2002

Western Australia Air Monitoring Report

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

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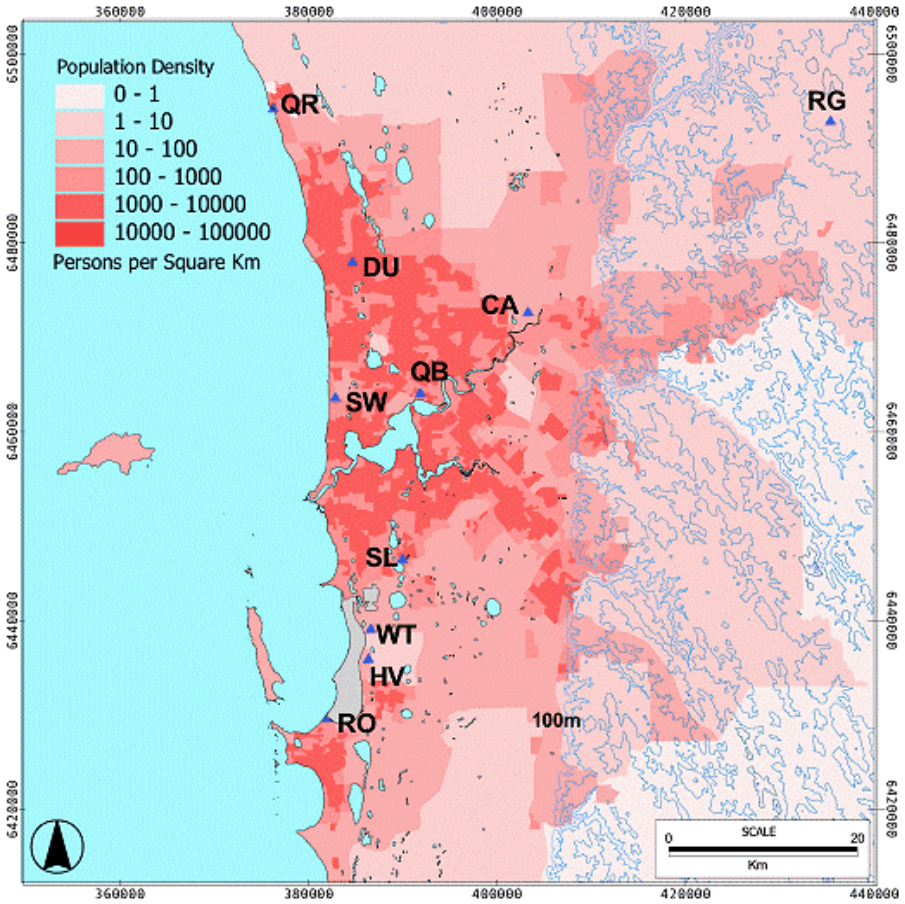
SECTION A – MONITORING SUMMARY

Current Monitoring Stations

The monitoring network shown in Figures A1 and A2 is a combination of networks which were each 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. Network 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. Table A1 indicates the pollutants monitored at each site in the Perth metropolitan and Bunbury region.



CA Caversham	**RO Rockingham**
DU Duncraig	**RG Rolling Green**
HV Hope Valley	**SL South Lake**
QB Queens Building	**SW Swanbourne**
QR Quinns Rock	**WT Wattleup**

Figure A1 - DoE air quality monitoring stations which are currently operating in the Perth metropolitan region.

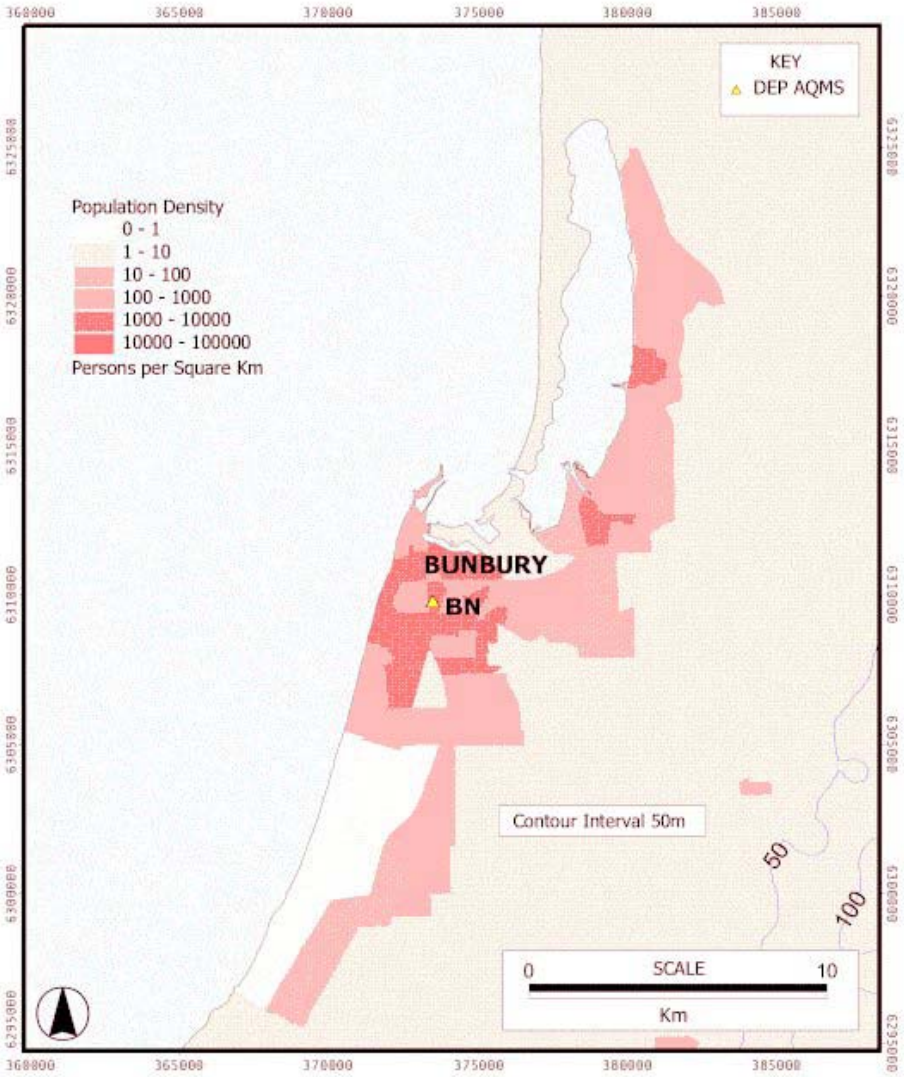


Figure A2 - DoE air quality monitoring stations which are currently operating in Bunbury

Table A1 Air quality parameters measured at DoE monitoring stations.

Monitoring Site	CO	O_3	NO_2	SO_2	lead	PM_{10} Hi-Vol	PM_{10} TEOM	$PM_{2.5}$ TEOM	Visibil-ity
BN Bunbury	03/99 to 04/02						06/99 to present	04/97 to pesent	02/97 to present
CA Caversham	08/93 to present	11/89 to present	09/90 to present			05/93 to present		03/94 to present	12/89 to present
DU Duncraig	08/95 to present		08/95 to present			09/94 to present	06/96 to present	01/95 to present	03/94 to present
HV Hope Valley	01/90 to 03/91		12/89 to present	12/89 to present					01/89 to present
QB Queens Building	08/89 to present		01/90 to present		01/90 to 12/01	01/90 to present			01/90 to present
QR Quinns Rock		11/92 to present	11/92 to present						12/95 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		03/00 to present
SW Swanbourne	01/93 to 05/95	01/93 to present	03/93 to present			03/94 to present		06/94 to 07/95	06/94 to present
WT Wattleup				01/88 to present					

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

Table A2 Monitoring in Western Australia.

Site:	CO	O_3	NO_2	SO_2	Pb	PM_{10}
BN – Bunbury						C
CA - Caversham	DoE	T	T			
DU - Duncraig	P/T		DoE			T
HV – Hope Valley				DoE		
QB - Queens Building	P		DoE		P(1)	
QR - Quinns Rock		DoE	DoE			
RG - Rolling Green		DoE	DoE			
RO - Rockingham				DoE		
SL - South Lake	P	P	P	T		P
SW - Swanbourne		P	P			
WT - Wattleup				DoE		

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% of the NEPM standard in accordance with the WA Monitoring Plan.
C – Campaign Monitoring
T – trend performance monitoring station
DoE – station will be maintained by DoE for the foreseeable future

Table A3 Stations siting 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.
Hope Valley	☑	☑	☑	☑	☑	☑	☑	☑	☑	
Queens Building	☑	☒	☒	☒	☑	☑	☒	☑	☑	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.
Bunbury Region										
Bunbury	☑	☑	☑	☑	☒	☑	☑	☑	☑	15 metres to small to medium eucalyptus trees.

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; hence 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 "ponding" 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 DoE maintains the Queens Buildings station 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 is not nominated as a trend site since it does not fit the normal pattern of a GRUB or population-average monitoring site.

