Department of
Environment and Conservation

2009

Western Australia Air Monitoring Report

Written to comply with the

National Environment Protection Measure

(Ambient Air Quality)

July 2010

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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 stations in Busselton and Collie are 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 established in Albany (Figure A4). Table A1 indicates the pollutants monitored at each site.

CA Caversham	**QR Quinns Rock**	**RG Rolling Green**	**SW Swanbourne**
DU Duncraig	**RO Rockingham**	**SL South Lake**	**WT Wattleup**

Figure A1 - DEC air quality monitoring stations operating in the Perth metropolitan region during 2009.

Figure A2 - DEC air quality monitoring stations operating in Bunbury, Busselton and Collie during 2009

Figure A3 - DEC air quality monitoring station operating in Geraldton during 2009

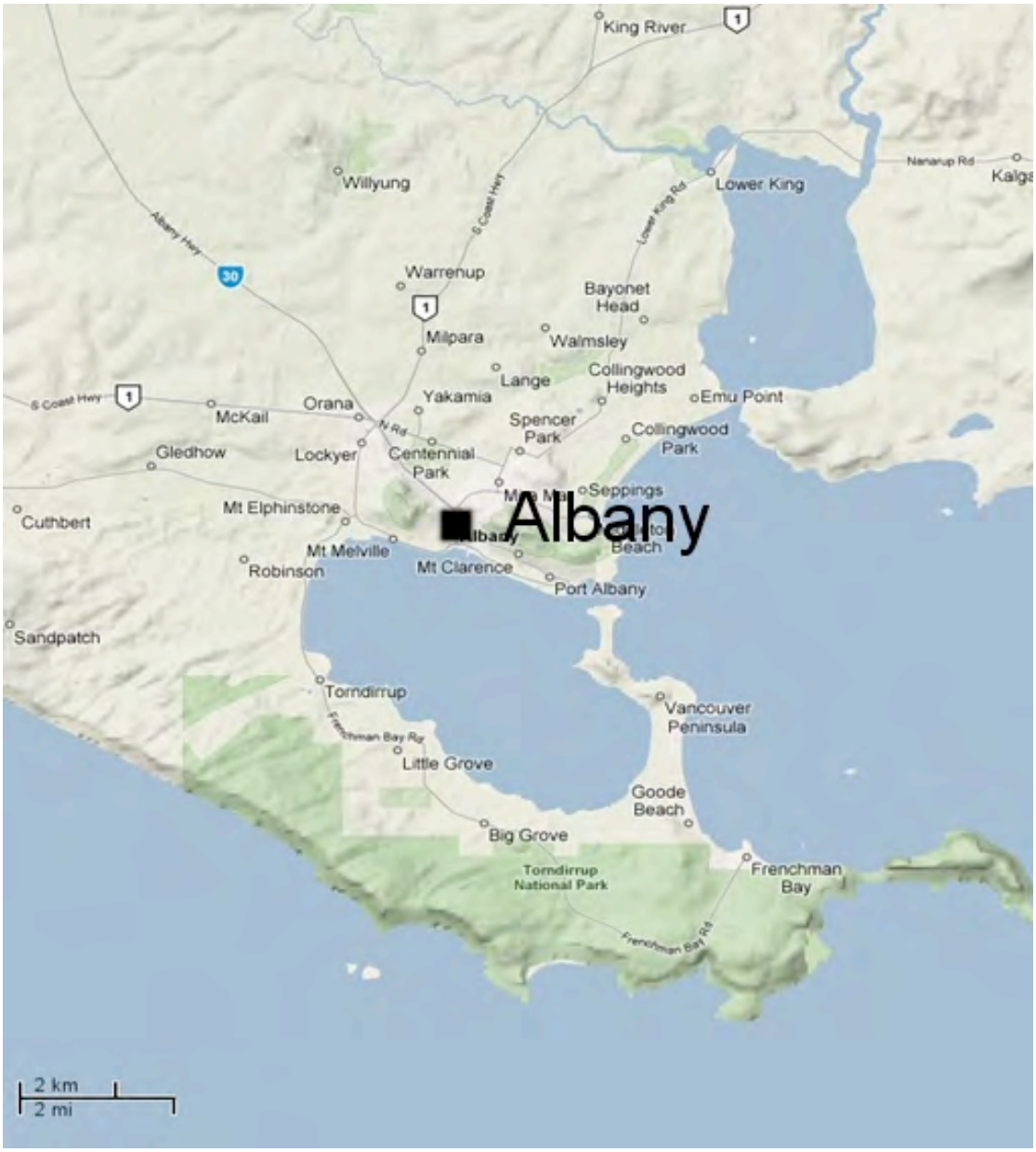

Figure A4 - DEC air quality monitoring station currently operating in Albany during 2009

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

Monitoring Site	CO	O_3	NO_2	SO_2	lead	PM_{10} TEOM	$PM_{2.5}$ TEOM
AL Albany						07/06 to present	
BN Bunbury	03/99 to 04/02					06/99 to present	04/97 to present
BS Busselton							11/06 to present
CA Caversham	08/93 to present	11/89 to present	09/90 to present			01/04 to present	03/94 to present
CO Collie						02/08 to present	
DU Duncraig	08/95 to present		08/95 to present			06/96 to present	01/95 to present
GE Geraldton						09/05 to present	
QR Quinns Rock		11/92 to present	11/92 to present				07/06 to present
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
SW Swanbourne	01/93 to 05/95	01/93 to present	03/93 to present				06/94 to 07/95
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
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
Particles as $PM_{2.5}$		Tapered element oscillating microbalance

Table A3. Monitoring in Western Australia.

Site:	CO	O_3	NO_2	SO_2	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	
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 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 A5. Screening procedures satisfied at each station.

Site:	Pop'n[a]	CO	O_3	NO_2	SO_2	Pb	PM_{10}
Perth & 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
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 Performance, Trend or Campaign sites where monitoring is currently underway.

Table A6. Stations site compliance with AS 2922 - 1987

	Height above ground	Min. distance to support structures	Clear sky angle of 120°	Unrestricted airflow of 270°/360°	20m from trees	No boilers or incinerators nearby	Minimum distance from road or traffic	Sample line material	Sample line length	Comments
Perth Region										
Caversham	☑	☑	☑	☑	☑	☑	☑	☑	☑	
Duncraig	☑	☑	☒	☑	☒	☑	☑	☑	☑	6 metres to medium sized trees and presence of power pole.
Quinns Rocks	☑	☑	☑	☑	☒	☑	☑	☑	☑	15 metres to small to medium size trees. Surrounding area dominated by low scrub.
Rockingham	☑	☑	☑	☑	☒	☑	☑	☑	☑	12 metres to trees. Northern vector dominated by grain storage facility.
Rolling Green	☑	☑	☑	☑	☑	☑	☑	☑	☑	
South Lake	☑	☑	☑	☑	☑	☑	☑	☑	☑	
Swanbourne	☑	☑	☑	☑	☑	☑	☑	☑	☑	
Wattleup	☑	☑	☑	☑	☒	☑	☑	☑	☑	10 metres to medium to large eucalyptus trees.
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.

In summary, during 2009, 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 will continue to maintain the stations at Rockingham, Quinns Rocks and Rolling Green for the foreseeable future as part of its wider ozone network.

Nitrogen dioxide

For purposes of scientific understanding, NO_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.

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

Lead

Since 1995, lead levels 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 at Geraldton in September 2005, Albany in July 2006 and Collie in February 2008.

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

Exceedence Summary

In 2009, the majority of exceedences were due to particle matter from smoke haze and dust. The site located at Geraldton 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. Rolling Green did not meet the ozone goal of no more than 1 exceedence of 0.08 ppm averaged over 4 hours.

All other sites met the NEPM goal.

Table A7. Air NEPM exceedences recorded during 2009

Site	Pollutant	Concentration	Date / Time	Reason
Bunbury	$PM_{2.5}$ – 24 hour	25.2 ug/m^3	17/04/2009	Smoke Haze
Bunbury	$PM_{2.5}$ – 24 hour	27.0 ug/m^3	03/05/2009	Smoke Haze
Bunbury	$PM_{2.5}$ – 24 hour	26.3 ug/m^3	05/05/2009	Smoke Haze
Bunbury	$PM_{2.5}$ – 24 hour	25.7 ug/m^3	15/05/2009	Smoke Haze
Bunbury	$PM_{2.5}$ – 24 hour	29.0 ug/m^3	16/05/2009	Smoke Haze
Bunbury	PM_{10} – 24 hour	53.8 ug/m^3	17/10/2009	Smoke Haze
Bunbury	$PM_{2.5}$ – 24 hour	40.0 ug/m^3	17/10/2009	Smoke Haze
Bunbury	$PM_{2.5}$ – 24 hour	30.0 ug/m^3	11/11/2009	Smoke Haze
Busselton	$PM_{2.5}$ – 24 hour	28.0 ug/m^3	17/04/2009	Smoke Haze
Busselton	$PM_{2.5}$ – 24 hour	30.4 ug/m^3	30/04/2009	Smoke Haze
Busselton	$PM_{2.5}$ – 24 hour	49.9 ug/m^3	03/05/2009	Smoke Haze
Busselton	$PM_{2.5}$ – 24 hour	69.0 ug/m^3	04/05/2009	Smoke Haze
Busselton	$PM_{2.5}$ – 24 hour	43.4 ug/m^3	05/05/2009	Smoke Haze
Busselton	$PM_{2.5}$ – 24 hour	29.0 ug/m^3	14/05/2009	Smoke Haze
Busselton	$PM_{2.5}$ – 24 hour	40.7 ug/m^3	15/05/2009	Smoke Haze
Busselton	$PM_{2.5}$ – 24 hour	48.0 ug/m^3	16/05/2009	Smoke Haze

Site	Pollutant	Concentration	Date / Time	Reason
Busselton	$PM_{2.5}$ – 24 hour	50.6 ug/m^3	16/10/2009	Smoke Haze
Busselton	$PM_{2.5}$ – 24 hour	34.1 ug/m^3	17/10/2009	Smoke Haze
Busselton	$PM_{2.5}$ – 24 hour	32.0 ug/m^3	10/11/2009	Smoke Haze
Busselton	$PM_{2.5}$ – 24 hour	30.5 ug/m^3	11/11/2009	Smoke Haze
Caversham	$PM_{2.5}$ – 24 hour	25.5 ug/m^3	17/01/2009	Smoke Haze
Caversham	O_3 – 1 hour	0.104 ppm	17/01/2009 13:00	Smoke induced
Caversham	O_3 – 4 hour	0.092 ppm	17/01/2009 13:00	Smoke induced
Caversham	$PM_{2.5}$ – 24 hour	25.0 ug/m^3	08/06/2009	Smoke Haze
Collie	PM_{10} – 24 hour	80.5 ug/m^3	14/02/2009	Smoke Haze
Collie	PM_{10} – 24 hour	53.5 ug/m^3	15/05/2009	Smoke Haze
Collie	PM_{10} – 24 hour	53.2 ug/m^3	16/12/2009	Smoke Haze
Duncraig	$PM_{2.5}$ – 24 hour	32.7 ug/m^3	17/01/2009	Smoke Haze
Duncraig	$PM_{2.5}$ – 24 hour	26.6 ug/m^3	11/11/2009	Smoke Haze
Duncraig	$PM_{2.5}$ – 24 hour	26.4 ug/m^3	16/12/2009	Smoke Haze
Geraldton	PM_{10} – 24 hour	51.3 ug/m^3	07/01/2009	Indeterminate
Geraldton	PM_{10} – 24 hour	60.3 ug/m^3	20/01/2009	Indeterminate
Geraldton	PM_{10} – 24 hour	54.2 ug/m^3	04/02/2009	Windborne dust
Geraldton	PM_{10} – 24 hour	67.5 ug/m^3	05/02/2009	Windborne dust
Geraldton	PM_{10} – 24 hour	75.8 ug/m^3	06/02/2009	Indeterminate
Geraldton	PM_{10} – 24 hour	53.8 ug/m^3	07/02/2009	Indeterminate
Geraldton	PM_{10} – 24 hour	53.4 ug/m^3	13/02/2009	Windborne dust
Geraldton	PM_{10} – 24 hour	128.9 ug/m^3	17/02/2009	Indeterminate
Geraldton	PM_{10} – 24 hour	72.0 ug/m^3	18/02/2009	Indeterminate
Geraldton	PM_{10} – 24 hour	60.3 ug/m^3	03/03/2009	Windborne dust
Geraldton	PM_{10} – 24 hour	83.5 ug/m^3	04/03/2009	Windborne dust
Geraldton	PM_{10} – 24 hour	50.4 ug/m^3	26/03/2009	Windborne dust
Geraldton	PM_{10} – 24 hour	50.4 ug/m^3	03/12/2009	Windborne dust
Geraldton	PM_{10} – 24 hour	60.2 ug/m^3	16/12/2009	Windborne dust
Quinns Rocks	$PM_{2.5}$ – 24 hour	31.3 ug/m^3	17/01/2009	Smoke Haze
Quinns Rocks	$PM_{2.5}$ – 24 hour	27.2 ug/m^3	16/12/2009	Smoke Haze
Rolling Green	O_3 – 4 hour	0.083 ppm	17/01/2009 17:00	Smoke induced
Rolling Green	O_3 – 1 hour	0.103 ppm	14/12/2009 13:00	Smoke induced
Rolling Green	O_3 – 4 hour	0.081 ppm	14/12/2009 15:00	Smoke induced
South Lake	$PM_{2.5}$ – 24 hour	26.8 ug/m^3	17/01/2009	Smoke Haze
South Lake	$PM_{2.5}$ – 24 hour	28.5 ug/m^3	11/11/2009	Smoke Haze
South Lake	$PM_{2.5}$ – 24 hour	32.0 ug/m^3	16/12/2009	Smoke Haze

SECTION B – ASSESSMENT OF COMPLIANCE WITH STANDARDS AND GOALS

Table B1. 2009 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	99.7	99.4	98.1	99.2	0	met
Duncraig (North Metro)	97.9	95.7	99.5	99.5	98.2	0	met
South Lake (South East Metro)	99.5	98.9	99.5	99.3	99.3	0	met

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

Table B2. 2009 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)	99.6	99.7	99.5	98.1	99.3	0.005	0	met	met
Duncraig (North Metro)	96.3	98.7	99.5	99.6	98.5	0.006	0	met	met
Quinns Rocks (Outer North Coast)	99.6	97.1	99.5	99.6	99	0.003	0	met	met
Rockingham (South Coast)	99.5	96.9	99.1	98.8	98.6	0.004	0	met	met
Rolling Green (Outer East Rural)	99.5	99.5	99.3	99.6	99.5	0.002	0	met	met
South Lake (South East Metro)	99.5	98.9	99.5	99.3	99.3	0.007	0	met	met
Swanbourne (Inner West Coast)	99.6	99.4	99.6	98.4	99.2	0.005	0	met	met

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

Table B3. 2009 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)	99.6	99.7	99.5	98.2	99.3	1	1	met	met
Quinns Rocks (Outer North Coast)	99.6	97.8	86.8	93	94.3	0	0	met	met
Rockingham (South Coast)	99.5	99.6	98.5	98.3	99	0	0	met	met
Rolling Green (Outer East Rural)	99.5	99.6	99.5	99.6	99.5	1	2	met	not met
South Lake (South East Metro)	99.5	99	99.5	99.4	99.4	0	0	met	met
Swanbourne (Inner West Coast)	99.6	99.5	99.5	99.5	99.6	0	0	met	met

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

Table B4. 2009 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											
Rockingham (South Coast)	99.5	97.4	99.1	98.8	98.7	0.001	0	0	met	met	met
South Lake (South East Metro)	98	96.8	99.5	99.3	98.4	0.001	0	0	met	met	met
Wattleup (South Metro)	98.2	90.8	96.4	96.7	95.6	0.001	0	0	met	met	met

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

Table B5. 2009 compliance summary for particles as PM_{10}

AAQ NEPM Standard
50 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)	99.9	99.7	98.5	99.7	99.4	0	met
Duncraig (North Metro)	99.6	98.6	99.8	99	99.2	0	met
South Lake (South East Metro)	99.6	99.2	99.6	99.7	99.5	0	met
Southwest Region							
Albany	96.5	98.9	95.7	99.9	97.7	0	met
Bunbury	99.4	99.3	99.9	99.5	99.5	1	met
Collie	98.4	99.9	100	99.9	99.5	3	met
Midwest Region							
Geraldton	99.8	98.8	99.8	100	99.6	14	not met

