Department of
Environment and Conservation
Our environment, our future

2008

Western Australia
Air Monitoring Report

Written to comply with the

National Environment Protection Measure

(Ambient Air Quality)

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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 southwest of the state to monitor fuel reduction burns, and a station in Busselton is also in operation for that purpose. The Geraldton station shown in Figure A3 was established in the mid-west 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 recently established in Albany (Figure A4). Table A1 indicates the pollutants monitored at each site.

CA Caversham	**HV Hope Valley**	**RO Rockingham**	**SW Swanbourne**
DU Duncraig	**QB Queen's Buildings**	**RG Rolling Green**	**WT Wattleup**
GO Gosnells	**QR Quinns Rock**	**SL South Lake**	

Figure A1 - DEC air quality monitoring stations operating in the Perth metropolitan region during 2008.

Figure A2 - DEC air quality monitoring stations operating in Bunbury and Busselton during 2008

Figure A3 - DEC air quality monitoring station operating in Geraldton during 2008

Figure A4 - DEC air quality monitoring station currently operating in Albany during 2008

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

Monitoring Site	CO	O_3	NO_2	SO_2	lead	PM_{10} Hi-Vol	PM_{10} TEOM	$PM_{2.5}$ TEOM	Visibility
AL Albany							07/06 to present		
BN Bunbury	03/99 to 04/02						06/99 to present	04/97 to present	02/97 to 06/05
BS Busselton								11/06 to present	
CA Caversham	08/93 to present	11/89 to present	09/90 to present			05/93 to 08/05	01/04 to present	03/94 to present	12/89 to 05/06
CO Collie							02/08 to present		
DU Duncraig	08/95 to present		08/95 to present			09/94 to 01/05	06/96 to present	01/95 to present	03/94 to 07/05
GE Geraldton							09/05 to present		
GO Gosnells							12/07 to present		
HV Hope Valley	01/90 to 03/91		12/89 to present	12/89 to present					01/89 to 09/05
QB Queen's Buildings	08/89 to 03/07		01/90 to 03/07		01/90 to 12/01	01/90 to 03/07			01/90 to 07/05
QR Quinns Rock		11/92 to present	11/92 to present					07/06 to present	12/95 to 06/06
RO Rockingham		12/95 to present	12/95 to present	07/88 to present					
RG Rolling Green		01/93 to present	01/93 to present						
SL 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	03/00 to 09/05
SW Swanbourne	01/93 to 05/95	01/93 to present	03/93 to present			03/94 to 04/06		06/94 to 07/95	06/94 to 07/03
WT Wattleup				01/88 to present					

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

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

Pollutant	Standard	Method
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 sulphur dioxide – Direct-reading instrumental method	Ultraviolet fluorescence
Lead	AS2800 1985 – Determination of particulate lead – high volume sampler gravimetric collection flame atomic absorption spectrometric method AS 3580.9.3 2003 – Methods for sampling and analysis of ambient air – Determination of suspended particulate matter – TSP high volume sampler with size selective inlet – Gravimetric method	Ambient air is drawn at a known rate through a prepared filter via a TSP inlet.
Particles as PM_{10}	AS 3580.9.8 2008 – Methods for sampling and analysis of ambient air – Determination of suspended particulate matter – PM_{10} continuous direct mass method using a tapered element oscillating microbalance analyser	Tapered element oscillating microbalance
	AS 3580.9.6 1990 – Methods for sampling and analysis of ambient air – Determination of suspended particulate matter – PM_{10} high volume sampler with size selective inlet – Gravimetric method	Ambient air is drawn at a known rate through a prepared filter via a PM_{10} inlet
Particles as $PM_{2.5}$		Tapered element oscillating microbalance

Table A3. Monitoring in Western Australia.

Site:	CO	O_3	NO_2	SO_2	Pb	PM_{10}	$PM_{2.5}$
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	
GO – Gosnells						C	
HV – Hope Valley			DEC	DEC			
QB - Queen's Buildings	P		DEC		P(1)	DEC	
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
P(1) – performance monitoring for lead was removed on 31 December 2001 after the annual average concentration reduced to less than 10 per cent of the NEPM standard in accordance with the WA monitoring plan.
C – Campaign monitoring
T – trend performance monitoring station
DEC – station will be maintained by DEC for the foreseeable future

Table A4. Screening procedures satisfied at each station.

Site:	Pop'n[a]	CO	O_3	NO_2	SO_2	Pb	PM_{10}
Perth, Gosnells & Rockingham	1,554,100				B&C	A	
Mandurah[b]	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[c]	30,903	M	E&F	E&F	T	F	P
Busselton	27,500						
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/
Shaded cells represent either Performance, Trend or Campaign sites where monitoring is currently underway.

Table A5. Screening procedures used to demonstrate whether pollutants are consistently below standards.

Screening procedures
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 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
Perth Region										
Caversham	☑	☑	☑	☑	☑	☑	☑	☑	☑	
Duncraig	☑	☑	☒	☑	☒	☑	☑	☑	☑	6 metres to medium sized trees and presence of power pole.
Gosnells	☑	☑	☑	☑	☑	☑	☑	☑	☑	
Hope Valley	☑	☑	☑	☑	☑	☑	☑	☑	☑	
Queen's Buildings	☑	☒	☒	☒	☑	☑	☒	☑	☑	City canyon with high traffic volume.
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.
Southwest Region										
Albany	☑	☑	☑	☑	☑	☑	☑	☑	☑	
Bunbury	☑	☑	☑	☑	☒	☑	☑	☑	☑	15 metres to small to medium eucalyptus trees.
Busselton	☑	☑	☑	☑	☒	☑	☑	☑	☑	5 metres to small to medium eucalyptus trees.
Collie	☑	☑	☑	☑	☑	☑	☑	☑	☑	
Midwest Region										
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.

The Queen's Buildings station was decommissioned in December 2007 due to major renovation works within the main building. An extensive search was made for an alternative site within a few kilometres but a suitable site proved impossible to find, and monitoring the central business district of Perth has regrettably ceased for the time being. The station was used as a performance monitoring station to provide an upper bound measurement of motor vehicle emitted CO, and to track the improving compliance with the NEPM. It was not nominated as a trend site since it did not fit the normal pattern of a generally representative upper bound for community exposure (GRUB) or population-average monitoring site.

In summary, during 2008, 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_3-rich air with the NO_x-rich plumes from Kwinana industry (potentially giving elevated NO_2 concentrations);

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

DEC also maintains the stations at Quinns Rocks and Rolling Green for the foreseeable future as part of its wider ozone network.

Nitrogen dioxide

The Queen's Buildings station was decommissioned in December 2007 due to major renovation works within the main building. The site located within the CBD provided an upper limit for NO_2.

For purposes of scientific understanding, NO_x is currently being monitored at all stations where O_3 is monitored. Caversham, Swanbourne and South Lake were therefore chosen as performance monitoring stations for NO_2 as these provide a good spatial distribution.

Caversham, Swanbourne and South Lake are also trend stations.

DEC will continue to measure NO_2 at Quinns Rocks, Rolling Green and Duncraig for the foreseeable future as part of its wider network.

Sulfur dioxide

WA operates one performance monitoring station at South Lake for sulphur dioxide, while maintaining a source management network which includes Wattleup and Rockingham. The Hope Valley monitoring station was decommissioned in April 2008 due to the resumption of the site for redevelopment.

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

Lead

Since 1995, lead levels at Queen's Buildings in the Perth CBD have been below 60 % of the 0.5 ug/m^3 annual NEPM standard. In 2001, the average lead level in Perth was 0.022 ug/m^3, less than 5% 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_{10}

Duncraig is an upper bound performance monitoring station site for PM_{10} 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_{10} concentrations from wood fires.

Duncraig and South Lake are both nominated as trend stations.

Campaign monitoring stations were established in Geraldton during September 2005, Albany during 2006 and Gosnells in December 2007.

Particles as $PM_{2.5}$

To make further assessments against the advisory standard, four additional $PM_{2.5}$ TEOMs were installed during 2006. There is now a total of six such devices in use in WA; four in the greater Perth metropolitan area, 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 is still working towards achieving NATA accreditation as discussed in the WA Monitoring Plan. The data within this report meets Department of Environment and Conservation quality standards.

Exceedence Summary

In 2008, the majority of exceedences were due to particle matter from smoke haze and dust. The sites located at Collie, Geraldton and Gosnells did not meet the PM_{10} NEPM goal of no more than five exceedences of 50 ug/m^3 averaged over 24 hours in any year.

All other sites met the NEPM goal.

Table A7. Air NEPM exceedences recorded during 2008

Site	Pollutant	Concentration	Date	Reason
Albany	PM_{10}	54.1 ug/m^3	16/02/2008	Smoke Haze
		56.3 ug/m^3	15/04/2008	Smoke Haze
Bunbury	$PM_{2.5}$	26.4 ug/m^3	02/12/2008	Smoke Haze
		27.8 ug/m^3	30/12/2008	Smoke Haze
Busselton	$PM_{2.5}$	28.0 ug/m^3	15/01/2008	Smoke Haze
		35.6 ug/m^3	09/10/2008	Smoke Haze
		25.5 ug/m^3	02/12/2008	Smoke Haze
Caversham	$PM_{2.5}$	26.3 ug/m^3	16/04/2008	Smoke Haze
Collie	PM_{10}	55.2 ug/m^3	28/03/2008	Smoke Haze
		64.9 ug/m^3	04/04/2008	Smoke Haze
		85.9 ug/m^3	13/04/2008	Smoke Haze
		66.4 ug/m^3	13/11/2008	Smoke Haze
		57.0 ug/m^3	14/11/2008	Smoke Haze
		51.5 ug/m^3	29/12/2008	Smoke Haze
		50.4 ug/m^3	01/12/2008	Smoke Haze
Duncraig	$PM_{2.5}$	38.3 ug/m^3	16/04/2008	Smoke Haze
Geraldton	PM_{10}	99.4 ug/m^3	16/01/2008	Dust
		53.2 ug/m^3	17/01/2008	Dust
		136.6 ug/m^3	19/02/2008	Dust
		59.7 ug/m^3	20/02/2008	Dust
		61.8 ug/m^3	22/02/2008	Dust
		150.7 ug/m^3	18/03/2008	Dust
		53.5 ug/m^3	25/03/2008	Dust
		62.6 ug/m^3	23/10/2008	Dust
		149.4 ug/m^3	11/12/2008	Dust
		115.1 ug/m^3	12/12/2008	Dust
Gosnells	PM_{10}	53.1 ug/m^3	03/01/2008	Dust
		51.4 ug/m^3	16/01/2008	Dust
		53.4 ug/m^3	17/01/2008	Dust
		54.6 ug/m^3	28/02/2008	Dust
		61.1 ug/m^3	14/04/2008	Unknown
		61.4 ug/m^3	15/10/2008	Dust
		66.8 ug/m^3	20/10/2008	Dust
Quinns Rocks	$PM_{2.5}$	53.3 ug/m^3	16/04/2008	Smoke Haze
South Lake	PM_{10}	55.0 ug/m^3	16/04/2008	Smoke Haze
	$PM_{2.5}$	45.2 ug/m^3	16/04/2008	Smoke Haze

SECTION B – ASSESSMENT OF COMPLIANCE WITH STANDARDS AND GOALS

Table B1. 2008 compliance summary for carbon monoxide

AAQ NEPM Standard
9.0 ppm (8-hour average)

Regional Performance Monitoring Station	Data availability rates (% of hours)					Number of exceedences (days)	Performance against the standards and goal
	Q1	Q2	Q3	Q4	Annual		
Perth Region							
Caversham (North East Metro)	99.5	99.5	99.5	99.5	99.5	0	met
Duncraig (North Metro)	99.4	99.3	97.8	99.3	99	0	met
Queen's Buildings (CBD)	0	0	0	0	0	0	not demonstrated
South Lake (South East Metro)	99.6	99.4	99.7	99.6	99.6	0	met

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

Table B2. 2008 compliance summary for nitrogen dioxide

AAQ NEPM Standard
0.12 ppm (1-hour average)
0.03 ppm (1-year average)

Regional Performance Monitoring Station	Data availability rates (% of hours)					Annual mean (ppm)	Number of exceedences (days)	Performance against the standards and goal	
	Q1	Q2	Q3	Q4	Annual			1-hour	1-year
Perth Region									
Caversham (North East Metro)	99.5	99.5	99.5	99.7	99.5	0.006	0	met	met
Duncraig (North Metro)	99.4	99.3	95.1	97.1	97.7	0.007	0	met	met
Hope Valley (South Metro)	99	11.4	0	0	27.5	0.003	0	met	met
Queen's Buildings (CBD)	0	0	0	0	0	-	0	not demonstrated	not demonstrated
Quinns Rocks (Outer North Coast)	99.4	99.2	86.2	99.7	96.1	0.003	0	met	met
Rockingham (South Coast)	98.9	99	99.8	99.6	99.3	0.005	0	met	met
Rolling Green (Outer East Rural)	98.7	99.6	99.8	99	99.3	0.002	0	met	met
South Lake (South East Metro)	99.6	99.5	99.8	99.5	99.6	0.008	0	met	met
Swanbourne (Inner West Coast)	98.9	94.4	99.7	99.6	98.2	0.006	0	met	met

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

Table B3. 2008 compliance summary for ozone

AAQ NEPM Standard
0.10 ppm (1-hour average)
0.08 ppm (4-hour average)

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
Perth Region									
Caversham (North East Metro)	99.5	99.5	99.5	99.6	99.5	0	0	met	met
Quinns Rocks (Outer North Coast)	99.5	99.2	99	99.7	99.4	0	0	met	met
Rockingham (South Coast)	98.9	99	99.8	99.6	99.4	0	0	met	met
Rolling Green (Outer East Rural)	99.7	99.6	99.8	99	99.5	0	0	met	met
South Lake (South East Metro)	99.6	99.5	99.7	99.4	99.6	0	0	met	met
Swanbourne (Inner West Coast)	98.9	94.4	99.7	99.6	98.2	0	0	met	met

Performance against the standards and goal: “met”, “not met”, “not demonstrated”

Table B4. 2008 compliance summary for sulfur dioxide

AAQ NEPM Standard
0.20 ppm (1-hour average)
0.08 ppm (24-hour average)
0.02 ppm (1-year average)

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
Perth Region											
Hope Valley (South Metro)	99.1	23.3	0	0	30.4	0.001	0	0	not demonstrated	not demonstrated	not demonstrated
Rockingham (South Coast)	97	98	99.8	98.5	98.3	0.001	0	0	met	met	met
South Lake (South East Metro)	99.6	99.5	99.8	99.5	99.6	0.001	0	0	met	met	met
Wattleup (South Metro)	71.1	97.2	93.5	96.5	89.6	0.001	0	0	not demonstrated	not demonstrated	not demonstrated

Performance against the standards and goal: “met”, “not met”, “not demonstrated”

Table B5. 2008 compliance summary for particles as PM_{10}

AAQ NEPM Standard
50 $^{ug/m3}$ (24-hour average)

Regional Performance Monitoring Station	Data availability rates (% of days)					Number of exceedences (Days)	Performance against the standards and goal
	Q1	Q2	Q3	Q4	Annual		
Perth Region							
Caversham (North East Metro)	99.6	99.5	99.5	98.8	99.3	0	met
Duncraig (North Metro)	99.6	99.7	97.9	99.7	99.2	0	met
Gosnells (South Metro)	99.5	99.5	99.4	84.8	95.8	7	not met
South Lake (South East Metro)	99.8	99.5	99.5	99.6	99.6	1	met
Southwest Region							
Albany	99.9	99.7	97.1	99.9	99.2	2	met
Bunbury	99.4	98.4	99.8	99.8	99.4	0	met
Collie	93	99.5	100	99.5	98.7	7	not met
Midwest Region							
Geraldton	99.8	100	96.3	99.7	98.9	10	not met

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

Table B6. 2008 compliance summary for particles as $PM_{2.5}$

AAQ NEPM Advisory Standard
25 ug/m^3 (24-hour average)

Regional Performance Monitoring Station	Data availability rates (% of days)					Number of exceedences (Days)	Performance against the standards and goal
	Q1	Q2	Q3	Q4	Annual		
Perth Region							
Caversham (North East Metro)	99.3	99.3	99.2	99.7	99.4	1	n/a
Duncraig (North Metro)	99.3	99.5	99.1	99.3	99.3	1	n/a
Quinns Rocks (Outer North Coast)	99.7	99.2	98.6	99.7	99.3	1	n/a
South Lake (South East Metro)	99.8	99.4	99.5	98.8	99.4	1	n/a
Southwest Region							
Bunbury	99.4	99.5	100	99.8	99.7	2	n/a
Busselton	99.7	99.6	98.5	99.4	99.3	3	n/a

SECTION C – ANALYSIS OF AIR QUALITY MONITORING

Carbon monoxide

The NEPM standard for carbon monoxide of 9.0 ppm averaged over eight hours was not exceeded at any site during 2008. The NEPM goal of no more than 1 exceedence at each site was met. Table C1 contains the summary statistics for daily peak eight-hour CO in Western Australia.

Table C1. 2008 summary statistics for daily peak eight-hour carbon monoxide

AAQ NEPM Standard
9.0 ppm (8-hour average)

Regional Performance Monitoring Station	Data Recovery Rates (%)	Highest (ppm)	Highest (date)	Highest (time)	2nd Highest (ppm)	2nd Highest (date)	2nd Highest (time)
Perth Region							
Caversham (North East Metro)	99.5	0.8	09/05/2008	0200	0.8	28/07/2008	0300
Duncraig (North Metro)	99	3.1	20/07/2008	0800	2.6	23/06/2008	0400
Queen's Buildings (CBD)	0	-	00/00/0000	0000	-	00/00/0000	0000
South Lake (South East Metro)	99.6	2.0	20/07/2008	0400	1.7	21/07/2008	0900

Nitrogen dioxide

The NEPM standard for nitrogen dioxide of 0.12 ppm averaged over one hour and the 0.03 ppm annual average were not exceeded at any site during 2008. The NEPM goal of no more than 1 exceedence at each site was met. Table C2 contains the summary statistics for daily peak 1-hour NO_2 in Western Australia.

Table C2. 2008 summary statistics for daily peak one-hour nitrogen dioxide

AAQ NEPM Standard
0.12 ppm (one-hour average)

Regional Performance Monitoring Station	Data Recovery Rates (%)	Highest (ppm)	Highest (date)	Highest (time)	2nd Highest (ppm)	2nd Highest (date)	2nd Highest (time)
Perth Region							
Caversham (North East Metro)	99.5	0.036	06/05/2008	2000	0.035	08/09/2008	1900
Duncraig (North Metro)	97.7	0.038	06/05/2008	2000	0.036	13/04/2008	2000
Hope Valley (South Metro)	27.5	0.027	05/02/2008	2400	0.027	28/02/2008	2100
Queen's Buildings (CBD)	0	-	00/00/0000	0000	-	00/00/0000	0000
Quinns Rocks (Outer North Coast)	96.1	0.037	06/05/2008	2200	0.034	27/03/2008	2200
Rockingham (South Coast)	99.3	0.031	21/05/2008	2300	0.029	14/07/2008	2000
Rolling Green (Outer East Rural)	99.3	0.023	10/10/2008	2000	0.022	19/06/2008	0800
South Lake (South East Metro)	99.6	0.044	25/01/2008	1700	0.044	18/12/2008	1600
Swanbourne (Inner West Coast)	98.2	0.035	02/05/2008	2300	0.035	05/08/2008	2100

Photochemical smog as ozone

The NEPM standard for ozone of 0.10 ppm averaged over one hour was not exceeded at any site during 2008. 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_3 in Western Australia.

Table C3. 2008 summary statistics for daily peak 1-hour ozone

AAQ NEPM Standard
0.10 ppm (1-hour average)

Regional Performance Monitoring Station	Data Recovery Rates (%)	Highest (ppm)	Highest (date)	Highest (time)	2nd Highest (ppm)	2nd Highest (date)	2nd Highest (time)
Perth Region							
Caversham (North East Metro)	99.5	0.083	19/12/2008	1200	0.080	25/01/2008	1400
Quinns Rocks (Outer North Coast)	99.4	0.083	16/04/2008	1500	0.080	11/02/2008	1400
Rockingham (South Coast)	99.4	0.077	16/04/2008	1200	0.068	28/02/2008	1300
Rolling Green (Outer East Rural)	99.5	0.087	25/01/2008	1700	0.086	05/03/2008	1600
South Lake (South East Metro)	99.6	0.082	16/04/2008	1500	0.066	25/01/2008	1300
Swanbourne (Inner West Coast)	98.2	0.076	26/02/2008	1500	0.074	17/01/2008	1500

The NEPM standard for ozone of 0.08 ppm averaged over four hours was not exceeded at any site during 2008. 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_3 in Western Australia.