Carbon monoxide was monitored at Bunbury during 2000 and 2001 where the highest concentrations measured were 3.04 ppm and 1.97 ppm respectively. These concentrations are less than 34% of the NEPM standard. Screening procedures agreed to in the the W.A. Monitoring Plan required up to 2 years of carbon monoxide monitoring at Bunbury with an acceptance limit set at 60% of the NEPM standard. The results for 2000 and 2001 clearly meet the acceptance limit for 2 years of monitoring and so monitoring for carbon monoxide at Bunbury ceased in 2002.

In summary, WA maintains performance monitoring of CO at Duncraig, South Lake and Queens Buildings. Duncraig and South Lake are also 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 it's 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.

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

Nitrogen dioxide

The Queens Buildings site located within the CBD provides 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.

The DoE will continue to measure NO_2 at Quinns Rocks, Rolling Green and Duncraig for the foreseeable future as part of its wider network. The DoE will also continue to measure NO_2 at Queens Buildings in order to determine the long-term trend.

Sulfur dioxide

WA operates one performance monitoring station at South Lake for sulfur dioxide, while maintaining a source management network which includes Hope Valley, Wattleup and Rockingham.

South Lake is an upper bound performance monitoring station for sulfur 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 Queens Buildings in the Perth CBD have been below 60 % of the NEPM standard of 0.5 ug/m^3. In 2001, the average lead level in Perth was 0.022 ug/m^3 representing 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.

Particles as PM_{10}

Duncraig is an upper bound performance monitoring station site for PM_{10} caused by the combination of vehicle and home fire emissions during strongly stable meteorological conditions. Likewise, the site at South Lake is measures significant PM_{10} concentrations from wood fires.

Duncraig and South Lake are all nominated as trend stations.

Status of NATA Accreditation

WA is still working towards achieving NATA accreditation as discussed in the WA Monitoring Plan, and hence the data within this report only meets Department of Environment quality standards.

SECTION B – ASSESSMENT OF COMPLIANCE WITH STANDARDS AND GOALS

Table B1. 2002 compliance summary for CO in Western Australia

AAQ NEPM Standard
9.0 ppm (8-hour average)

Regional Performance Monitoring Station	Data availability rates					Number of exceedances	Performance against the standards and goal
	%	%	%	%	%	(days)	
	Q1	Q2	Q3	Q4	Annual		
Perth Region							
Caversham (North East Metro)	93.8	99.7	99.5	99.4	98.1	0	met
Duncraig (North Metro)	99.6	96.2	97.1	93.7	96.6	0	met
Queens Building (CBD)	99.6	97.3	95.3	95.3	96.8	0	met
South Lake (South East Metro)	92	99.6	99.5	99.3	97.6	0	met
Bunbury Region							
Bunbury (South West Region)	97	45.4	0	0	35.3	0	not demonstrated

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

Table B2. 2002 compliance summary for NO_2 in Western Australia

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

Regional Performance Monitoring Station	Data availability rates					Annual mean	Number of exceedances	Performance against the standards and goal	
	%	%	%	%	%				
	Q1	Q2	Q3	Q4	Annual	(ppm)	(days)	1-hour	1-year
Perth Region									
Caversham (North East Metro)	99.6	99.6	99.5	99.5	99.5	0.006	0	met	met
Duncraig (North Metro)	95.4	99.6	94.4	99.1	97.1	0.009	0	met	met
Hope Valley (South Metro)	99.6	99.6	99.6	99.5	99.6	0.005	0	met	met
Queens Building (CBD)	99.6	97.2	99.6	99.5	99	0.02	0	met	met
Quinns Rocks (Outer North Coast)	99.5	99.5	99.7	99.3	99.5	0.004	0	met	met
Rockingham (South Coast)	99.4	99.7	99.7	99.6	99.6	0.006	0	met	met
Rolling Green (Outer East Rural)	91.7	99.6	99.6	99.6	97.6	0.002	0	met	met
South Lake (South East Metro)	84.3	99.5	98.8	99.3	95.5	0.008	0	met	met
Swanbourne (Inner West Coast)	90.5	83.9	94.1	99.7	92.1	0.006	0	met	met

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

Table B3. 2002 compliance summary for ozone in Western Australia

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

Regional Performance Monitoring Station	Data availability rates					Number of Exceedances (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	99.4	99.6	0	0	met	met
Quinns Rocks (Outer North Coast)	99.4	99.5	99.6	99.5	99.5	0	0	met	met
Rockingham (South Coast)	99.3	99.7	99.7	99.6	99.6	0	0	met	met
Rolling Green (Outer East Rural)	99.4	99.6	99.6	99.6	99.6	0	0	met	met
South Lake (South East Metro)	99.6	99.6	99.6	99.2	99.5	0	0	met	met
Swanbourne (Inner West Coast)	94.9	92.6	96.3	99.7	95.9	0	0	met	met

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

Table B4. 2002 compliance summary for SO_2 in Western Australia

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					Annual mean	Number of Exceedances (days)		Performance against the standards and goal		
	%	%	%	%	%						
	Q1	Q2	Q3	Q4	Annual	(ppm)	1-hour	24-hour	1-hour	24-hour	1-y
Perth Region											
Hope Valley (South Metro)	99.7	99.5	99.7	99.3	99.6	0.001	0	0	met	met	met
Rockingham (South Coast)	99.3	99.7	99.7	99.6	99.6	0.001	0	0	met	met	met
South Lake (South East Metro)	91.3	99.5	99.6	99.3	97.4	0.001	0	0	met	met	met
Wattleup (South Metro)	99.7	99.7	99.6	97	99	0.001	0	0	met	met	met

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

Table B5. 2002 compliance summary for PM_{10} in Western Australia

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

Regional Performance Monitoring Station	Data availability rates (% of days)					Number of exceedances (Days)	Performance against the standards and goal
	Q1	Q2	Q3	Q4	Annual		
Perth Region							
Duncraig (North Metro)	99.8	94.1	97.2	99.2	97.6	1	met
South Lake (South East Metro)	99.7	99.5	99.8	98.4	99.3	2	met
Bunbury Region							
Bunbury (South West Region)	99.2	99.6	99.6	99.6	99.5	0	met

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

Table B6. 2002 compliance summary for Lead in Western Australia

AAQ NEPM Standard
0.50 ug/m^3 (1-year average)

Regional Performance Monitoring Station	Data availability rates (% of days)					Annual mean Concentration (ug/m^3)	Performance against the standards and goal
	Q1	Q2	Q3	Q4	Annual		
Perth Region							
Queens Building (CBD)	-	-	-	-	-	N/A	N/A

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

SECTION C – ANALYSIS OF AIR QUALITY MONITORING

Carbon Monoxide

The NEPM standard for carbon monoxide of 9.0 ppm averaged over 8 hours was not exceeded at any site during 2002. The NEPM goal of no more than 1 exceedance at each site was met. Table C1 contains the summary statistics for daily peak 8-hour CO in Western Australia.

Table C1. 2002 Summary statistics for daily peak 8-hour CO in Western Australia

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)	98.1	1.3	23/06/2002	0200	1.1	06/07/2002	0200
Duncraig (North Metro)	96.6	5.4	23/06/2002	0400	3.9	08/08/2002	0400
Queens Building (CBD)	96.8	4.7	09/03/2002	0100	3.4	07/08/2002	2300
South Lake (South East Metro)	97.6	3.2	23/06/2002	0200	3.0	31/05/2002	0100
Bunbury Region							
Bunbury (South West Region)	35.3	2.2	24/02/2002	0800	1.4	17/05/2002	0200

Nitrogen Dioxide

The NEPM standard for nitrogen dioxide of 0.12 ppm averaged over 1 hour and 0.03 ppm annual average was not exceeded at any site during 2002. The NEPM goal of no more than 1 exceedance at each site was met. Table C2 contains the summary statistics for daily peak 1-hour NO_2 in Western Australia.

Table C2. 2002 summary statistics for daily peak 1-hour NO_2 in Western Australia

AAQ NEPM Standard
0.12 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	0.055	18/09/2002	1900	0.044	14/03/2002	2200
Duncraig (North Metro)	97.1	0.049	30/05/2002	2200	0.045	11/12/2002	2200
Hope Valley (South Metro)	99.6	0.039	30/05/2002	1800	0.036	01/06/2002	1900
Queens Building (CBD)	99	0.091	14/03/2002	1600	0.084	18/09/2002	1800
Quinns Rocks (Outer North Coast)	99.5	0.037	30/05/2002	1900	0.032	10/12/2002	2200
Rockingham (South Coast)	99.6	0.042	08/03/2002	2300	0.040	19/12/2002	2100
Rolling Green (Outer East Rural)	97.6	0.025	29/01/2002	2200	0.024	15/01/2002	2200
South Lake (South East Metro)	95.5	0.048	27/11/2002	1400	0.042	08/03/2002	2000
Swanbourne (Inner West Coast)	92.1	0.051	14/11/2002	2000	0.043	30/05/2002	1900

Photochemical Smog as Ozone

The NEPM standard for ozone of 0.10 ppm averaged over 1 hour was not exceeded at any site during 2002. The NEPM goal of no more than 1 exceedance at each site was met. Table C3 contains the summary statistics for daily peak 1-hour O_3 in Western Australia.

