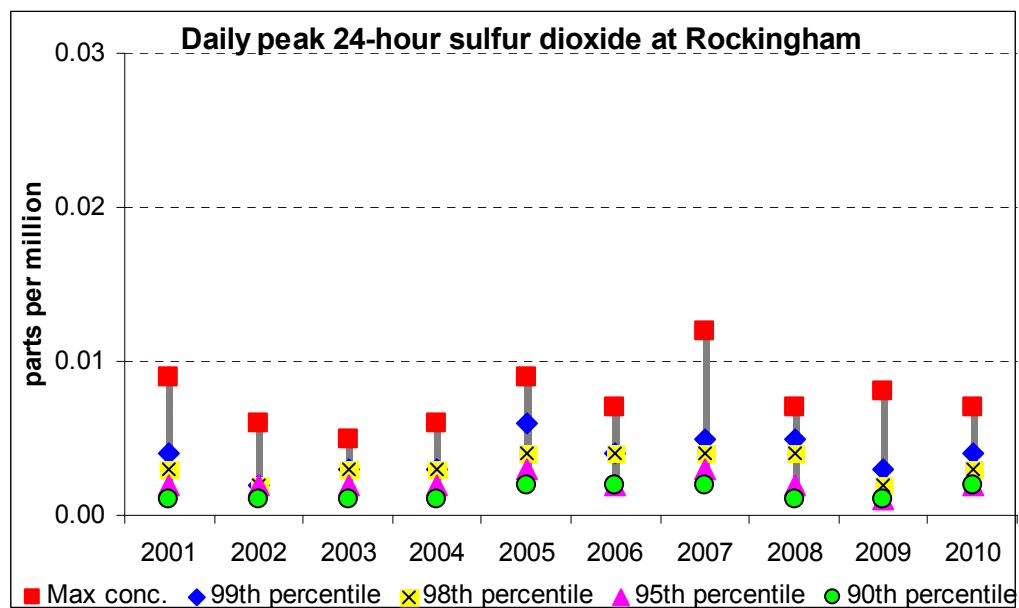
*Figure A1-23 - 1-hour sulfur dioxide at Rockingham*