Table C4. 2008 summary statistics for daily peak 4-hour ozone

AAQ NEPM Standard
0.08 ppm (4-hour average)

Regional Performance Monitoring Station	Data Recovery Rates (%)	Highest (ppm)	Highest (date)	Highest (time)	2nd Highest (ppm)	2nd Highest (date)	2nd Highest (time)
Perth Region							
Caversham (North East Metro)	99.5	0.076	19/12/2008	1400	0.063	25/01/2008	1700
Quinns Rocks (Outer North Coast)	99.4	0.073	16/04/2008	1600	0.069	25/01/2008	1500
Rockingham (South Coast)	99.4	0.072	16/04/2008	1500	0.062	28/02/2008	1600
Rolling Green (Outer East Rural)	99.5	0.075	05/03/2008	1800	0.071	25/01/2008	2000
South Lake (South East Metro)	99.6	0.067	16/04/2008	1600	0.063	25/01/2008	1500
Swanbourne (Inner West Coast)	98.2	0.070	26/02/2008	1600	0.066	16/04/2008	1600

Sulfur dioxide

The NEPM standard for sulfur dioxide of 0.20 ppm averaged over one hour was not exceeded at any site during 2008. 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_2 in Western Australia.

Table C5. 2008 summary statistics for daily peak 1-hour sulfur dioxide

AAQ NEPM Standard
0.20 ppm (1-hour average)

Regional Performance Monitoring Station	Data Recovery Rates (%)	Highest (ppm)	Highest (date)	Highest (time)	2nd Highest (ppm)	2nd Highest (date)	2nd Highest (time)
Perth Region							
Hope Valley (South Metro)	30.4	0.038	25/01/2008	1400	0.032	25/02/2008	1500
Rockingham (South Coast)	98.3	0.079	23/06/2008	1000	0.034	22/07/2008	2400
South Lake (South East Metro)	99.6	0.046	23/01/2008	1700	0.037	18/12/2008	1600
Wattleup (South Metro)	89.6	0.077	24/01/2008	1500	0.050	25/02/2008	1700

The NEPM standard for sulfur dioxide of 0.08 ppm averaged over 24 hours was not exceeded at any site during 2008. The NEPM goal of no more than 1 exceedence at each site was met. Table C6 contains the summary statistics for daily peak 24-hour SO_2 in Western Australia.

Table C6. 2008 summary statistics for 24-hour sulfur dioxide

AAQ NEPM Standard
0.08 ppm (24-hour average)

Regional Performance Monitoring Station	Data Recovery Rates (%)	Highest (ppm)	Highest (date)	Highest (time)	2nd Highest (ppm)	2nd Highest (date)	2nd Highest (time)
Perth Region							
Hope Valley (South Metro)	30.4	0.005	05/03/2008	2400	0.004	09/04/2008	2400
Rockingham (South Coast)	98.3	0.007	08/07/2008	2400	0.007	23/06/2008	2400
South Lake (South East Metro)	99.6	0.005	14/01/2008	2400	0.005	23/01/2008	2400
Wattleup (South Metro)	89.6	0.011	24/01/2008	2400	0.006	17/01/2008	2400

Particles as PM_{10}

The NEPM standard for particles as PM_{10} of 50 µg/m^3 averaged over 24 hours was exceeded during 2008 once at South Lake (55.0 ug/m^3 on 16/04/2008), 7 times at Gosnells (53.1 ug/m^3 on 03/01/2008, 51.4 ug/m^3 on 16/01/2008, 53.4 ug/m^3 on 17/01/2008, 54.6 ug/m^3 on 28/02/2008, 61.1 ug/m^3 on 14/04/2008, 61.4 ug/m^3 on 15/10/2008 and 66.8 ug/m^3 on 20/10/2008), twice at Albany (54.1 ug/m^3 on 16/02/2008 and 56.3 ug/m^3 on 15/04/2008), 7 times at Collie (55.2 ug/m^3 on 28/03/2008, 65.0 ug/m^3 on 04/04/2008, 86.0 ug/m^3 on 13/04/2008, 66.4 ug/m^3 on 13/11/2008, 57.0 ug/m^3 on 14/11/2008, 50.4 ug/m^3 on 01/12/2008 and 51.5 ug/m^3 on 29/12/2008) and 10 times at Geraldton (99.4 ug/m^3 on 16/01/2008, 53.2 ug/m^3 on 17/01/2008, 136.6 ug/m^3 on 19/02/2008, 59.7 ug/m^3 on 20/02/2008, 61.8 ug/m^3 on 22/02/2008, 150.7 ug/m^3 on 18/03/2008, 53.5 ug/m^3 on 25/03/2008, 62.6 ug/m^3 on 23/10/2008, 149.4 ug/m^3 on 11/12/2008 and 115.1 ug/m^3 on 12/12/2008). The NEPM goal of no more than five exceedences was met at all sites except Gosnells and Geraldton where the goal was not met. Table C7 contains the summary statistics for daily peak 24-hour PM_{10} in Western Australia.

Table C7. 2008 summary statistics for 24-hour particles as PM_{10} [1]

AAQ NEPM Standard
50 ug/m^3 (24-hour average)

Regional Performance Monitoring Station	Data Recovery Rates (%)	Highest (ug/m^3)	Highest (date)	Highest (time)	6th Highest (ug/m^3)	6th Highest (date)	6th Highest (time)
Perth Region							
Caversham (North East Metro)	99.3	39.1	18/01/2008	2400	34.9	26/01/2008	2400
Duncraig (North Metro)	99.2	46.9	16/04/2008	2400	33.2	08/01/2008	2400
Gosnells (South Metro)	95.8	66.8	20/10/2008	2400	53.1	03/01/2008	2400
South Lake (South East Metro)	99.6	55.0	16/04/2008	2400	38.9	12/02/2008	2400
Southwest Region							
Albany	99.2	56.3	15/04/2008	2400	33.7	14/02/2008	2400
Bunbury	99.4	39.1	02/12/2008	2400	31.2	18/01/2008	2400
Collie	98.7	85.9	13/04/2008	2400	51.5	29/12/2008	2400
Midwest Region							
Geraldton	98.9	150.7	18/03/2008	2400	62.6	23/10/2008	2400

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

Particles as $PM_{2.5}$

The NEPM advisory standard for particles as $PM_{2.5}$ of 25 micrograms per cubic metre averaged over 24 hours was exceeded once at Caversham (26.3 ug/m^3 on 16/04/2008), Duncraig (38.3 ug/m^3 on 16/04/2008), Quinns Rocks (53.3 ug/m^3 on 16/04/2008) and South Lake (45.2 ug/m^3 on 16/04/2008), twice at Bunbury (27.8 ug/m^3 on 30/12/2008 and 26.4 ug/m^3 on 02/12/2008) and three times at Busselton (35.6 ug/m^3 on 09/10/2008, 28.0 ug/m^3 on 15/01/2008 and 25.5 ug/m^3 02/12/2008). Table C8 contains the summary statistics for daily peak 24-hour $PM_{2.5}$ in Western Australia.

Table C8. 2008 summary statistics for 24-hour particles as $PM_{2.5}$ [1]

AAQ NEPM Advisory Standard 25 ug/m^3 (24-hour average)

Regional Performance Monitoring Station	Data Recovery Rates (%)	Highest (ug/m^3)	Highest (date)	Highest (time)	6th Highest (ug/m^3)	6th Highest (date)	6th Highest (time)
Perth Region							
Caversham (North East Metro)	99.4	26.3	16/04/2008	2400	15.0	14/01/2008	2400
Duncraig (North Metro)	99.3	38.3	16/04/2008	2400	17.1	14/01/2008	2400
Quinns Rocks (Outer North Coast)	99.3	53.3	16/04/2008	2400	16.1	14/01/2008	2400
South Lake (South East Metro)	99.4	45.2	16/04/2008	2400	14.4	20/07/2008	2400
Southwest Region							
Bunbury	99.7	27.8	30/12/2008	2400	19.7	07/05/2008	2400
Busselton	99.3	35.6	09/10/2008	2400	17.3	13/06/2008	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 $PM_{2.5}$ of 8 micrograms per cubic metre averaged over one year was not exceeded during 2008.

Table C9. 2008 summary statistics for annual particles as $PM_{2.5}$ [1]

AAQ NEPM Advisory Standard 8 ug/m^3 (annual average)

Regional Performance Monitoring Station	Data Recovery Rates (%)	annual average (ug/m^3)
Perth Region		
Caversham (North East Metro)	99.4	7.1
Duncraig (North Metro)	99.3	7.7
Quinns Rocks (Outer North Coast)	99.3	7.2
South Lake (South East Metro)	99.4	7.7
Southwest Region		
Bunbury	99.7	7.6
Busselton	99.3	7.3

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 2008

Table D1. 2008 percentiles of daily peak 8-hour carbon monoxide concentrations

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)
Perth Region								
Caversham (North East Metro)	99.5	0.8	0.7	0.7	0.6	0.5	0.3	0.2
Duncraig (North Metro)	99	3.1	1.9	1.7	1.4	1.0	0.4	0.2
Queen's Buildings (CBD)	0	-	-	-	-	-	-	-
South Lake (South East Metro)	99.6	2.0	1.6	1.4	1.2	0.9	0.4	0.2

Table D2. 2008 percentiles 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)	90th percentile (ppm)	75th percentile (ppm)	50th percentile (ppm)
Perth Region								
Caversham (North East Metro)	99.5	0.036	0.033	0.032	0.028	0.026	0.022	0.015
Duncraig (North Metro)	97.7	0.038	0.034	0.030	0.029	0.027	0.024	0.018
Hope Valley (South Metro)	27.5	0.027	0.026	0.026	0.022	0.019	0.014	0.009
Queen's Buildings (CBD)	0	-	-	-	-	-	-	-
Quinns Rocks (Outer North Coast)	96.1	0.037	0.033	0.032	0.028	0.025	0.017	0.010
Rockingham (South Coast)	99.3	0.031	0.028	0.027	0.025	0.024	0.019	0.013
Rolling Green (Outer East Rural)	99.3	0.023	0.020	0.019	0.016	0.015	0.011	0.007
South Lake (South East Metro)	99.6	0.044	0.040	0.038	0.033	0.030	0.026	0.020
Swanbourne (Inner West Coast)	98.2	0.035	0.034	0.033	0.031	0.029	0.023	0.015

Table D3. 2008 percentiles of daily peak 1-hour ozone concentrations

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)
Perth Region								
Caversham (North East Metro)	99.5	0.083	0.067	0.066	0.053	0.046	0.035	0.031
Quinns Rocks (Outer North Coast)	99.4	0.083	0.073	0.060	0.052	0.043	0.037	0.033
Rockingham (South Coast)	99.4	0.077	0.063	0.053	0.045	0.038	0.035	0.031
Rolling Green (Outer East Rural)	99.5	0.087	0.080	0.071	0.056	0.047	0.036	0.031
South Lake (South East Metro)	99.6	0.082	0.061	0.056	0.044	0.037	0.033	0.029
Swanbourne (Inner West Coast)	98.2	0.076	0.067	0.060	0.048	0.042	0.036	0.032

Table D4. 2008 percentiles 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)	90th percentile (ppm)	75th percentile (ppm)	50th percentile (ppm)
Perth Region								
Caversham (North East Metro)	99.5	0.076	0.061	0.056	0.047	0.041	0.034	0.029
Quinns Rocks (Outer North Coast)	99.4	0.073	0.061	0.055	0.046	0.041	0.035	0.032
Rockingham (South Coast)	99.4	0.072	0.058	0.049	0.042	0.036	0.033	0.029
Rolling Green (Outer East Rural)	99.5	0.075	0.065	0.062	0.051	0.043	0.034	0.030
South Lake (South East Metro)	99.6	0.067	0.051	0.046	0.040	0.034	0.031	0.027
Swanbourne (Inner West Coast)	98.2	0.070	0.060	0.053	0.045	0.039	0.034	0.031

Table D5. 2008 percentiles of daily peak 1-hour sulfur dioxide concentrations

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)
Perth Region								
Hope Valley (South Metro)	30.4	0.038	0.031	0.028	0.018	0.013	0.006	0.002
Rockingham (South Coast)	98.3	0.079	0.026	0.019	0.015	0.008	0.002	0.001
South Lake (South East Metro)	99.6	0.046	0.025	0.020	0.014	0.010	0.004	0.001
Wattleup (South Metro)	89.6	0.077	0.034	0.028	0.022	0.016	0.009	0.003

Table D6. 2008 percentiles of daily peak 24-hour sulfur dioxide concentrations

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)
Perth Region								
Hope Valley (South Metro)	30.4	0.005	0.004	0.003	0.003	0.002	0.001	0.001
Rockingham (South Coast)	98.3	0.007	0.005	0.004	0.002	0.001	0.001	0.000
South Lake (South East Metro)	99.6	0.005	0.003	0.003	0.002	0.001	0.001	0.000
Wattleup (South Metro)	89.6	0.011	0.005	0.004	0.003	0.002	0.002	0.001

Table D7. 2008 percentiles of daily peak 24-hour particles as PM_{10} concentrations

Regional Performance Monitoring Station	Data availability rates (%)	Max conc. ($\mu g/m^3$)	99th percentile ($\mu g/m^3$)	98th percentile ($\mu g/m^3$)	95th percentile ($\mu g/m^3$)	90th percentile ($\mu g/m^3$)	75th percentile ($\mu g/m^3$)	50th percentile ($\mu g/m^3$)
Perth Region								
Caversham (North East Metro)	99.3	39.1	37.0	32.5	26.1	22.5	17.1	12.9
Duncraig (North Metro)	99.2	46.9	34.4	31.1	25.8	21.9	17.5	13.9
Gosnells (South Metro)	95.8	66.8	54.0	49.5	36.2	27.9	19.3	14.1
South Lake (South East Metro)	99.6	55.0	39.9	36.1	30.3	25.8	19.3	14.8
Southwest Region								
Albany	99.2	56.3	34.1	32.8	26.1	22.7	16.8	13.4
Bunbury	99.4	39.1	31.4	30.3	27.3	23.7	18.8	14.9
Midwest Region								
Geraldton	98.9	150.7	105.2	58.1	45.9	38.6	26.2	17.6

Table D8. 2008 percentiles of daily peak 24-hour particles as $PM_{2.5}$ concentrations

Regional Performance Monitoring Station	Data availability rates (%)	Max conc. ($\mu g/m^3$)	99th percentile ($\mu g/m^3$)	98th percentile ($\mu g/m^3$)	95th percentile ($\mu g/m^3$)	90th percentile ($\mu g/m^3$)	75th percentile ($\mu g/m^3$)	50th percentile ($\mu g/m^3$)
Perth Region								
Caversham (North East Metro)	99.4	26.3	15.2	14.0	11.7	10.6	8.2	6.5
Duncraig (North Metro)	99.3	38.3	18.0	15.9	12.6	11.1	9.0	7.0
Quinns Rocks (Outer North Coast)	99.3	53.3	17.3	15.4	12.8	11.3	8.5	6.5
South Lake (South East Metro)	99.4	45.2	18.2	14.1	12.7	11.2	9.2	6.9
Southwest Region								
Bunbury	99.7	27.8	21.0	18.6	13.2	11.4	8.8	6.8
Busselton	99.3	35.6	20.5	15.5	11.9	10.5	8.3	6.8

Maxima and percentiles by site 1999 to 2008

Table D9. Daily peak 8-hour carbon monoxide at Caversham (1999-2008)
Trend station/region: Caversham AAQ NEPM Standard 9.0 ppm (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)
1999	99.6	0	1.6	1.2	1.1	0.8	0.6
2000	99.3	0	1.4	1.0	1.0	0.8	0.6
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

Table D10. Daily peak 8-hour carbon monoxide at Duncraig (1999-2008)
Trend station/region: Duncraig AAQ NEPM Standard 9.0 ppm (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)
1999	96.9	0	6.6	4.5	4.2	2.8	2.0
2000	98.7	0	4.8	3.5	3.0	2.3	1.6
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

Table D11. Daily peak 8-hour carbon monoxide at Queen's Buildings (1999-2008)
Trend station/region: Queen's Buildings AAQ NEPM Standard
9.0 ppm (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)
1999	99.4	0	5.0	4.3	4.0	3.6	3.1
2000	98.7	0	4.3	3.5	3.3	3.0	2.7
2001	99.6	0	4.8	3.9	3.1	2.5	2.4
2002	96.8	0	4.7	2.7	2.5	2.2	2.0
2003	95.9	0	2.8	2.2	2.2	2.0	1.8
2004	99.5	0	2.8	2.1	2.0	1.7	1.6
2005	99.7	0	4.2	2.7	2.0	1.6	1.4
2006	99.7	0	2.9	1.8	1.5	1.2	1.1
2007	24.8	0	1.6	1.1	1.0	0.8	0.7
2008	0.0	0	-	-	-	-	-

Table D12. Daily peak 8-hour carbon monoxide at South Lake (1999-2008)
Trend station/region: South Lake AAQ NEPM Standard
9.0 ppm (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)
1999	0.0	0					
2000	82.3	0	3.6	2.2	2.1	1.8	1.6
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

Table D13. Daily peak 1-hour nitrogen dioxide at Caversham (1999-2008)
Trend station/region: Caversham AAQ NEPM Standard
0.12 ppm (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)
1999	99.6	0	0.038	0.031	0.030	0.028	0.025
2000	99.3	0	0.044	0.035	0.033	0.030	0.028
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

Table D14. Daily peak 1-hour nitrogen dioxide at Duncraig (1999-2008)
Trend station/region: Duncraig AAQ NEPM Standard
0.12 ppm (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)
1999	93.5	0	0.049	0.035	0.032	0.030	0.027
2000	98.7	0	0.050	0.035	0.033	0.031	0.029
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

Table D15. Daily peak 1-hour nitrogen dioxide at Hope Valley (1999-2008)
Trend station/region: Hope valley AAQ NEPM Standard
0.12 ppm (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)
1999	98.8	0	0.032	0.028	0.026	0.024	0.022
2000	99.6	0	0.033	0.030	0.028	0.025	0.023
2001	99.6	0	0.033	0.031	0.030	0.027	0.025
2002	99.6	0	0.039	0.033	0.030	0.028	0.024
2003	94.6	0	0.039	0.034	0.028	0.024	0.021
2004	99.6	0	0.034	0.032	0.028	0.024	0.021
2005	99.2	0	0.035	0.030	0.027	0.025	0.023
2006	95.6	0	0.045	0.030	0.029	0.026	0.024
2007	93.8	0	0.084	0.031	0.028	0.025	0.023
2008	27.5	0	0.027	0.026	0.026	0.022	0.019

Table D16. Daily peak 1-hour nitrogen dioxide at Queen's Buildings (1999-2008)
Trend station/region: Queen's Buildings AAQ NEPM Standard
0.12 ppm (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)
1999	99.4	0	0.073	0.063	0.061	0.054	0.047
2000	98.6	0	0.073	0.068	0.065	0.056	0.049
2001	99.5	0	0.082	0.065	0.064	0.058	0.055
2002	99.0	0	0.091	0.077	0.072	0.060	0.055
2003	95.9	1	0.121	0.075	0.067	0.058	0.055
2004	99.5	0	0.075	0.070	0.064	0.058	0.050
2005	89.2	0	0.113	0.072	0.058	0.051	0.045
2006	99.7	0	0.068	0.057	0.051	0.047	0.043
2007	24.8	0	0.055	0.047	0.046	0.044	0.041
2008	0.0	0	-	-	-	-	-

Table D17. Daily peak 1-hour nitrogen dioxide at Quinns Rocks (1999-2008)
Trend station/region: Quinns Rocks AAQ NEPM Standard
0.12 ppm (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)
1999	98.5	0	0.034	0.030	0.029	0.025	0.023
2000	98.7	0	0.045	0.032	0.031	0.028	0.025
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

Table D18. Daily peak 1-hour nitrogen dioxide at Rockingham (1999-2008)
Trend station/region: Rockingham AAQ NEPM Standard
0.12 ppm (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)
1999	93.5	0	0.030	0.029	0.028	0.025	0.024
2000	99.4	0	0.048	0.041	0.039	0.036	0.032
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

Table D19. Daily peak 1-hour nitrogen dioxide at Rolling Green (1999-2008)
Trend station/region: Rolling Green AAQ NEPM Standard
0.12 ppm (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)
1999	98.7	0	0.024	0.017	0.016	0.015	0.012
2000	97.1	0	0.027	0.021	0.019	0.015	0.014
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

Table D20. Daily peak 1-hour nitrogen dioxide at South Lake (1999-2008)
Trend station/region: South Lake AAQ NEPM Standard
0.12 ppm (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)
1999	0.0	0	-	-	-	-	-
2000	81.3	0	0.041	0.035	0.032	0.031	0.029
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

Table D21. Daily peak 1-hour nitrogen dioxide at Swanbourne (1999-2008)
Trend station/region: Swanbourne AAQ NEPM Standard
0.12 ppm (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)
1999	95.3	0	0.037	0.034	0.033	0.031	0.028
2000	98.0	0	0.045	0.038	0.036	0.034	0.030
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

Table D22. Daily peak 1-hour ozone at Caversham (1999-2008)
Trend station/region: Caversham AAQ NEPM Standard
0.10 ppm (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)
1999	99.5	1	0.101	0.083	0.075	0.061	0.048
2000	99.3	0	0.084	0.069	0.064	0.054	0.046
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