Table C3. 2002 summary statistics for daily peak 1-hour O_3 in Western Australia

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)	99.6	0.091	31/01/2002	1400	0.080	09/11/2002	1500
Quinns Rocks (Outer North Coast)	99.5	0.079	11/12/2002	1600	0.077	24/02/2002	1300
Rockingham (South Coast)	99.6	0.079	11/12/2002	1400	0.070	24/02/2002	1300
Rolling Green (Outer East Rural)	99.6	0.091	12/02/2002	1500	0.090	20/03/2002	1600
South Lake (South East Metro)	99.5	0.067	22/01/2002	1300	0.065	31/01/2002	1200
Swanbourne (Inner West Coast)	95.9	0.081	24/02/2002	1300	0.072	11/12/2002	1400

The NEPM standard for ozone of 0.08 ppm averaged over 4 hours was not exceeded at any site during 2002. The NEPM goal of no more than 1 exceedance at each site was met. Table C4 contains the summary statistics for daily peak 4-hour O_3 in Western Australia.

Table C4. 2002 summary statistics for daily peak 4-hour O_3 in Western Australia

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)	99.6	0.068	14/03/2002	1800	0.068	31/01/2002	1600
Quinns Rocks (Outer North Coast)	99.5	0.069	11/12/2002	1800	0.063	24/02/2002	1400
Rockingham (South Coast)	99.6	0.071	11/12/2002	1600	0.066	05/02/2002	1800
Rolling Green (Outer East Rural)	99.6	0.071	10/11/2002	1600	0.070	12/02/2002	1700
South Lake (South East Metro)	99.5	0.058	31/01/2002	1400	0.057	11/12/2002	1600
Swanbourne (Inner West Coast)	95.9	0.066	24/02/2002	1500	0.061	11/12/2002	1600

Particles as PM_{10}

The NEPM standard for particles as PM_{10} of 50 micrograms per cubic metre averaged over 24 hours was exceeded once at Duncraig (54 ug/m^3 on 23/12/2002) and twice at South lake (57.9 ug/m^3 on 14/1/2002 and 82.6 ug/m^3 on 23/12/2002) during 2002. Attachments 1 and 2 contain descriptions of the circumstances which lead to the exceedances. The NEPM goal of no more than 5 exceedance at each site was met. Table C5 contains the summary statistics for daily peak 24-hour PM_{10} in Western Australia.

Table C5. 2002 summary statistics for 24-hour PM_{10} in Western Australia

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 [1] (North East Metro)	100	35	14/01/2002	2400	27	10/11/2002	2400
Duncraig [2] (North Metro)	97.6	54.0	23/12/2002	2400	31.5	10/12/2002	2400
Queens Buildings [1] (CBD)	98.4	36	19/02/2002	2400	28	10/12/2002	2400
South Lake [2] (South East Metro)	99.3	82.6	23/12/2002	2400	42.8	20/12/2002	2400
Swanbourne [1] (Inner West Coast)	100	33	10/12/2002	2400	26	08/05/2002	2400
Bunbury Region							
Bunbury [2] (South West Region)	99.5	42.5	08/11/2002	2400	37.2	21/11/2002	2400

1 – High volume samplers operating 1 day in every six.
2 – Tapered Element Oscillating Microbalance (TEOM) operating continuously

SECTION D – DATA ANALYSIS

Table D1. Percentiles of daily peak 1-hour carbon monoxide concentrations for 2002

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)	98.1	1.3	1.0	0.9	0.8	0.7	0.4	0.2
Quinns Rocks (Outer North Coast)	96.6	5.4	3.7	3.6	2.6	1.8	0.7	0.3
Rockingham (South Coast)	96.8	4.7	2.7	2.45	2.2	2.0	1.7	1.3
Rolling Green (Outer East Rural)	97.6	3.2	2.8	2.4	1.9	1.3	0.6	0.3
South Lake (South East Metro)	35.3	2.2	1.3	1.1	0.6	0.4	0.3	0.2

Table D2. Percentiles of daily peak 1-hour nitrogen dioxide concentrations for 2002

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	0.055	0.035	0.033	0.031	0.028	0.023	0.017
Duncraig (North Metro)	97.1	0.049	0.040	0.037	0.034	0.031	0.028	0.022
Hope Valley (South Metro)	99.6	0.039	0.033	0.030	0.028	0.024	0.019	0.013
Queens Building (CBD)	99	0.091	0.077	0.072	0.060	0.055	0.047	0.038
Quinns Rocks (Outer North Coast)	99.5	0.037	0.031	0.030	0.028	0.026	0.020	0.013
Rockingham (South Coast)	99.6	0.042	0.039	0.038	0.035	0.032	0.026	0.018
Rolling Green (Outer East Rural)	97.6	0.025	0.022	0.020	0.017	0.015	0.012	0.008
South Lake (South East Metro)	95.5	0.048	0.035	0.032	0.030	0.028	0.024	0.020
Swanbourne (Inner West Coast)	92.1	0.051	0.040	0.036	0.031	0.029	0.024	0.017

Table D3. Percentiles of daily peak 1-hour ozone concentrations for 2002

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)	99.6	0.091	0.074	0.065	0.057	0.048	0.036	0.032
Quinns Rocks (Outer North Coast)	99.5	0.079	0.069	0.060	0.055	0.046	0.037	0.034
Rockingham (South Coast)	99.6	0.079	0.067	0.057	0.050	0.043	0.035	0.032
Rolling Green (Outer East Rural)	99.6	0.091	0.080	0.068	0.059	0.049	0.037	0.032
South Lake (South East Metro)	99.5	0.067	0.062	0.054	0.049	0.043	0.034	0.030
Swanbourne (Inner West Coast)	95.9	0.081	0.063	0.057	0.051	0.046	0.035	0.032

Table D4. Percentiles of daily peak 4-hour ozone concentrations for 2002

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)	99.6	0.068	0.065	0.058	0.049	0.042	0.034	0.030
Quinns Rocks (Outer North Coast)	99.5	0.069	0.057	0.053	0.048	0.041	0.035	0.032
Rockingham (South Coast)	99.6	0.071	0.058	0.050	0.047	0.039	0.034	0.030
Rolling Green (Outer East Rural)	99.6	0.071	0.065	0.061	0.052	0.043	0.035	0.030
South Lake (South East Metro)	99.5	0.058	0.053	0.050	0.044	0.039	0.032	0.028
Swanbourne (Inner West Coast)	95.9	0.066	0.056	0.054	0.047	0.041	0.034	0.030

Table D5. Percentiles of daily peak 1-hour sulfur dioxide concentrations for 2002

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)	99.6	0.058	0.048	0.032	0.024	0.017	0.009	0.003
Rockingham (South Coast)	99.6	0.035	0.021	0.017	0.009	0.006	0.003	0.001
South Lake (South East Metro)	97.4	0.043	0.036	0.026	0.020	0.015	0.006	0.002
Wattleup (South Metro)	99	0.081	0.039	0.030	0.023	0.019	0.010	0.004

Table D6. Percentiles of daily peak 1-hour sulfur dioxide concentrations for 2002

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)	99.6	0.007	0.006	0.004	0.003	0.002	0.001	0.001
Rockingham (South Coast)	99.6	0.006	0.002	0.002	0.002	0.001	0.001	0.000
South Lake (South East Metro)	97.4	0.006	0.005	0.004	0.003	0.002	0.001	0.001
Wattleup (South Metro)	99	0.008	0.005	0.005	0.004	0.003	0.002	0.001

Table D7. Percentiles of daily peak 24-hour particles as PM10 concentrations for 2002

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								
Duncraig (North Metro)	97.6	54.0	37.5	30.8	26.4	24.2	19.7	16.0
South Lake (South East Metro)	99.3	82.6	45.8	38.8	32.8	27.9	21.7	17.2
Bunbury (South West Region)	99.5	42.5	38.9	32.9	29.5	27.1	22.6	18.0

Table D8. Daily peak 8-hour carbon monoxide data summary (1993-2002)

Trend station/region: Caversham

AAQ NEPM Standard
9.0 ppm (8-hour average)

Year	Data Recovery (%)	No. of exceedances (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
1993	34.7	0	1.6	1.3	1.3	1.1	0.9
1994	83.0	0	3.4	2.3	2.2	1.7	1.3
1995	94.9	0	2.2	2.1	1.8	1.2	0.9
1996	98.5	0	2. 7	2.0	1.7	1.2	0.8
1997	97.6	0	2. 3	1.6	1.3	1.0	0.9
1998	98.0	0	1.7	1.3	1.2	1.0	0.8
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