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

Table B6. 2009 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)	99.8	99.6	99	99.7	99.5	2	n/a
Duncraig (North Metro)	99.6	98.5	99.8	99.8	99.4	3	n/a
Quinns Rocks (Outer North Coast)	99.7	99.7	99.8	100	99.8	2	n/a
South Lake (South East Metro)	99.4	98.6	99.7	99.5	99.3	3	n/a
Southwest Region							
Bunbury	99.3	99	100	99.8	99.5	7	n/a
Busselton	99.7	99.6	99.9	99.8	99.8	12	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 2009. 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. 2009 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)	99.2	1.0	09/06/2009	0300	0.8	08/06/2009	0900
Duncraig (North Metro)	98.2	2.6	02/08/2009	0700	2.0	01/08/2009	0800
South Lake (South East Metro)	99.3	1.8	17/06/2009	0300	1.6	02/08/2009	0400

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 2009. 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. 2009 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)	99.3	0.044	09/04/2009	2000	0.038	17/04/2009	1900
Duncraig (North Metro)	98.5	0.042	17/10/2009	2200	0.039	11/11/2009	2200
Quinns Rocks (Outer North Coast)	99.0	0.034	09/04/2009	2200	0.034	07/04/2009	2100
Rockingham (South Coast)	98.6	0.031	16/03/2009	0800	0.030	07/05/2009	2000
Rolling Green (Outer East Rural)	99.5	0.035	19/04/2009	2000	0.034	20/04/2009	2000
South Lake (South East Metro)	99.3	0.048	12/12/2009	1700	0.040	04/12/2009	1600
Swanbourne (Inner West Coast)	99.2	0.037	29/11/2009	0200	0.035	07/08/2009	2200

Photochemical smog as ozone

The NEPM standard for ozone of 0.10 ppm averaged over one hour was exceeded at Caversham and Rolling Green during 2009. 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. 2009 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)	99.3	**0.104**	17/01/2009	1300	0.081	05/12/2009	1300
Quinns Rocks (Outer North Coast)	94.3	0.070	19/12/2009	1500	0.068	01/02/2009	1400
Rockingham (South Coast)	99.0	0.078	10/03/2009	1400	0.074	21/02/2009	1400
Rolling Green (Outer East Rural)	99.5	**0.103**	14/12/2009	1300	0.097	17/01/2009	1600
South Lake (South East Metro)	99.4	0.065	02/02/2009	1300	0.064	10/03/2009	1300
Swanbourne (Inner West Coast)	99.6	0.068	19/12/2009	1300	0.066	17/01/2009	1000

The NEPM standard for ozone of 0.08 ppm averaged over four hours was exceeded at Caversham and Rolling Green during 2009. The NEPM goal of no more than one exceedence at each site was not met at Rolling Green. Table C4 contains the summary statistics for daily peak four-hour O_3 in Western Australia.

Table C4. 2009 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)	99.3	**0.092**	17/01/2009	1500	0.069	02/02/2009	1600
Quinns Rocks (Outer North Coast)	94.3	0.062	19/12/2009	1600	0.060	01/02/2009	1500
Rockingham (South Coast)	99.0	0.066	10/03/2009	1600	0.066	11/02/2009	1700
Rolling Green (Outer East Rural)	99.5	**0.083**	17/01/2009	1700	**0.081**	14/12/2009	1500
South Lake (South East Metro)	99.4	0.057	02/02/2009	1400	0.055	11/11/2009	1500
Swanbourne (Inner West Coast)	99.6	0.063	19/12/2009	1500	0.060	11/02/2009	1800

Sulfur dioxide

The NEPM standard for sulfur dioxide of 0.20 ppm averaged over one hour was not exceeded at any site during 2009. 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. 2009 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							
Rockingham (South Coast)	98.7	0.032	08/07/2009	1900	0.032	10/06/2009	0200
South Lake (South East Metro)	98.4	0.036	21/12/2009	1500	0.036	10/01/2009	1500
Wattleup (South Metro)	95.6	0.059	22/12/2009	1300	0.052	09/04/2009	1600

The NEPM standard for sulfur dioxide of 0.08 ppm averaged over 24 hours was not exceeded at any site during 2009. 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. 2009 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							
Rockingham (South Coast)	98.7	0.008	08/07/2009	2400	0.005	10/06/2009	2400
South Lake (South East Metro)	98.4	0.006	21/12/2009	2400	0.006	26/12/2009	2400
Wattleup (South Metro)	95.6	0.008	22/12/2009	2400	0.007	14/12/2009	2400

The NEPM advisory standard for sulfur dioxide of 0.02 ppm averaged over one year was not exceeded at any site during 2009. Table C7 contains the summary statistics for annual SO_2 in Western Australia.

Table C7. 2009 summary statistics for annual sulfur dioxide

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

Regional Performance Monitoring Station	Data Recovery Rates (%)	annual average (ppm)
Perth Region		
Rockingham (South Coast)	98.7	0.001
South Lake (South East Metro)	99.4	0.001
Wattleup (South Metro)	95.6	0.001

Particles as PM_{10}

The NEPM standard for particles as PM_{10} of 50 μg/m^3 averaged over 24 hours was exceeded once at Bunbury, three times at Collie and 14 times at Geraldton during 2009. The NEPM goal of no more than five exceedences was met at all sites except Geraldton where the goal was not met. Table C8 contains the summary statistics for daily peak 24-hour PM_{10} in Western Australia.

Table C8. 2009 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)	(time)	6th Highest (ug/m^3)	6th Highest (date)	(time)
Perth Region							
Caversham (North East Metro)	99.4	45.7	17/01/2009	2400	34.3	06/03/2009	2400
Duncraig (North Metro)	99.2	45.5	17/01/2009	2400	32.4	09/04/2009	2400
South Lake (South East Metro)	99.5	49.0	16/12/2009	2400	34.6	05/12/2009	2400
Southwest Region							
Albany	97.7	36.7	16/05/2009	2400	29.8	25/10/2009	2400
Bunbury	99.5	**53.8**	17/10/2009	2400	38.9	15/05/2009	2400
Collie	99.5	**80.4**	14/02/2009	2400	46.8	08/05/2009	2400
Midwest Region							
Geraldton	99.6	**128.9**	17/02/2009	2400	**60.3**	03/03/2009	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 seven times at Bunbury, 12 times at Busselton, twice at Caversham, three times at Duncraig, twice at Quinns Rocks and three times at South Lake during 2009. Table C9 contains the summary statistics for daily peak 24-hour $PM_{2.5}$ in Western Australia.

Table C9. 2009 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)	99.5	**25.5**	17/01/2009	2400	18.7	15/12/2009	2400
Duncraig (North Metro)	99.4	**32.7**	17/01/2009	2400	19.4	30/11/2009	2400
Quinns Rocks (Outer North Coast)	99.8	**31.3**	17/01/2009	2400	20.0	12/11/2009	2400
South Lake (South East Metro)	99.3	**32.0**	16/12/2009	2400	22.1	14/12/2009	2400
Southwest Region							
Bunbury	99.5	**40.0**	17/10/2009	2400	**25.7**	15/05/2009	2400
Busselton	99.8	**69.0**	04/05/2009	2400	**40.7**	15/05/2009	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 exceeded at Duncraig, South Lake, Bunbury and Busselton during 2009. Table C10 contains the summary statistics for annual $PM_{2.5}$ in Western Australia.

Table C10. 2009 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)	99.5	7.8
Duncraig (North Metro)	99.4	**8.2**
Quinns Rocks (Outer North Coast)	99.8	7.8
South Lake (South East Metro)	99.3	**8.2**
Southwest Region		
Bunbury	99.5	**8.3**
Busselton	99.8	**9.0**

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 2009

Table D1. 2009 percentiles of daily peak 8-hour carbon monoxide concentrations

AAQ NEPM Standard
9.0 ppm (8-hour average)

Regional Performance Monitoring Station	Data availability rates (%)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)	75th percentile (ppm)	50th percentile (ppm)
Perth Region								
Caversham (North East Metro)	99.2	1.0	0.6	0.5	0.4	0.4	0.2	0.1
Duncraig (North Metro)	98.2	2.6	1.7	1.4	1.0	0.7	0.4	0.2
South Lake (South East Metro)	99.3	1.8	1.4	1.1	0.9	0.7	0.3	0.2

Table D2. 2009 percentiles of daily peak 1-hour nitrogen dioxide concentrations

AAQ NEPM Standard
0.12 ppm (one-hour average)

Regional Performance Monitoring Station	Data availability rates (%)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)	75th percentile (ppm)	50th percentile (ppm)
Perth Region								
Caversham (North East Metro)	99.3	0.044	0.034	0.033	0.028	0.026	0.021	0.015
Duncraig (North Metro)	98.5	0.042	0.037	0.034	0.030	0.027	0.023	0.018
Quinns Rocks (Outer North Coast)	99	0.034	0.032	0.031	0.027	0.024	0.018	0.012
Rockingham (South Coast)	98.6	0.031	0.029	0.028	0.026	0.024	0.019	0.011
Rolling Green (Outer East Rural)	99.5	0.035	0.023	0.019	0.017	0.015	0.011	0.007
South Lake (South East Metro)	99.3	0.048	0.039	0.036	0.033	0.029	0.025	0.020
Swanbourne (Inner West Coast)	99.2	0.037	0.034	0.032	0.028	0.026	0.021	0.015

Table D3. 2009 percentiles of daily peak 1-hour ozone concentrations

AAQ NEPM Standard
0.10 ppm (1-hour average)

Regional Performance Monitoring Station	Data availability rates (%)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)	75th percentile (ppm)	50th percentile (ppm)
Perth Region								
Caversham (North East Metro)	99.3	**0.104**	0.072	0.067	0.056	0.050	0.036	0.031
Quinns Rocks (Outer North Coast)	94.3	0.070	0.063	0.061	0.053	0.045	0.038	0.034
Rockingham (South Coast)	99	0.078	0.064	0.054	0.048	0.041	0.036	0.033
Rolling Green (Outer East Rural)	99.5	**0.103**	0.081	0.069	0.059	0.052	0.037	0.032
South Lake (South East Metro)	99.4	0.065	0.057	0.053	0.045	0.039	0.033	0.030
Swanbourne (Inner West Coast)	99.6	0.068	0.063	0.059	0.053	0.044	0.036	0.033

Table D4. 2009 percentiles percentiles of daily peak 4-hour ozone concentrations

AAQ NEPM Standard
0.08 ppm (4-hour average)

Regional Performance Monitoring Station	Data availability rates (%)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)	75th percentile (ppm)	50th percentile (ppm)
Perth Region								
Caversham (North East Metro)	99.3	**0.092**	0.067	0.057	0.051	0.043	0.034	0.030
Quinns Rocks (Outer North Coast)	94.3	0.062	0.056	0.054	0.048	0.040	0.036	0.033
Rockingham (South Coast)	99	0.066	0.058	0.051	0.045	0.039	0.035	0.031
Rolling Green (Outer East Rural)	99.5	**0.083**	0.064	0.057	0.051	0.043	0.035	0.031
South Lake (South East Metro)	99.4	0.057	0.053	0.048	0.040	0.036	0.032	0.028
Swanbourne (Inner West Coast)	99.6	0.063	0.058	0.054	0.046	0.039	0.035	0.031

Table D5. 2009 percentiles of daily peak 1-hour sulfur dioxide concentrations

AAQ NEPM Standard
0.20 ppm (1-hour average)

Regional Performance Monitoring Station	Data availability rates (%)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)	75th percentile (ppm)	50th percentile (ppm)
Perth Region								
Rockingham (South Coast)	98.7	0.032	0.022	0.017	0.010	0.007	0.002	0.001
South Lake (South East Metro)	98.4	0.036	0.033	0.029	0.018	0.015	0.007	0.002
Wattleup (South Metro)	95.6	0.059	0.039	0.036	0.029	0.022	0.012	0.004

Table D6. 2009 percentiles of daily peak 24-hour sulfur dioxide concentrations

AAQ NEPM Standard
0.08 ppm (24-hour average)

Regional Performance Monitoring Station	Data availability rates (%)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)	75th percentile (ppm)	50th percentile (ppm)
Perth Region								
Rockingham (South Coast)	98.7	0.008	0.003	0.002	0.001	0.001	0.001	0.000
South Lake (South East Metro)	98.4	0.006	0.005	0.003	0.003	0.002	0.001	0.001
Wattleup (South Metro)	95.6	0.008	0.005	0.005	0.004	0.003	0.002	0.001

Table D7. 2009 percentiles of daily peak 24-hour particles as PM_{10} concentrations

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

Regional Performance Monitoring Station	Data availability rates (%)	Max conc. (µg/m^3)	99th percentile (µg/m^3)	98th percentile (µg/m^3)	95th percentile (µg/m^3)	90th percentile (µg/m^3)	75th percentile (µg/m^3)	50th percentile (µg/m^3)
Perth Region								
Caversham (North East Metro)	99.4	45.7	37.2	32.4	29.0	25.8	20.5	16.2
Duncraig (North Metro)	99.2	45.5	36.2	30.0	24.5	22.6	18.4	15.0
South Lake (South East Metro)	99.5	49.0	38.7	34.3	30.8	27.5	20.6	16.2
Southwest Region								
Albany	84.5	35.5	30.3	28.6	26.5	23.3	18.8	14.5
Bunbury	99.5	**53.8**	40.3	36.0	29.5	25.4	20.8	17.1
Collie	99.5	**80.4**	47.3	46.2	38.0	31.3	24.6	18.4
Midwest Region								
Geraldton	99.6	**128.9**	69.2	58.6	48.5	40.3	30.8	21.0

Table D8. 2009 percentiles of daily peak 24-hour particles as $PM_{2.5}$ concentrations

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

Regional Performance Monitoring Station	Data availability rates (%)	Max conc. (µg/m^3)	99th percentile (µg/m^3)	98th percentile (µg/m^3)	95th percentile (µg/m^3)	90th percentile (µg/m^3)	75th percentile (µg/m^3)	50th percentile (µg/m^3)
Perth Region								
Caversham (North East Metro)	99.5	**25.5**	19.4	17.3	12.9	11.0	8.6	7.2
Duncraig (North Metro)	99.4	**32.7**	22.1	17.5	13.2	11.5	9.3	7.5
Quinns Rocks (Outer North Coast)	99.8	**31.3**	20.7	15.2	12.7	11.3	8.8	7.1
South Lake (South East Metro)	99.3	**32.0**	22.8	19.1	14.1	11.7	9.4	7.4
Southwest Region								
Bunbury	99.5	**40.0**	26.6	22.3	16.9	12.6	9.2	7.5
Busselton	99.8	**69.0**	45.0	31.6	17.7	14.0	9.5	7.2

Maxima and percentiles by site 2000 to 2009

Table D9. Daily peak 8-hour carbon monoxide at Caversham (2000-2009)
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)
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
2009	99.2	0	1.0	0.6	0.5	0.4	0.4

Table D10. Daily peak 8-hour carbon monoxide at Duncraig (2000-2009)
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)
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
2009	98.2	0	2.6	1.7	1.4	1.0	0.7

Table D11. Daily peak 8-hour carbon monoxide at South Lake (2000-2009)
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)
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
2009	99.3	0	1.8	1.4	1.1	0.9	0.7

Table D12. Daily peak 1-hour nitrogen dioxide at Caversham (2000-2009)
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)
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
2009	99.3	0	0.044	0.034	0.033	0.028	0.026

Table D13. Daily peak 1-hour nitrogen dioxide at Duncraig (2000-2009)
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)
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
2009	98.5	0	0.042	0.037	0.034	0.030	0.027

Table D14. Daily peak 1-hour nitrogen dioxide at Quinns Rocks (2000-2009)
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)
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
2009	99.0	0	0.034	0.032	0.031	0.027	0.024

Table D15. Daily peak 1-hour nitrogen dioxide at Rockingham (2000-2009)
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)
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
2009	98.6	0	0.031	0.029	0.028	0.026	0.024

Table D16. Daily peak 1-hour nitrogen dioxide at Rolling Green (2000-2009)
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)
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
2009	99.5	0	0.035	0.023	0.019	0.017	0.015

Table D17. Daily peak 1-hour nitrogen dioxide at South Lake (2000-2009)
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)
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
2009	99.3	0	0.048	0.039	0.036	0.033	0.029

Table D18. Daily peak 1-hour nitrogen dioxide at Swanbourne (2000-2009)
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)
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
2009	99.2	0	0.037	0.034	0.032	0.028	0.026