*Figure A1-24 - 1-hour sulfur dioxide at South Lake*

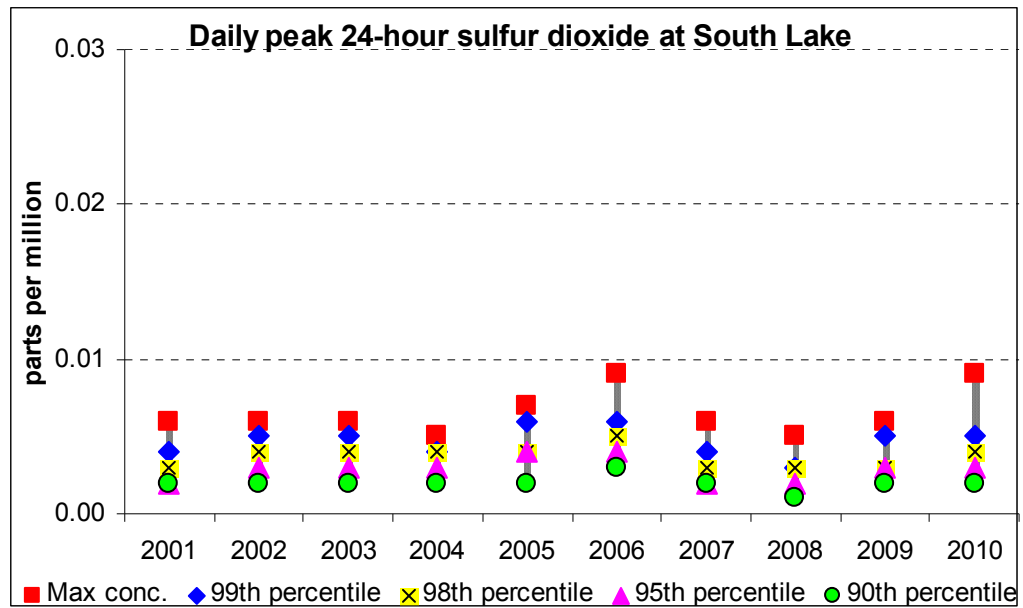


*Figure A1-25 - 1-hour sulfur dioxide at Wattleup*

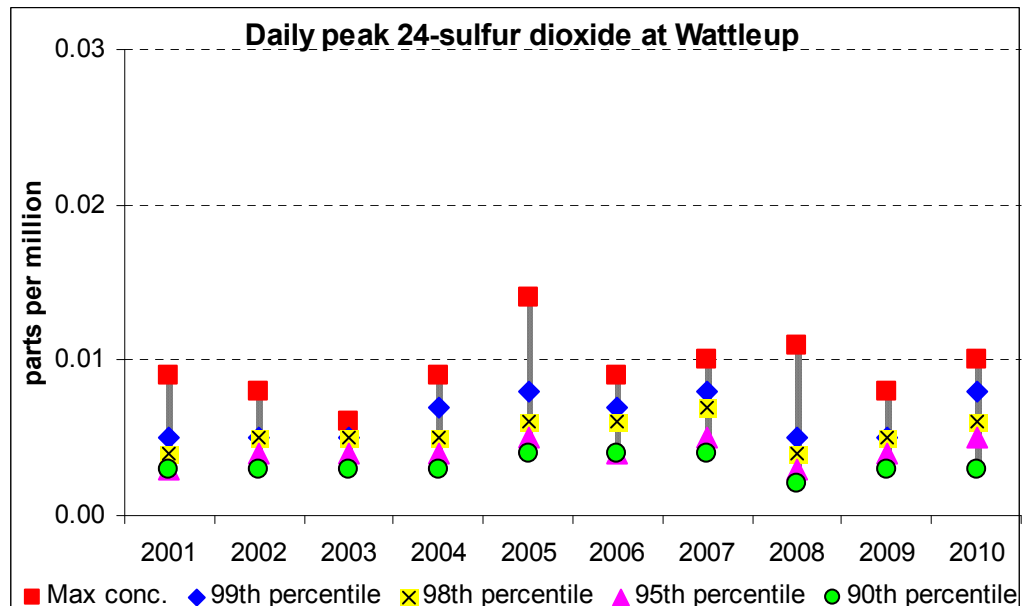


*Figure A1-26 - 24-hour sulfur dioxide at Rockingham*