Table D9. Daily peak 8-hour carbon monoxide data summary (1993-2002)
Trend station/region: Duncraig AAQ NEPM Standard 9.0 ppm (8-hour average)

Year	Data Recovery (%)	No. of exceedances (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
1993	0.0	0	-	-	-	-	-
1994	0.0	0	-	-	-	-	-
1995	47.9	0	5.2	4.8	3.8	2.8	1.9
1996	96.4	0	7.2	6.1	4.7	3.3	2.1
1997	98.0	0	6.8	5.2	4.8	3.9	2.4
1998	98.4	0	6.1	4.9	4.3	3.0	2.0
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

Table D10. Daily peak 8-hour carbon monoxide data summary (1993-2002)
Trend station/region: Queens Building AAQ NEPM Standard 9.0 ppm (8-hour average)

Year	Data Recovery (%)	No. of exceedances (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
1993	93.6	0	7.4	6.7	6.1	5.4	4.9
1994	97.6	0	8.8	7.2	6.7	5.6	5.2
1995	96.2	0	8.5	5.9	5.5	5.0	4.6
1996	99.0	0	7.2	6.4	5.6	4.9	4.3
1997	99.2	0	5.6	5.0	4.8	4.2	3.8
1998	98.5	0	6.1	5.3	4.7	3.9	3.6
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

Table D11. Daily peak 8-hour carbon monoxide data summary (1993-2002)
Trend station/region: South Lake AAQ NEPM Standard 9.0 ppm (8-hour average)

Year	Data Recovery (%)	No. of exceedances (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
1993	0.0	0	-	-	-	-	-
1994	0.0	0	-	-	-	-	-
1995	0.0	0	-	-	-	-	-
1996	0.0	0	-	-	-	-	-
1997	0.0	0	-	-	-	-	-
1998	0.0	0	-	-	-	-	-
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

Table D12. Daily peak 8-hour carbon monoxide data summary (1993-2002)
Trend station/region: Bunbury AAQ NEPM Standard 9.0 ppm (8-hour average)

Year	Data Recovery (%)	No. of exceedances (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
1993	0.0	0	-	-	-	-	-
1994	0.0	0	-	-	-	-	-
1995	0.0	0	-	-	-	-	-
1996	0.0	0	-	-	-	-	-
1997	0.0	0	-	-	-	-	-
1998	0.0	0	-	-	-	-	-
1999	82.7	0	2.7	2.1	1.9	1.5	1.1
2000	99.2	0	3.0	1.7	1.5	1.3	1.0
2001	99.6	0	2.0	1.8	1.6	1.4	1.0
2002	35.3	0	2.2	1.3	1.1	0.6	0.4

Table D13. Daily peak 1-hour nitrogen dioxide data summary (1993-2002)
Trend station/region: Caversham AAQ NEPM Standard 0.12 ppm (1-hour average)

Year	Data Recovery (%)	No. of exceedances (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
1993	90.2	0	0.051	0.035	0.034	0.028	0.024
1994	95.0	0	0.058	0.042	0.039	0.034	0.030
1995	97.3	0	0.047	0.037	0.034	0.029	0.026
1996	98.1	0	0.045	0.036	0.034	0.030	0.026
1997	99.3	0	0.051	0.041	0.034	0.028	0.026
1998	99.0	0	0.051	0.038	0.034	0.031	0.028
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

Table D14. Daily peak 1-hour nitrogen dioxide data summary (1993-2002)
Trend station/region: Duncraig AAQ NEPM Standard 0.12 ppm (1-hour average)

Year	Data Recovery (%)	No. of exceedances (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
1993	0.0	0	-	-	-	-	-
1994	0.0	0	-	-	-	-	-
1995	48.8	0	0.038	0.035	0.032	0.028	0.026
1996	97.6	0	0.043	0.035	0.035	0.028	0.025
1997	98.3	0	0.046	0.039	0.035	0.029	0.027
1998	98.5	0	0.065	0.040	0.037	0.031	0.028
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

Table D15. Daily peak 1-hour nitrogen dioxide data summary (1993-2002)
Trend station/region: Hope valley AAQ NEPM Standard 0.12 ppm (1-hour average)

Year	Data Recovery (%)	No. of exceedances (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
1993	50.6	0	0.042	0.034	0.033	0.028	0.025
1994	71.1	0	0.047	0.037	0.034	0.030	0.025
1995	72.5	0	0.033	0.029	0.025	0.022	0.020
1996	99.6	0	0.045	0.034	0.028	0.023	0.019
1997	99.0	0	0.033	0.028	0.027	0.024	0.021
1998	97.0	0	0.044	0.029	0.027	0.024	0.020
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

Table D16. Daily peak 1-hour nitrogen dioxide data summary (1993-2002)
Trend station/region: Queens Building AAQ NEPM Standard 0.12 ppm (1-hour average)

Year	Data Recovery (%)	No. of exceedances (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
1993	51.8	1	0.125	0.111	0.097	0.076	0.070
1994	65.8	0	0.097	0.089	0.083	0.075	0.062
1995	98.3	0	0.084	0.070	0.066	0.057	0.050
1996	46.6	0	0.093	0.079	0.077	0.060	0.050
1997	99.4	0	0.098	0.077	0.074	0.063	0.056
1998	99.5	0	0.093	0.085	0.077	0.068	0.058
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

Table D17. Daily peak 1-hour nitrogen dioxide data summary (1993-2002)
Trend station/region: Quinns Rocks AAQ NEPM Standard 0.12 ppm (1-hour average)

Year	Data Recovery (%)	No. of exceedances (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
1993	99.3	0	0.033	0.030	0.028	0.026	0.023
1994	95.5	0	0.051	0.031	0.030	0.028	0.025
1995	60.9	0	0.036	0.028	0.028	0.024	0.021
1996	94.8	0	0.036	0.029	0.028	0.023	0.020
1997	99.5	0	0.038	0.028	0.026	0.024	0.022
1998	96.7	0	0.041	0.033	0.029	0.026	0.024
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

Table D18. Daily peak 1-hour nitrogen dioxide data summary (1993-2002)
Trend station/region: Rockingham AAQ NEPM Standard 0.12 ppm (1-hour average)

Year	Data Recovery (%)	No. of exceedances (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
1993	0.0	0	-	-	-	-	-
1994	0.0	0	-	-	-	-	-
1995	11.0	0	0.020	0.020	0.020	0.019	0.015
1996	97.3	0	0.041	0.031	0.030	0.027	0.024
1997	85.1	0	0.033	0.030	0.029	0.026	0.024
1998	99.2	0	0.043	0.031	0.028	0.026	0.024
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

Table D19. Daily peak 1-hour nitrogen dioxide data summary (1993-2002)
Trend station/region: Rolling Green AAQ NEPM Standard 0.12 ppm (1-hour average)

Year	Data Recovery (%)	No. of exceedances (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
1993	93.4	0	0.028	0.019	0.018	0.015	0.013
1994	82.1	0	0.028	0.023	0.021	0.017	0.013
1995	50.5	0	0.035	0.020	0.017	0.013	0.011
1996	65.1	0	0.022	0.018	0.017	0.015	0.013
1997	64.1	0	0.035	0.019	0.018	0.017	0.014
1998	95.7	0	0.029	0.021	0.019	0.017	0.014
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

Table D20. Daily peak 1-hour nitrogen dioxide data summary (1993-2002)
Trend station/region: South Lake AAQ NEPM Standard 0.12 ppm (1-hour average)

Year	Data Recovery (%)	No. of exceedances (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
1993	0.0	0	-	-	-	-	-
1994	0.0	0	-	-	-	-	-
1995	0.0	0	-	-	-	-	-
1996	0.0	0	-	-	-	-	-
1997	0.0	0	-	-	-	-	-
1998	0.0	0	-	-	-	-	-
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

Table D21. Daily peak 1-hour nitrogen dioxide data summary (1993-2002)
Trend station/region: Swanbourne AAQ NEPM Standard
0.12 ppm (1-hour average)

Year	Data Recovery (%)	No. of exceedances (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
1993	81.3	0	0.046	0.043	0.036	0.034	0.030
1994	98.3	0	0.049	0.037	0.034	0.031	0.028
1995	99.6	0	0.038	0.032	0.028	0.027	0.026
1996	98.6	0	0.046	0.037	0.033	0.028	0.025
1997	98.4	0	0.040	0.034	0.031	0.029	0.027
1998	93.5	0	0.051	0.036	0.033	0.030	0.028
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

Table D22. Daily peak 1-hour ozone data summary (1993-2002)
Trend station/region: Caversham AAQ NEPM Standard
0.10 ppm (1-hour average)

Year	Data Recovery (%)	No. of exceedances (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
1993	98.0	1	0.111	0.084	0.075	0.061	0.047
1994	98.8	1	0.103	0.077	0.070	0.057	0.045
1995	96.8	0	0.093	0.072	0.069	0.058	0.047
1996	99.4	2	0.114	0.085	0.075	0.061	0.049
1997	99.1	0	0.100	0.095	0.083	0.058	0.047
1998	99.2	1	0.112	0.085	0.076	0.058	0.049
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