Table D19. Daily peak 1-hour ozone at Caversham (2000-2009)
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)
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
2009	99.3	1	**0.104**	0.072	0.067	0.056	0.050

Table D20. Daily peak 1-hour ozone at Quinns Rocks (2000-2009)
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)
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
2009	94.3	0	0.070	0.063	0.061	0.053	0.045

Table D21. Daily peak 1-hour ozone at Rockingham (2000-2009)
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)
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
2009	99.0	0	0.078	0.064	0.054	0.048	0.041

Table D22. Daily peak 1-hour ozone at Rolling Green (2000-2009)
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)
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
2009	99.5	1	**0.103**	0.081	0.069	0.059	0.052

Table D23. Daily peak 1-hour ozone at South Lake (2000-2009)

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)
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
2009	99.4	0	0.065	0.057	0.053	0.045	0.039

Table D24. Daily peak 1-hour ozone at Swanbourne (2000-2009)

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)
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
2009	99.6	0	0.068	0.063	0.059	0.053	0.044

Table D25. Daily peak 4-hour ozone at Caversham (2000-2009)

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)
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
2009	99.3	1	**0.092**	0.067	0.057	0.051	0.043

Table D26. Daily peak 4-hour ozone at Quinns Rocks (2000-2009)
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)
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
2009	94.3	0	0.062	0.056	0.054	0.048	0.040

Table D27. Daily peak 4-hour ozone at Rockingham (2000-2009)
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)
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
2009	99.0	0	0.066	0.058	0.051	0.045	0.039

Table D28. Daily peak 4-hour ozone at Rolling Green (2000-2009)
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)
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
2009	99.5	2	**0.083**	0.064	0.057	0.051	0.043

Table D29. Daily peak 4-hour ozone at South Lake (2000-2009)
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)
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
2009	99.4	0	0.057	0.053	0.048	0.040	0.036

Table D30. Daily peak 4-hour ozone at Swanbourne (2000-2009)
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)
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
2009	99.6	0	0.063	0.058	0.054	0.046	0.039

Table D31. Daily peak 1-hour sulfur dioxide at Rockingham (2000-2009)
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)
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
2009	98.7	0	0.032	0.022	0.017	0.010	0.007

Table D32. Daily peak 1-hour sulfur dioxide at South Lake (2000-2009)
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)
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
2009	98.4	0	0.036	0.033	0.029	0.018	0.015

Table D33. Daily peak 1-hour sulfur dioxide at Wattleup (2000-2009)
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)
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
2009	95.6	0	0.059	0.039	0.036	0.029	0.022

Table D34. Daily peak 24-hour sulfur dioxide at Rockingham (2000-2009)
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)
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
2009	98.7	0	0.008	0.003	0.002	0.001	0.001

Table D35. Daily peak 24-hour sulfur dioxide at South Lake (2000-2009)
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)
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
2009	98.4	0	0.006	0.005	0.003	0.003	0.002

Table D36. Daily peak 24-hour sulfur dioxide at Wattleup (2000-2009)
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)
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
2009	95.6	0	0.008	0.005	0.005	0.004	0.003

Table D37. Daily peak 24-hour particles as PM_{10} at Caversham (2000-2009)
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 ($\mu g/m^3$)
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
2009	99.4	0	45.7	37.2	32.4	29.0	25.8

Table D38. Daily peak 24-hour particles as PM_{10} at Duncraig (2000-2009)
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 ($\mu g/m^3$)
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
2009	99.2	0	45.5	36.2	30.0	24.5	22.6

Table D39. Daily peak 24-hour particles as PM_{10} at South Lake (2000-2009)
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 ($\mu g/m^3$)
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
2009	99.5	0	49.0	38.7	34.3	30.8	27.5

Table D40. Daily peak 24-hour particles as PM_{10} at Bunbury (2000-2009)
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 ($\mu g/m^3$)
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
2009	99.5	1	**53.8**	40.3	36.0	29.5	25.4

Table D41. Daily peak 24-hour particles as PM_{10} at Albany (2000-2009)

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 ($\mu g/m^3$)
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	52.4	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
2009	97.7	0	36.7	32.3	28.7	24.5	21.4

Table D42. Daily peak 24-hour particles as PM_{10} at Geraldton (2000-2009)

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 ($\mu g/m^3$)
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
2009	99.6	14	**128.9**	69.2	58.6	48.5	40.3

Table D43. Daily peak 24-hour particles as PM_{10} at Collie (2000-2009)

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 ($\mu g/m^3$)
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	87.6	7	**85.9**	56.7	50.1	37.4	30.5
2009	99.5	3	**80.4**	47.3	46.2	38.0	31.3

Table D44. Daily peak 24-hour particles as $PM_{2.5}$ at Caversham (2000-2009)

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 ($\mu g/m^3$)
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	98.6	1	**27.3**	16.3	14.4	13.4	11.6
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
2009	99.5	2	**25.5**	19.4	17.3	12.9	11.0

Table D45. Daily peak 24-hour particles as $PM_{2.5}$ at Duncraig (2000-2009)

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 ($\mu g/m^3$)
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
2009	99.4	3	**32.7**	22.1	17.5	13.2	11.5

Table D46. Daily peak 24-hour particles as $PM_{2.5}$ at Quinns Rocks (2000-2009)

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 ($\mu g/m^3$)
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
2009	99.8	2	**31.3**	20.7	15.2	12.7	11.3

Table D47. Daily peak 24-hour particles as $PM_{2.5}$ at South Lake (2000-2009)
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 ($\mu g/m^3$)
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
2009	99.3	3	**32.0**	22.8	19.1	14.1	11.7

Table D48. Daily peak 24-hour particles as $PM_{2.5}$ at Bunbury (2000-2009)
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 ($\mu g/m^3$)
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
2009	99.5	7	**40.0**	26.6	22.3	16.9	12.6

Table D49. Daily peak 24-hour particles as $PM_{2.5}$ at Busselton (2000-2009)
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 ($\mu g/m^3$)
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
2009	99.8	12	**69.0**	45.0	31.6	17.7	14.0

Maxima by pollutant 2000-2009

Table D50. Annual daily peak 8-hour carbon monoxide concentrations (ppm) for 2000-2009

AAQ NEPM Standard
9.0 ppm (8-hour average)

Regional Performance Monitoring Station	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Perth Region										
Caversham (North East Metro)	1.4	1.5	1.3	1.1	1.3	1.3	1.8	0.9	0.8	1.0
Duncraig (North Metro)	4.8	5.9	5.4	4.1	4.5	3.3	3.4	2.0	3.1	2.6
South Lake (South East Metro)	3.6	4.0	3.2	3.1	3.5	2.9	2.5	1.7	2.0	1.8
Caversham (North East Metro)	1.4	1.5	1.3	1.1	1.3	1.3	1.8	0.9	0.8	1.0

Highlighted cells indicate NEPM exceedences.

Table D51. Annual daily peak 1-hour nitrogen dioxide concentrations (ppm) for 2000-2009

AAQ NEPM Standard
0.12 ppm (1-hour average)

Regional Performance Monitoring Station	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Perth Region										
Caversham (North East Metro)	0.044	0.045	0.055	0.043	0.046	0.048	0.084	0.044	0.036	0.044
Duncraig (North Metro)	0.050	0.041	0.049	0.057	0.043	0.051	0.056	0.053	0.038	0.042
Quinns Rocks (Outer North Coast)	0.045	0.036	0.037	0.035	0.041	0.041	0.065	0.035	0.037	0.034
Rockingham (South Coast)	0.048	0.046	0.042	0.051	0.055	0.045	0.054	0.040	0.031	0.031
Rolling Green (Outer East Rural)	0.027	0.026	0.025	0.032	0.025	0.029	0.026	0.020	0.023	0.035
South Lake (South East Metro)	0.041	0.039	0.048	0.048	0.043	0.052	0.045	0.057	0.044	0.048
Swanbourne (Inner West Coast)	0.045	0.037	0.051	0.048	0.042	0.039	0.043	0.038	0.035	0.037

Highlighted cells indicate NEPM exceedences.

Table D52. Annual daily peak 1-hour ozone concentrations (ppm) for 2000-2009

AAQ NEPM Standard
0.10 ppm (1-hour average)

Regional Performance Monitoring Station	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Perth Region										
Caversham (North East Metro)	0.084	0.099	0.091	0.083	0.079	0.094	0.080	0.085	0.083	0.104
Quinns Rocks (Outer North Coast)	0.078	0.073	0.079	0.086	0.079	0.095	0.085	0.081	0.083	0.070
Rockingham (South Coast)	0.083	0.076	0.079	0.064	0.102	0.081	0.072	0.084	0.077	0.078
Rolling Green (Outer East Rural)	0.092	0.097	0.091	0.087	0.101	0.079	0.093	0.095	0.087	0.103
South Lake (South East Metro)	0.077	0.079	0.067	0.071	0.076	0.080	0.066	0.067	0.082	0.065
Swanbourne (Inner West Coast)	0.079	0.074	0.081	0.082	0.077	0.076	0.075	0.077	0.076	0.068

Highlighted cells indicate NEPM exceedences.

Table D53. Annual daily peak 4-hour ozone concentrations (ppm) for 2000-2009

AAQ NEPM Standard
0.08 ppm (4-hour average)

Regional Performance Monitoring Station	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Perth Region										
Caversham (North East Metro)	0.058	0.079	0.068	0.069	0.067	0.069	0.072	0.073	0.076	0.092
Quinns Rocks (Outer North Coast)	0.072	0.066	0.069	0.071	0.068	0.070	0.074	0.075	0.073	0.062
Rockingham (South Coast)	0.078	0.071	0.071	0.059	0.079	0.075	0.067	0.079	0.072	0.066
Rolling Green (Outer East Rural)	0.075	0.094	0.071	0.075	0.077	0.068	0.079	0.080	0.075	0.083
South Lake (South East Metro)	0.067	0.076	0.058	0.063	0.064	0.070	0.063	0.059	0.067	0.057
Swanbourne (Inner West Coast)	0.073	0.069	0.066	0.066	0.067	0.066	0.069	0.067	0.070	0.063

Highlighted cells indicate NEPM exceedences.

Table D54. Annual daily peak 1-hour sulfur dioxide concentrations (ppm) for 2000-2009

AAQ NEPM Standard
0.20 ppm (1-hour average)

Regional Performance Monitoring Station	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Perth Region										
Rockingham (South Coast)	0.034	0.028	0.035	0.026	0.039	0.041	0.040	0.041	0.079	0.032
South Lake (South East Metro)	0.042	0.046	0.043	0.038	0.042	0.046	0.060	0.040	0.046	0.036
Wattleup (South Metro)	0.046	0.074	0.081	0.062	0.076	0.120	0.062	0.060	0.077	0.059

Highlighted cells indicate NEPM exceedences.

Table D55. Annual daily peak 24-hour sulfur dioxide concentrations (ppm) for 2000-2009

AAQ NEPM Standard
0.08 ppm (24-hour average)

Regional Performance Monitoring Station	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Perth Region										
Rockingham (South Coast)	0.012	0.009	0.006	0.005	0.006	0.009	0.007	0.012	0.007	0.008
South Lake (South East Metro)	0.004	0.006	0.006	0.006	0.005	0.007	0.009	0.006	0.005	0.006
Wattleup (South Metro)	0.006	0.009	0.008	0.006	0.009	0.014	0.009	0.010	0.011	0.008

Highlighted cells indicate NEPM exceedences.

Table D56. Annual daily peak 24-hour particles as PM_{10} concentrations (ug/m^3) for 2000-2009

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

Regional Performance Monitoring Station	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Perth Region										
Caversham (North East Metro)	-	-	-	-	58.0	76.8	42.6	58.8	39.1	45.7
Duncraig (North Metro)	29.8	53.6	54.0	66.7	45.1	59.2	40.6	40.3	46.9	45.5
South Lake (South East Metro)	39.6	56.7	82.6	44.5	50.5	98.8	45.3	56.7	55.0	49.0
Southwest Region										
Bunbury	42.4	57.6	42.5	54.5	99.5	63.3	123.5	46.5	39.1	53.8
Collie	-	-	-	-	-	-	-	-	85.9	80.4
Albany	-	-	-	-	-	-	39.4	55.7	56.3	36.7
Mid West Region										
Geraldton	-	-	-	-	-	61.3	78.0	116.3	150.7	128.9

Highlighted cells indicate NEPM exceedences.

Table D57. Annual daily peak 24-hour particles as $PM_{2.5}$ concentrations (ug/m^3) for 2000-2009

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

Regional Performance Monitoring Station	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Perth Region										
Caversham (North East Metro)	20.1	31.8	25.7	27.3	16.5	27.3	34.0	24.5	26.3	25.5
Duncraig (North Metro)	22.2	27.0	28.3	25.2	24.4	40.6	33.4	19.6	38.3	32.7
Quinns Rocks (Outer North Coast)	-	-	-	-	-	-	63.9	19.9	53.3	31.3
South Lake (South East Metro)	-	-	-	-	-	-	30.5	21.2	45.2	32.0
Southwest Region										
Bunbury	29.2	47.3	36.1	37.6	94.8	64.2	113.5	34.5	27.8	40.0
Busselton	-	-	-	-	-	-	12.7	51.1	35.6	69.0

Highlighted cells indicate NEPM exceedences.

Table D58. Annual averaged particles as $PM_{2.5}$ concentrations (ug/m^3) for 2000-2009

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

Regional Performance Monitoring Station	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Perth Region										
Caversham (North East Metro)	7.4	7.6	8.1	8.0	7.6	8.0	8.1	7.5	7.1	7.8
Duncraig (North Metro)	8.0	8.6	9.2	8.9	7.9	7.8	8.2	7.3	7.7	8.2
Quinns Rocks (Outer North Coast)	-	-	-	-	-	-	7.8	6.9	7.2	7.8
South Lake (South East Metro)	-	-	-	-	-	-	8.7	7.6	7.7	8.2
Southwest Region										
Bunbury	9.3	8.7	9.0	8.6	9.2	8.6	8.7	7.8	7.6	8.3
Busselton	-	-	-	-	-	-	6.9	7.4	7.3	9.0

Highlighted cells indicate NEPM exceedences.