Table D23. Daily peak 1-hour ozone at Quinns Rocks (1999-2008)
Trend station/region: Quinns Rocks AAQ NEPM Standard
0.10 ppm (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)
1999	98.6	1	0.105	0.070	0.068	0.058	0.046
2000	98.7	0	0.078	0.069	0.067	0.055	0.045
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

Table D24. Daily peak 1-hour ozone at Rockingham (1999-2008)
Trend station/region: Rockingham AAQ NEPM Standard
0.10 ppm (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)
1999	99.0	0	0.076	0.067	0.060	0.050	0.040
2000	99.4	0	0.083	0.077	0.063	0.050	0.040
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	0.102	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

Table D25. Daily peak 1-hour ozone at Rolling Green (1999-2008)
Trend station/region: Rolling Green AAQ NEPM Standard
0.10 ppm (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)
1999	98.8	0	0.096	0.080	0.073	0.064	0.052
2000	97.1	0	0.092	0.072	0.065	0.058	0.049
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	0.101	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

Table D26. Daily peak 1-hour ozone at South Lake (1999-2008)

Trend station/region: South Lake

AAQ NEPM Standard
0.10 ppm (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)
1999	0.0	0	-	-	-	-	-
2000	83.3	0	0.077	0.061	0.053	0.043	0.038
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

Table D27. Daily peak 1-hour ozone at Swanbourne (1999-2008)

Trend station/region: Swanbourne

AAQ NEPM Standard
0.10 ppm (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)
1999	96.6	0	0.088	0.069	0.064	0.054	0.042
2000	98.0	0	0.079	0.069	0.064	0.053	0.043
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

Table D28. Daily peak 4-hour ozone at Caversham (1999-2008)

Trend station/region: Caversham

AAQ NEPM Standard
0.08 ppm (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)
1999	99.5	0	0.080	0.071	0.064	0.052	0.043
2000	99.3	0	0.058	0.056	0.054	0.047	0.041
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

Table D29. Daily peak 4-hour ozone at Quinns Rocks (1999-2008)
Trend station/region: Quinns Rocks AAQ NEPM Standard
0.08 ppm (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)
1999	98.6	1	0.083	0.061	0.057	0.051	0.042
2000	98.7	0	0.072	0.064	0.059	0.048	0.041
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

Table D30. Daily peak 4-hour ozone at Rockingham (1999-2008)
Trend station/region: Rockingham AAQ NEPM Standard
0.08 ppm (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)
1999	99.0	0	0.067	0.060	0.055	0.045	0.038
2000	99.4	0	0.078	0.069	0.059	0.046	0.037
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

Table D31. Daily peak 4-hour ozone at Rolling Green (1999-2008)
Trend station/region: Rolling Green AAQ NEPM Standard
0.08 ppm (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)
1999	98.8	0	0.077	0.070	0.059	0.055	0.046
2000	97.1	0	0.075	0.059	0.055	0.047	0.041
2001	99.0	2	0.094	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

Table D32. Daily peak 4-hour ozone at South Lake (1999-2008)
Trend station/region: South Lake

AAQ NEPM Standard
0.08 ppm (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)
1999	0.0	0	-	-	-	-	-
2000	83.3	0	0.067	0.051	0.045	0.037	0.035
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

Table D33. Daily peak 4-hour ozone at Swanbourne (1999-2008)
Trend station/region: Swanbourne

AAQ NEPM Standard
0.10 ppm (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)
1999	96.6	0	0.074	0.060	0.056	0.048	0.039
2000	98.0	0	0.073	0.065	0.057	0.047	0.039
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

Table D34. Daily peak 1-hour sulfur dioxide at Hope Valley (1999-2008)
Trend station/region: Hope Valley

AAQ NEPM Standard
0.20 ppm (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)
1999	98.7	0	0.064	0.036	0.029	0.019	0.014
2000	99.4	0	0.079	0.051	0.036	0.020	0.014
2001	99.6	0	0.044	0.029	0.025	0.019	0.013
2002	99.6	0	0.058	0.048	0.032	0.024	0.017
2003	94.1	0	0.060	0.041	0.031	0.024	0.017
2004	99.6	0	0.061	0.045	0.040	0.031	0.022
2005	99.2	0	0.074	0.047	0.036	0.027	0.019
2006	99.3	0	0.105	0.054	0.044	0.032	0.024
2007	99.5	0	0.190	0.056	0.045	0.033	0.025
2008	30.4	0	0.038	0.031	0.028	0.018	0.013

Table D35. Daily peak 1-hour sulfur dioxide at Rockingham (1999-2008)
Trend station/region: Rockingham AAQ NEPM Standard
0.20 ppm (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)
1999	99.0	0	0.047	0.027	0.024	0.016	0.011
2000	98.8	0	0.034	0.021	0.017	0.010	0.006
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

Table D36. Daily peak 1-hour sulfur dioxide at South Lake (1999-2008)
Trend station/region: South Lake AAQ NEPM Standard
0.20 ppm (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)
1999	0.0	0	-	-	-	-	-
2000	82.5	0	0.042	0.027	0.024	0.019	0.013
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

Table D37. Daily peak 1-hour sulfur dioxide at Wattleup (1999-2008)
Trend station/region: Wattleup AAQ NEPM Standard
0.20 ppm (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)
1999	99.3	0	0.060	0.033	0.030	0.022	0.017
2000	99.7	0	0.046	0.034	0.027	0.022	0.016
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

Table D38. Daily peak 24-hour sulfur dioxide at Hope Valley (1999-2008)

Trend station/region: Hope Valley — AAQ NEPM Standard 0.08 ppm (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)
1999	98.7	0	0.007	0.004	0.003	0.003	0.002
2000	99.4	0	0.007	0.005	0.003	0.003	0.002
2001	99.6	0	0.004	0.004	0.003	0.002	0.002
2002	99.6	0	0.007	0.006	0.004	0.003	0.002
2003	94.1	0	0.006	0.005	0.004	0.003	0.002
2004	99.6	0	0.009	0.006	0.006	0.004	0.003
2005	99.2	0	0.011	0.007	0.005	0.004	0.003
2006	99.3	0	0.012	0.007	0.005	0.004	0.003
2007	99.5	0	0.015	0.011	0.008	0.006	0.004
2008	30.4	0	0.005	0.004	0.003	0.003	0.002

Table D39. Daily peak 24-hour sulfur dioxide at Rockingham (1999-2008)

Trend station/region: Rockingham — AAQ NEPM Standard 0.08 ppm (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)
1999	99.0	0	0.016	0.008	0.006	0.004	0.002
2000	98.8	0	0.012	0.003	0.003	0.002	0.001
2001	99.2	0	0.009	0.004	0.003	0.002	0.001
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

Table D40. Daily peak 24-hour sulfur dioxide at South Lake (1999-2008)

Trend station/region: South Lake — AAQ NEPM Standard 0.08 ppm (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)
1999	0.0	0	-	-	-	-	-
2000	82.5	0	0.004	0.003	0.003	0.003	0.002
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

Table D41. Daily peak 24-hour sulfur dioxide at Wattleup (1999-2008)
Trend station/region: Wattleup AAQ NEPM Standard 0.08 ppm (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)
1999	99.3	0	0.007	0.005	0.005	0.004	0.003
2000	99.7	0	0.006	0.004	0.004	0.003	0.002
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

Table D42. Daily peak 24-hour particles as PM_{10} at Caversham (1999-2008)
Trend station/region: Caversham AAQ NEPM Standard 50 ug/m3 (24-hour average)

Year	Data Recovery (%)	No. of exceedences (days)	Max conc. ($\mu g/m^3$)	99th percentile ($\mu g/m^3$)	98th percentile ($\mu g/m^3$)	95th percentile ($\mu g/m^3$)	90th percentile ($\mu g/m^3$)
1999	0.0	0	-	-	-	-	-
2000	0.0	0	-	-	-	-	-
2001	0.0	0	-	-	-	-	-
2002	0.0	0	-	-	-	-	-
2003	0.0	0	-	-	-	-	-
2004	93.2	1	58.0	39.0	34.4	29.7	25.4
2005	98.2	1	76.8	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	58.8	39.7	35.9	30.3	26.1
2008	99.3	0	39.1	37.0	32.5	26.1	22.5

Table D43. Daily peak 24-hour particles as PM_{10} at Duncraig (1999-2008)
Trend station/region: Duncraig AAQ NEPM Standard 50 ug/m3 (24-hour average)

Year	Data Recovery (%)	No. of exceedences (days)	Max conc. ($\mu g/m^3$)	99th percentile ($\mu g/m^3$)	98th percentile ($\mu g/m^3$)	95th percentile ($\mu g/m^3$)	90th percentile ($\mu g/m^3$)
1999	97.2	0	35.2	32.0	29.3	25.3	22.4
2000	76.5	0	29.8	28.0	25.2	24.0	22.2
2001	99.5	1	53.6	34.3	31.9	27.5	23.4
2002	97.6	1	54.0	37.5	30.8	26.4	24.2
2003	99.1	1	66.7	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	59.2	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

Table D44. Daily peak 24-hour particles as PM_{10} at Gosnells (1999-2008)
Trend station/region: Gosnells AAQ NEPM Standard 50 ug/m3 (24-hour average)

Year	Data Recovery (%)	No. of exceedences (days)	Max conc. ($\mu g/m^3$)	99th percentile ($\mu g/m^3$)	98th percentile ($\mu g/m^3$)	95th percentile ($\mu g/m^3$)	90th percentile ($\mu g/m^3$)
1999	0.0	0	-	-	-	-	-
2000	0.0	0	-	-	-	-	-
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	9.4	0	40.3	31.8	29.4	25.8	22.0
2008	95.8	7	66.8	54.0	49.5	36.2	27.9

Table D45. Daily peak 24-hour particles as PM_{10} at South Lake (1999-2008)
Trend station/region: South Lake AAQ NEPM Standard 50 ug/m3 (24-hour average)

Year	Data Recovery (%)	No. of exceedences (days)	Max conc. ($\mu g/m^3$)	99th percentile ($\mu g/m^3$)	98th percentile ($\mu g/m^3$)	95th percentile ($\mu g/m^3$)	90th percentile ($\mu g/m^3$)
1999	0.0	0	-	-	-	-	-
2000	82.7	0	39.6	33.2	30.6	29.3	26.0
2001	99.1	1	56.7	37.3	33.2	27.7	25.3
2002	99.3	2	82.6	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	50.5	35.8	32.8	30.2	26.2
2005	98.8	3	98.8	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	56.7	37.7	36.0	32.9	26.7
2008	99.6	1	55.0	39.9	36.1	30.3	25.8

Table D46. Daily peak 24-hour particles as PM_{10} at Bunbury (1999-2008)
Trend station/region: Bunbury AAQ NEPM Standard 50 ug/m3 (24-hour average)

Year	Data Recovery (%)	No. of exceedences (days)	Max conc. ($\mu g/m^3$)	99th percentile ($\mu g/m^3$)	98th percentile ($\mu g/m^3$)	95th percentile ($\mu g/m^3$)	90th percentile ($\mu g/m^3$)
1999	52.3	0	40.0	33.8	30.8	27.7	24.6
2000	99.5	0	42.4	33.8	31.0	28.4	24.8
2001	99.6	1	57.6	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	54.5	34.2	33.3	30.2	26.3
2004	92.4	4	99.5	51.8	38.2	29.9	26.3
2005	99.1	3	63.3	37.9	33.3	27.5	24.9
2006	99.2	3	123.5	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

Table D47. Daily peak 24-hour particles as PM_{10} at Albany (1999-2008)
Trend station/region: Albany AAQ NEPM Standard 50 ug/m3 (24-hour average)

Year	Data Recovery (%)	No. of exceedences (days)	Max conc. ($\mu g/m^3$)	99th percentile ($\mu g/m^3$)	98th percentile ($\mu g/m^3$)	95th percentile ($\mu g/m^3$)	90th percentile ($\mu g/m^3$)
1999	0.0	0	-	-	-	-	-
2000	0.0	0	-	-	-	-	-
2001	0.0	0	-	-	-	-	-
2002	0.0	0	-	-	-	-	-
2003	0.0	0	-	-	-	-	-
2004	0.0	0	-	-	-	-	-
2005	0.0	0	-	-	-	-	-
2006	52.1	0	39.4	35.4	33.0	26.6	24.6
2007	99.8	1	55.7	31.3	28.0	24.7	22.1
2008	99.2	2	56.3	34.1	32.8	26.1	22.7

Table D48. Daily peak 24-hour particles as PM_{10} at Geraldton (1999-2008)
Trend station/region: Geraldton AAQ NEPM Standard 50 ug/m3 (24-hour average)

Year	Data Recovery (%)	No. of exceedences (days)	Max conc. ($\mu g/m^3$)	99th percentile ($\mu g/m^3$)	98th percentile ($\mu g/m^3$)	95th percentile ($\mu g/m^3$)	90th percentile ($\mu g/m^3$)
1999	0.0	0	-	-	-	-	-
2000	0.0	0	-	-	-	-	-
2001	0.0	0	-	-	-	-	-
2002	0.0	0	-	-	-	-	-
2003	0.0	0	-	-	-	-	-
2004	0.0	0	-	-	-	-	-
2005	27.7	2	61.3	52.9	47.0	34.8	31.6
2006	99.4	4	78.0	48.6	45.8	40.0	35.4
2007	99.7	10	116.3	87.2	67.9	44.7	36.4
2008	98.9	10	150.7	105.2	58.1	45.9	38.6

Table D49. Daily peak 24-hour particles as PM_{10} at Collie (1999-2008)
Trend station/region: Collie AAQ NEPM Standard 50 ug/m3 (24-hour average)

Year	Data Recovery (%)	No. of exceedences (days)	Max conc. ($\mu g/m^3$)	99th percentile ($\mu g/m^3$)	98th percentile ($\mu g/m^3$)	95th percentile ($\mu g/m^3$)	90th percentile ($\mu g/m^3$)
1999	0.0	0	-	-	-	-	-
2000	0.0	0	-	-	-	-	-
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	98.7	7	85.9	56.7	50.1	37.4	30.5

Table D50. Daily peak 24-hour particles as $PM_{2.5}$ at Caversham (1999-2008)

Trend station/region: Caversham — AAQ NEPM Advisory Standard 25 ug/m3 (24-hour average)

Year	Data Recovery (%)	No. of exceedences (days)	Max conc. ($\mu g/m^3$)	99th percentile ($\mu g/m^3$)	98th percentile ($\mu g/m^3$)	95th percentile ($\mu g/m^3$)	90th percentile ($\mu g/m^3$)
1999	98.2	0	20.3	14.3	13.6	12.4	10.9
2000	93.7	0	20.1	16.5	14.8	11.9	10.5
2001	97.2	1	31.8	15.9	15.1	12.9	11.3
2002	99.6	1	25.7	16.2	15.0	13.4	12.0
2003	98.6	1	27.3	16.3	14.4	13.4	11.6
2004	5.3	0	16.5	15.7	14.9	12.6	10.4
2005	0.0	0	-	-	-	-	-
2006	63.8	1	34.0	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	26.3	15.2	14.0	11.7	10.6

Table D51. Daily peak 24-hour particles as $PM_{2.5}$ at Duncraig (1999-2008)

Trend station/region: Duncraig — AAQ NEPM Advisory Standard 25 ug/m3 (24-hour average)

Year	Data Recovery (%)	No. of exceedences (days)	Max conc. ($\mu g/m^3$)	99th percentile ($\mu g/m^3$)	98th percentile ($\mu g/m^3$)	95th percentile ($\mu g/m^3$)	90th percentile ($\mu g/m^3$)
1999	96.9	2	26.3	21.3	17.3	14.5	12.4
2000	79.2	0	22.2	17.1	15.0	13.4	11.5
2001	93.8	4	27.0	25.5	22.6	16.1	13.4
2002	98.9	1	28.3	20.3	17.4	15.7	13.3
2003	98.4	1	25.2	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	40.6	17.3	15.0	13.1	11.4
2006	99.0	2	33.4	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	38.3	18.0	15.9	12.6	11.1

Table D52. Daily peak 24-hour particles as $PM_{2.5}$ at Quinns Rocks (1999-2008)

Trend station/region: Quinns Rocks — AAQ NEPM Advisory Standard 25 ug/m3 (24-hour average)

Year	Data Recovery (%)	No. of exceedences (days)	Max conc. ($\mu g/m^3$)	99th percentile ($\mu g/m^3$)	98th percentile ($\mu g/m^3$)	95th percentile ($\mu g/m^3$)	90th percentile ($\mu g/m^3$)
1999	0.0	0	-	-	-	-	-
2000	0.0	0	-	-	-	-	-
2001	0.0	0	-	-	-	-	-
2002	0.0	0	-	-	-	-	-
2003	0.0	0	-	-	-	-	-
2004	0.0	0	-	-	-	-	-
2005	0.0	0	-	-	-	-	-
2006	55.3	1	63.9	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	53.3	17.3	15.4	12.8	11.3

Table D53. Daily peak 24-hour particles as $PM_{2.5}$ at South Lake (1999-2008)
Trend station/region: South Lake AAQ NEPM Advisory Standard 25 ug/m3 (24-hour average)

Year	Data Recovery (%)	No. of exceedences (days)	Max conc. ($\mu g/m^3$)	99th percentile ($\mu g/m^3$)	98th percentile ($\mu g/m^3$)	95th percentile ($\mu g/m^3$)	90th percentile ($\mu g/m^3$)
1999	0.0	0	-	-	-	-	-
2000	0.0	0	-	-	-	-	-
2001	0.0	0	-	-	-	-	-
2002	0.0	0	-	-	-	-	-
2003	0.0	0	-	-	-	-	-
2004	0.0	0	-	-	-	-	-
2005	0.0	0	-	-	-	-	-
2006	76.7	1	30.5	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	45.2	18.2	14.1	12.7	11.2

Table D54. Daily peak 24-hour particles as $PM_{2.5}$ at Bunbury (1999-2008)
Trend station/region: Bunbury AAQ NEPM Advisory Standard 25 ug/m3 (24-hour average)

Year	Data Recovery (%)	No. of exceedences (days)	Max conc. ($\mu g/m^3$)	99th percentile ($\mu g/m^3$)	98th percentile ($\mu g/m^3$)	95th percentile ($\mu g/m^3$)	90th percentile ($\mu g/m^3$)
1999	88.9	1	30.0	21.7	18.4	15.0	12.9
2000	99.6	3	29.2	23.3	20.4	16.0	13.7
2001	92.7	2	47.3	19.6	17.4	15.4	13.1
2002	99.5	4	36.1	24.5	20.2	15.7	14.0
2003	98.9	3	37.6	20.7	18.3	15.7	13.1
2004	98.0	5	94.8	31.7	21.5	15.8	13.2
2005	99.0	5	64.2	26.9	19.1	15.4	12.1
2006	99.3	8	113.5	32.4	26.0	14.8	13.0
2007	99.4	3	34.5	21.2	17.8	13.2	10.7
2008	99.7	2	27.8	21.0	18.6	13.2	11.4

Table D55. Daily peak 24-hour particles as $PM_{2.5}$ at Busselton (1999-2008)
Trend station/region: Busselton AAQ NEPM Advisory Standard 25 ug/m3 (24-hour average)

Year	Data Recovery (%)	No. of exceedences (days)	Max conc. ($\mu g/m^3$)	99th percentile ($\mu g/m^3$)	98th percentile ($\mu g/m^3$)	95th percentile ($\mu g/m^3$)	90th percentile ($\mu g/m^3$)
1999	0.0	0	-	-	-	-	-
2000	0.0	0	-	-	-	-	-
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	51.1	15.6	14.3	11.7	9.9
2008	99.3	3	35.6	20.5	15.5	11.9	10.5

Maxima by pollutant 1999 to 2008

Table D56. Annual daily peak 8-hour carbon monoxide concentrations (ppm) for 1999-2008

AAQ NEPM Standard
9.0 ppm (8-hour average)

Regional Performance Monitoring Station	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Perth Region										
Caversham (North East Metro)	1.6	1.4	1.5	1.3	1.1	1.3	1.3	1.8	0.9	0.8
Duncraig (North Metro)	6.6	4.8	5.9	5.4	4.1	4.5	3.3	3.4	2.0	3.1
Queen's Buildings (CBD)	5.0	4.3	4.8	4.7	2.8	2.8	4.2	2.9	1.6	-
South Lake (South East Metro)	-	3.6	4.0	3.2	3.1	3.5	2.9	2.5	1.7	2.0
Southwest Region										
Bunbury	2.7	3.0	2.0	2.2	2.2	-	-	-	-	-

Highlighted cells indicate NEPM exceedences.