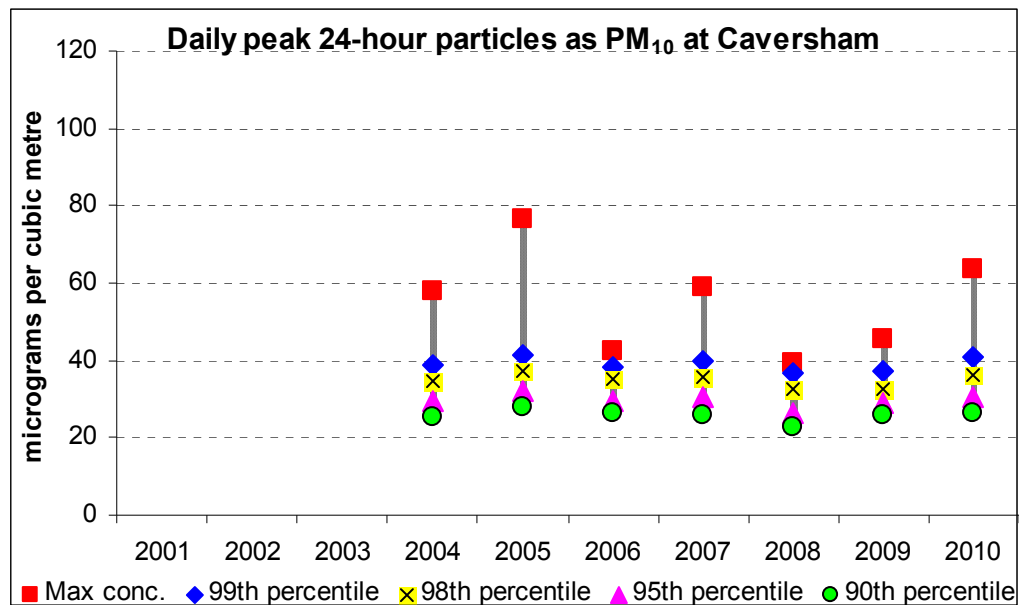


*Figure A1-27 - 24-hour sulfur dioxide at South Lake*

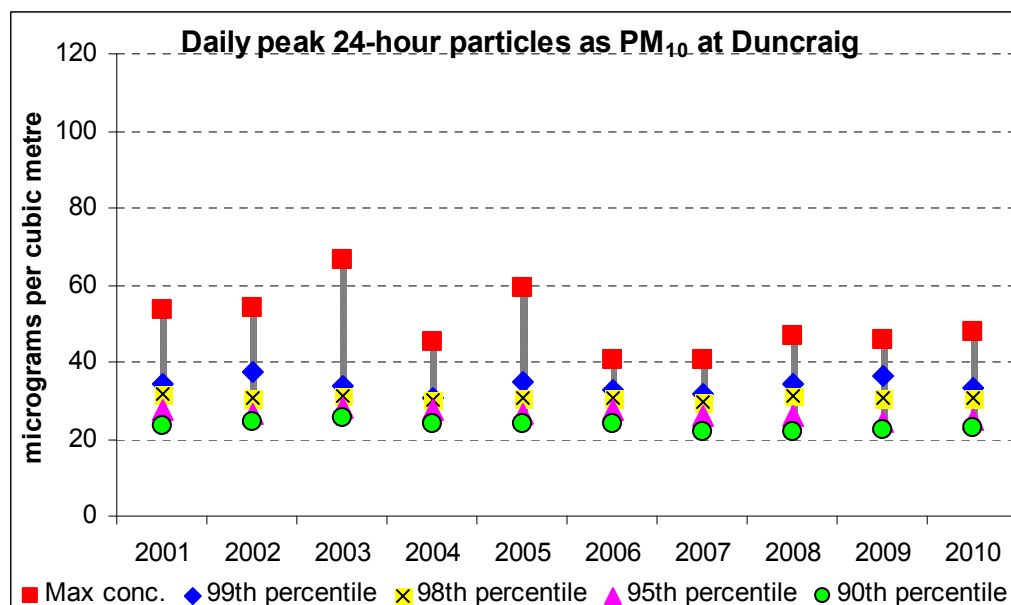


*Figure A1-28 - 24-hour sulfur dioxide at Wattleup*

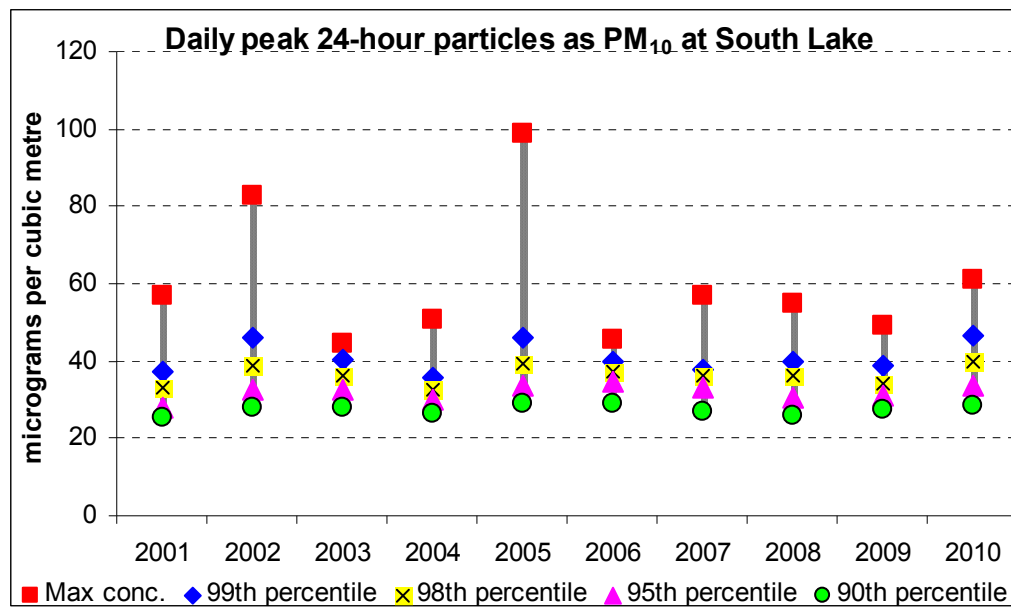