ATTACHMENT 1 – Graphical trends

This attachment provides graphical representations of tables D8 to D44 of Section D. Each graph show the maximum, 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

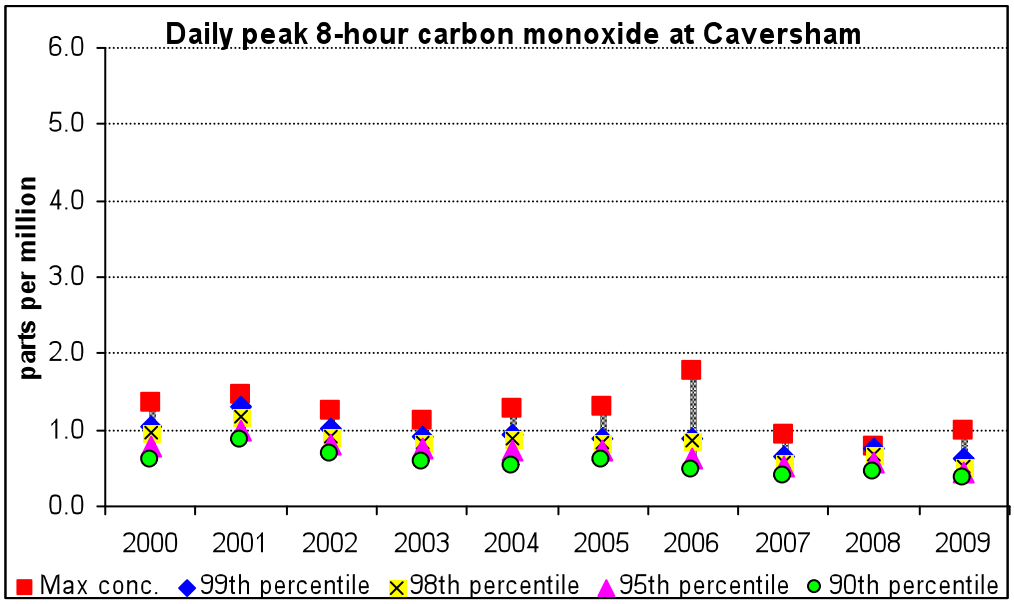

Figure A1-1 - 8-hour carbon monoxide at Caversham

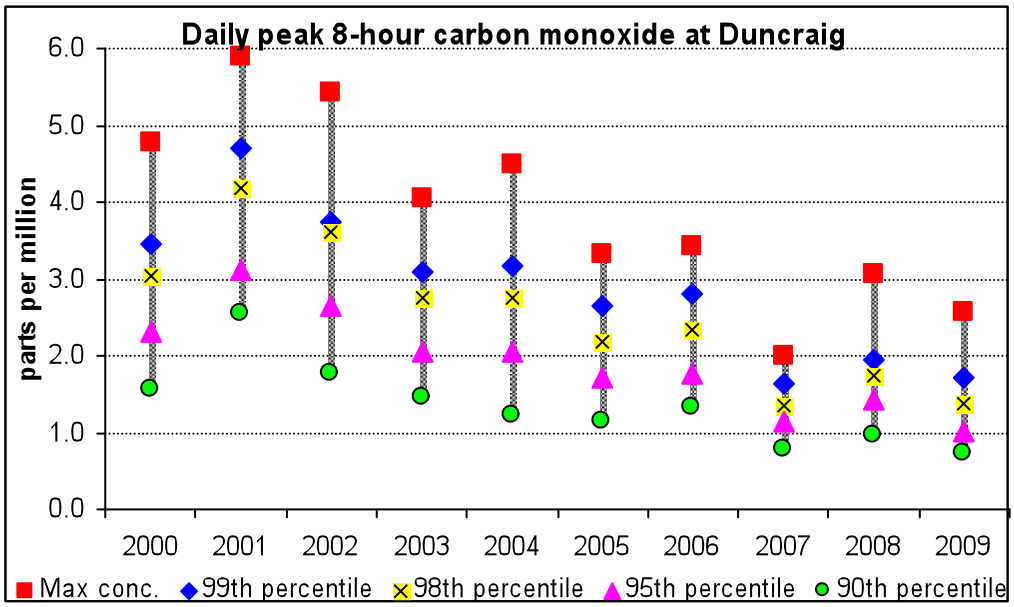

Figure A1-2 - 8-hour carbon monoxide at Duncraig

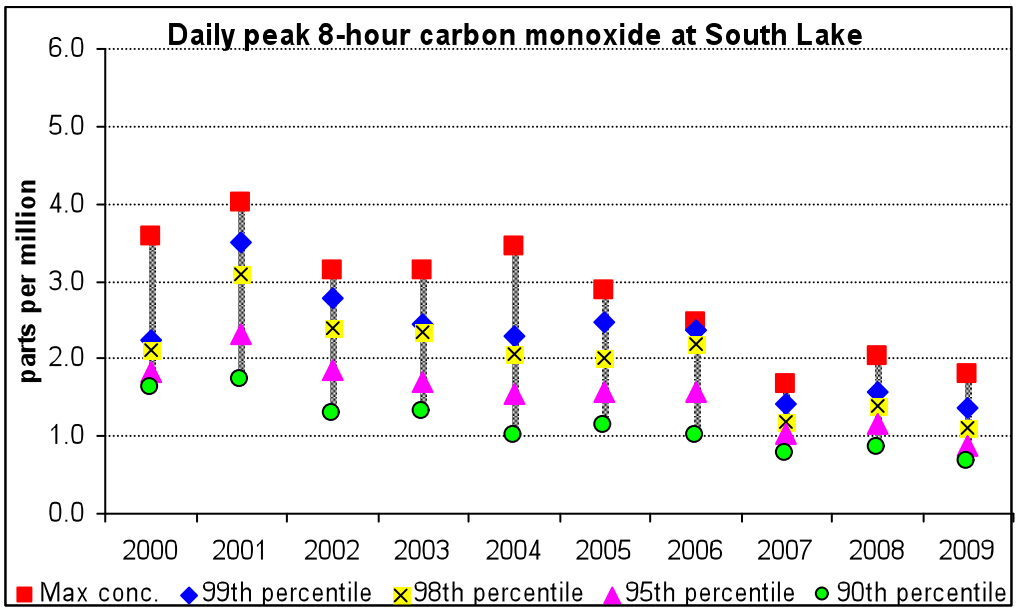

Figure A1-3 - 8-hour carbon monoxide at South Lake

Nitrogen dioxide

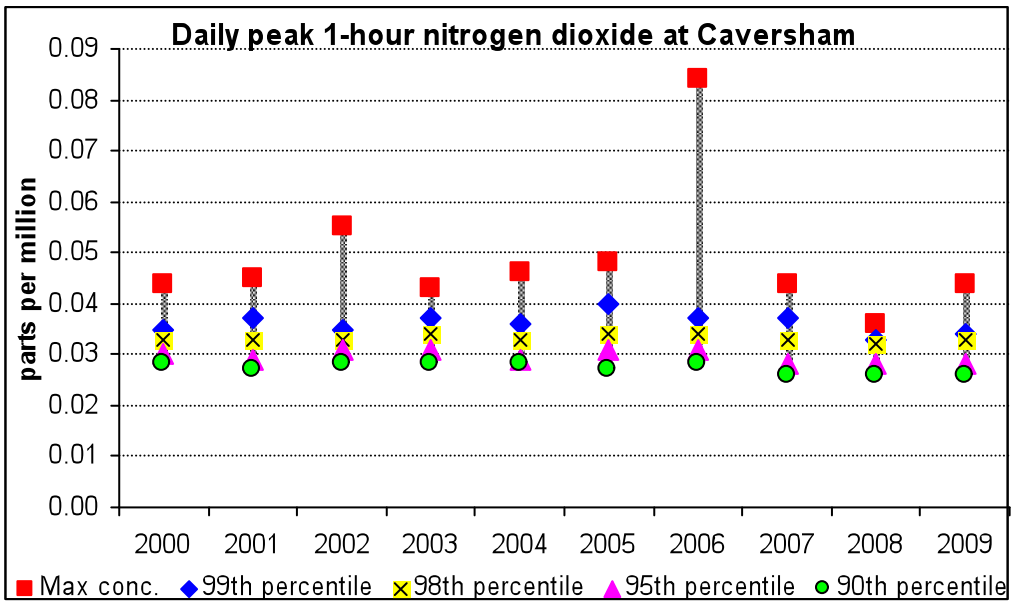

Figure A1-4 - 1-hour nitrogen dioxide at Caversham

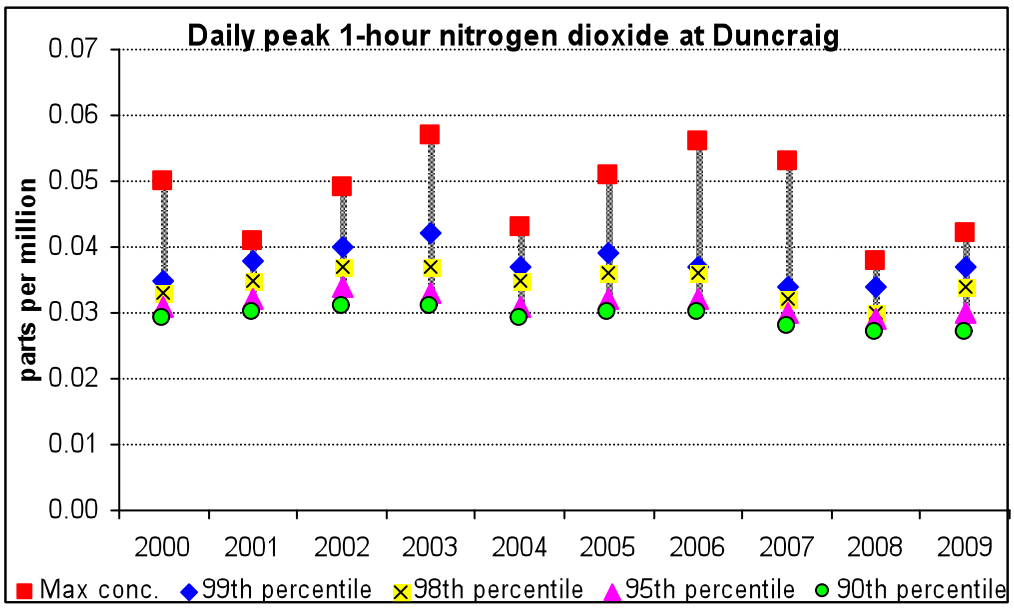

Figure A1-5 - 1-hour nitrogen dioxide at Duncraig

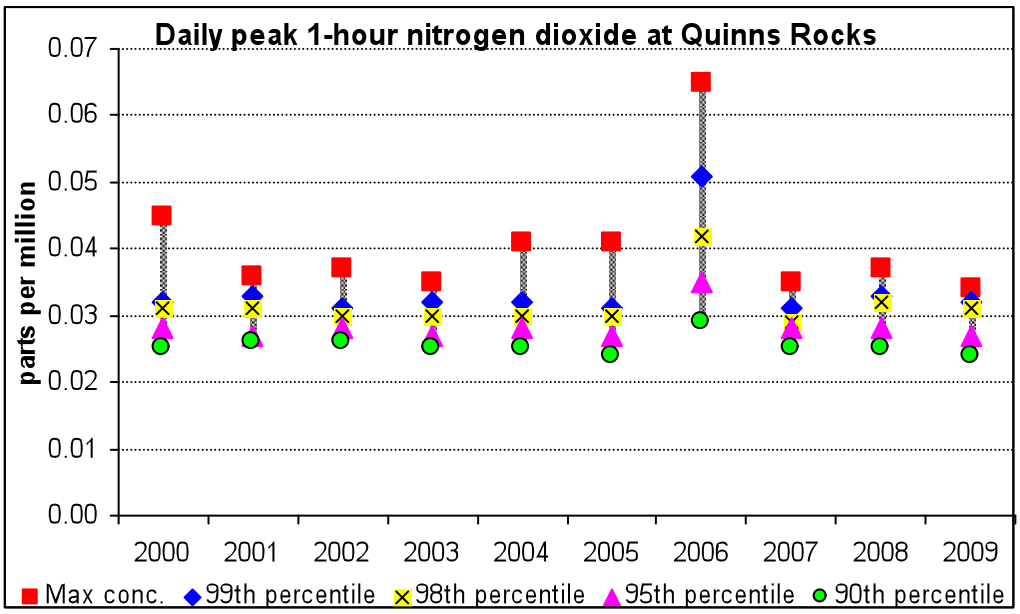

Figure A1-6 - 1-hour nitrogen dioxide at Quinns Rocks