Table D57. Annual daily peak 1-hour nitrogen dioxide concentrations (ppm) for 1999-2008

AAQ NEPM Standard
0.12 ppm (1-hour average)

Regional Performance Monitoring Station	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Perth Region										
Caversham (North East Metro)	0.038	0.044	0.045	0.055	0.043	0.046	0.048	0.084	0.044	0.036
Duncraig (North Metro)	0.049	0.050	0.041	0.049	0.057	0.043	0.051	0.056	0.053	0.038
Hope Valley (South Metro)	0.032	0.033	0.033	0.039	0.039	0.034	0.035	0.045	0.084	0.027
Queen's Buildings (CBD)	0.073	0.073	0.082	0.091	0.121	0.075	0.113	0.068	0.055	-
Quinns Rocks (Outer North Coast)	0.034	0.045	0.036	0.037	0.035	0.041	0.041	0.065	0.035	0.037
Rockingham (South Coast)	0.030	0.048	0.046	0.042	0.051	0.055	0.045	0.054	0.040	0.031
Rolling Green (Outer East Rural)	0.024	0.027	0.026	0.025	0.032	0.025	0.029	0.026	0.020	0.023
South Lake (South East Metro)	-	0.041	0.039	0.048	0.048	0.043	0.052	0.045	0.057	0.044
Swanbourne (Inner West Coast)	0.037	0.045	0.037	0.051	0.048	0.042	0.039	0.043	0.038	0.035

Highlighted cells indicate NEPM exceedences.

Table D58. Annual daily peak 1-hour ozone concentrations (ppm) for 1999-2008

AAQ NEPM Standard
0.10 ppm (1-hour average)

Regional Performance Monitoring Station	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Perth Region										
Caversham (North East Metro)	0.101	0.084	0.099	0.091	0.083	0.079	0.094	0.080	0.085	0.083
Quinns Rocks (Outer North Coast)	0.105	0.078	0.073	0.079	0.086	0.079	0.095	0.085	0.081	0.083
Rockingham (South Coast)	0.076	0.083	0.076	0.079	0.064	0.102	0.081	0.072	0.084	0.077
Rolling Green (Outer East Rural)	0.096	0.092	0.097	0.091	0.087	0.101	0.079	0.093	0.095	0.087
South Lake (South East Metro)	-	0.077	0.079	0.067	0.071	0.076	0.080	0.066	0.067	0.082
Swanbourne (Inner West Coast)	0.088	0.079	0.074	0.081	0.082	0.077	0.076	0.075	0.077	0.076

Highlighted cells indicate NEPM exceedences.

Table D59. Annual daily peak 4-hour ozone concentrations (ppm) for 1999-2008

AAQ NEPM Standard
0.08 ppm (4-hour average)

Regional Performance Monitoring Station	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Perth Region										
Caversham (North East Metro)	0.080	0.058	0.079	0.068	0.069	0.067	0.069	0.072	0.073	0.076
Quinns Rocks (Outer North Coast)	0.083	0.072	0.066	0.069	0.071	0.068	0.070	0.074	0.075	0.073
Rockingham (South Coast)	0.067	0.078	0.071	0.071	0.059	0.079	0.075	0.067	0.079	0.072
Rolling Green (Outer East Rural)	0.077	0.075	0.094	0.071	0.075	0.077	0.068	0.079	0.080	0.075
South Lake (South East Metro)	-	0.067	0.076	0.058	0.063	0.064	0.070	0.063	0.059	0.067
Swanbourne (Inner West Coast)	0.074	0.073	0.069	0.066	0.066	0.067	0.066	0.069	0.067	0.070

Highlighted cells indicate NEPM exceedences.

Table D60. Annual daily peak 1-hour sulfur dioxide concentrations (ppm) for 1999-2008

AAQ NEPM Standard
0.20 ppm (1-hour average)

Regional Performance Monitoring Station	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Perth Region										
Hope Valley (South Metro)	0.064	0.079	0.044	0.058	0.060	0.061	0.074	0.105	0.190	0.038
Rockingham (South Coast)	0.047	0.034	0.028	0.035	0.026	0.039	0.041	0.040	0.041	0.079
South Lake (South East Metro)	-	0.042	0.046	0.043	0.038	0.042	0.046	0.060	0.040	0.046
Wattleup (South Metro)	0.060	0.046	0.074	0.081	0.062	0.076	0.120	0.062	0.060	0.077

Highlighted cells indicate NEPM exceedences.

Table D61. Annual daily peak 24-hour sulfur dioxide concentrations (ppm) for 1999-2008

AAQ NEPM Standard
0.08 ppm (24-hour average)

Regional Performance Monitoring Station	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Perth Region										
Hope Valley (South Metro)	0.007	0.007	0.004	0.007	0.006	0.009	0.011	0.012	0.015	0.005
Rockingham (South Coast)	0.016	0.012	0.009	0.006	0.005	0.006	0.009	0.007	0.012	0.007
South Lake (South East Metro)	-	0.004	0.006	0.006	0.006	0.005	0.007	0.009	0.006	0.005
Wattleup (South Metro)	0.007	0.006	0.009	0.008	0.006	0.009	0.014	0.009	0.010	0.011

Highlighted cells indicate NEPM exceedences.

Table D62. Annual daily peak 24-hour particles as PM_{10} concentrations (ug/m^3) for 1999-2008

AAQ NEPM Standard
50 ug/m3 (24-hour average)

Regional Performance Monitoring Station	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Perth Region										
Caversham (North East Metro)	-	-	-	-	-	58.0	76.8	42.6	58.8	39.1
Duncraig (North Metro)	35.2	29.8	53.6	54.0	66.7	45.1	59.2	40.6	40.3	46.9
Gosnells (South Metro)	-	-	-	-	-	-	-	-	49.2	66.8
South Lake (South East Metro)	-	39.6	56.7	82.6	44.5	50.5	98.8	45.3	56.7	55.0
Southwest Region										
Bunbury	40.0	42.4	57.6	42.5	54.5	99.5	63.3	123.5	46.5	39.1
Collie	-	-	-	-	-	-	-	-	-	85.9
Albany	-	-	-	-	-	-	-	39.4	55.7	56.3
Midwest Region										
Geraldton	-	-	-	-	-	-	61.3	78.0	116.3	150.7

Highlighted cells indicate NEPM exceedences.

Table D63. Annual daily peak 24-hour particles as $PM_{2.5}$ concentrations (ug/m^3) for 1999-2008

AAQ NEPM Advisory Standard
25 ug/m3 (24-hour average)

Regional Performance Monitoring Station	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Perth Region										
Caversham (North East Metro)	20.3	20.1	31.8	25.7	27.3	16.5	-	34.0	24.5	26.3
Duncraig (North Metro)	26.3	22.2	27.0	28.3	25.2	24.4	40.6	33.4	19.6	38.3
Quinns Rocks (Outer North Coast)	-	-	-	-	-	-	-	63.9	19.9	53.3
South Lake (South East Metro)	-	-	-	-	-	-	-	30.5	21.2	45.2
Southwest Region										
Bunbury	30.0	29.2	47.3	36.1	37.6	94.8	64.2	113.5	34.5	27.8
Busselton	-	-	-	-	-	-	-	12.7	51.1	35.6

Highlighted cells indicate NEPM exceedences.

Table D64. Annual averaged particles as $PM_{2.5}$ concentrations (ug/m^3) for 1999-2008

AAQ NEPM Advisory Standard
8 ug/m3 (annual average)

Regional Performance Monitoring Station	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Perth Region										
Caversham (North East Metro)	7.2	7.4	7.6	8.1	8.0	7.6	-	8.1	7.5	7.1
Duncraig (North Metro)	8.6	8.0	8.6	9.2	8.9	7.9	7.8	8.2	7.3	7.7
Quinns Rocks (Outer North Coast)	-	-	-	-	-	-	-	7.8	6.9	7.2
South Lake (South East Metro)	-	-	-	-	-	-	-	8.7	7.6	7.7
Southwest Region										
Bunbury	9.3	9.3	8.7	9.0	8.6	9.2	8.6	8.7	7.8	7.6
Busselton	-	-	-	-	-	-	-	6.9	7.4	7.3

Highlighted cells indicate NEPM exceedences.

Table D65. Annual averaged lead concentrations (ug/m^3) for 1999-2008

AAQ NEPM Advisory Standard
0.50 ug/m3 (annual average)

Regional Performance Monitoring Station	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Perth Region										
Queen's Buildings (CBD)	0.08	0.03	0.02	-	-	-	-	-	-	-

Monitoring for lead ceased at the end of 2001.

ATTACHMENT 1 – Graphical trends

This attachment provides graphical representations of tables D8 to D44 of Section D. Each graph show the maximum, 99th percentile, 98th percentile, 95th percentile and 90th 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