## Particles as PM<sub>10</sub>



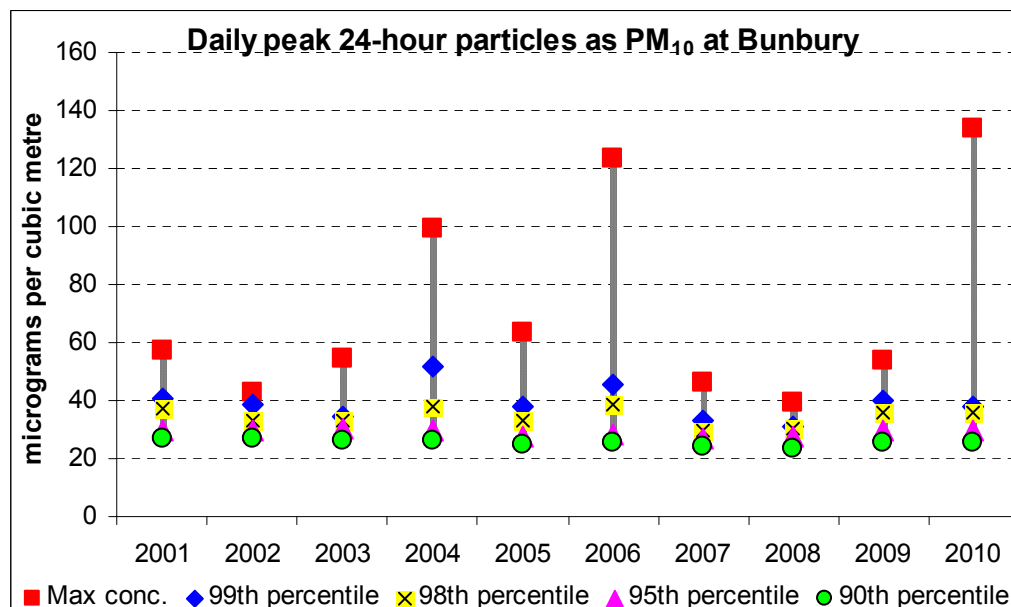
*Figure A1-29 - 24-hour PM<sub>10</sub> at Caversham*



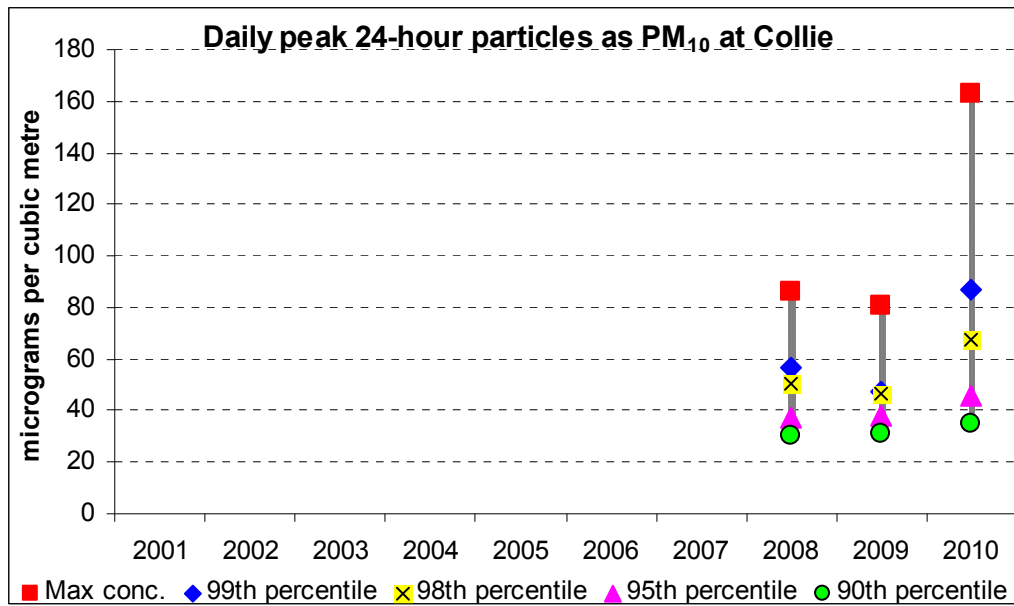
*Figure A1-30 - 24-hour PM<sub>10</sub> at Duncraig*