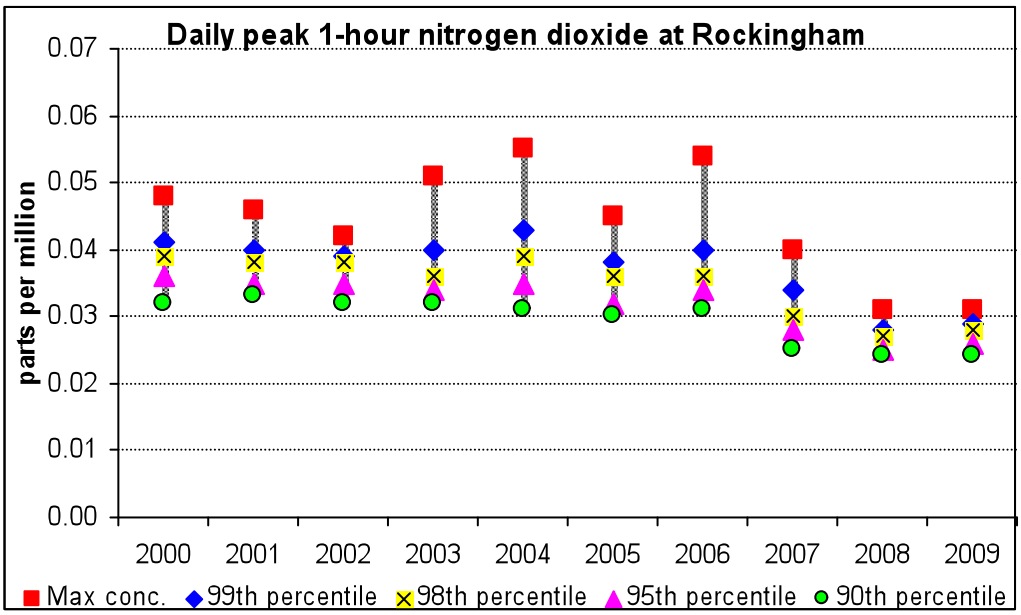

Figure A1-7 - 1-hour nitrogen dioxide at Rockingham

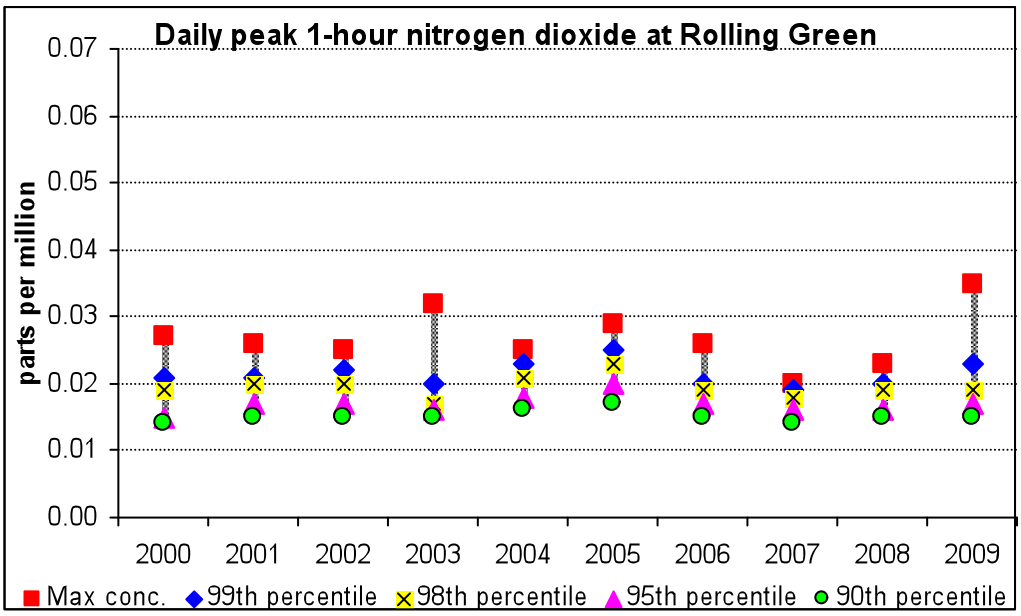

Figure A1-8 - 1-hour nitrogen dioxide at Rolling Green

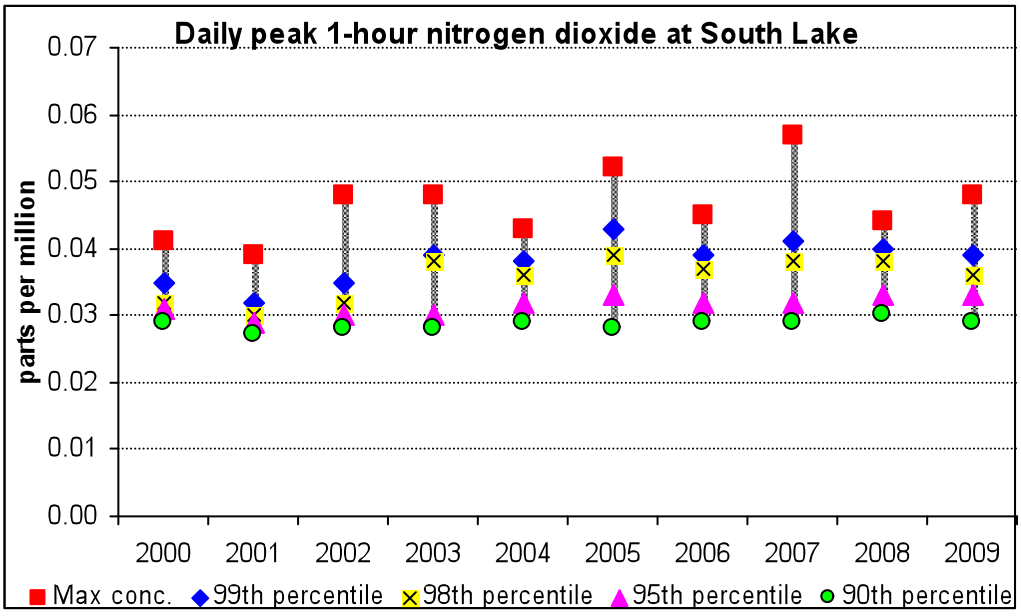

Figure A1-9 - 1-hour nitrogen dioxide at South Lake

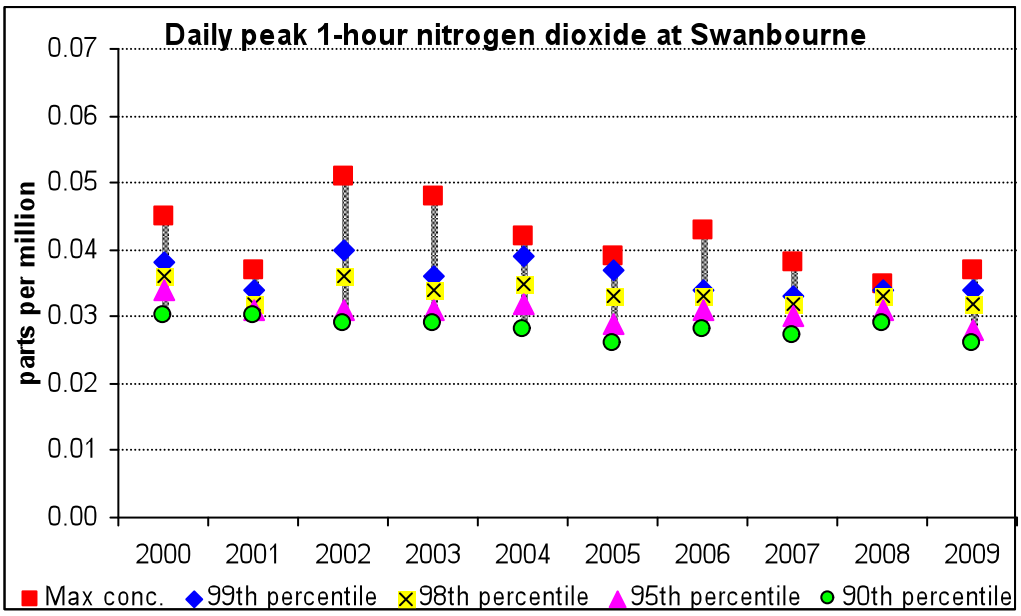

Figure A1-10 - 1-hour nitrogen dioxide at Swanbourne

Ozone

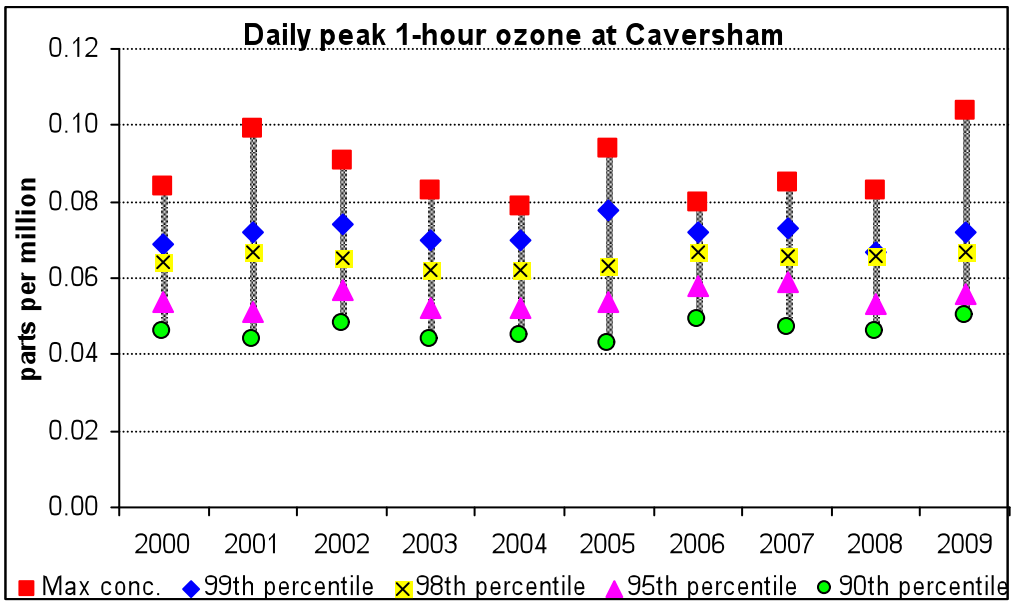

Figure A1-11 - 1-hour ozone at Caversham

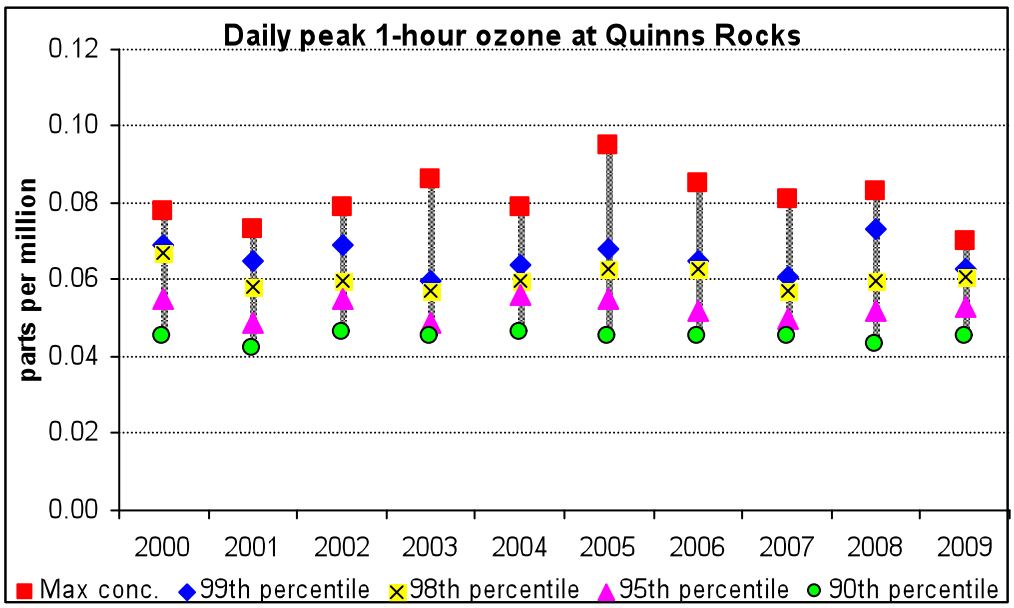

Figure A1-12 - 1-hour ozone at Quinns Rocks

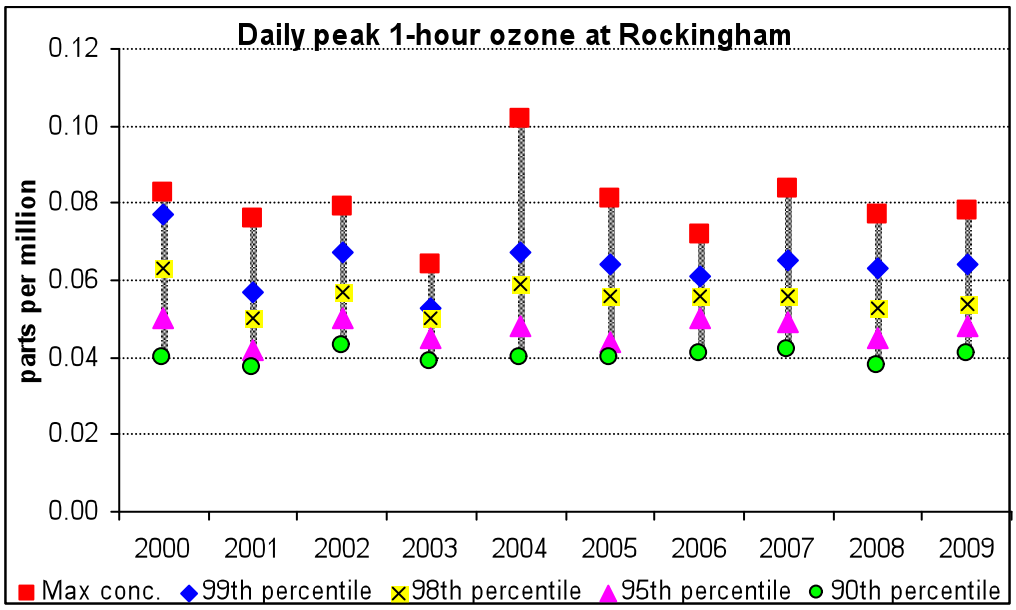

Figure A1-13 - 1-hour ozone at Rockingham

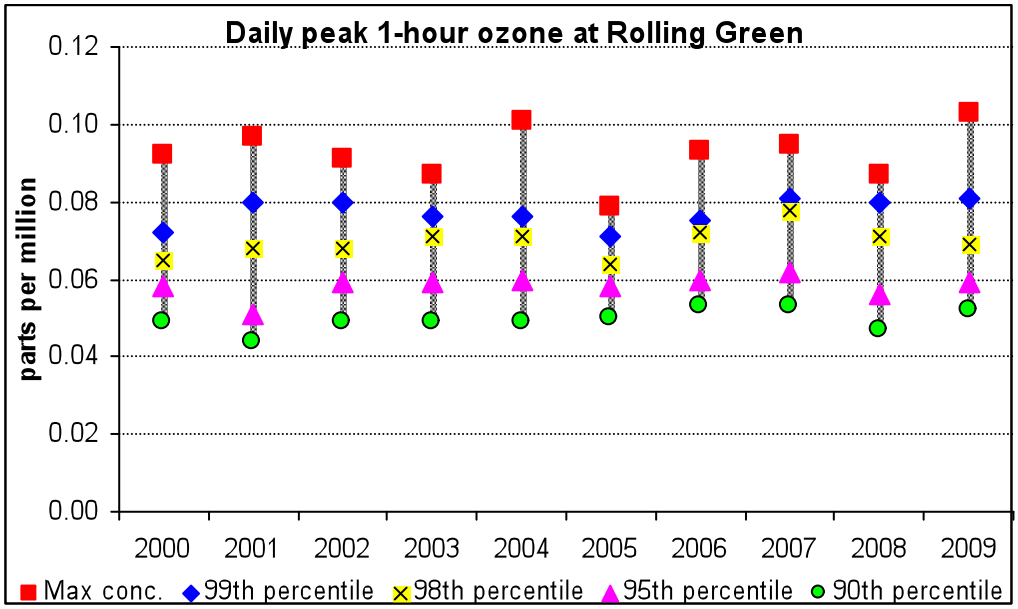

Figure A1-14 - 1-hour ozone at Rolling Green

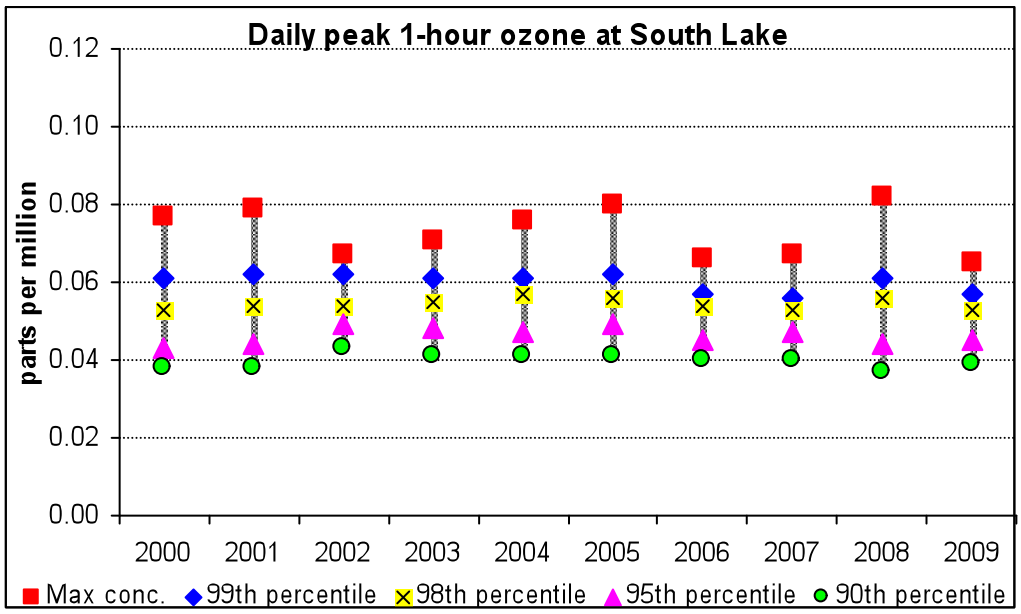

Figure A1-15 - 1-hour ozone at South Lake