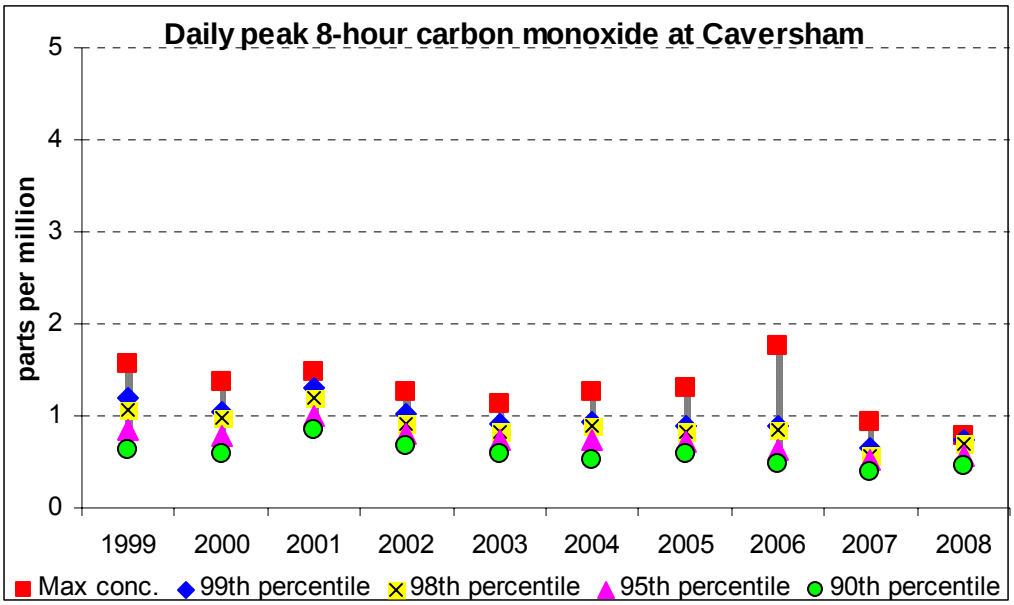

Figure A1-1 - 8-hour carbon monoxide at Caversham

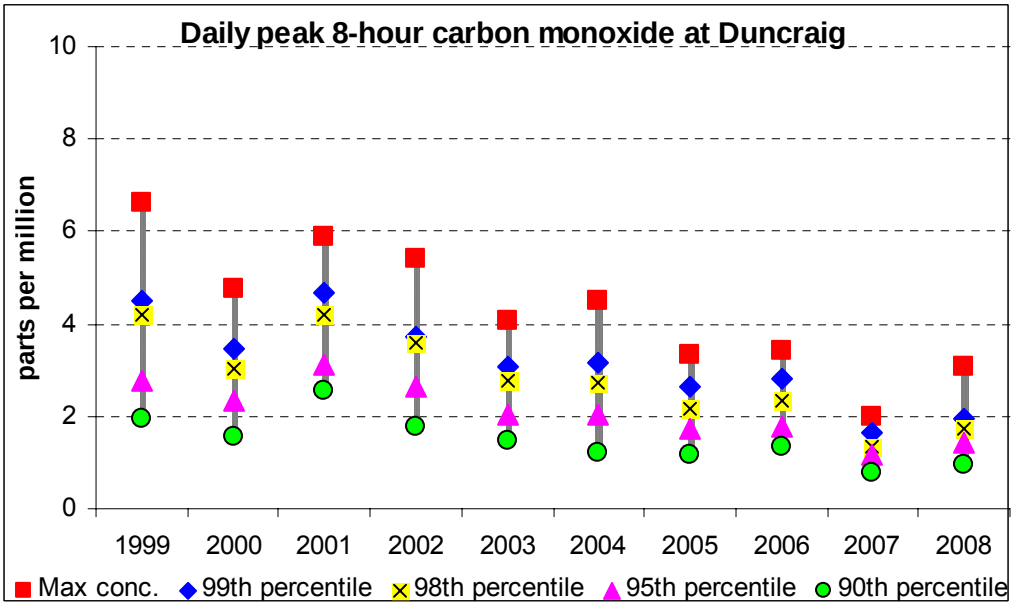

Figure A1-2 - 8-hour carbon monoxide at Duncraig

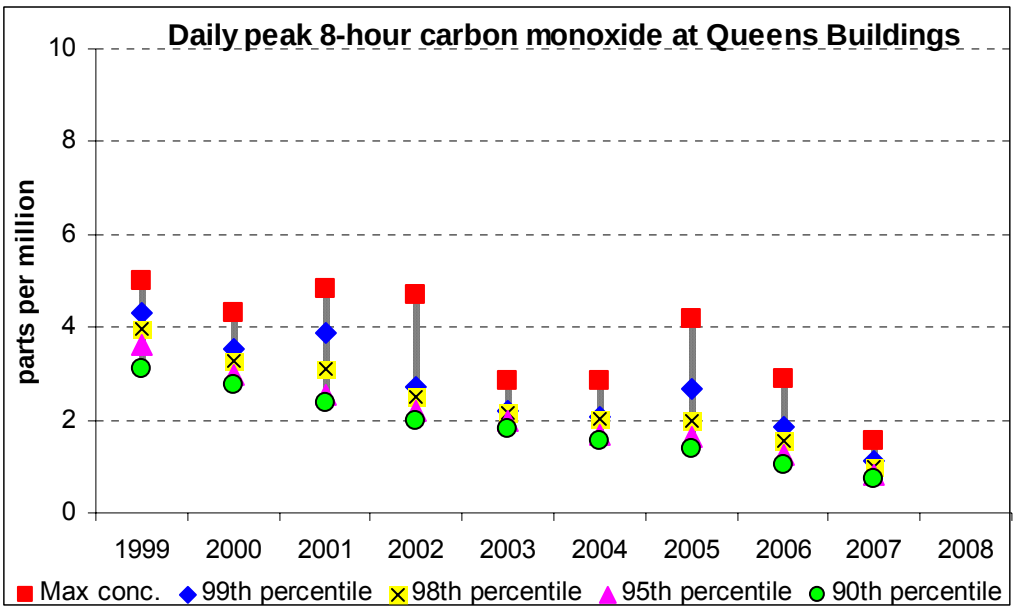

Figure A1-3 - 8-hour carbon monoxide at Queen's Buildings

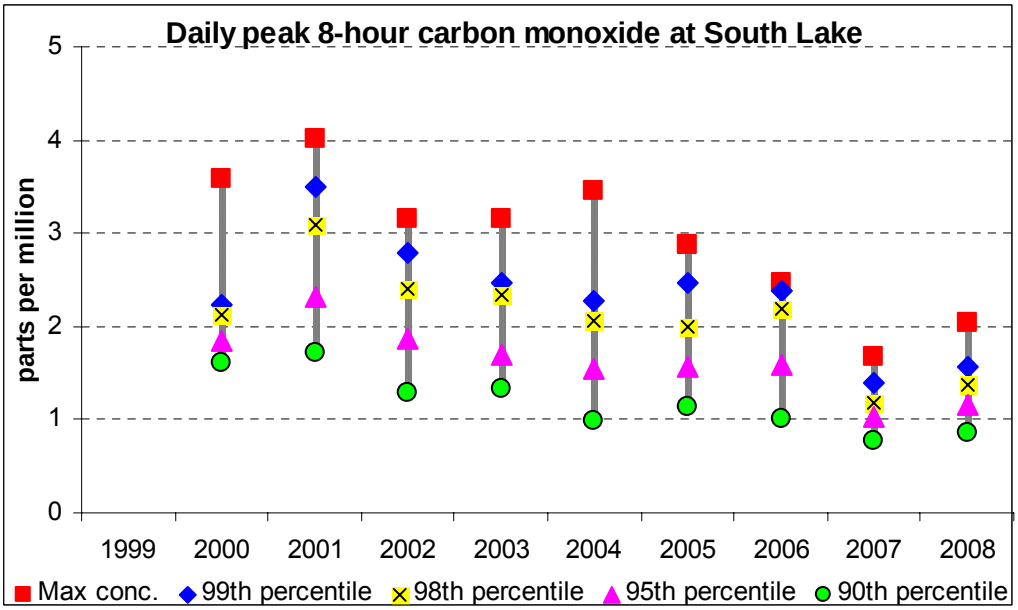

Figure A1-4 - 8-hour carbon monoxide at South Lake

Nitrogen dioxide

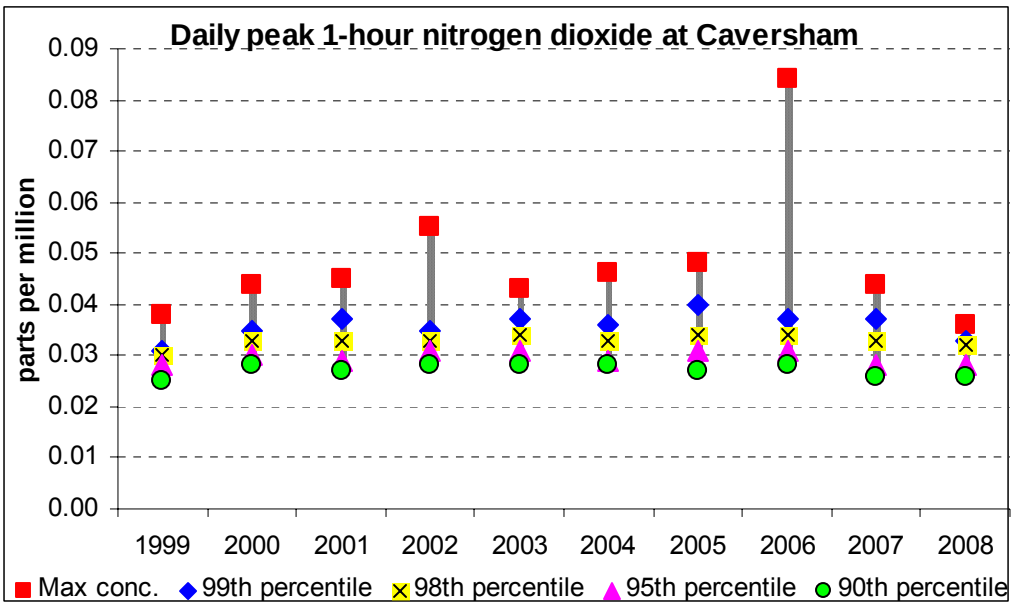

Figure A1-5 - 1-hour nitrogen dioxide at Caversham

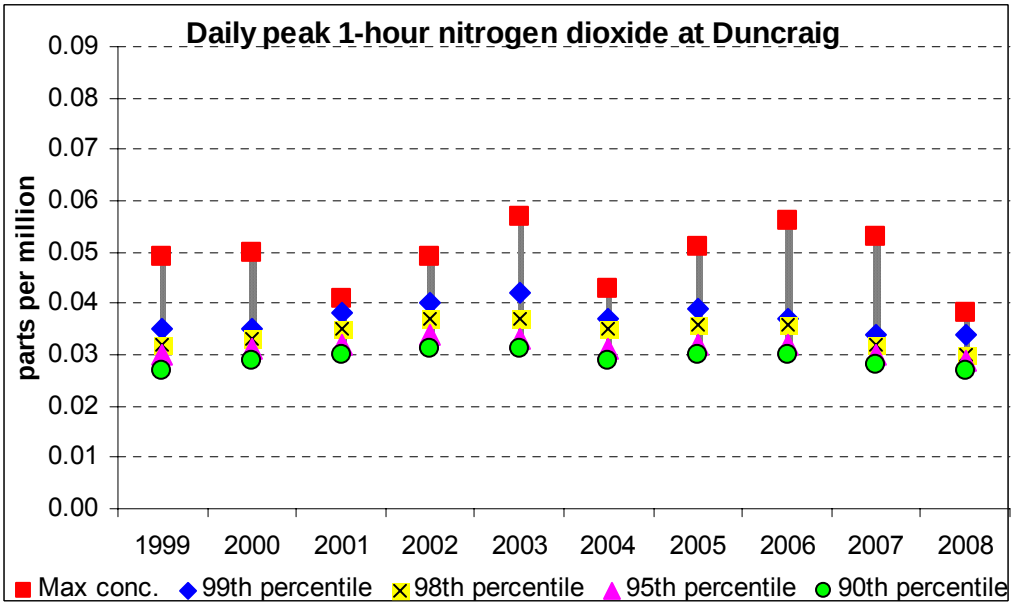

Figure A1-6 - 1-hour nitrogen dioxide at Duncraig

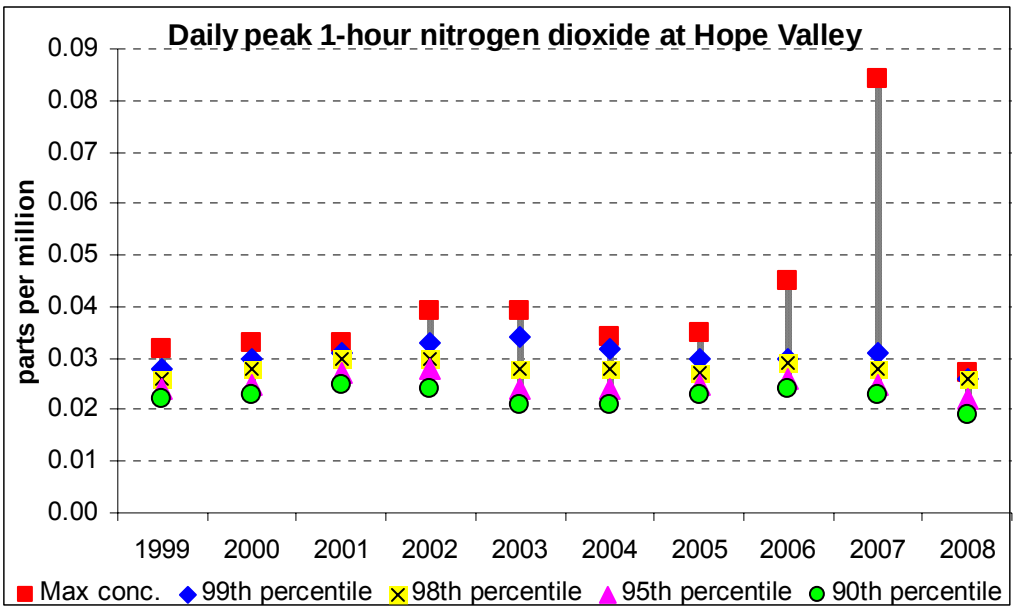

Figure A1-7 - 1-hour nitrogen dioxide at Hope Valley

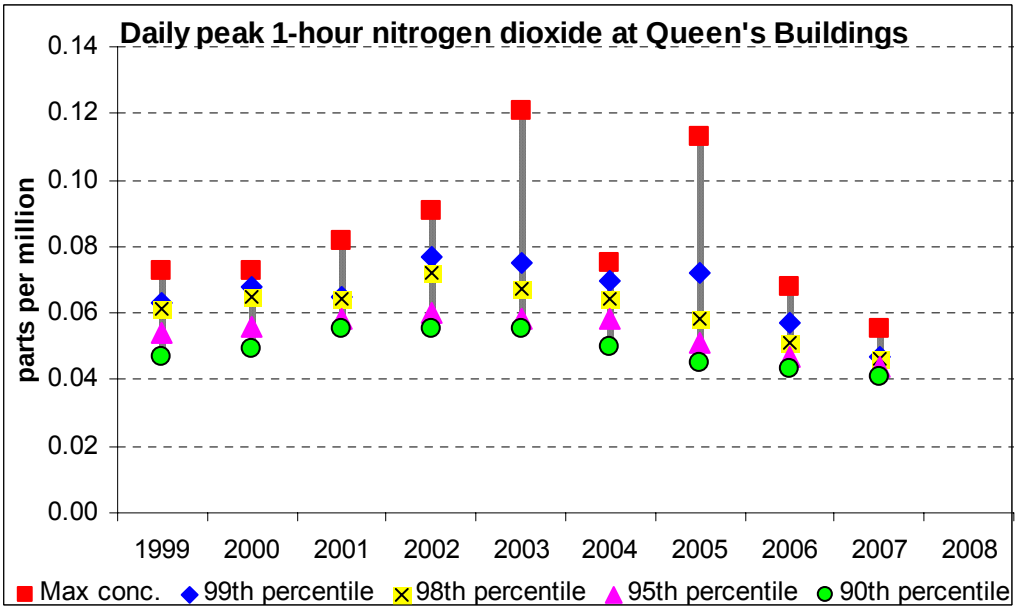

Figure A1-8 - 1-hour nitrogen dioxide at Queen's Buildings

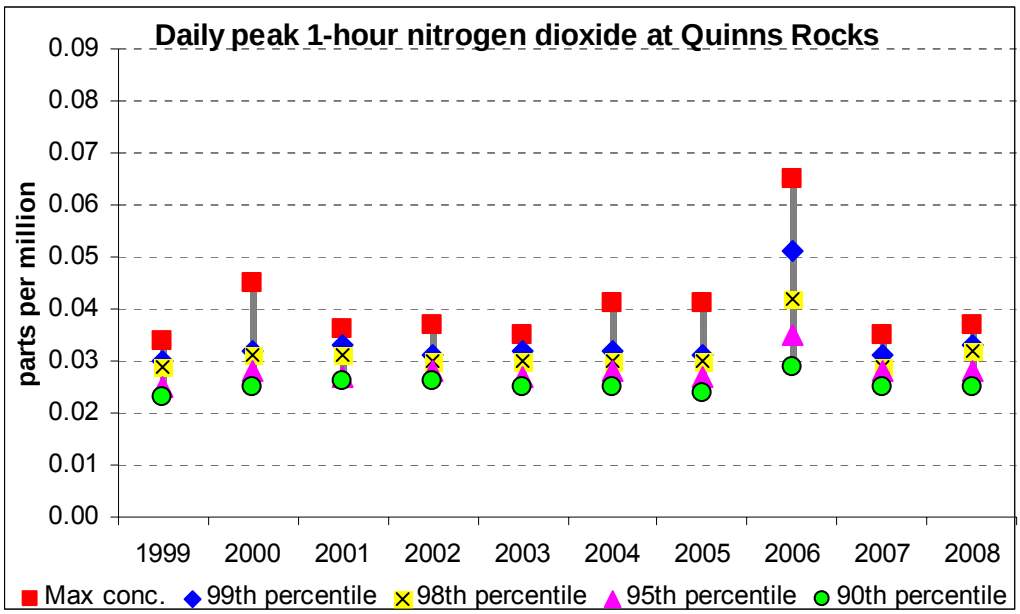

Figure A1-9 - 1-hour nitrogen dioxide at Quinns Rocks

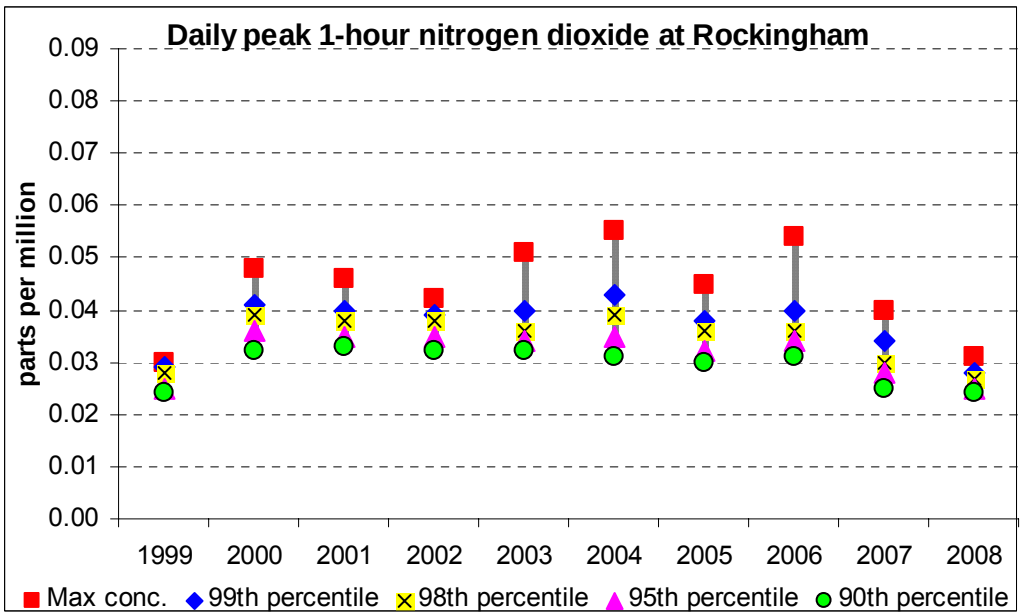

Figure A1-10 - 1-hour nitrogen dioxide at Rockingham

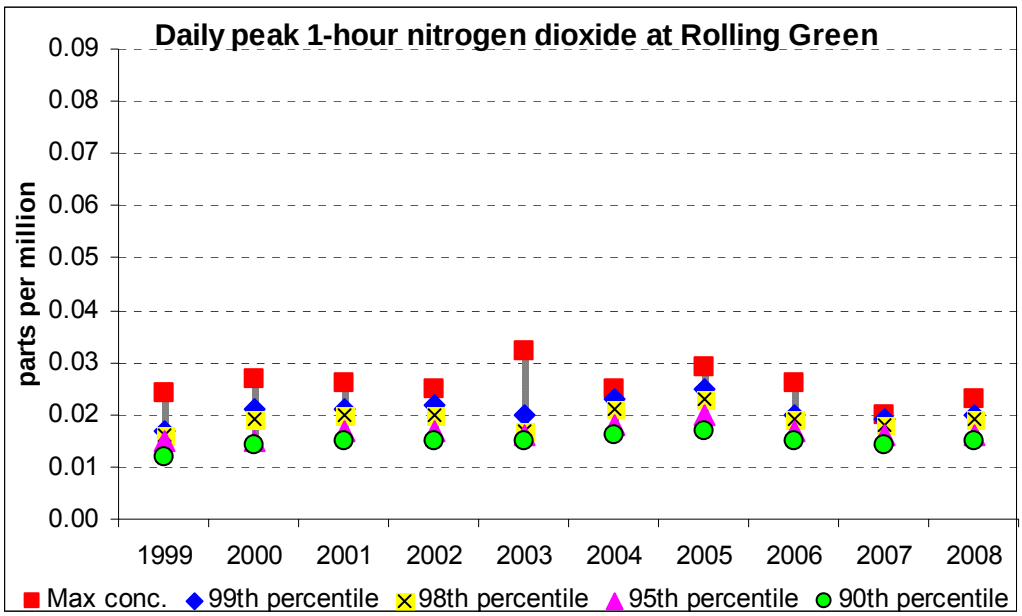

Figure A1-11 - 1-hour nitrogen dioxide at Rolling Green