Table D23. Daily peak 1-hour ozone data summary (1993-2002)
Trend station/region: Quinns Rocks AAQ NEPM Standard
0.10 ppm (1-hour average)

Year	Data Recovery (%)	No. of exceedances (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
1993	97.7	0	0.082	0.069	0.066	0.054	0.045
1994	95.3	0	0.074	0.072	0.066	0.053	0.044
1995	67.5	0	0.089	0.078	0.070	0.062	0.052
1996	98.0	0	0.084	0.072	0.070	0.055	0.046
1997	99.4	1	0.106	0.076	0.067	0.060	0.052
1998	98.5	0	0.080	0.072	0.070	0.058	0.049
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

Table D24. Daily peak 1-hour ozone data summary (1993-2002)
Trend station/region: Rockingham

AAQ NEPM Standard
0.10 ppm (1-hour average)

Year	Data Recovery (%)	No. of exceedances (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
1993	0.0	0	-	-	-	-	-
1994	0.0	0	-	-	-	-	-
1995	12.3	0	0.043	0.041	0.039	0.038	0.037
1996	97.2	0	0.091	0.067	0.060	0.048	0.041
1997	83.8	0	0.078	0.063	0.056	0.045	0.039
1998	99.0	0	0.082	0.065	0.060	0.051	0.043
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

Table D25. Daily peak 1-hour ozone data summary (1993-2002)
Trend station/region: Rolling Green

AAQ NEPM Standard
0.10 ppm (1-hour average)

Year	Data Recovery (%)	No. of exceedances (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
1993	95.4	1	0.110	0.080	0.075	0.066	0.055
1994	98.9	0	0.092	0.076	0.070	0.059	0.051
1995	70.4	0	0.088	0.082	0.078	0.063	0.051
1996	99.2	2	0.104	0.096	0.084	0.065	0.051
1997	63.9	1	0.134	0.091	0.077	0.069	0.059
1998	99.5	1	0.109	0.085	0.077	0.063	0.056
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

Table D26. Daily peak 1-hour ozone data summary (1993-2002)
Trend station/region: South Lake

AAQ NEPM Standard
0.10 ppm (1-hour average)

Year	Data Recovery (%)	No. of exceedances (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
1993	0.0	0	-	-	-	-	-
1994	0.0	0	-	-	-	-	-
1995	0.0	0	-	-	-	-	-
1996	0.0	0	-	-	-	-	-
1997	0.0	0	-	-	-	-	-
1998	0.0	0	-	-	-	-	-
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

Table D27. Daily peak 1-hour ozone data summary (1993-2002)
Trend station/region: Swanbourne AAQ NEPM Standard 0.10 ppm (1-hour average)

Year	Data Recovery (%)	No. of exceedances (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
1993	96.6	0	0.080	0.067	0.055	0.048	0.041
1994	98.9	0	0.079	0.070	0.060	0.049	0.043
1995	99.2	0	0.098	0.075	0.065	0.057	0.046
1996	98.2	0	0.089	0.072	0.066	0.056	0.044
1997	98.1	1	0.109	0.069	0.064	0.056	0.046
1998	98.4	0	0.081	0.070	0.064	0.052	0.046
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	0.075	0.064	0.059	0.048	0.040
2002	95.9	0	0.081	0.063	0.057	0.051	0.046

Table D28. Daily peak 4-hour ozone data summary (1993-2002)
Trend station/region: Caversham AAQ NEPM Standard 0.08 ppm (4-hour average)

Year	Data Recovery (%)	No. of exceedances (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
1993	98.0	0	0.072	0.062	0.058	0.048	0.040
1994	98.8	2	0.084	0.063	0.057	0.045	0.038
1995	96.8	1	0.082	0.062	0.055	0.047	0.040
1996	99.4	1	0.090	0.072	0.062	0.052	0.045
1997	99.1	3	0.084	0.071	0.063	0.050	0.042
1998	99.2	2	0.087	0.068	0.061	0.050	0.043
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

Table D29. Daily peak 4-hour ozone data summary (1993-2002)
Trend station/region: Quinns Rocks AAQ NEPM Standard 0.08 ppm (4-hour average)

Year	Data Recovery (%)	No. of exceedances (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
1993	97.7	0	0.073	0.063	0.053	0.045	0.039
1994	95.3	0	0.064	0.058	0.055	0.044	0.038
1995	67.5	0	0.078	0.066	0.063	0.051	0.046
1996	98.0	0	0.075	0.062	0.054	0.049	0.041
1997	99.4	1	0.100	0.065	0.060	0.053	0.044
1998	98.5	0	0.077	0.061	0.060	0.050	0.042
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

Table D30. Daily peak 4-hour ozone data summary (1993-2002)
Trend station/region: Rockingham

AAQ NEPM Standard
0.08 ppm (4-hour average)

Year	Data Recovery (%)	No. of exceedances (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
1993	0.0	0	-	-	-	-	-
1994	0.0	0	-	-	-	-	-
1995	12.3	0	0.039	0.038	0.037	0.035	0.034
1996	97.2	1	0.085	0.061	0.056	0.042	0.039
1997	83.8	0	0.069	0.055	0.050	0.042	0.035
1998	99.0	0	0.074	0.062	0.051	0.046	0.039
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

Table 31. Daily peak 4-hour ozone data summary (1993-2002)
Trend station/region: Rolling Green

AAQ NEPM Standard
0.08 ppm (4-hour average)

Year	Data Recovery (%)	No. of exceedances (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
1993	95.4	1	0.092	0.068	0.064	0.054	0.045
1994	98.9	1	0.084	0.061	0.055	0.048	0.044
1995	70.4	0	0.080	0.069	0.064	0.054	0.046
1996	99.2	5	0.085	0.082	0.070	0.053	0.043
1997	63.9	2	0.124	0.077	0.070	0.058	0.051
1998	99.5	2	0.095	0.069	0.066	0.052	0.048
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

Table 32. Daily peak 4-hour ozone data summary (1993-2002)
Trend station/region: South Lake

AAQ NEPM Standard
0.08 ppm (4-hour average)

Year	Data Recovery (%)	No. of exceedances (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
1993	0.0	0	-	-	-	-	-
1994	0.0	0	-	-	-	-	-
1995	0.0	0	-	-	-	-	-
1996	0.0	0	-	-	-	-	-
1997	0.0	0	-	-	-	-	-
1998	0.0	0	-	-	-	-	-
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

Table D33. Daily peak 1-hour ozone data summary (1993-2002)
Trend station/region: Swanbourne AAQ NEPM Standard 0.10 ppm (1-hour average)

Year	Data Recovery (%)	No. of exceedances (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
1993	96.6	0	0.068	0.060	0.050	0.042	0.036
1994	98.9	0	0.067	0.057	0.051	0.042	0.037
1995	99.2	1	0.082	0.065	0.056	0.048	0.041
1996	98.2	1	0.081	0.066	0.056	0.048	0.039
1997	98.1	1	0.104	0.060	0.055	0.049	0.041
1998	98.4	0	0.078	0.060	0.054	0.047	0.040
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

Table D34. Daily peak 1-hour sulfur dioxide data summary (1993-2002)
Trend station/region: Hope Valley AAQ NEPM Standard 0.20 ppm (1-hour average)

Year	Data Recovery (%)	No. of exceedances (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
1993	99.1	1	0.343	0.093	0.071	0.059	0.042
1994	97.2	0	0.191	0.073	0.055	0.035	0.023
1995	99.3	0	0.076	0.056	0.045	0.037	0.029
1996	99.5	0	0.076	0.053	0.043	0.033	0.024
1997	97.4	0	0.047	0.040	0.031	0.023	0.016
1998	97.5	0	0.061	0.035	0.031	0.024	0.017
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

Table D35. Daily peak 1-hour sulfur dioxide data summary (1993-2002)
Trend station/region: Rockingham AAQ NEPM Standard 0.20 ppm (1-hour average)

Year	Data Recovery (%)	No. of exceedances (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
1993	0.0	0	-	-	-	-	-
1994	0.0	0	-	-	-	-	-
1995	15.3	0	0.017	0.014	0.012	0.008	0.004
1996	97.0	0	0.057	0.050	0.038	0.025	0.016
1997	88.1	0	0.039	0.028	0.018	0.013	0.008
1998	96.9	0	0.047	0.029	0.022	0.017	0.010
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

Table D36. Daily peak 1-hour sulfur dioxide data summary (1993-2002)
Trend station/region: South Lake AAQ NEPM Standard
0.20 ppm (1-hour average)

Year	Data Recovery (%)	No. of exceedances (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
1993	0.0	0	-	-	-	-	-
1994	0.0	0	-	-	-	-	-
1995	0.0	0	-	-	-	-	-
1996	0.0	0	-	-	-	-	-
1997	0.0	0	-	-	-	-	-
1998	0.0	0	-	-	-	-	-
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