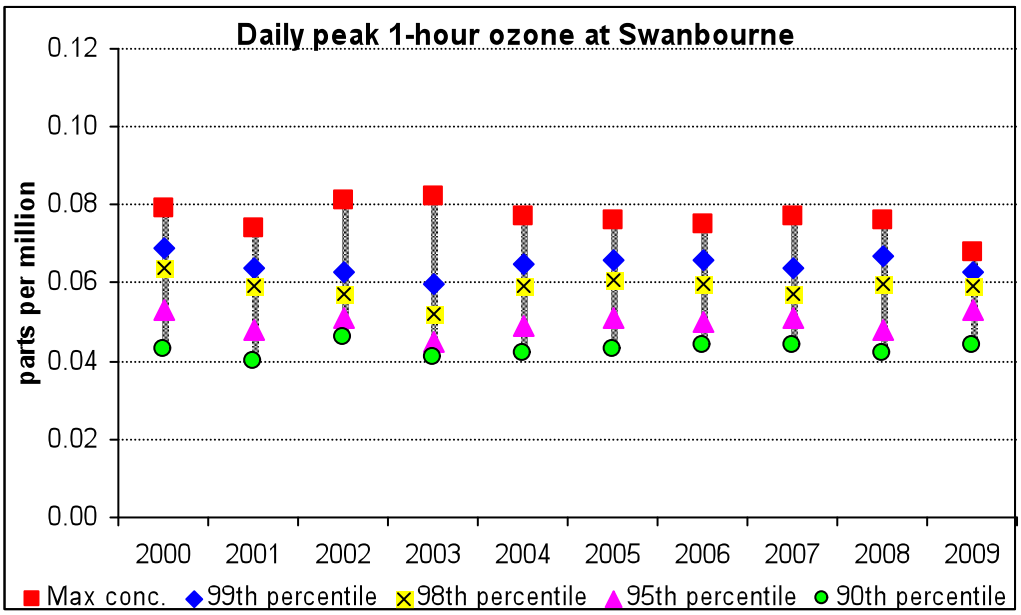

Figure A1-16 - 1-hour ozone at Swanbourne

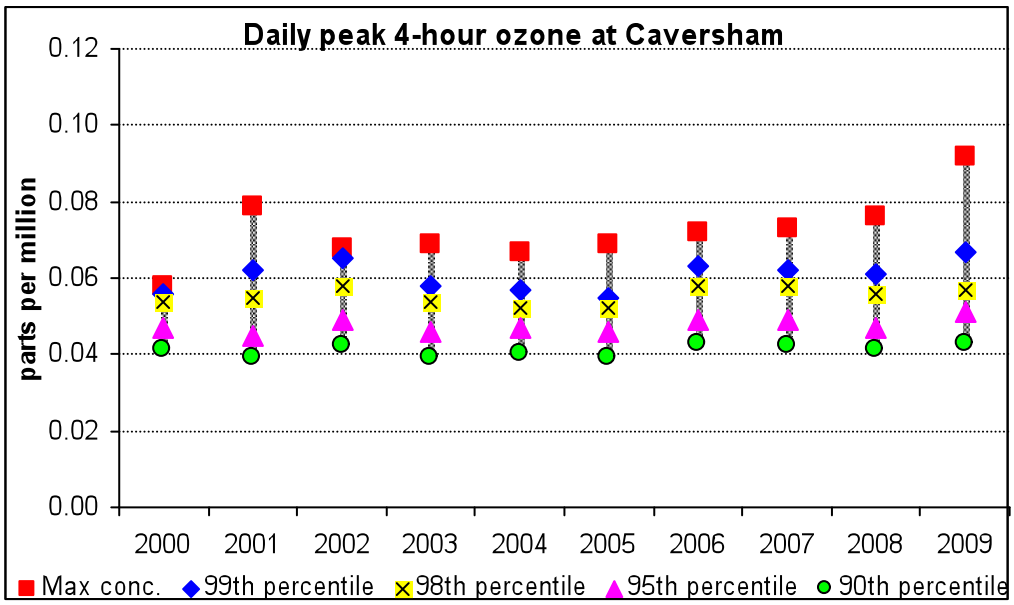

Figure A1-17 - 4-hour ozone at Caversham

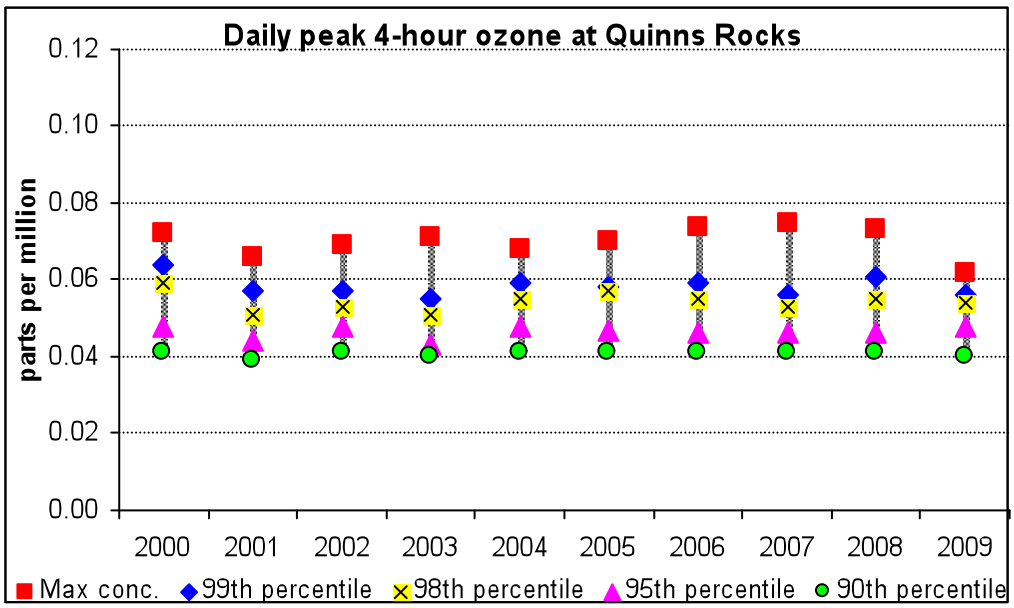

Figure A1-18 - 4-hour ozone at Quinns Rocks

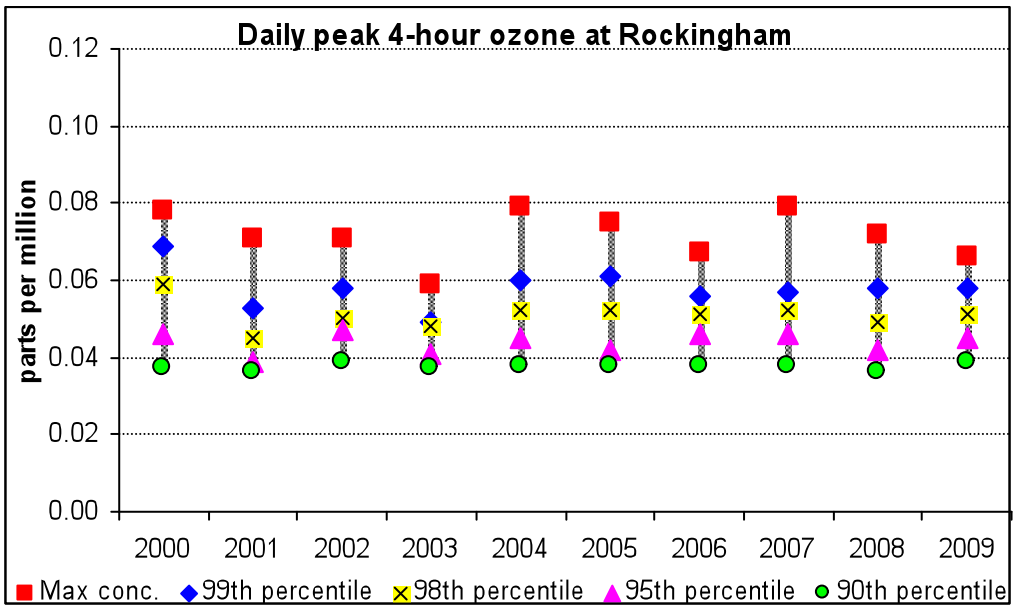

Figure A1-19 - 4-hour ozone at Rockingham

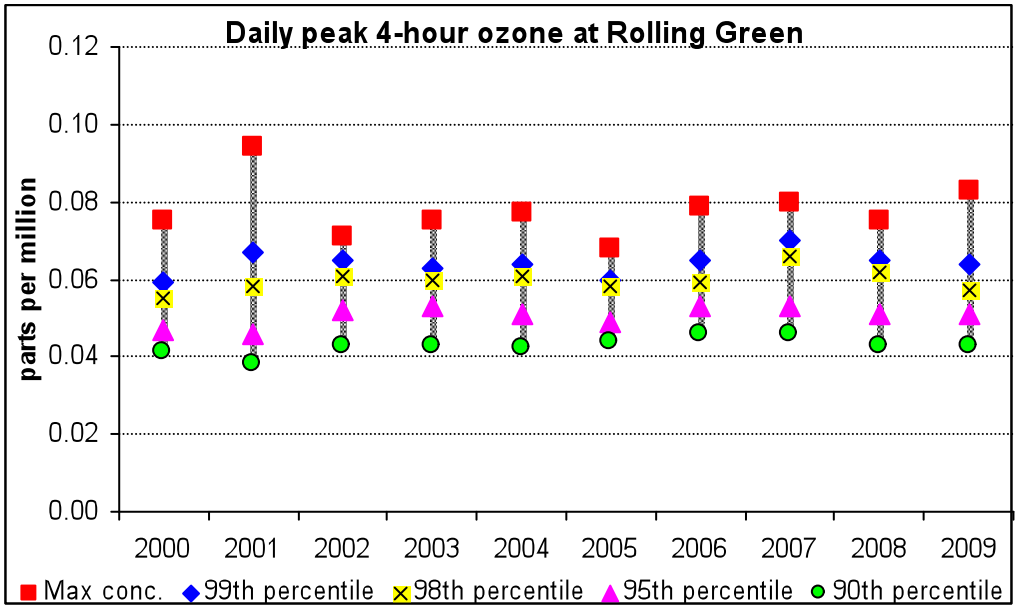

Figure A1-20 - 4-hour ozone at Rolling Green

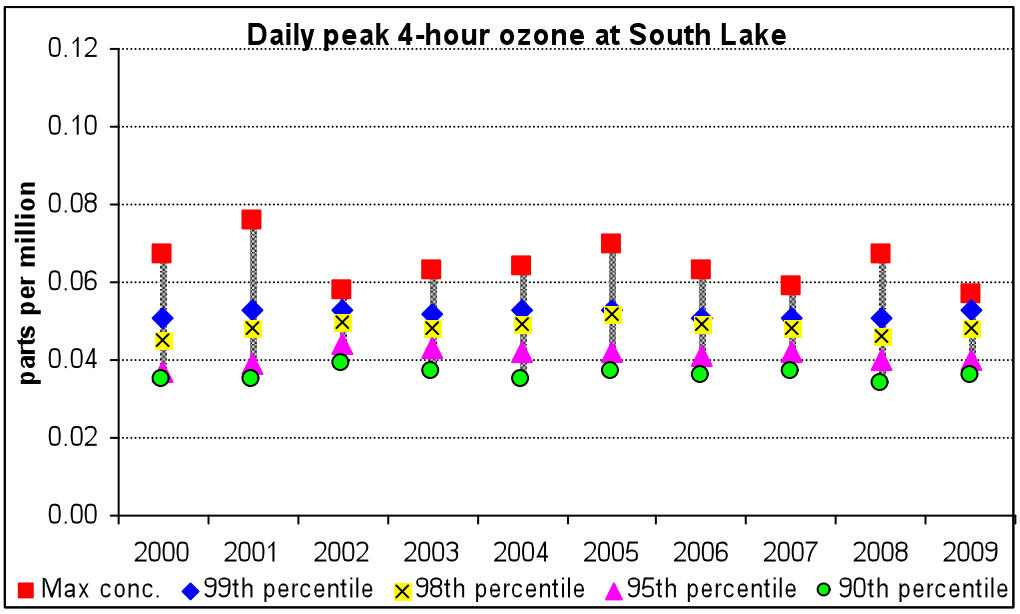

Figure A1-21 - 4-hour ozone at South Lake

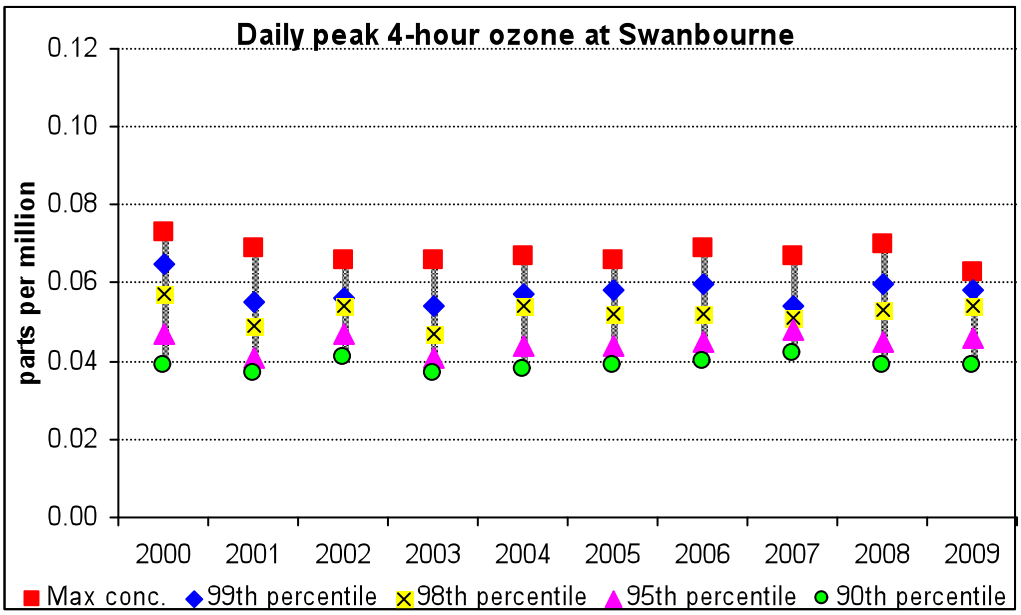

Figure A1-22 - 4-hour ozone at Swanbourne

Sulfur dioxide

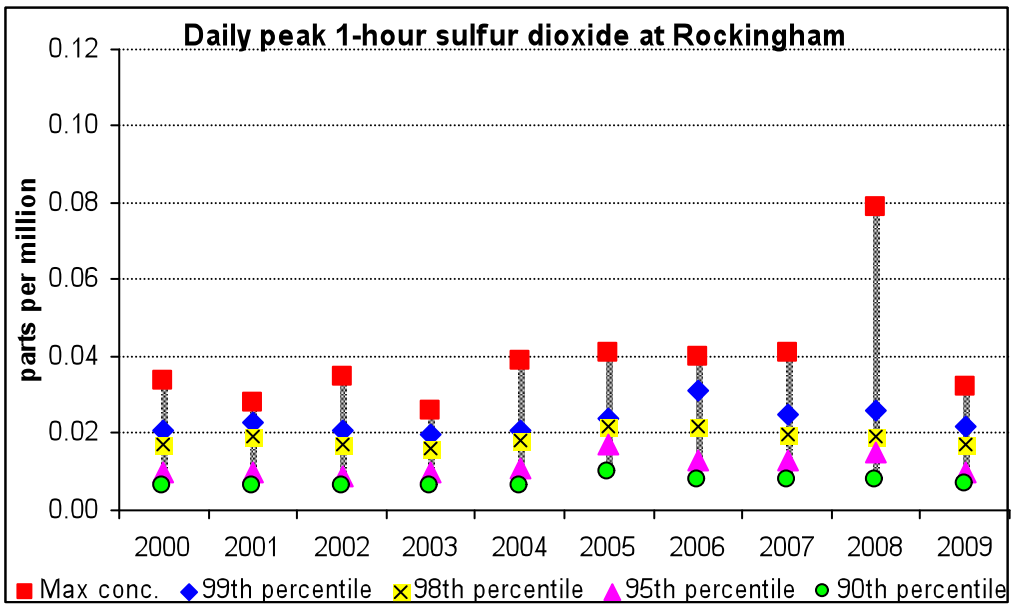

Figure A1-23 - 1-hour sulfur dioxide at Rockingham

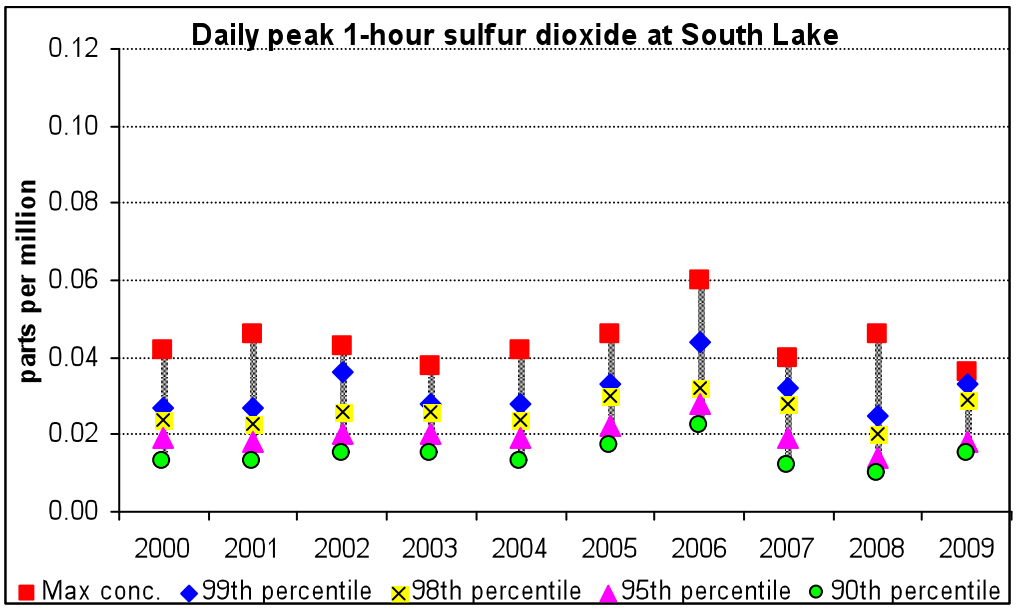

Figure A1-24 - 1-hour sulfur dioxide at South Lake