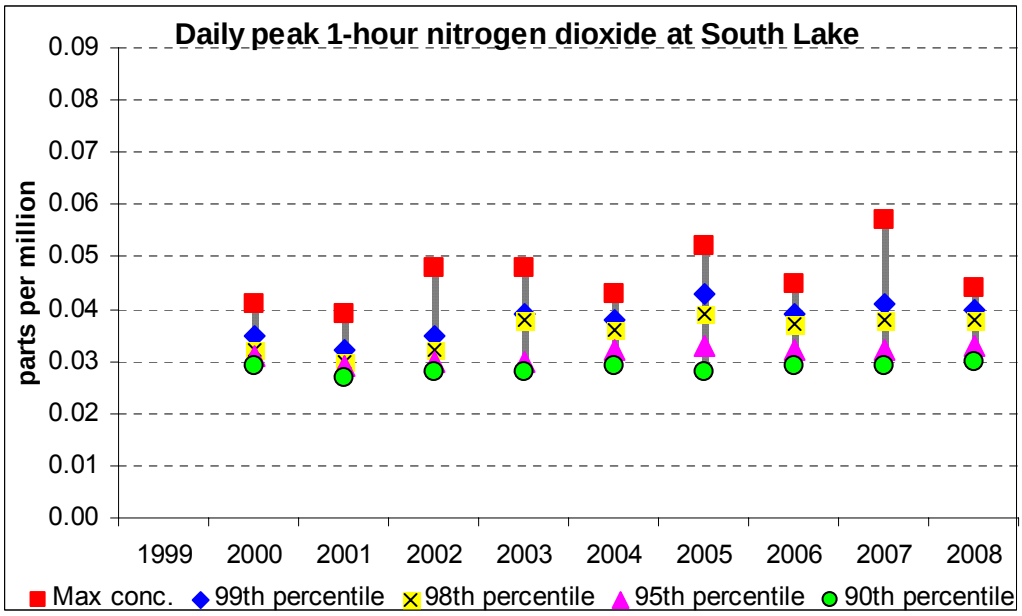

Figure A1-12 - 1-hour nitrogen dioxide at South Lake

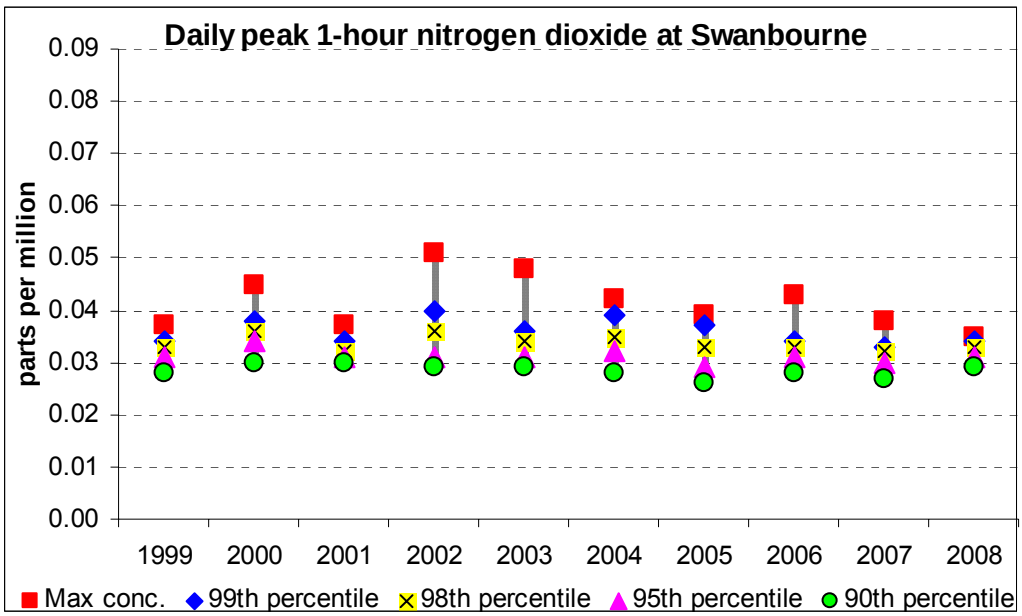

Figure A1-13 - 1-hour nitrogen dioxide at Swanbourne

Ozone

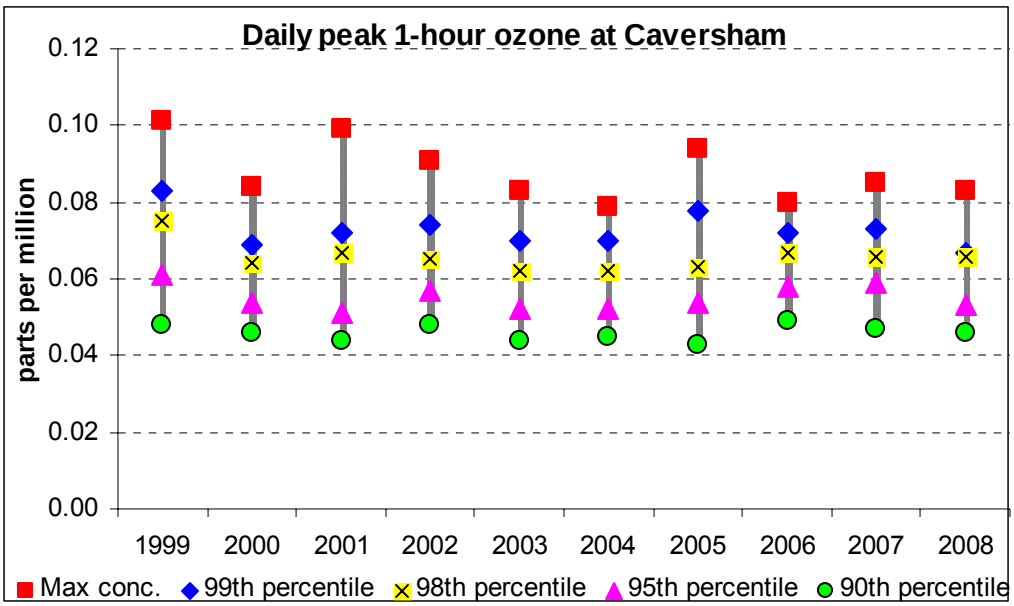

Figure A1-14 - 1-hour ozone at Caversham

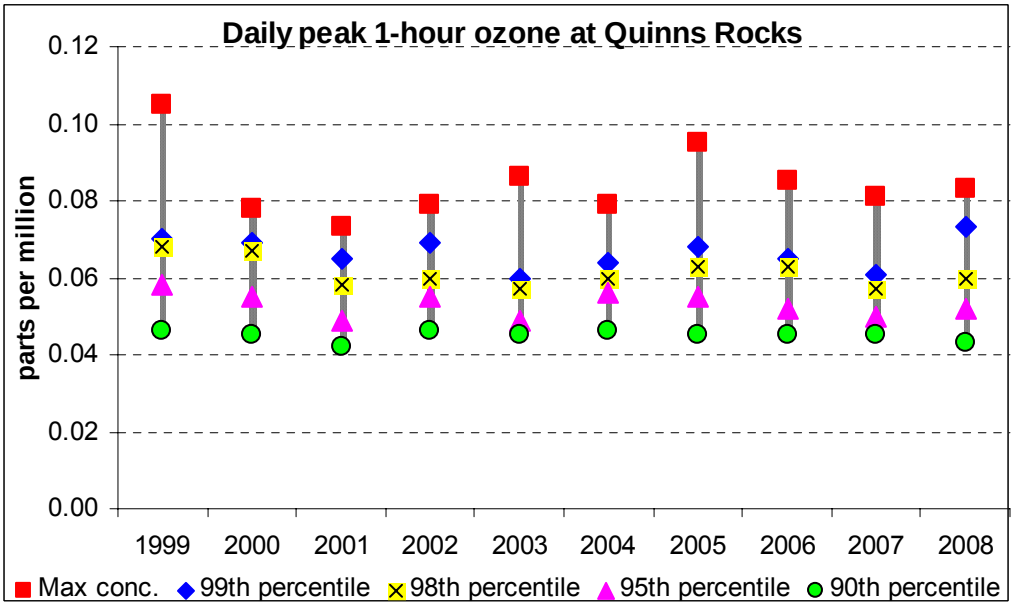

Figure A1-15 - 1-hour ozone at Quinns Rocks

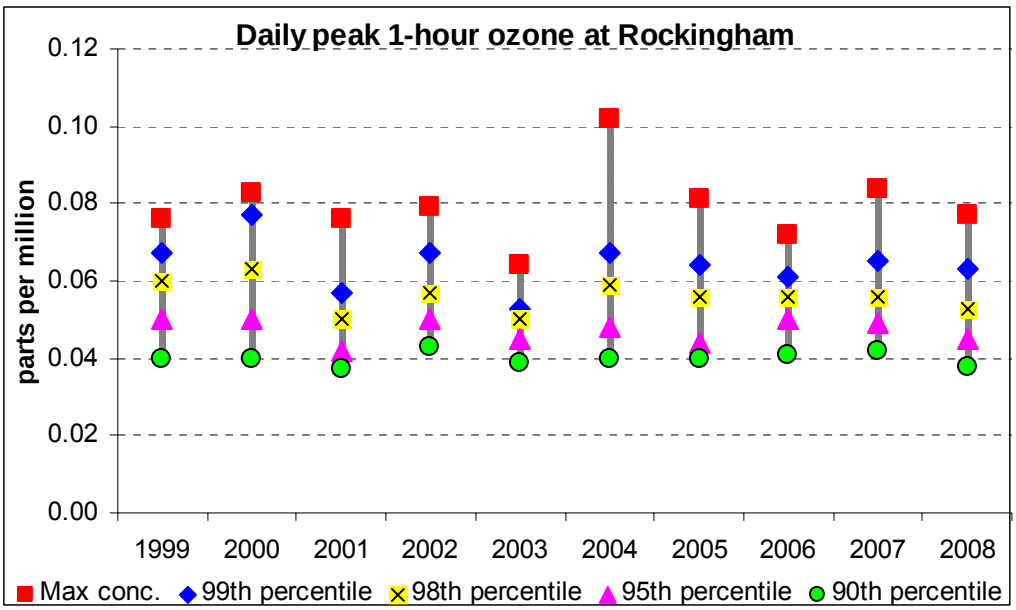

Figure A1-16 - 1-hour ozone at Rockingham

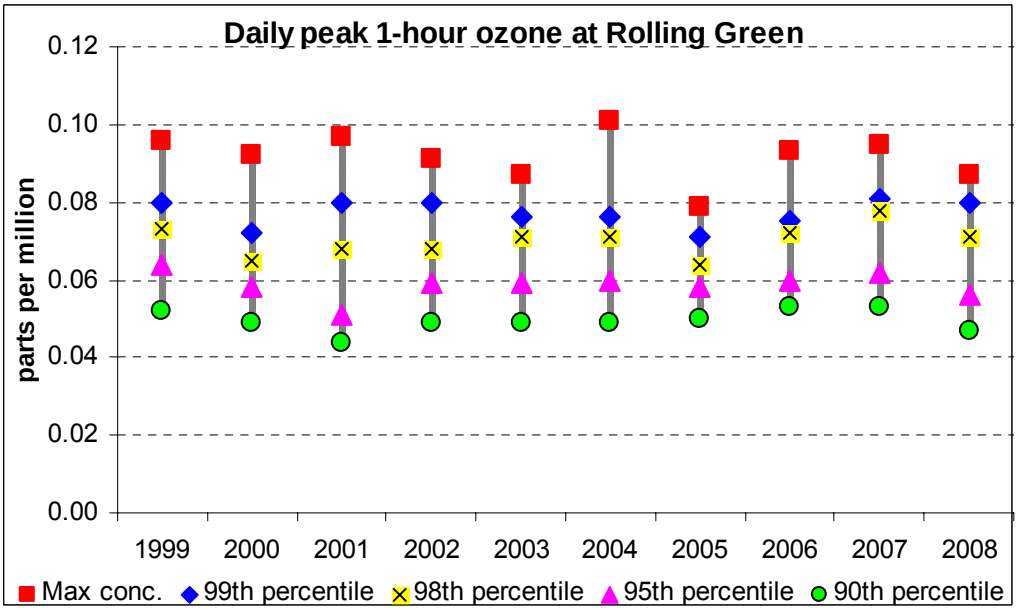

Figure A1-17 - 1-hour ozone at Rolling Green

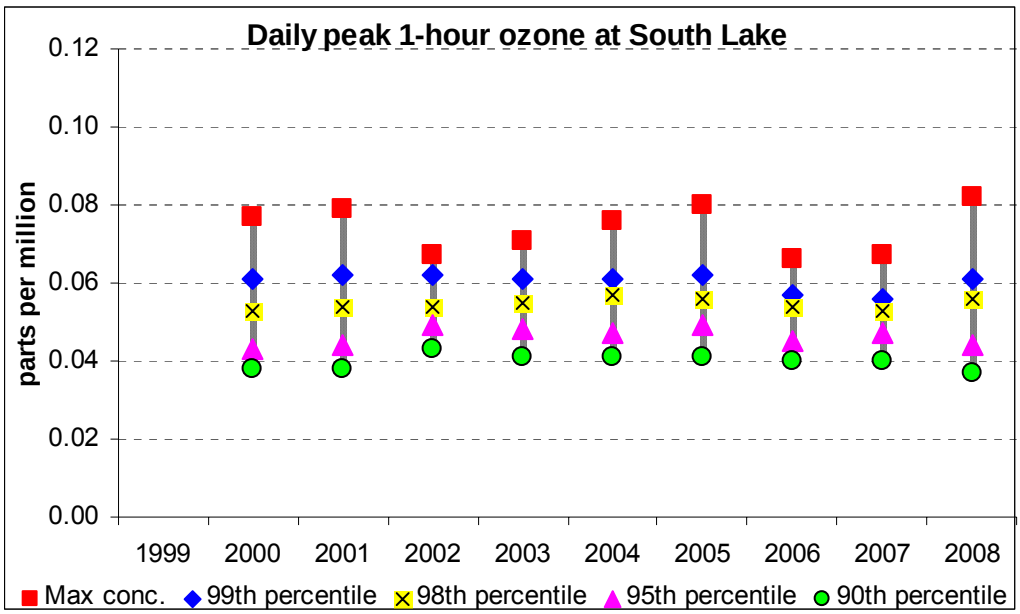

Figure A1-18 - 1-hour ozone at South Lake

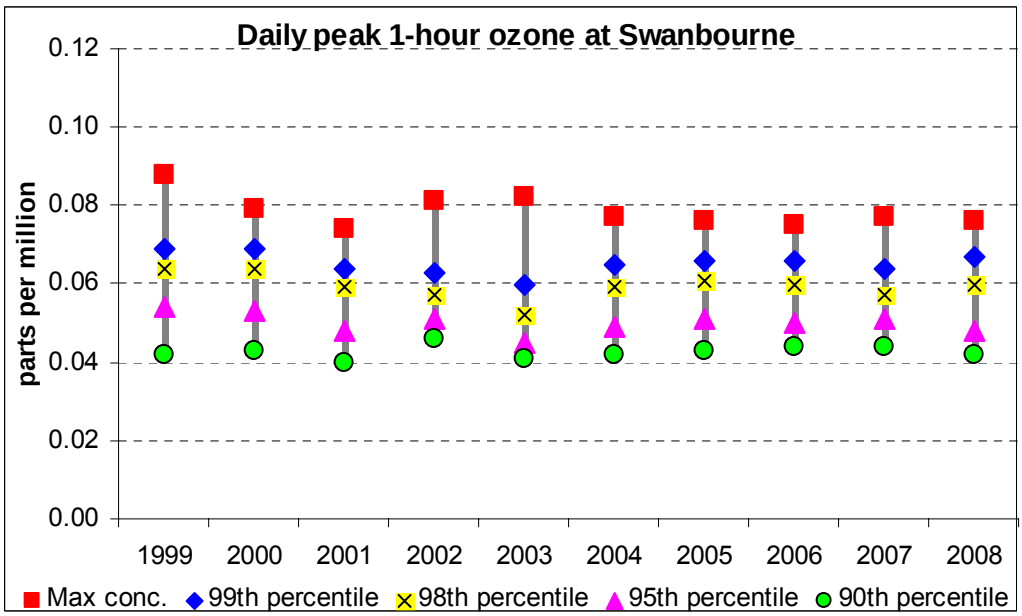

Figure A1-19 - 1-hour ozone at Swanbourne

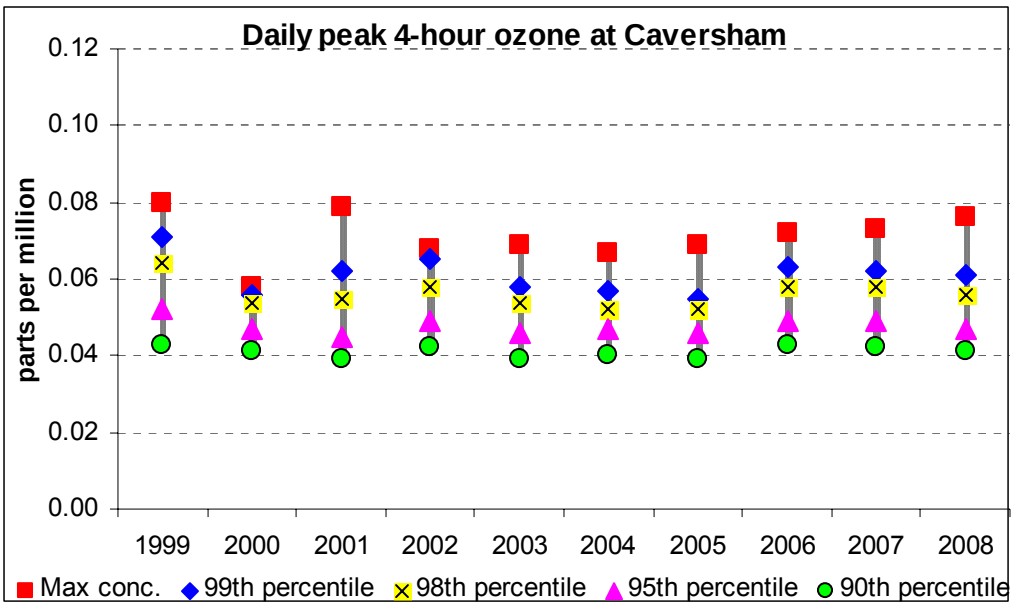

Figure A1-20 - 4-hour ozone at Caversham

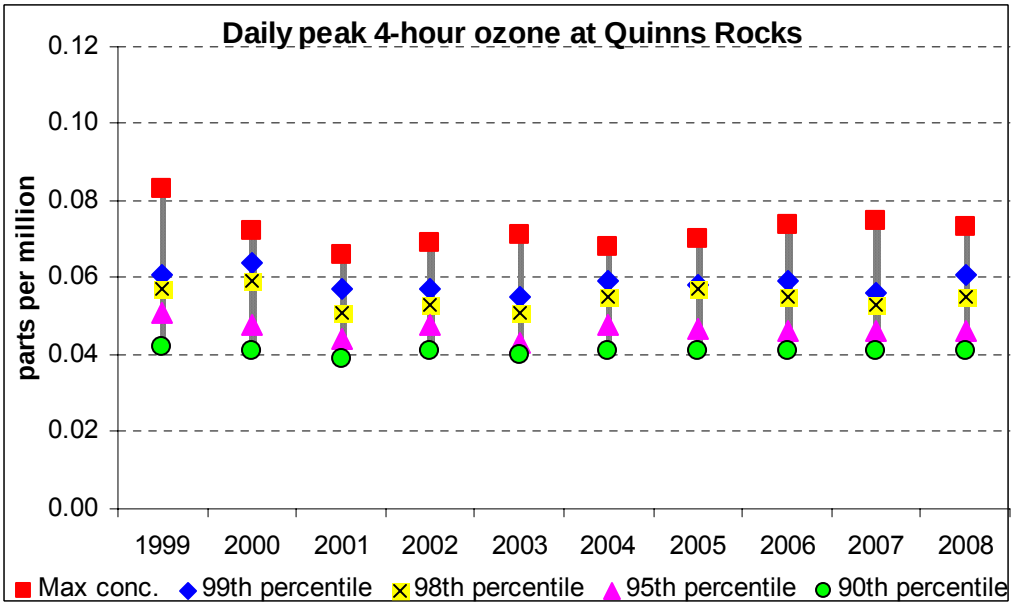

Figure A1-21 - 4-hour ozone at Quinns Rocks

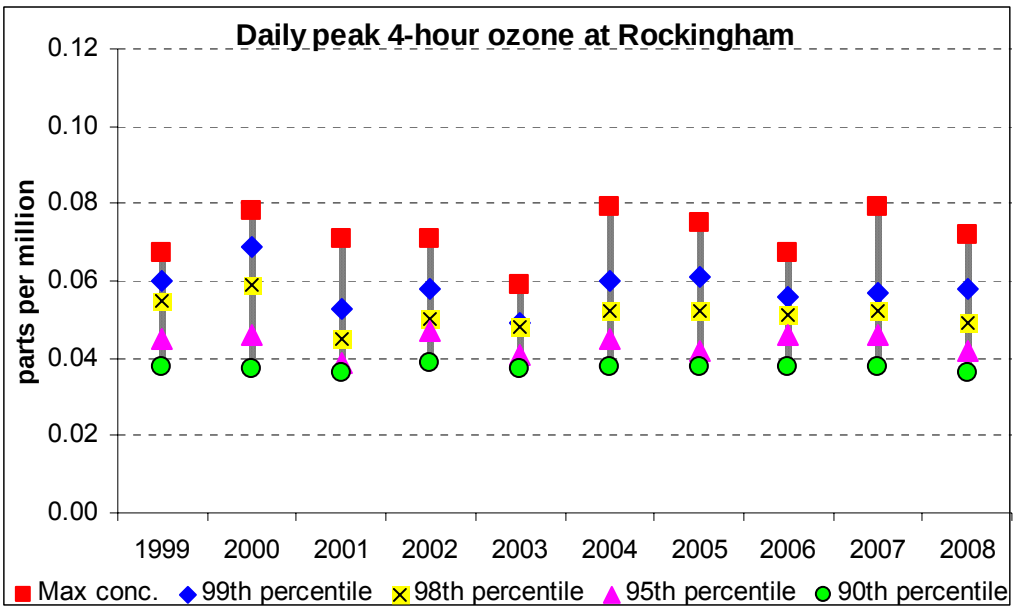

Figure A1-22 - 4-hour ozone at Rockingham

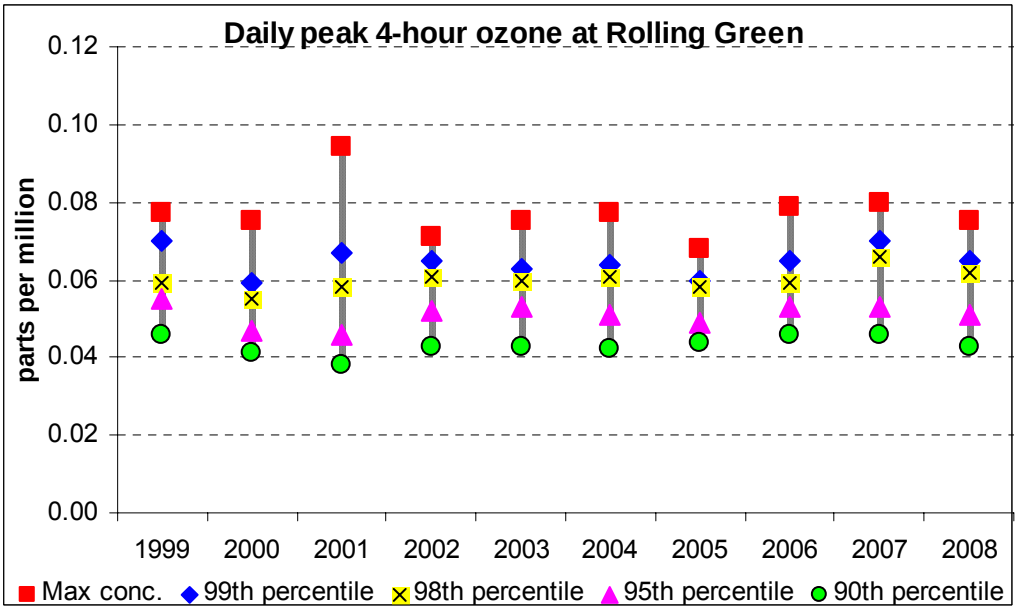

Figure A1-23 - 4-hour ozone at Rolling Green

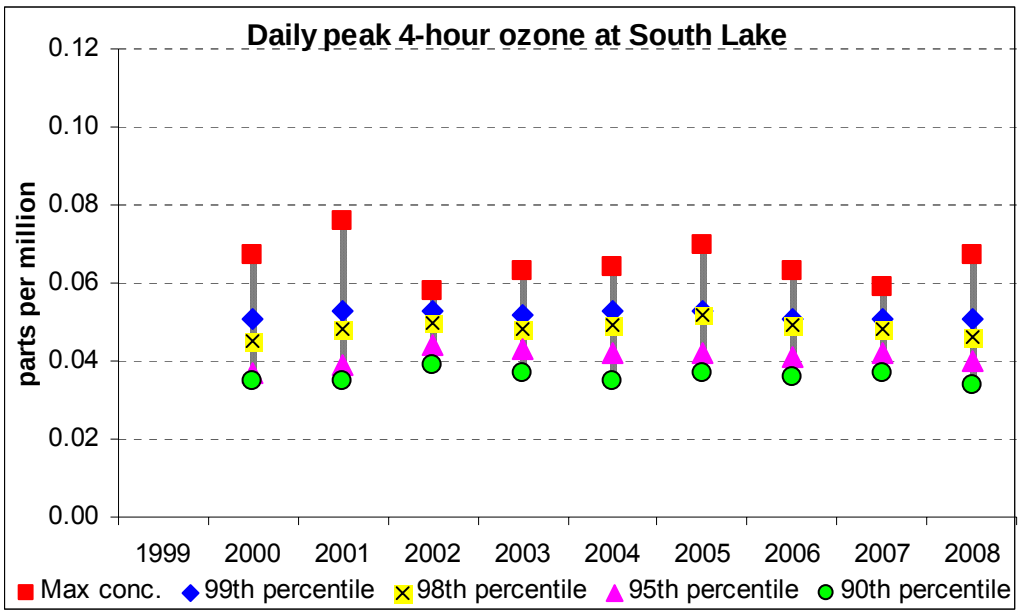