Table D37. Daily peak 1-hour sulfur dioxide data summary (1993-2002)
Trend station/region: Wattleup AAQ NEPM Standard
0.20 ppm (1-hour average)

Year	Data Recovery (%)	No. of exceedances (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
1993	97.5	1	0.205	0.095	0.083	0.063	0.047
1994	97.3	0	0.095	0.058	0.048	0.037	0.026
1995	98.7	0	0.090	0.063	0.055	0.042	0.033
1996	96.7	0	0.082	0.049	0.044	0.033	0.026
1997	91.9	0	0.065	0.047	0.040	0.026	0.018
1998	94.4	0	0.061	0.043	0.040	0.027	0.020
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

Table D38. Daily peak 24-hour sulfur dioxide data summary (1993-2002)
Trend station/region: Hope Valley AAQ NEPM Standard
0.08 ppm (24-hour average)

Year	Data Recovery (%)	No. of exceedances (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
1993	99.1	0	0.027	0.010	0.009	0.006	0.004
1994	97.2	0	0.017	0.008	0.007	0.005	0.004
1995	99.3	0	0.011	0.008	0.007	0.005	0.004
1996	99.5	0	0.008	0.006	0.005	0.004	0.003
1997	97.4	0	0.005	0.005	0.004	0.003	0.002
1998	97.5	0	0.008	0.006	0.004	0.003	0.002
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

Table D39. Daily peak 24-hour sulfur dioxide data summary (1993-2002)
Trend station/region: Rockingham AAQ NEPM Standard 0.08 ppm (24-hour average)

Year	Data Recovery (%)	No. of exceedances (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
1993	0.0	0	-	-	-	-	-
1994	0.0	0	-	-	-	-	-
1995	15.3	0	0.002	0.002	0.001	0.001	0.001
1996	97.0	0	0.022	0.010	0.008	0.005	0.003
1997	88.1	0	0.014	0.005	0.004	0.003	0.003
1998	96.9	0	0.009	0.006	0.005	0.003	0.002
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

Table D40. Daily peak 24-hour sulfur dioxide data summary (1993-2002)
Trend station/region: South Lake AAQ NEPM Standard 0.08 ppm (24-hour average)

Year	Data Recovery (%)	No. of exceedances (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
1993	0.0	0	-	-	-	-	-
1994	0.0	0	-	-	-	-	-
1995	0.0	0	-	-	-	-	-
1996	0.0	0	-	-	-	-	-
1997	0.0	0	-	-	-	-	-
1998	0.0	0	-	-	-	-	-
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

Table D41. Daily peak 24-hour sulfur dioxide data summary (1993-2002)
Trend station/region: Wattleup AAQ NEPM Standard 0.08 ppm (24-hour average)

Year	Data Recovery (%)	No. of exceedances (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
1993	97.5	0	0.025	0.012	0.011	0.009	0.006
1994	97.3	0	0.008	0.006	0.006	0.005	0.004
1995	98.7	0	0.012	0.010	0.008	0.006	0.005
1996	96.7	0	0.011	0.009	0.009	0.007	0.006
1997	91.9	0	0.010	0.006	0.005	0.004	0.003
1998	94.4	0	0.008	0.006	0.005	0.004	0.003
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

Table D42. Daily peak 24-hour particles as PM10 data summary (1993-2002)
Trend station/region: Duncraig AAQ NEPM Standard
50 ug/m3 (24-hour average)

Year	Data Recovery (%)	No. of exceedances (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
1993	0.0	0	-	-	-	-	-
1994	0.0	0	-	-	-	-	-
1995	0.0	0	-	-	-	-	-
1996	44.9	0	37.7	36.4	33.4	27.5	25.2
1997	60.8	4	56.2	50.2	46.5	37.3	30.7
1998	98.4	1	68.9	39.2	35.8	29.7	26.5
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

Table D43. Daily peak 24-hour particles as PM10 data summary (1993-2002)
Trend station/region: South Lake AAQ NEPM Standard
50 ug/m3 (24-hour average)

Year	Data Recovery (%)	No. of exceedances (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
1993	0.0	0	-	-	-	-	-
1994	0.0	0	-	-	-	-	-
1995	0.0	0	-	-	-	-	-
1996	0.0	0	-	-	-	-	-
1997	0.0	0	-	-	-	-	-
1998	0.0	0	-	-	-	-	-
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

Table D44. Daily peak 24-hour particles as PM10 data summary (1993-2002)
Trend station/region: Bunbury AAQ NEPM Standard
50 ug/m3 (24-hour average)

Year	Data Recovery (%)	No. of exceedances (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
1993	0.0	0	-	-	-	-	-
1994	0.0	0	-	-	-	-	-
1995	0.0	0	-	-	-	-	-
1996	0.0	0	-	-	-	-	-
1997	0.0	0	-	-	-	-	-
1998	0.0	0	-	-	-	-	-
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

Table D45. Annual daily peak 8-hour carbon monoxide concentrations (ppm) for 1993-2002

AAQ NEPM Standard
9.0 ppm (8-hour average)

Regional Performance Monitoring Station	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Perth Region										
Caversham (North East Metro)	1.6	3.4	2.2	2.7	2.3	1.7	1.6	1.4	1.5	1.3
Duncraig (North Metro)	-	-	5.2	7.2	6.8	6.1	6.6	4.8	5.9	5.4
Queens Building (CBD)	7.4	8.8	8.5	7.2	5.6	6.1	5.0	4.3	4.8	4.7
South Lake (South East Metro)	-	-	-	-	-	-	-	3.6	4.0	3.2
Bunbury Region										
Bunbury (South West Region)	-	-	-	-	-	-	2.7	3.0	2.0	2.2

Highlighted cells indicate NEPM exceedances.

Table D46. Annual daily peak 1-hour nitrogen dioxide concentrations (ppm) for 1993-2002

AAQ NEPM Standard
0.12 ppm (1-hour average)

Regional Performance Monitoring Station	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Perth Region										
Caversham (North East Metro)	0.051	0.058	0.047	0.045	0.051	0.051	0.038	0.044	0.045	0.055
Duncraig (North Metro)	-	-	0.038	0.043	0.046	0.065	0.049	0.050	0.041	0.049
Hope Valley (South Metro)	0.042	0.047	0.033	0.045	0.033	0.044	0.032	0.033	0.033	0.039
Queens Building (CBD)	0.125	0.097	0.084	0.093	0.098	0.093	0.073	0.073	0.082	0.091
Quinns Rocks (Outer North Coast)	0.033	0.051	0.036	0.036	0.038	0.041	0.034	0.045	0.036	0.037
Rockingham (South Coast)	-	-	0.020	0.041	0.033	0.043	0.030	0.048	0.046	0.042
Rolling Green (Outer East Rural)	0.028	0.028	0.035	0.022	0.035	0.029	0.024	0.027	0.026	0.025
South Lake (South East Metro)	-	-	-	-	-	-	-	0.041	0.039	0.048
Swanbourne (Inner West Coast)	0.046	0.049	0.038	0.046	0.040	0.051	0.037	0.045	0.037	0.051

Highlighted cells indicate NEPM exceedances.

Table D47. Annual daily peak 1-hour ozone concentrations (ppm) for 1993-2002

AAQ NEPM Standard
0.10 ppm (1-hour average)

Regional Performance Monitoring Station	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Perth Region										
Caversham (North East Metro)	0.111	0.103	0.093	0.114	0.1	0.112	0.101	0.084	0.099	0.091
Quinns Rocks (Outer North Coast)	0.082	0.074	0.089	0.084	0.106	0.080	0.105	0.078	0.073	0.079
Rockingham (South Coast)	-	-	0.043	0.091	0.078	0.082	0.076	0.083	0.076	0.079
Rolling Green (Outer East Rural)	0.110	0.092	0.088	0.104	0.134	0.109	0.096	0.092	0.097	0.091
South Lake (South East Metro)	-	-	-	-	-	-	-	0.077	0.079	0.067
Swanbourne (Inner West Coast)	0.080	0.079	0.098	0.089	0.109	0.081	0.088	0.079	0.075	0.081

Highlighted cells indicate NEPM exceedances.

Table D48. Annual daily peak 4-hour ozone concentrations (ppm) for 1993-2002

AAQ NEPM Standard
0.08 ppm (4-hour average)

Regional Performance Monitoring Station	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Perth Region										
Caversham (North East Metro)	0.072	0.084	0.082	0.090	0.084	0.087	0.080	0.058	0.079	0.068
Quinns Rocks (Outer North Coast)	0.073	0.064	0.078	0.075	0.100	0.077	0.083	0.072	0.066	0.069
Rockingham (South Coast)	-	-	0.039	0.085	0.069	0.074	0.067	0.078	0.071	0.071
Rolling Green (Outer East Rural)	0.092	0.084	0.080	0.085	0.124	0.095	0.077	0.075	0.094	0.071
South Lake (South East Metro)	-	-	-	-	-	-	-	0.067	0.076	0.058
Swanbourne (Inner West Coast)	0.068	0.067	0.082	0.081	0.104	0.078	0.074	0.073	0.069	0.066

Highlighted cells indicate NEPM exceedances.