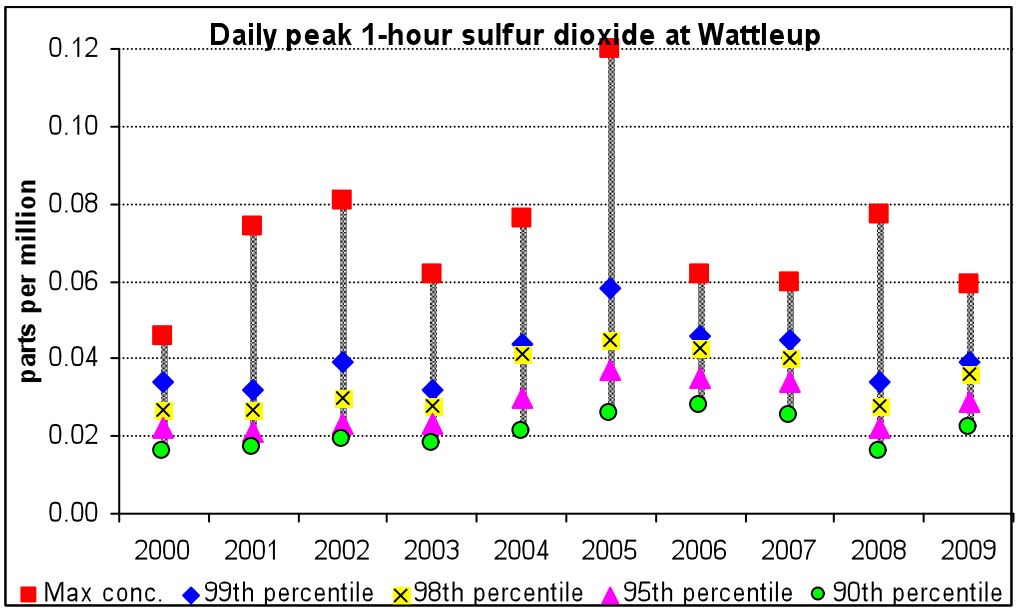

Figure A1-25 - 1-hour sulfur dioxide at Wattleup

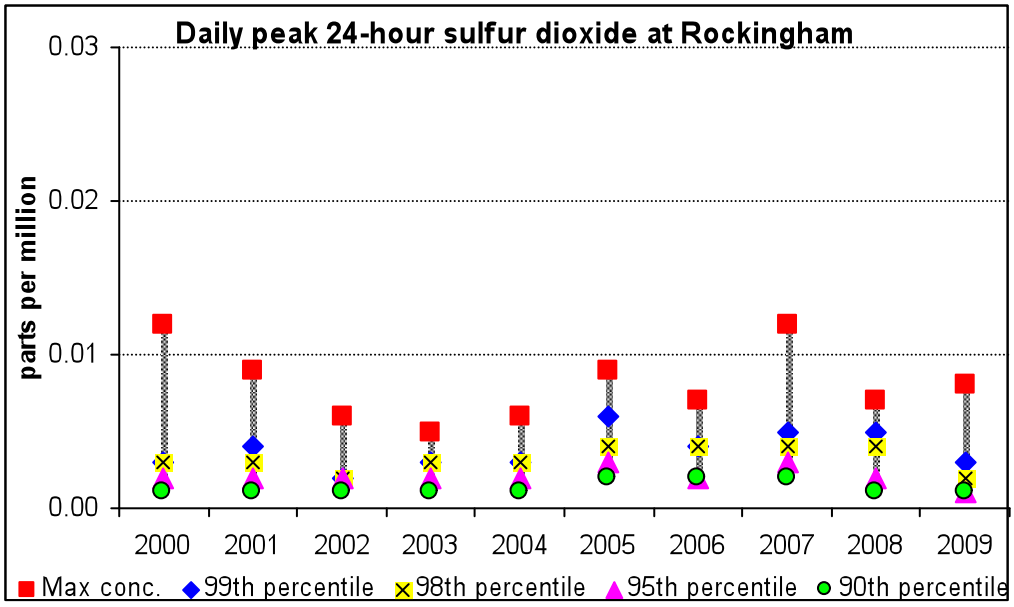

Figure A1-26 - 24-hour sulfur dioxide at Rockingham

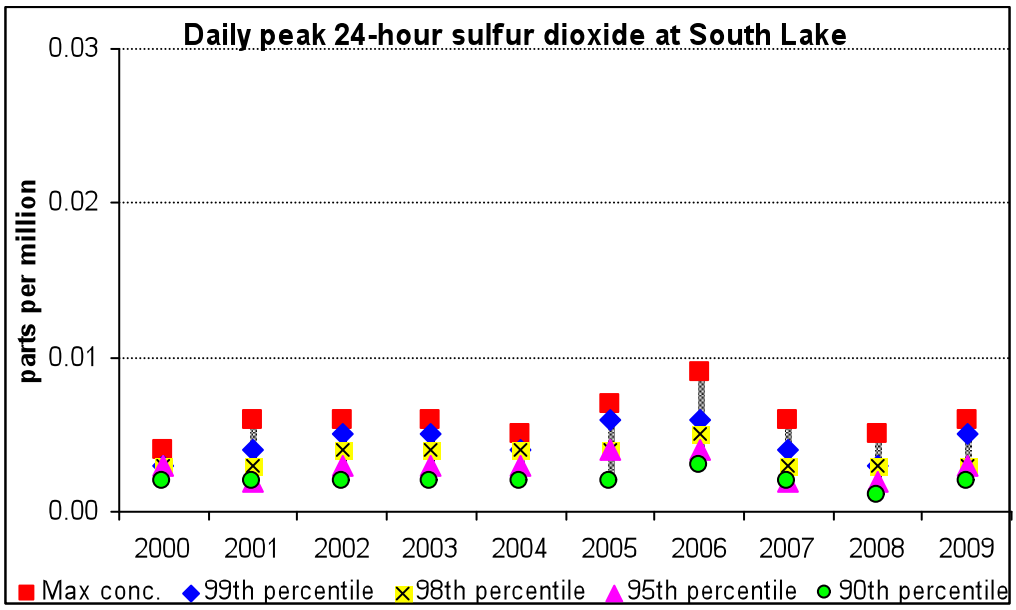

Figure A1-27 - 24-hour sulfur dioxide at South Lake

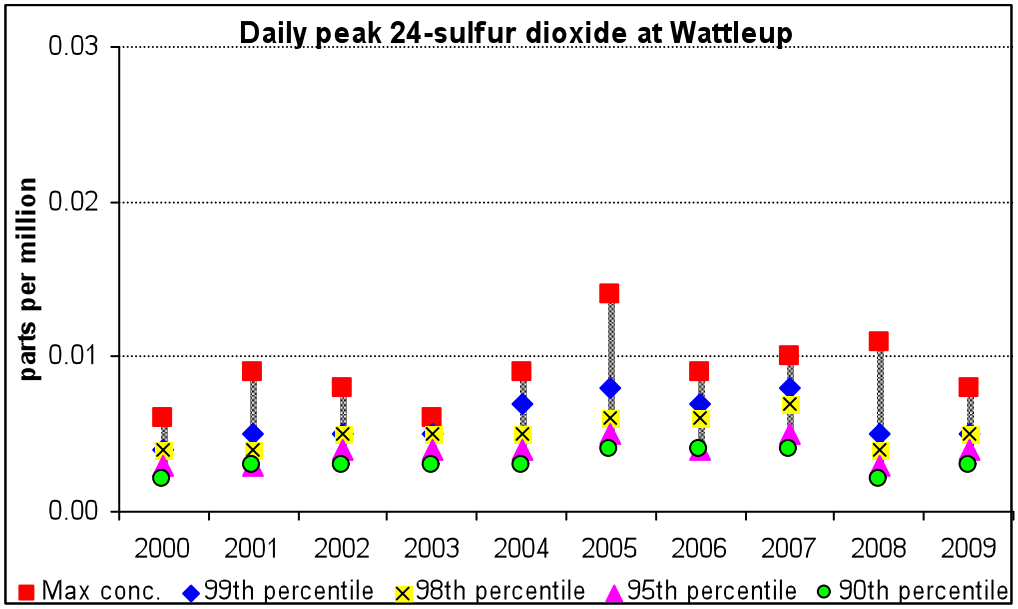

Figure A1-28 - 24-hour sulfur dioxide at Wattleup

Particles as PM_{10}

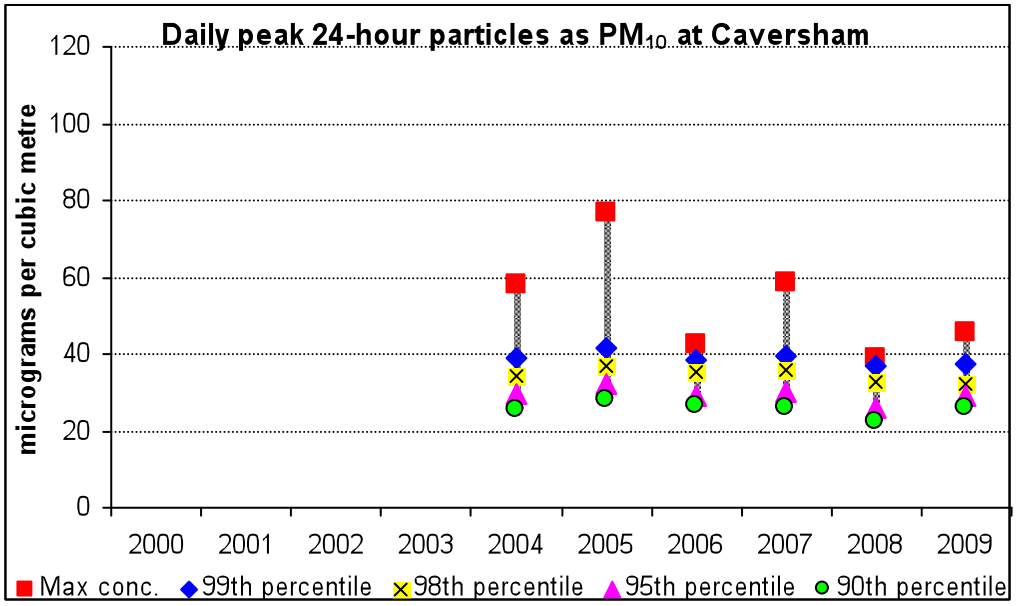

Figure A1-29 - 24-hour PM_{10} at Caversham

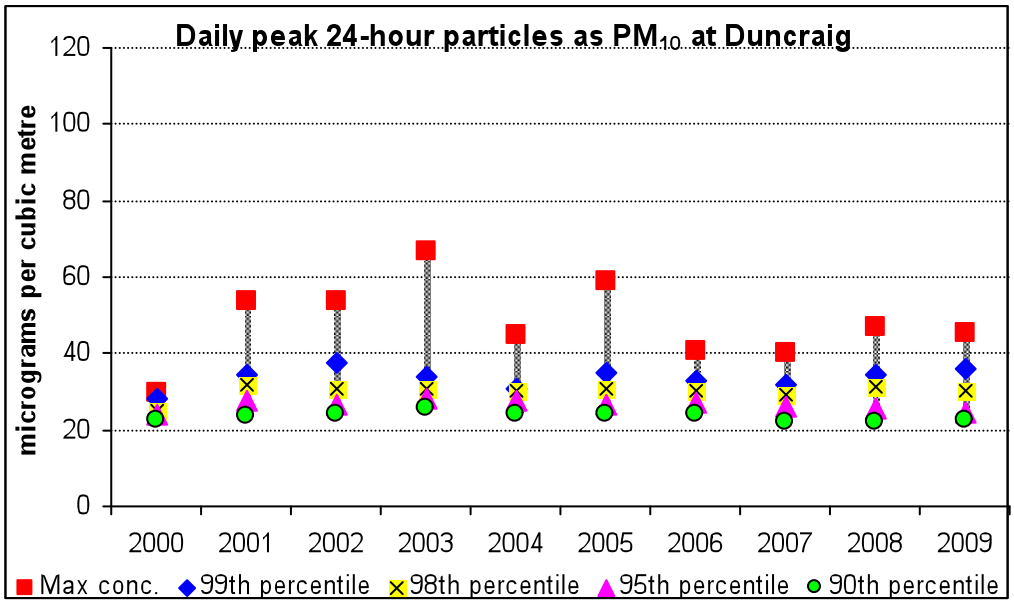

Figure A1-30 - 24-hour PM_{10} at Duncraig

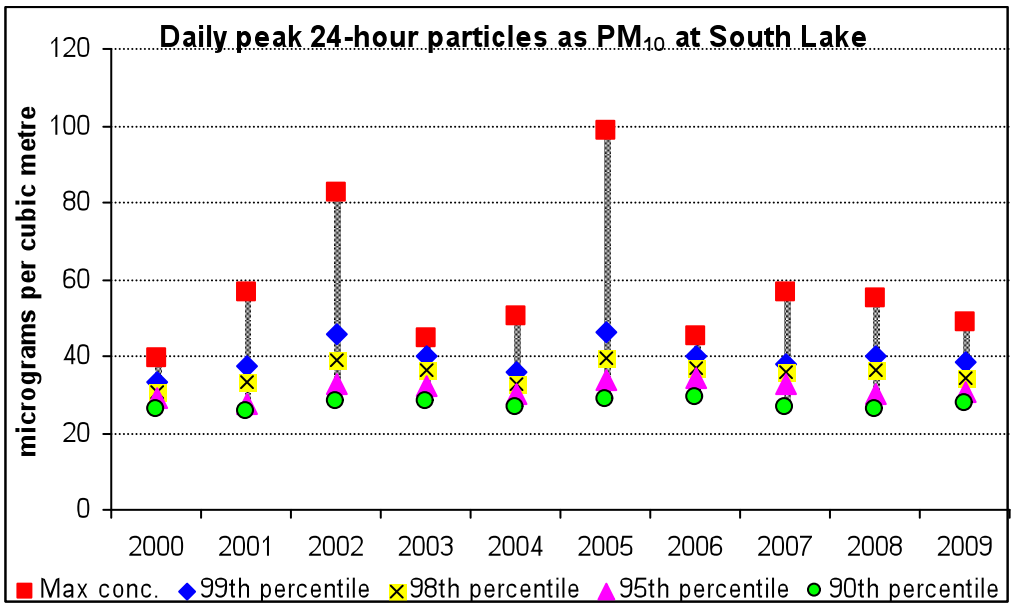

Figure A1-31 - 24-hour PM_{10} at South Lake

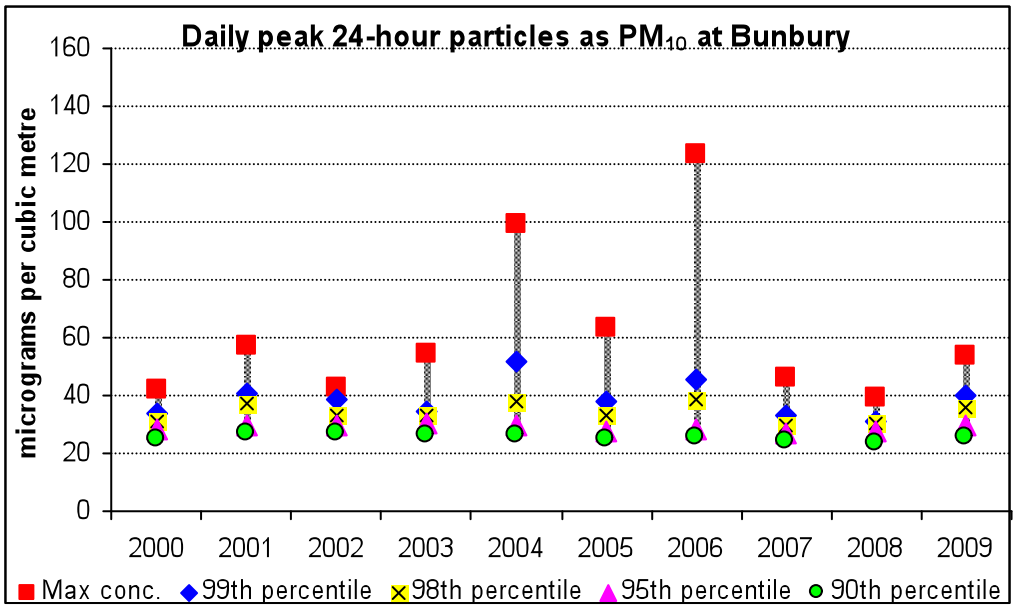

Figure A1-32 - 24-hour PM_{10} at Bunbury

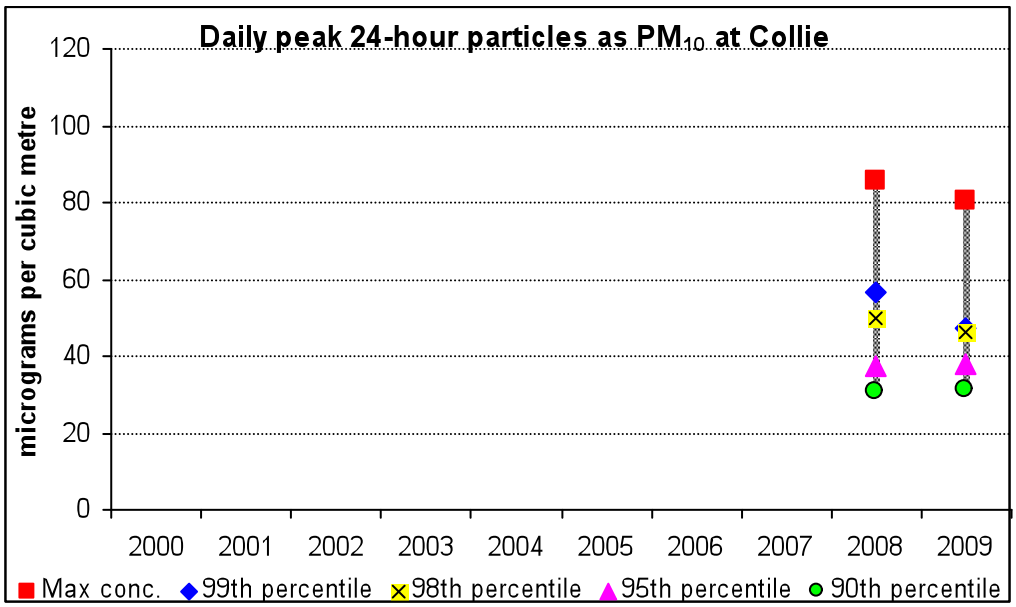