Figure A1-24 - 4-hour ozone at South Lake

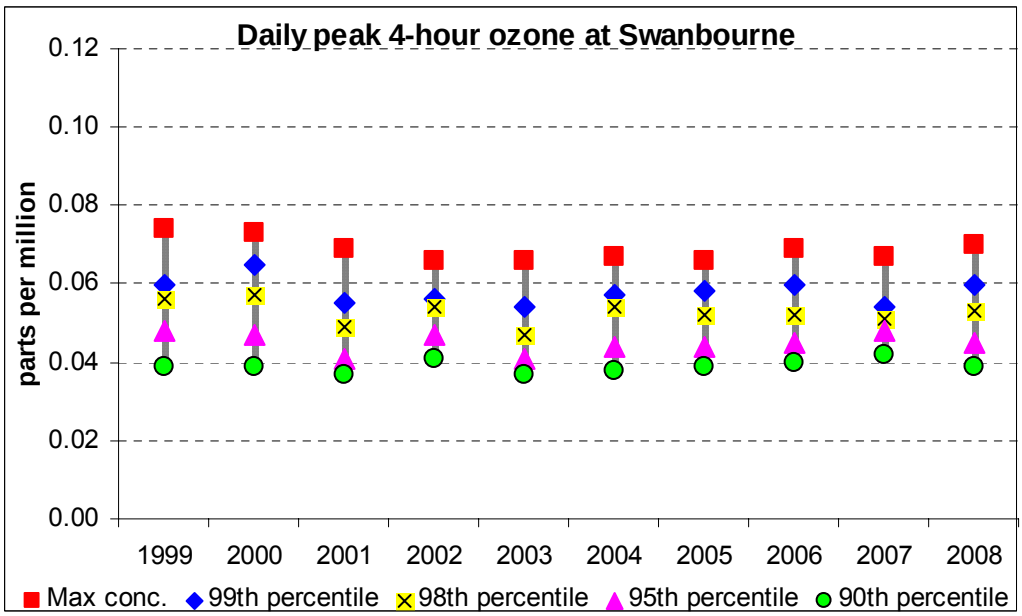

Figure A1-25 - 4-hour ozone at Swanbourne

Sulfur dioxide

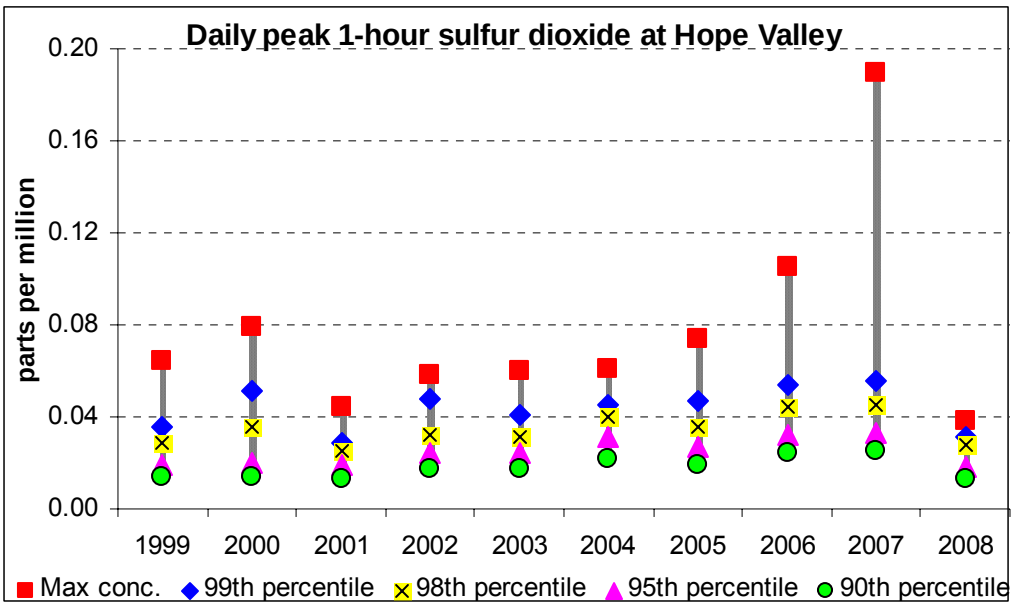

Figure A1-26 - 1-hour sulfur dioxide at Hope valley

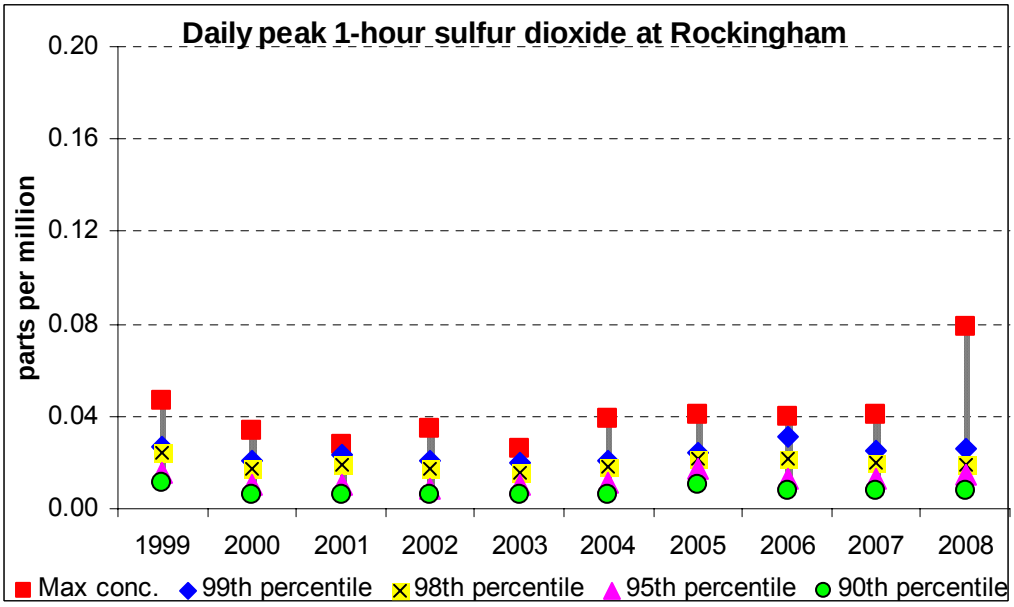

Figure A1-27 - 1-hour sulfur dioxide at Rockingham

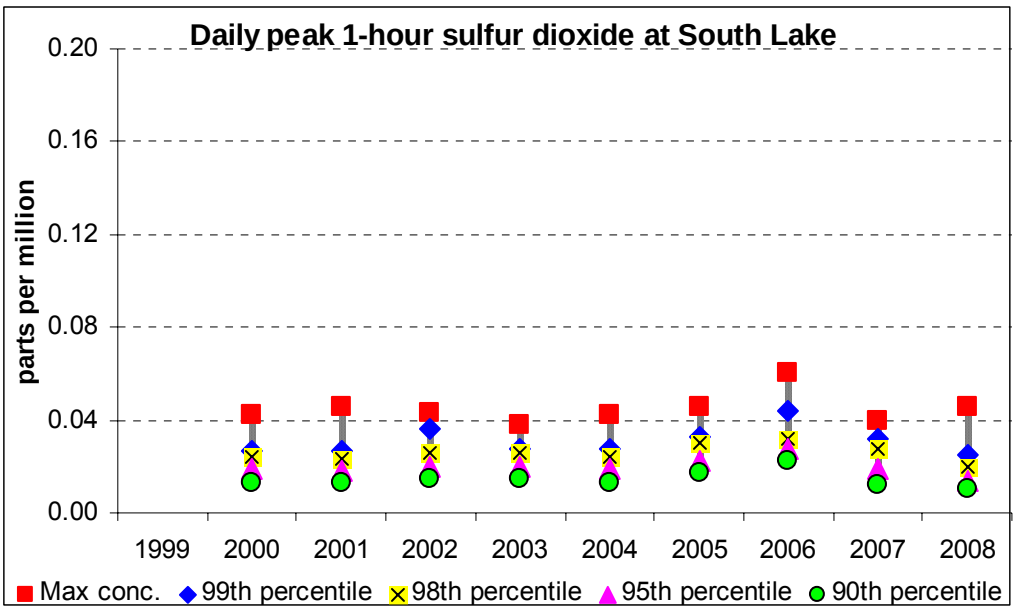

Figure A1-28 - 1-hour sulfur dioxide at South Lake

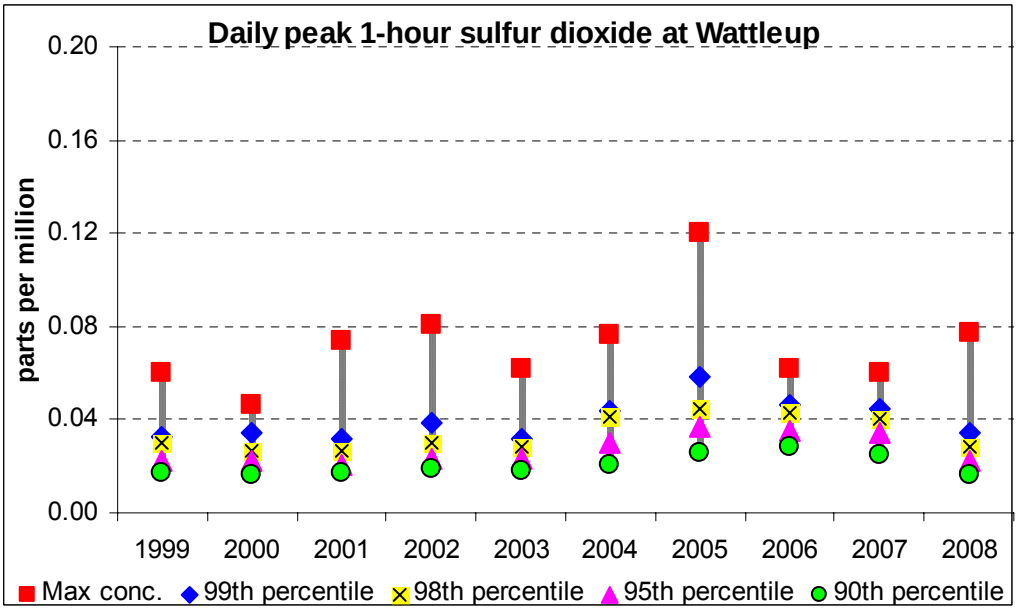

Figure A1-29 - 1-hour sulfur dioxide at Wattleup

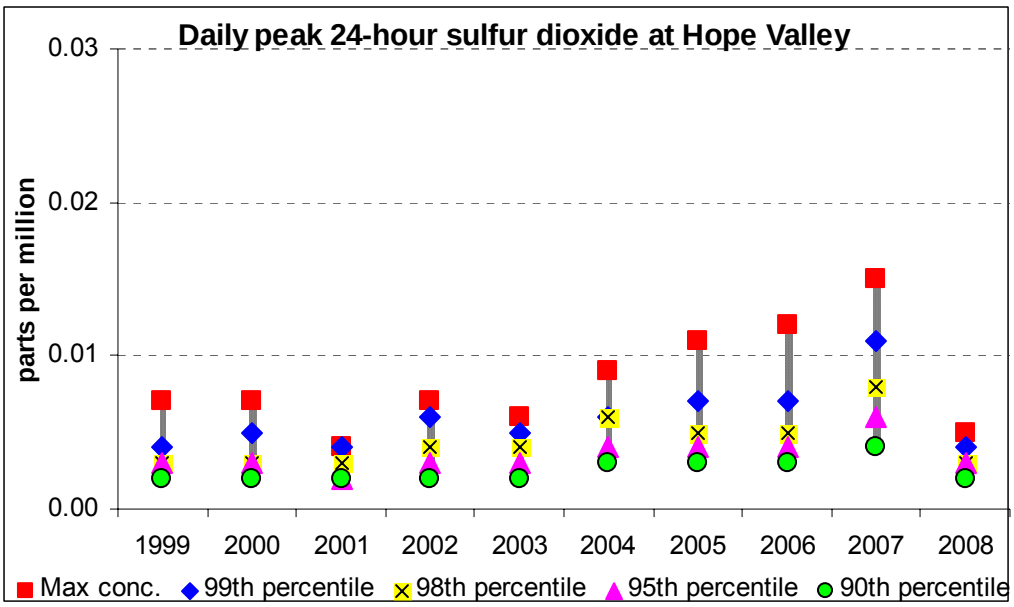

Figure A1-30 - 24-hour sulfur dioxide at Hope Valley

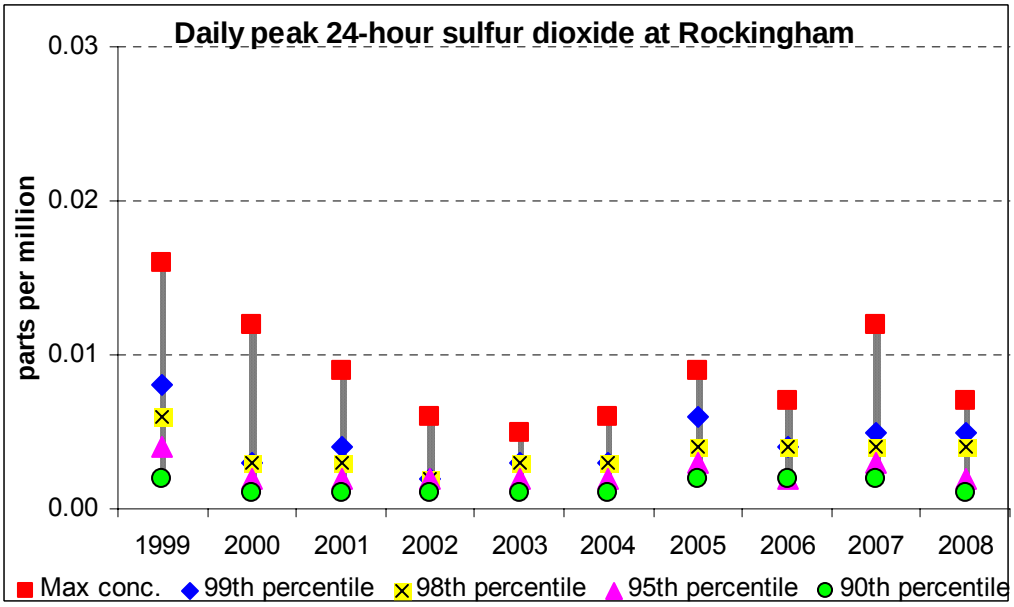

Figure A1-31 - 24-hour sulfur dioxide at Rockingham

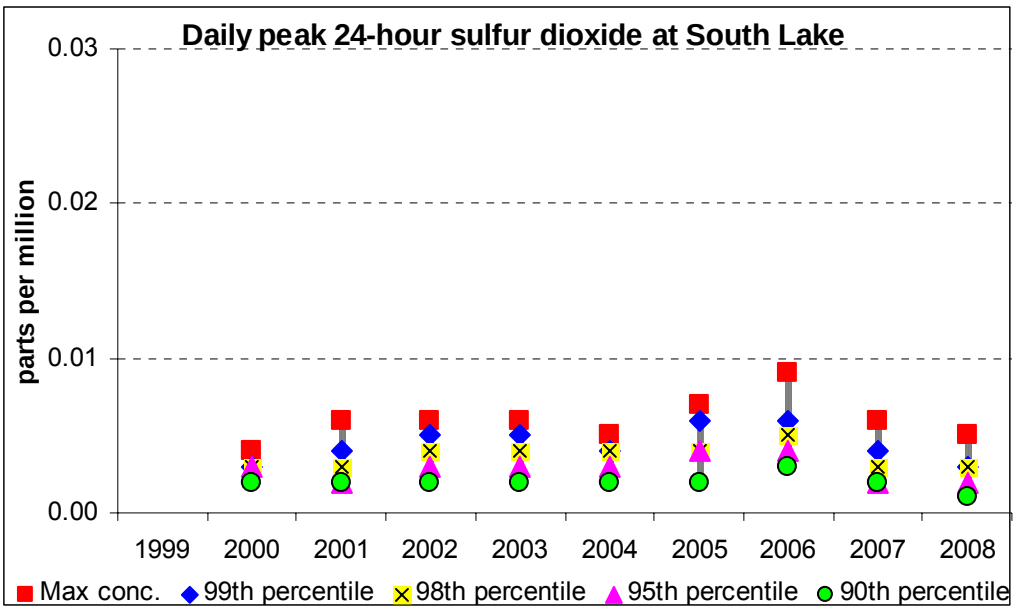

Figure A1-32 - 24-hour sulfur dioxide at South Lake

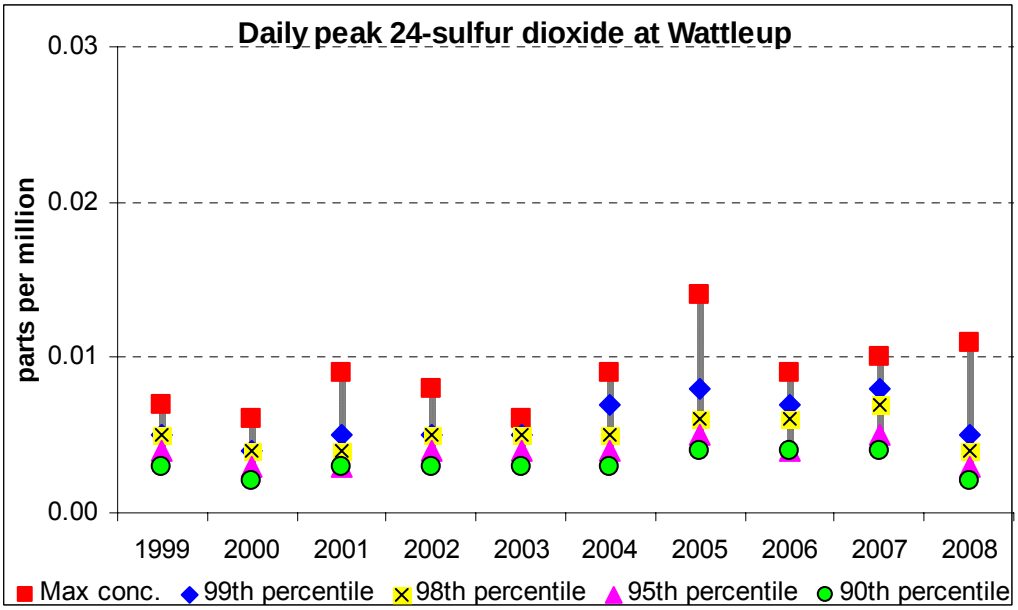

Figure A1-33 - 24-hour sulfur dioxide at Wattleup

Particles as PM_{10}

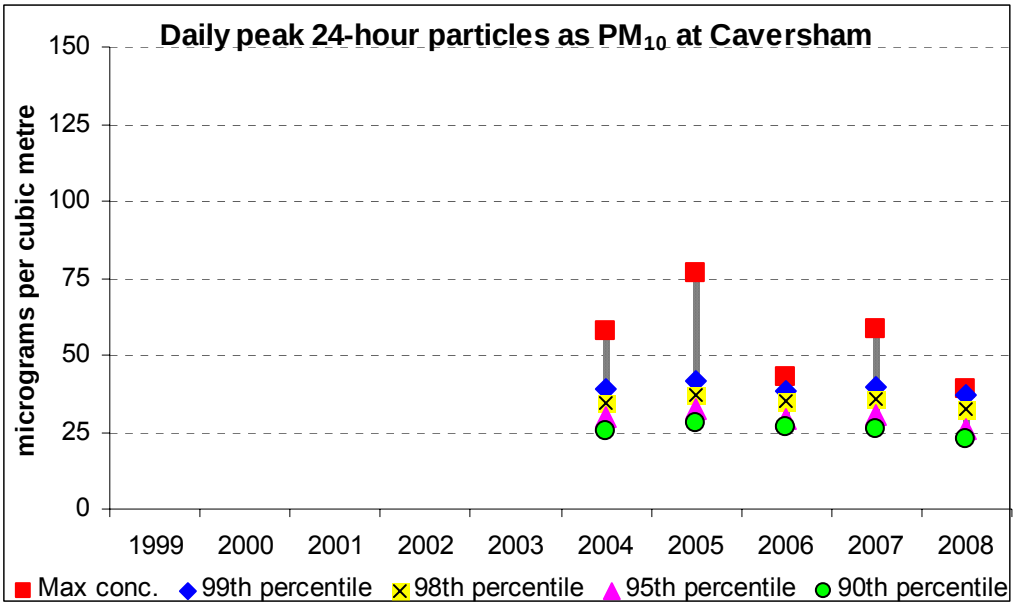

Figure A1-34 - 24-hour PM_{10} at Caversham

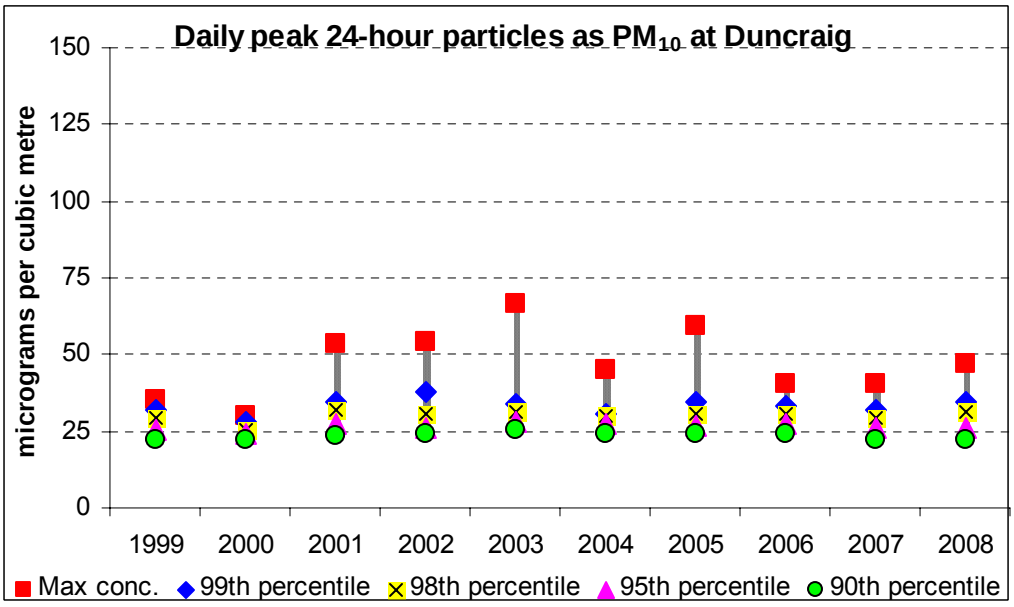

Figure A1-35 - 24-hour PM_{10} at Duncraig