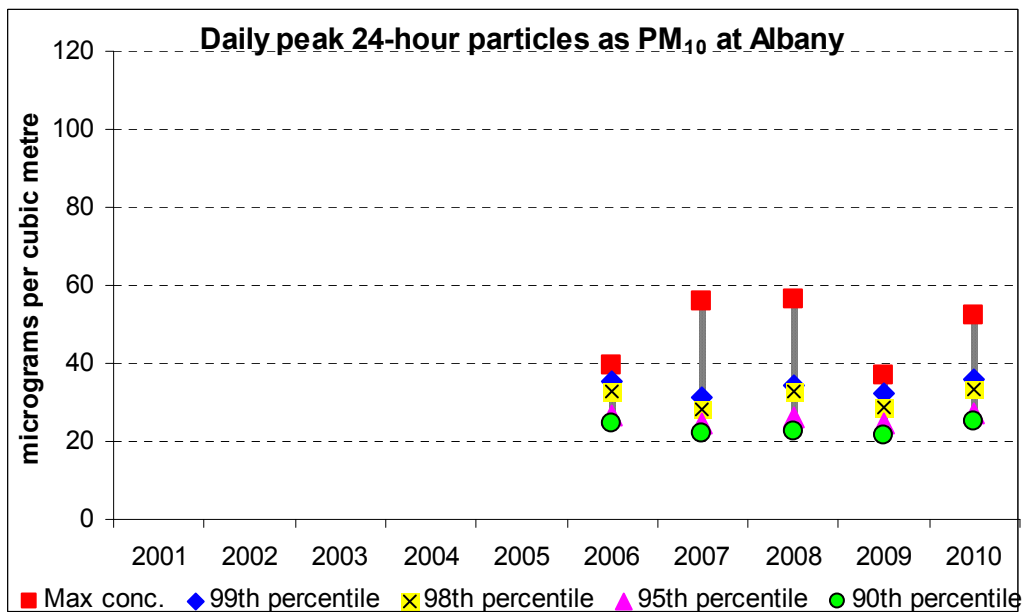
*Figure A1-31 - 24-hour PM<sub>10</sub> at South Lake*



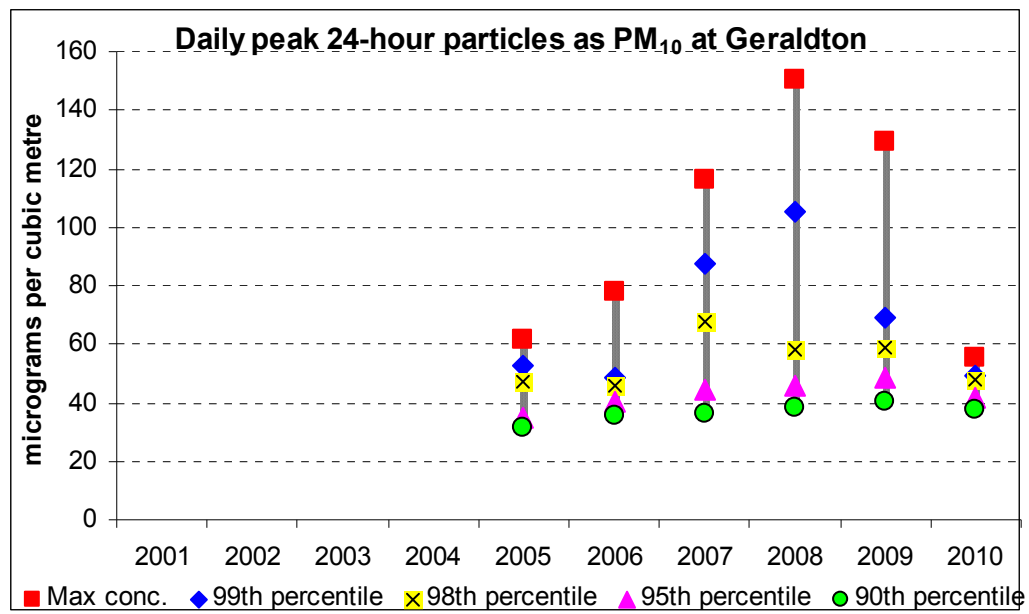
*Figure A1-32 - 24-hour PM<sub>10</sub> at Bunbury*