Figure A1-33 - 24-hour PM_{10} at Collie

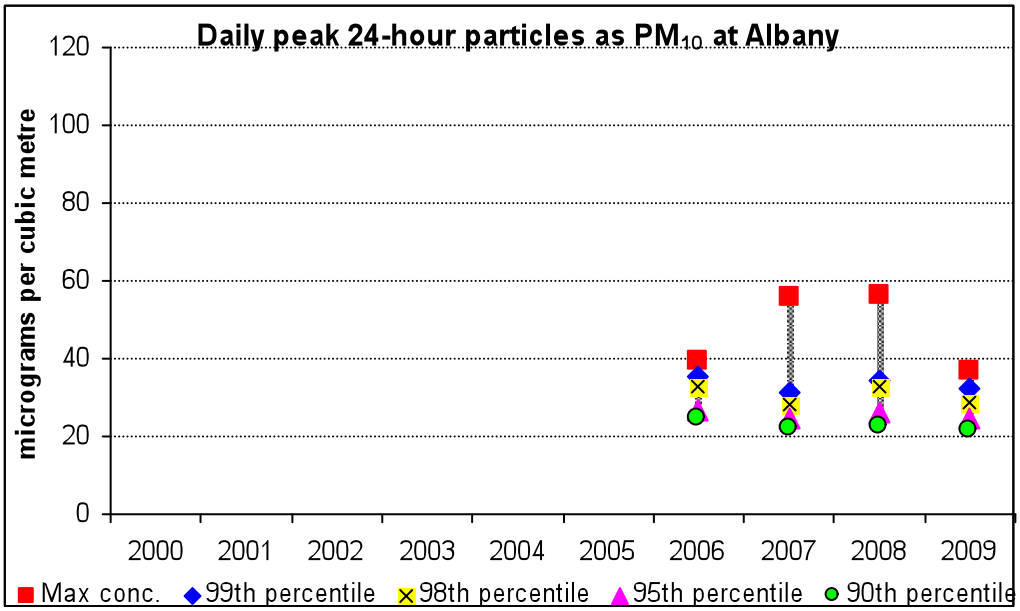

Figure A1-34 - 24-hour PM_{10} at Albany

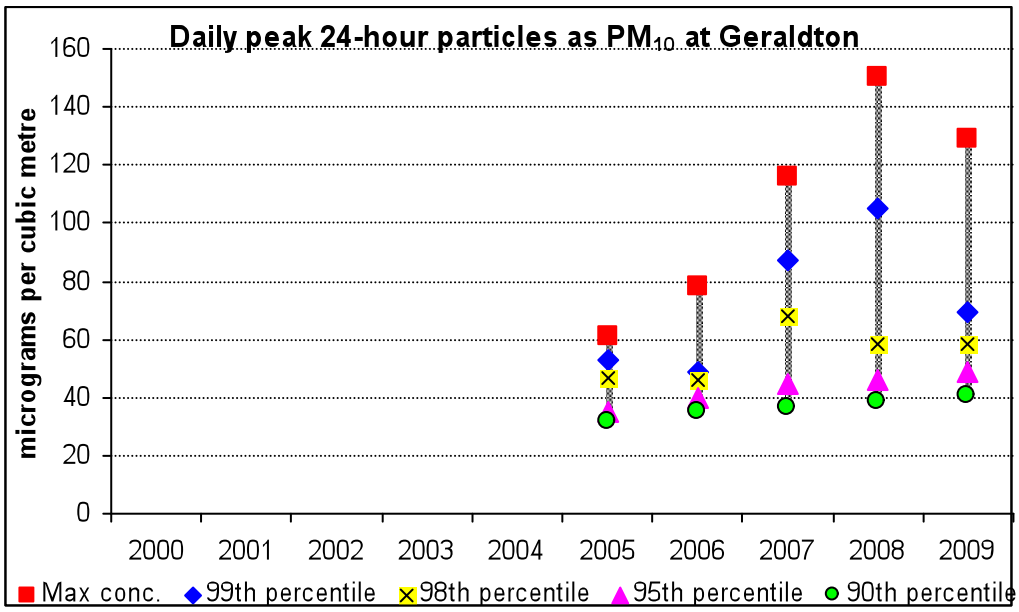

Figure A1-35 - 24-hour PM_{10} at Geraldton

Particles as $PM_{2.5}$

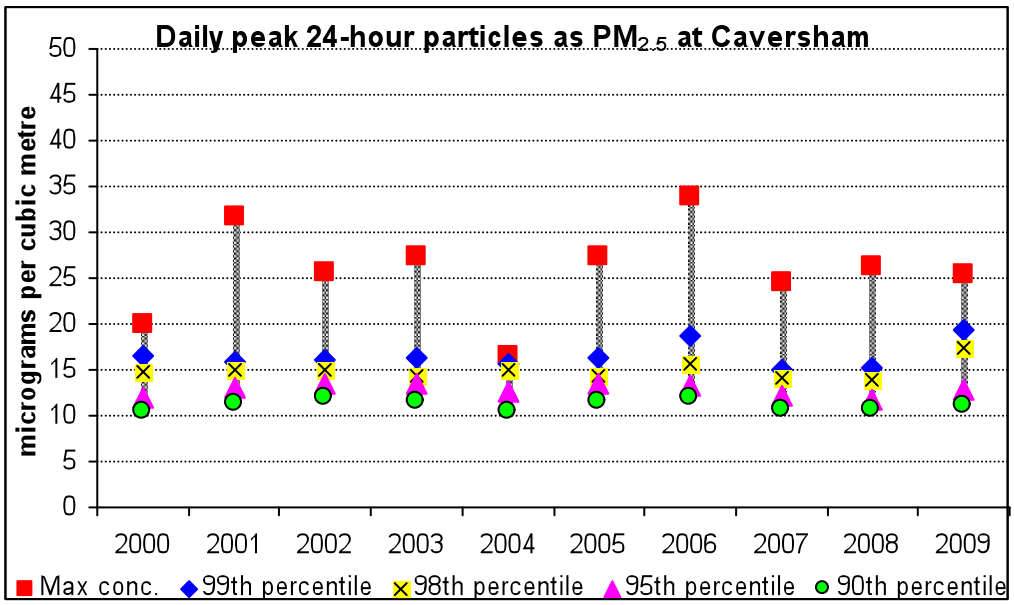

Figure A1-36 - 24-hour $PM_{2.5}$ at Caversham

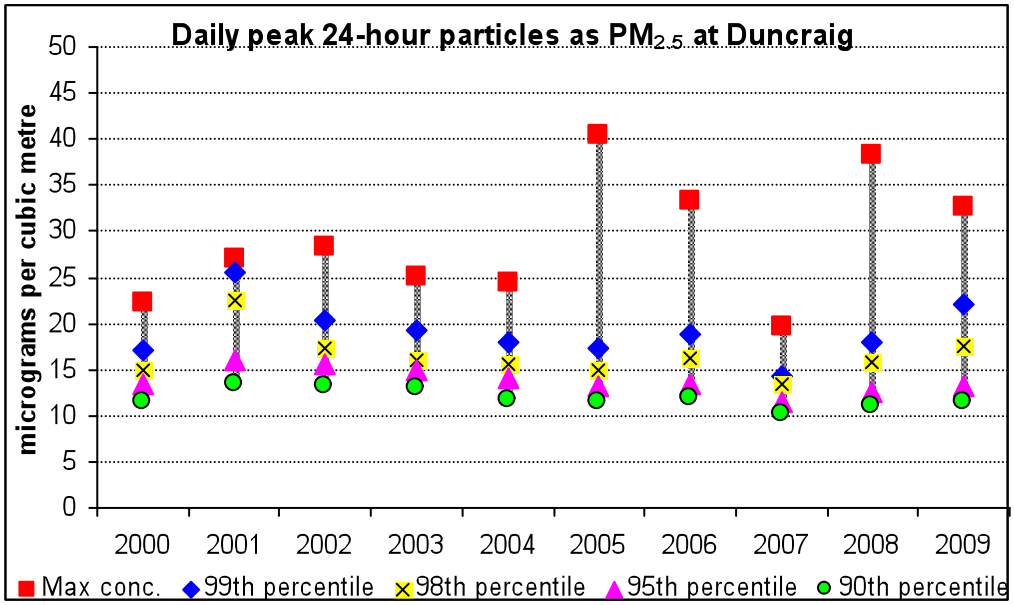

Figure A1-37 - 24-hour $PM_{2.5}$ at Duncraig

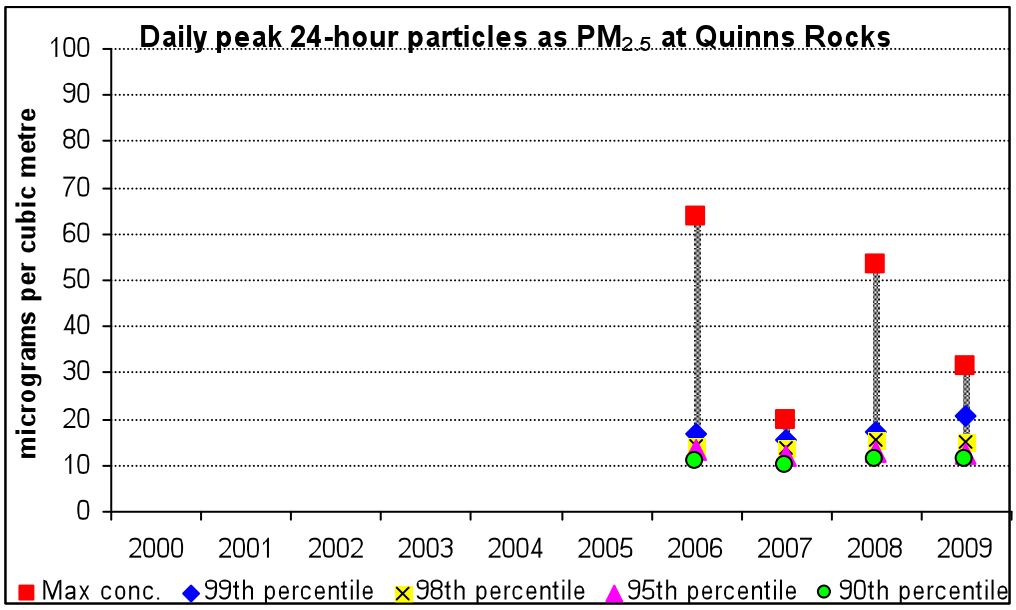

Figure A1-38 - 24-hour $PM_{2.5}$ at Quinns Rocks

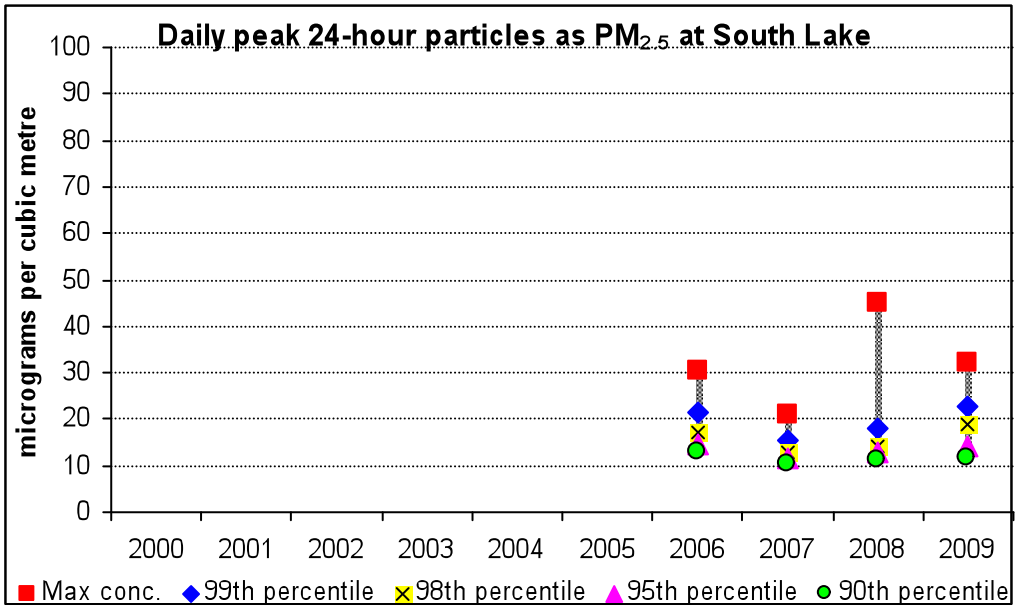

Figure A1-39 - 24-hour $PM_{2.5}$ at South Lake

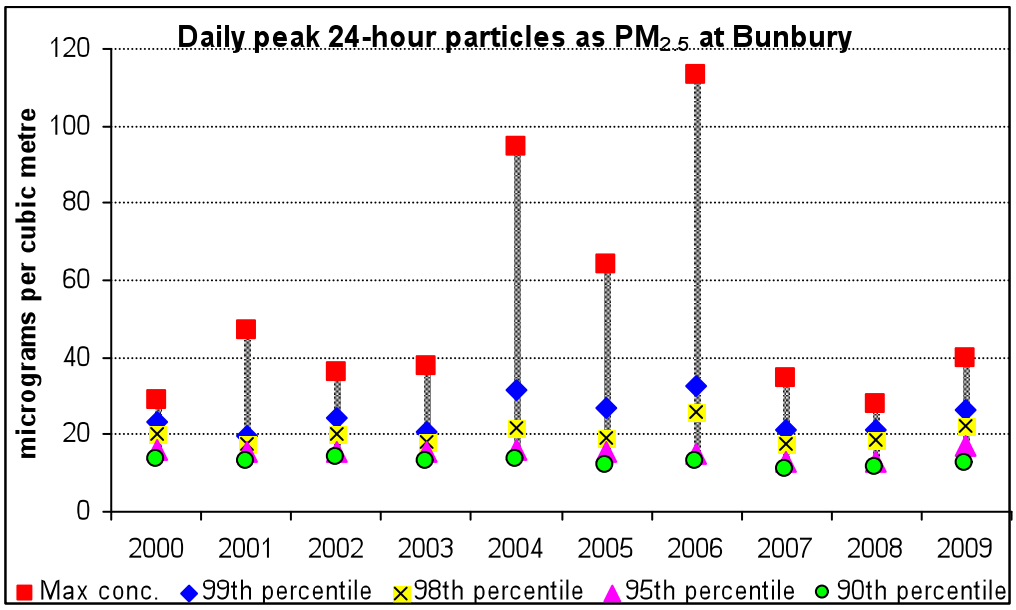

Figure A1-40 - 24-hour $PM_{2.5}$ at Bunbury

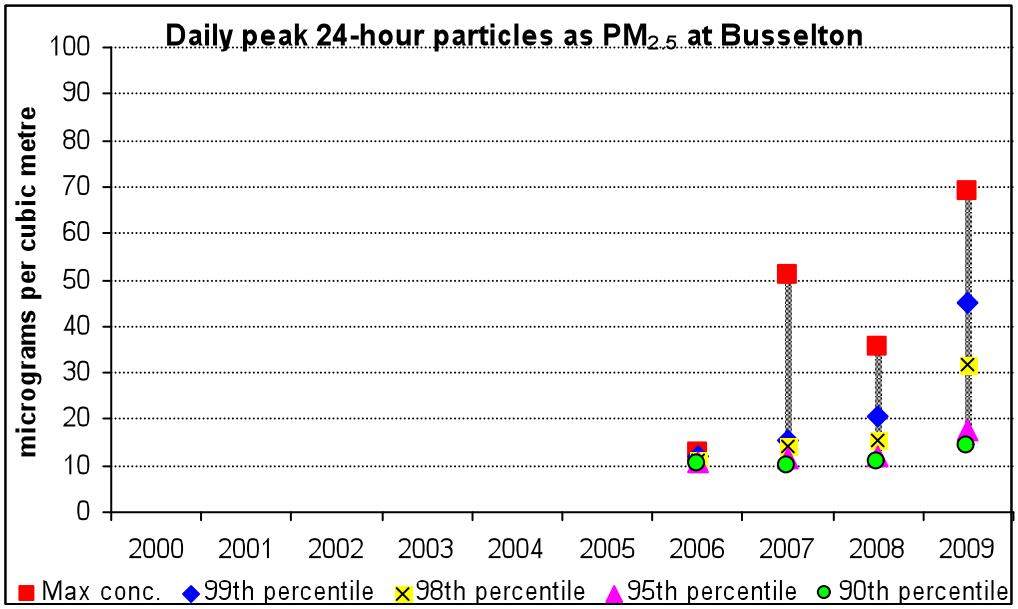

Figure A1-41 - 24-hour $PM_{2.5}$ at Busselton