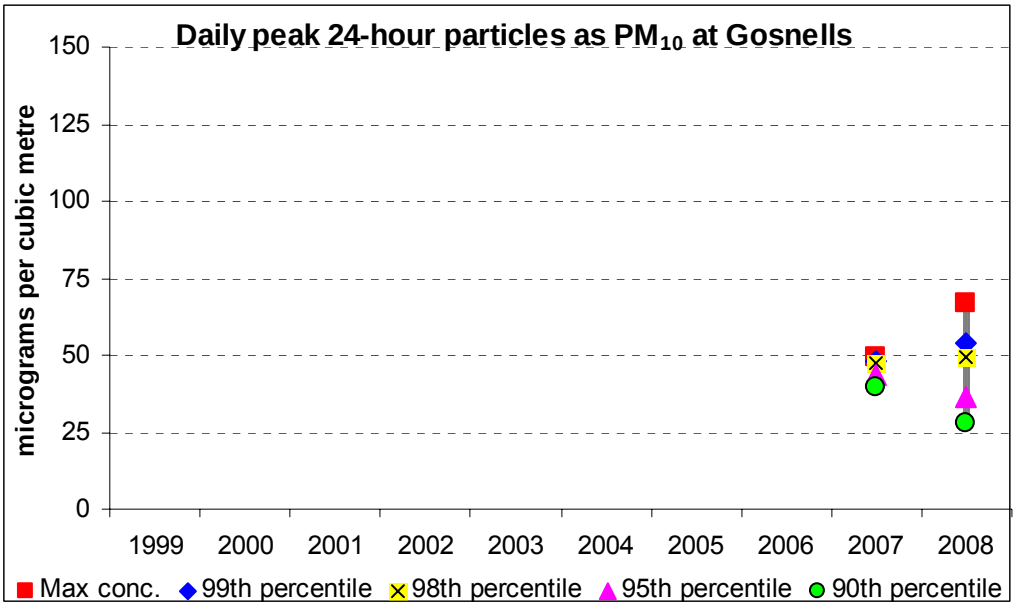

Figure A1-36 - 24-hour PM_{10} at Gosnells

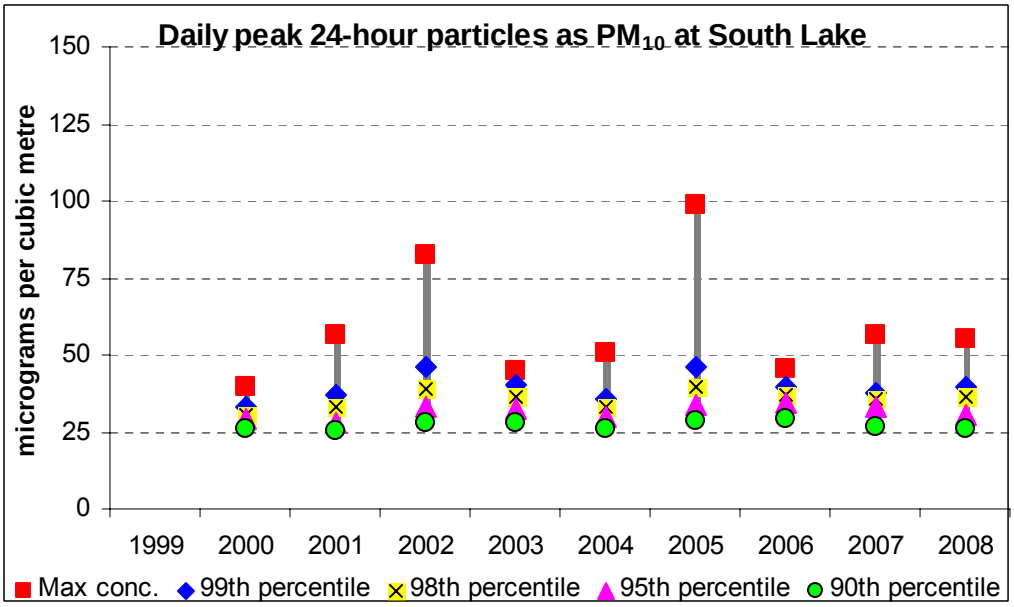

Figure A1-37 - 24-hour PM_{10} at South Lake

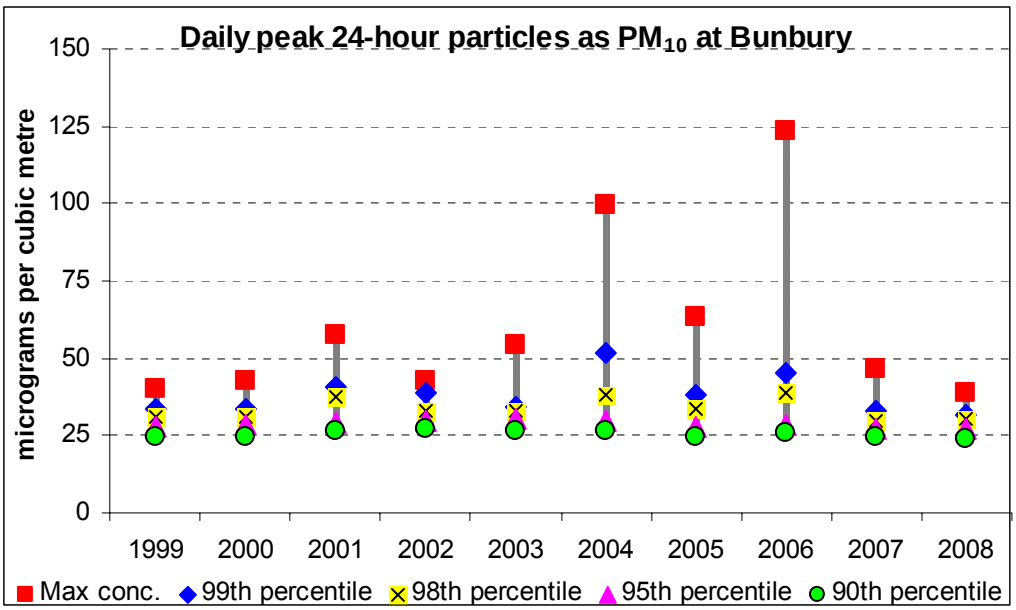

Figure A1-38 - 24-hour PM_{10} at Bunbury

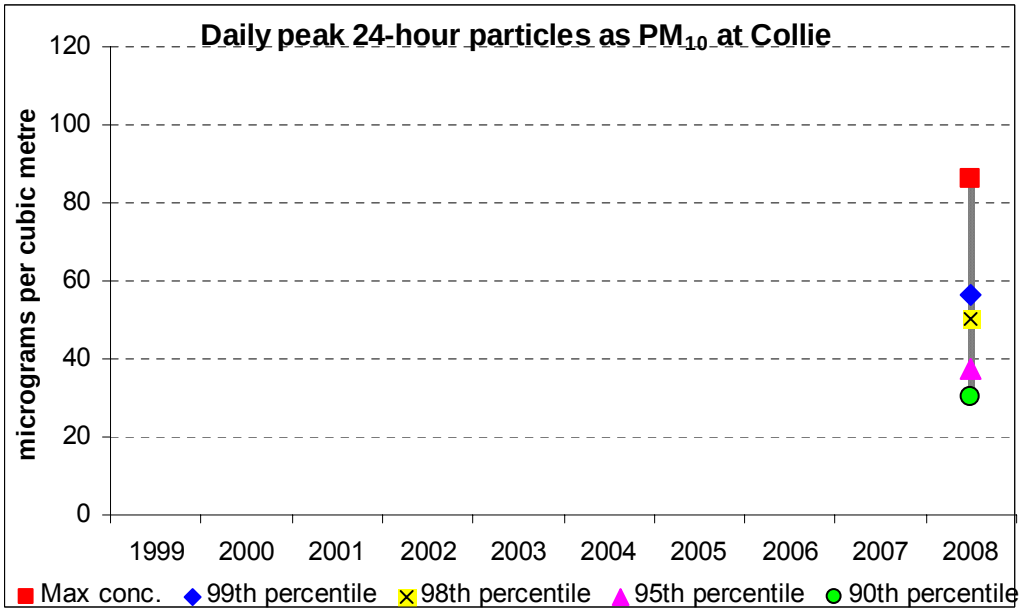

Figure A1-39 - 24-hour PM_{10} at Collie

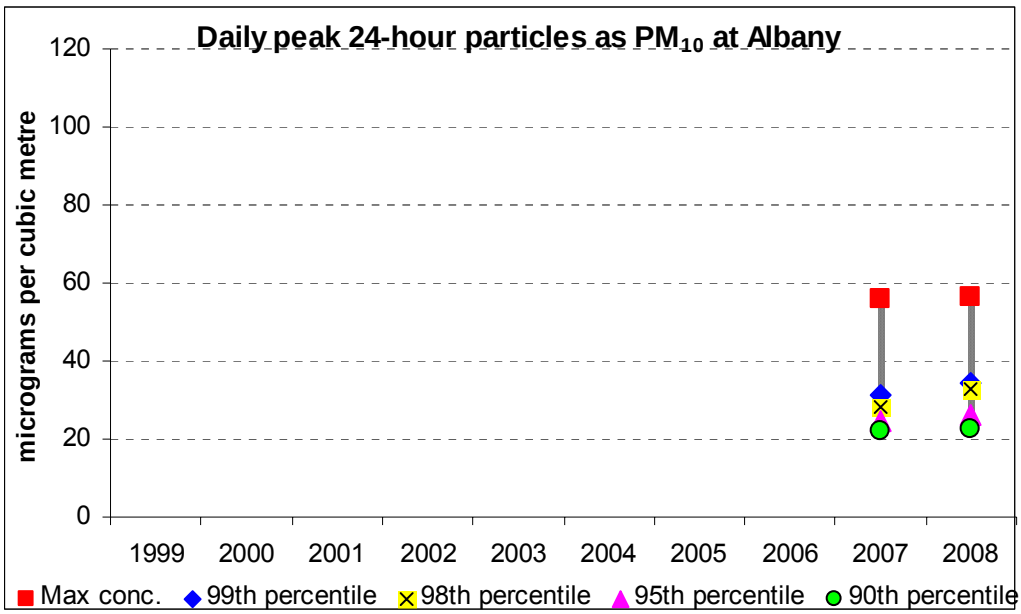

Figure A1-40 - 24-hour PM_{10} at Albany

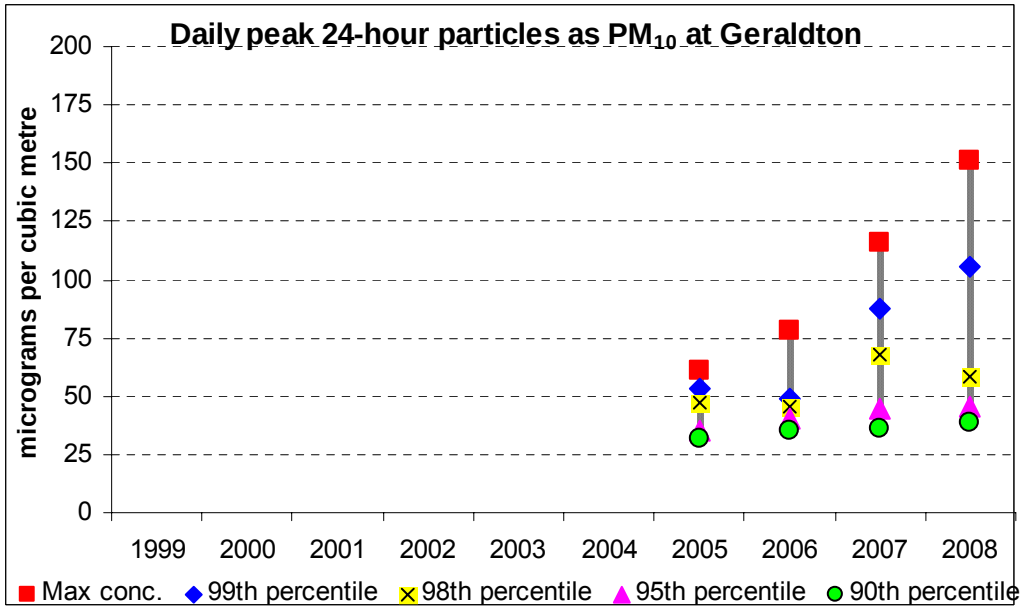

Figure A1-41 - 24-hour PM_{10} at Geraldton

Particles as $PM_{2.5}$

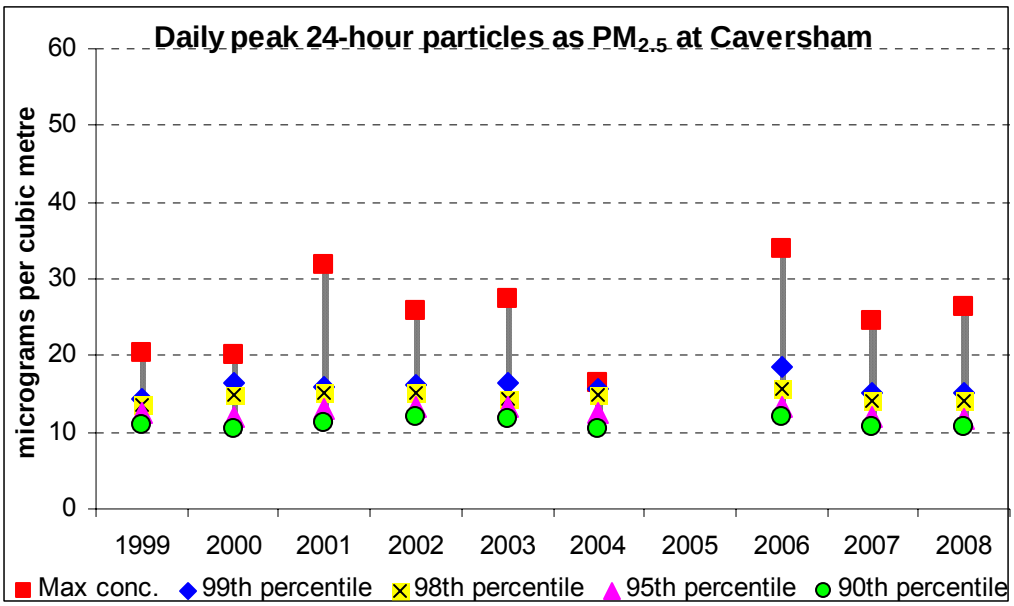

Figure A1-42 - 24-hour $PM_{2.5}$ at Caversham

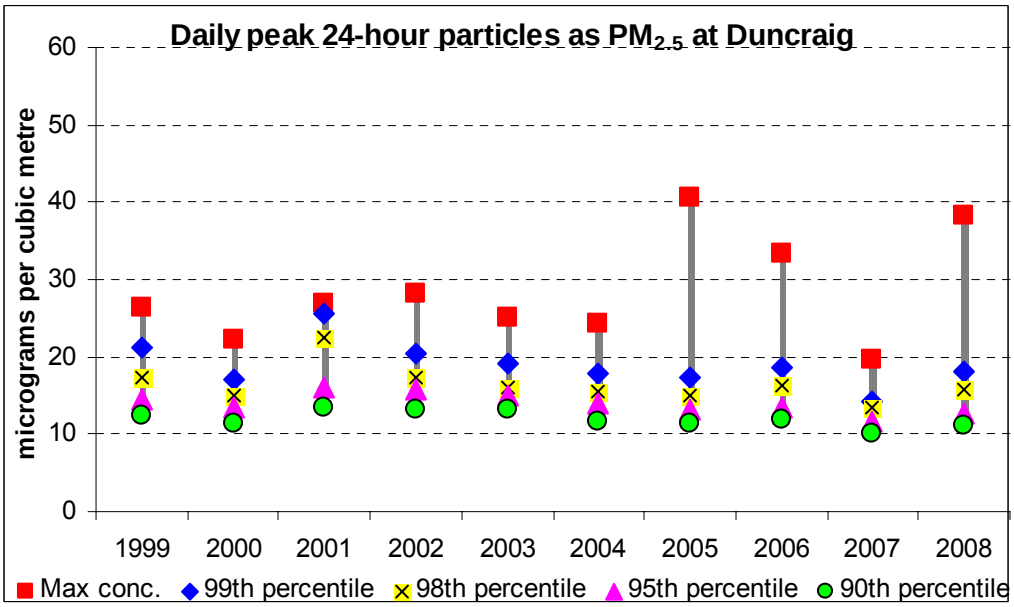

Figure A1-43 - 24-hour $PM_{2.5}$ at Duncraig

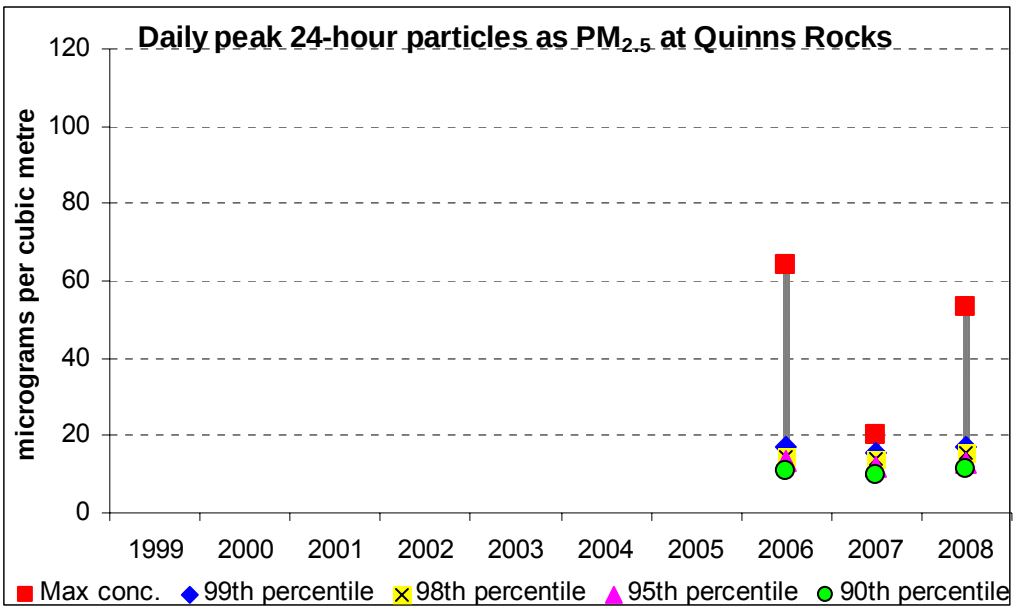

Figure A1-44 - 24-hour $PM_{2.5}$ at Quinns Rocks

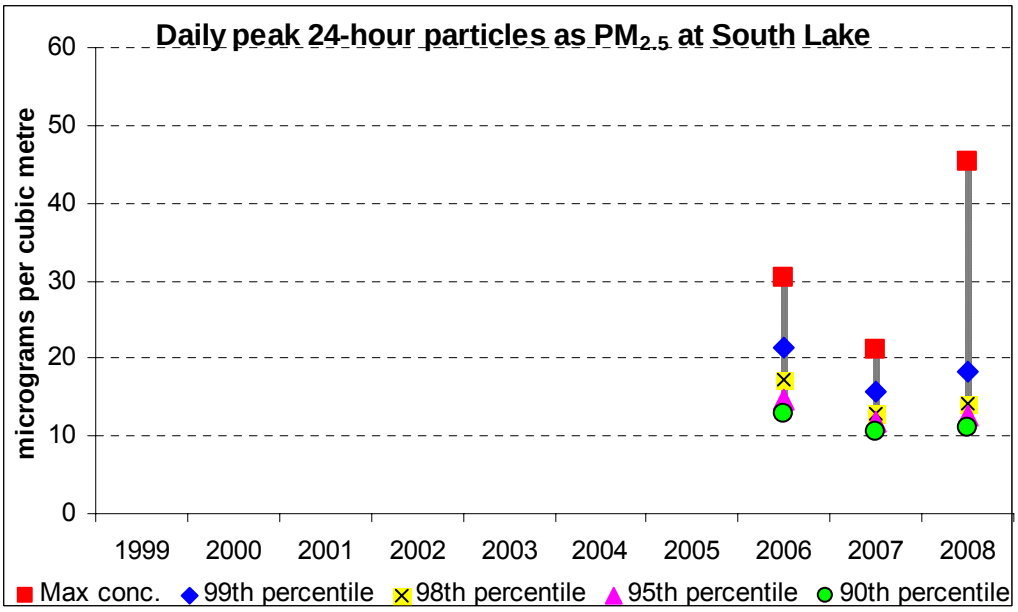

Figure A1-45 - 24-hour $PM_{2.5}$ at South Lake

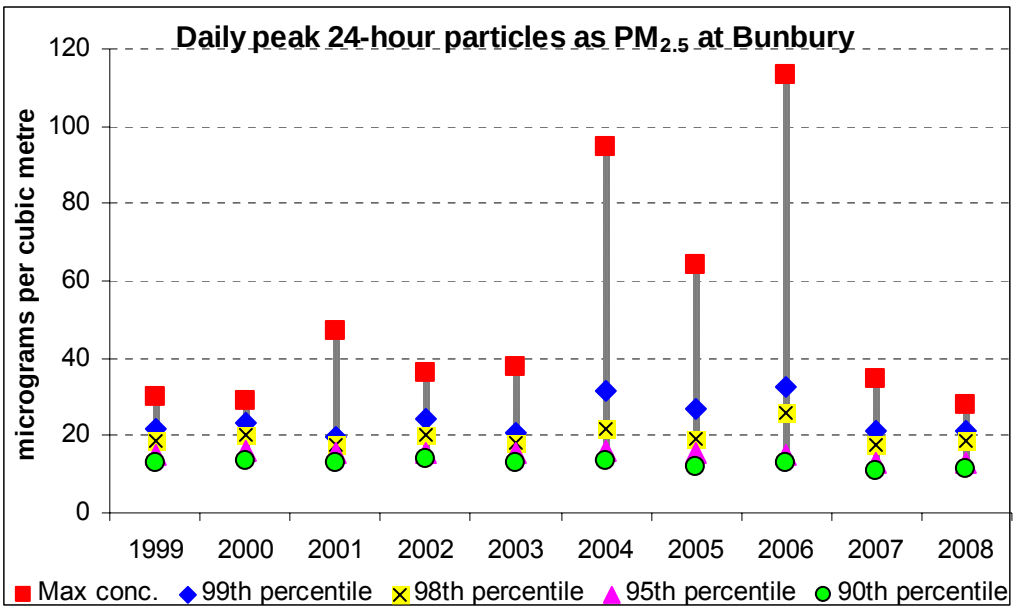

Figure A1-46 - 24-hour $PM_{2.5}$ at Bunbury

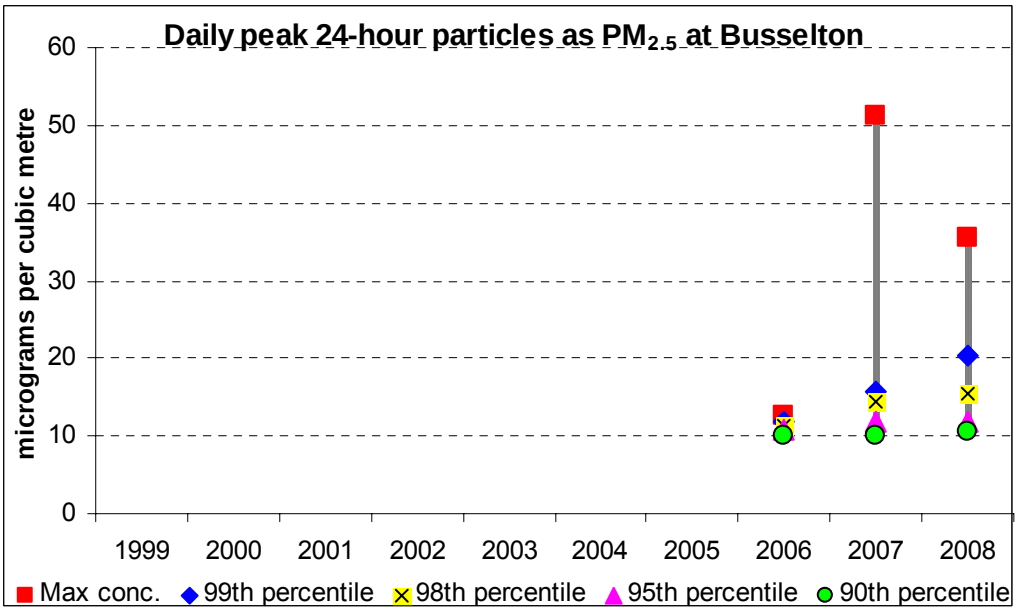

Figure A1-47 - 24-hour $PM_{2.5}$ at Busselton