*Figure A1-33 - 24-hour PM<sub>10</sub> at Collie*

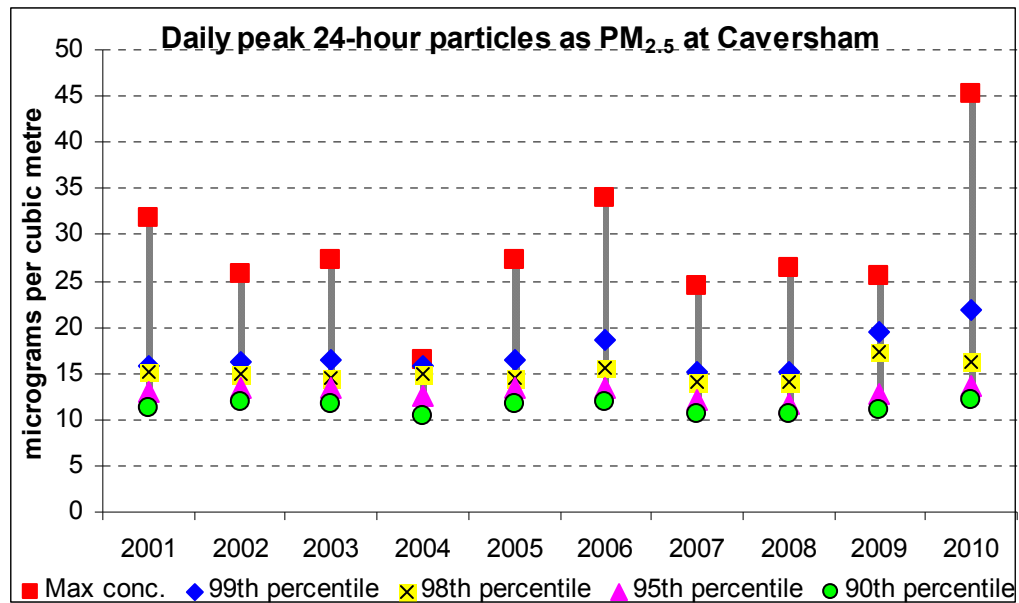


*Figure A1-34 - 24-hour PM<sub>10</sub> at Albany*

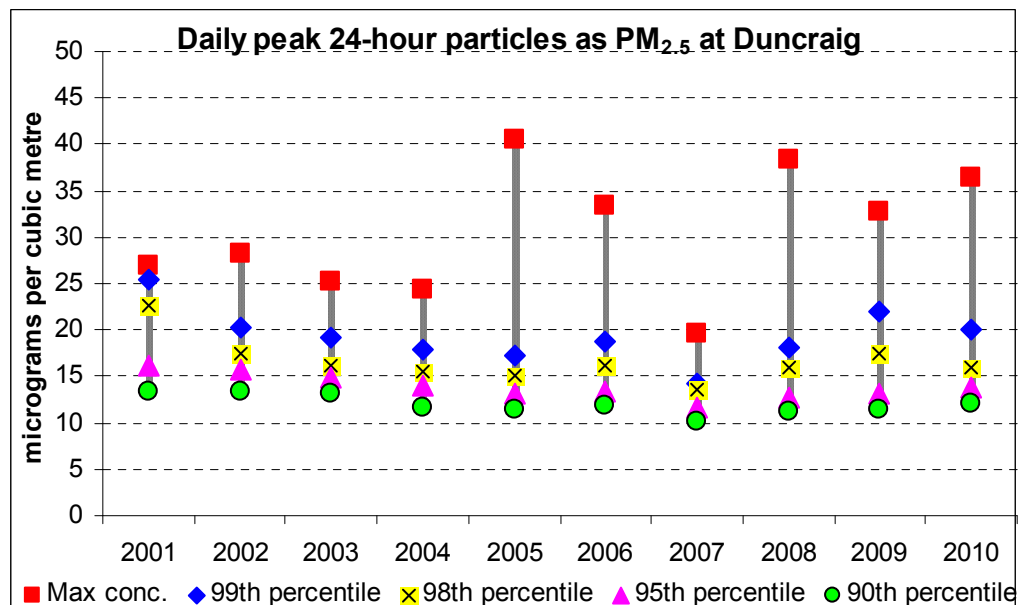