Table D49. Annual daily peak 1-hour sulfur dioxide concentrations (ppm) for 1993-2002

AAQ NEPM Standard
0.20 ppm (1-hour average)

Regional Performance Monitoring Station	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Perth Region										
Hope Valley (South Metro)	0.343	0.191	0.076	0.076	0.047	0.061	0.064	0.079	0.044	0.058
Rockingham (South Coast)	-	-	0.017	0.057	0.039	0.047	0.047	0.034	0.028	0.035
South Lake (South East Metro)	-	-	-	-	-	-	-	0.042	0.046	0.043
Wattleup (South Metro)	0.205	0.095	0.090	0.082	0.065	0.061	0.060	0.046	0.074	0.081

Highlighted cells indicate NEPM exceedances.

Table D50. Annual daily peak 24-hour sulfur dioxide concentrations (ppm) for 1993-2002

AAQ NEPM Standard
0.08 ppm (24-hour average)

Regional Performance Monitoring Station	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Perth Region										
Hope Valley (South Metro)	0.027	0.017	0.011	0.008	0.005	0.008	0.007	0.007	0.004	0.007
Rockingham (South Coast)	-	-	0.002	0.022	0.014	0.009	0.016	0.012	0.009	0.006
South Lake (South East Metro)	-	-	-	-	-	-	-	0.004	0.006	0.006
Wattleup (South Metro)	0.025	0.008	0.012	0.011	0.010	0.008	0.007	0.006	0.009	0.008

Highlighted cells indicate NEPM exceedances.

Table D51. Annual daily 24-hour particles as PM10 concentrations (ug/m3) for 1993-2002

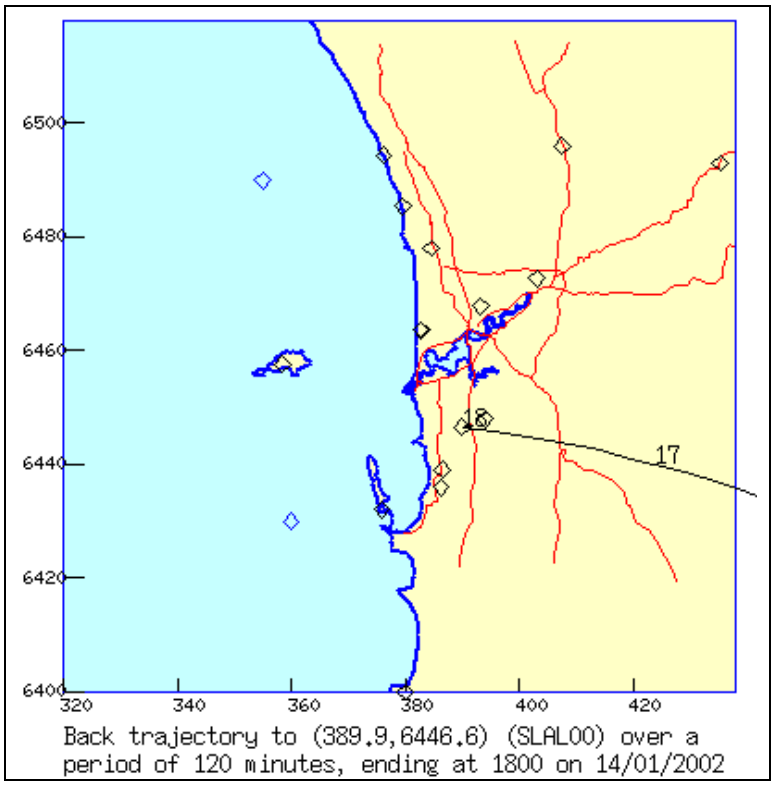
AAQ NEPM Standard
50 ppm (24-hour average)

Regional Performance Monitoring Station	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Perth Region										
Duncraig (North Metro)	-	-	-	37.7	56.2	68.9	35.2	29.8	53.6	54.0
South Lake (South East Metro)	-	-	-	-	-	-	-	39.6	56.7	82.6
Bunbury Region										
Bunbury (South West Region)	-	-	-	-	-	-	40.0	42.4	57.6	42.5

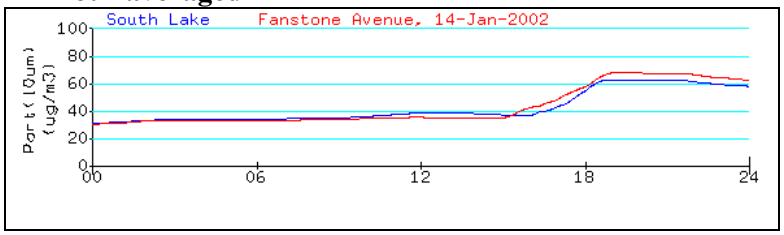
Highlighted cells indicate NEPM exceedances.

ATTACHMENT 1

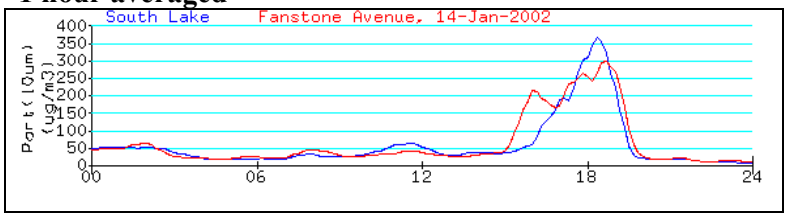
PM_{10} Exceedance on 14 January 2002



24 hour averaged



1 hour averaged



Pollutant

PM_{10}

Monitoring Site

South Lake (DoE) and
Fanstone Avenue (Industry)

Highest Concentration

57.9 ug/m^3 – South Lake
62.8 ug/m^3 – Fanstone Avenue

Averaging Period

24 hours

NEPM Standard

50 ug/m^3

Description of Event

Easterly winds have blown dust over the monitoring stations. The easterly breeze continued throughout the day pushing the dust out to sea. As a result, no other metropolitan station measured elevated particle levels. (Duncraig registered a PM_{10} level of 29.1 ug/m^3.)

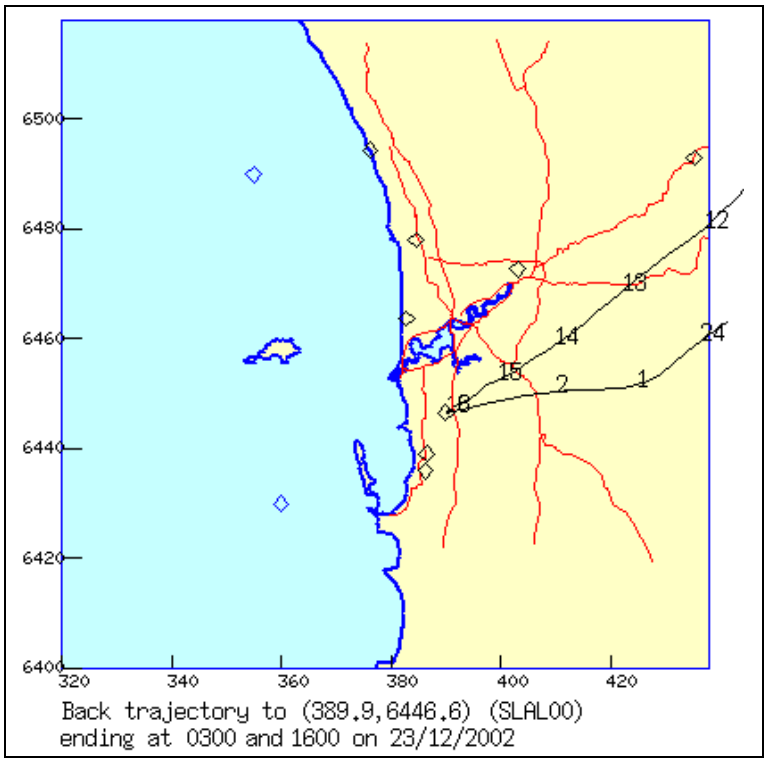
The South Lake nephelometer registered 0.8 bsp (1-hr averaged). The low nephelometer reading indicates a high proportion of coarse particles. The wind speed was 8 – 9 ms^{-1} during the event with no major change in wind direction during the day.

Advice from a local Service Station proprietor was that excavation work at a new housing development in Berrigan Drive 500m east of the South Lake station was the cause.