*Figure A1-35 - 24-hour PM<sub>10</sub> at Geraldton*

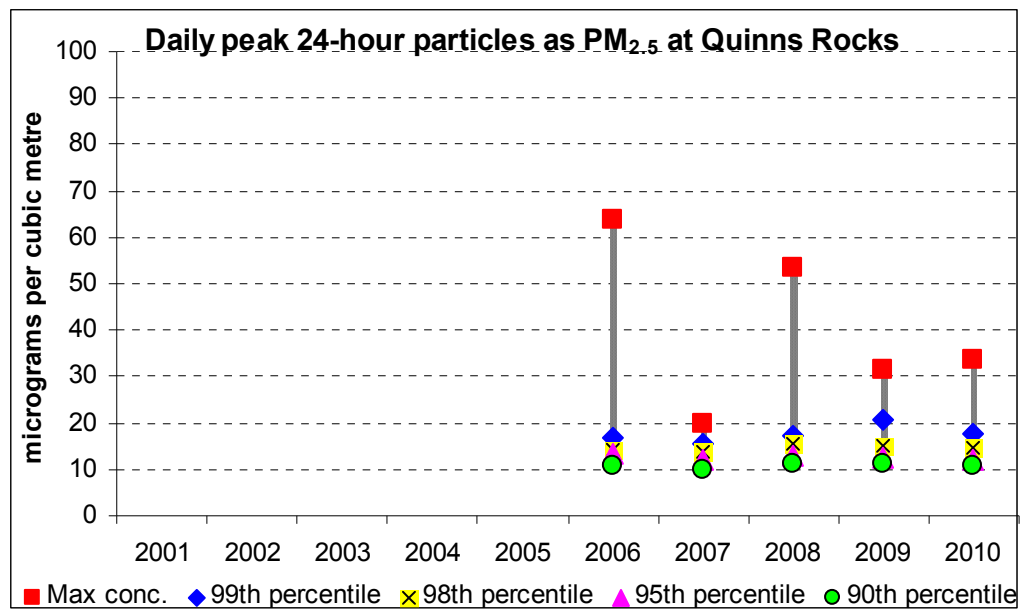
## Particles as PM<sub>2.5</sub>



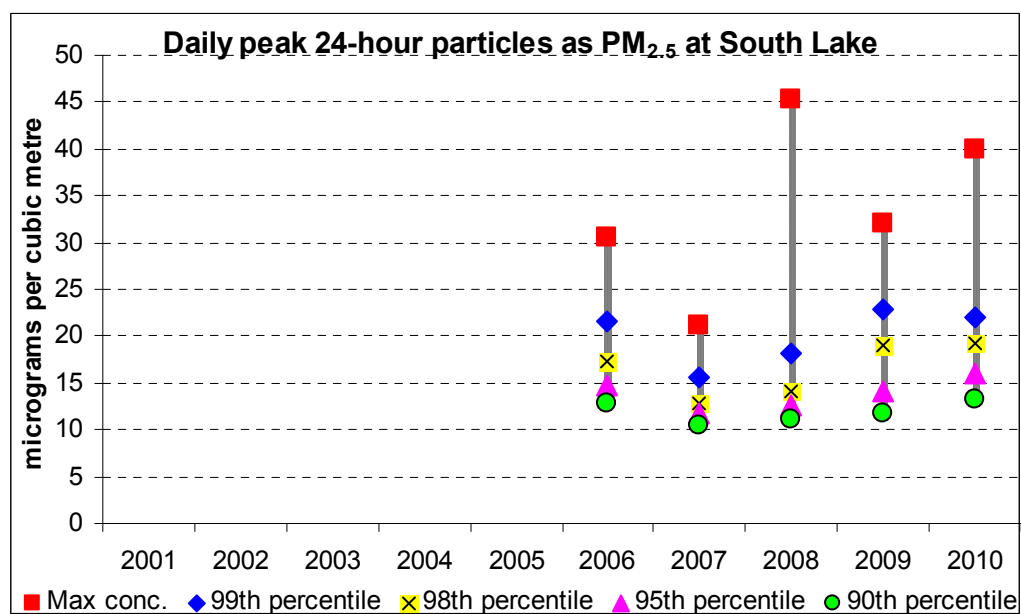
*Figure A1-36 - 24-hour PM<sub>2.5</sub> at Caversham*



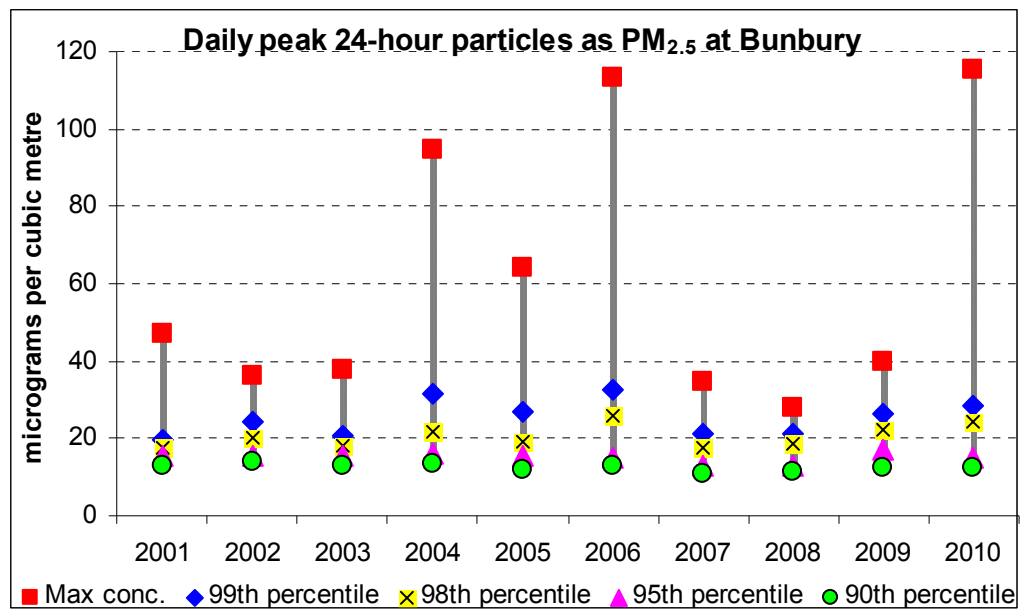
*Figure A1-37 - 24-hour PM<sub>2.5</sub> at Duncraig*



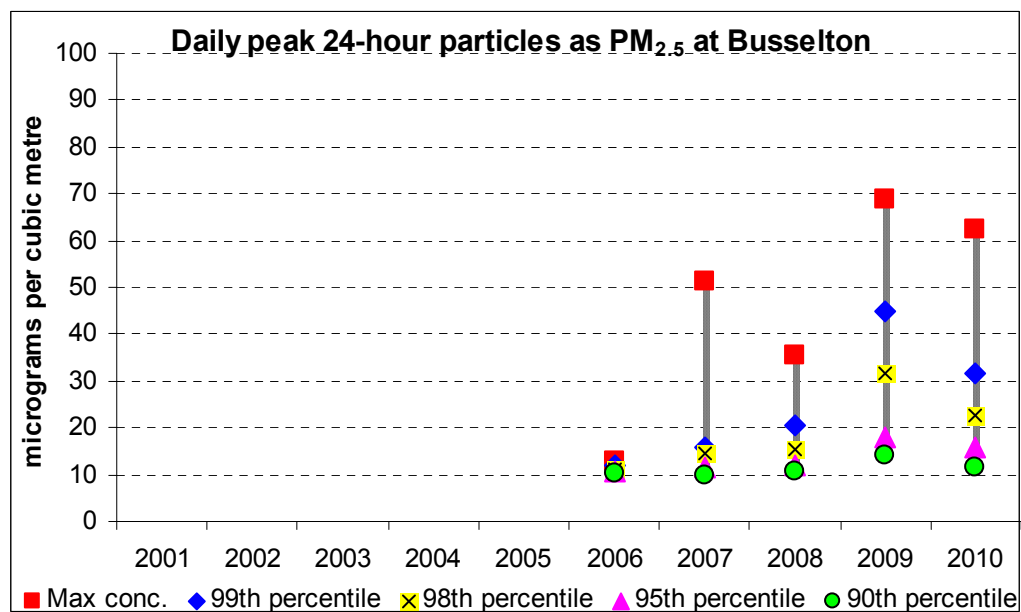
*Figure A1-38 - 24-hour PM<sub>2.5</sub> at Quinns Rocks*



*Figure A1-39 - 24-hour PM<sub>2.5</sub> at South Lake*



*Figure A1-40 - 24-hour PM<sub>2.5</sub> at Bunbury*



*Figure A1-41 - 24-hour PM<sub>2.5</sub> at Busselton*