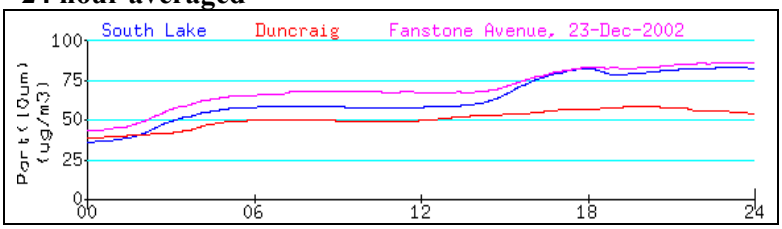
In the case of Fanstone Avenue, advice from KIC indicates that a small fire was burning in a park 1-2 km NE of Fanstone Avenue site.

ATTACHMENT 2

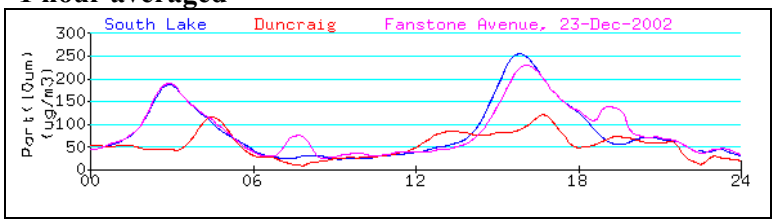
PM_{10} Exceedance on 23 December 2002



24 hour averaged



1 hour averaged



Pollutant

PM_{10}

Monitoring Site

South Lake (DoE)
Duncraig (DoE)

Highest Concentration

South Lake – 82.6 ug/m^3
Duncraig – 54.0 ug/m^3
Fanstone Avenue – 85.9 ug/m^3

Averaging Period

24 hours

NEPM Standard

50 ug/m^3

Description of Event

Lightning strikes due to thunderstorm activity around Perth on Sunday 23rd December ignited several bushfires around the Perth Metropolitan region.

The 24-hour averaged $PM_{2.5}$ concentration at Duncraig reached 21.3 ug/m^3, which is less than the proposed NEPM $PM_{2.5}$ standard of 25.0 ug/m^3.

720 ABC PERTH Radio News 4:00PM AWST Monday, 23 December 2002
News Director: Mr Kim Jordan 08 9220 2700
Health authorities are urging people to take care with smoke coming from bushfires which may harm people with medical conditions

ATTACHMENT 3 – 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 in Western Australia. The nominated percentiles can also be expressed as an Nth highest concentration. Based on 100% 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)

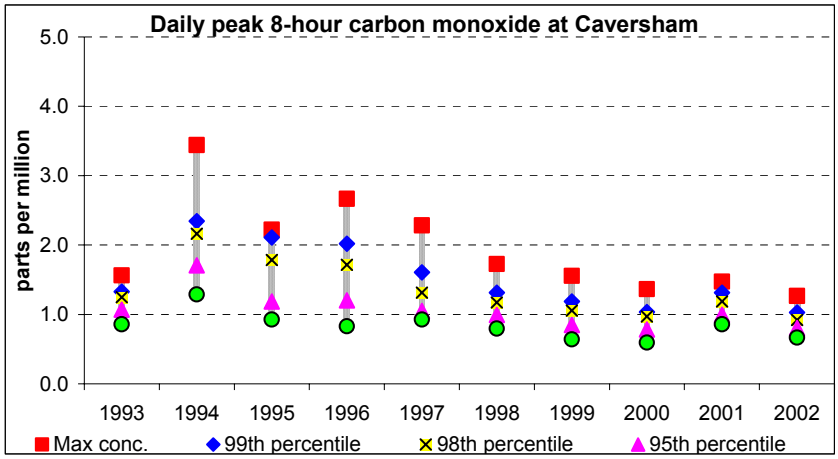


Figure 1 - 8-hour carbon monoxide at Caversham

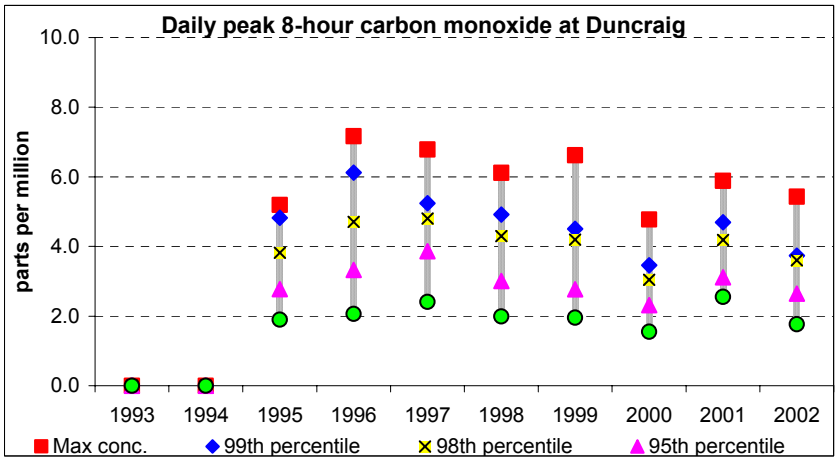


Figure 2 - 8-hour carbon monoxide at Duncraig

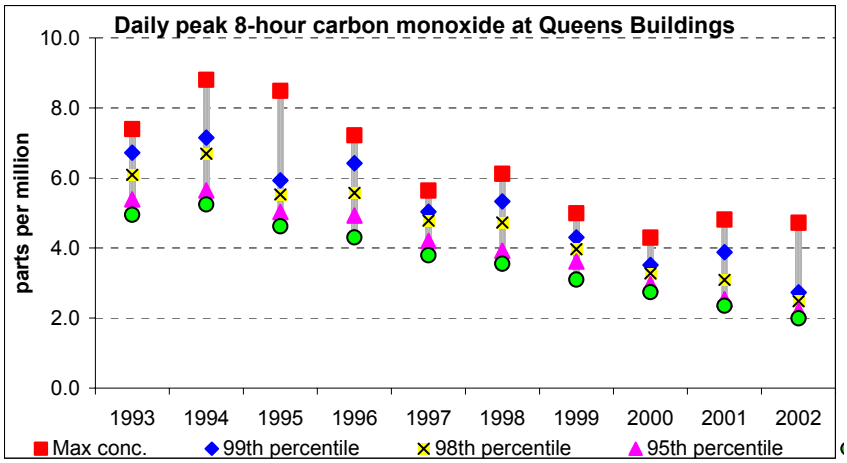


Figure 3 - 8-hour carbon monoxide at Queens Buildings

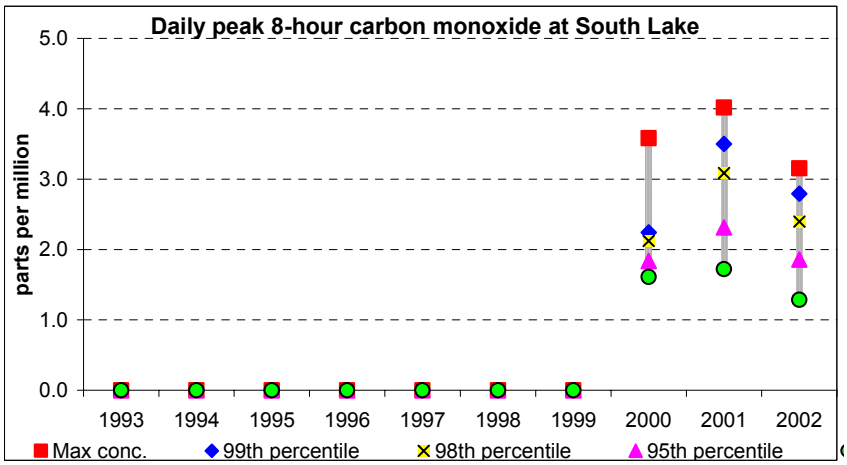


Figure 4 - 8-hour carbon monoxide at South Lake

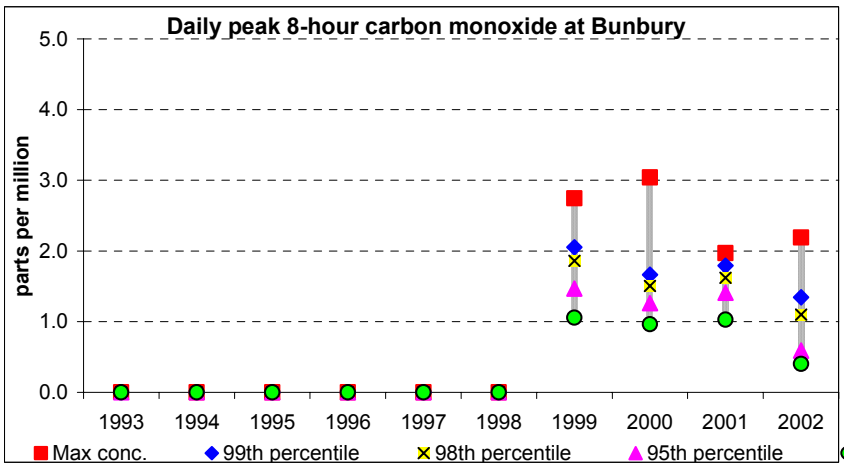


Figure 5 - 8-hour carbon monoxide at Bunbury

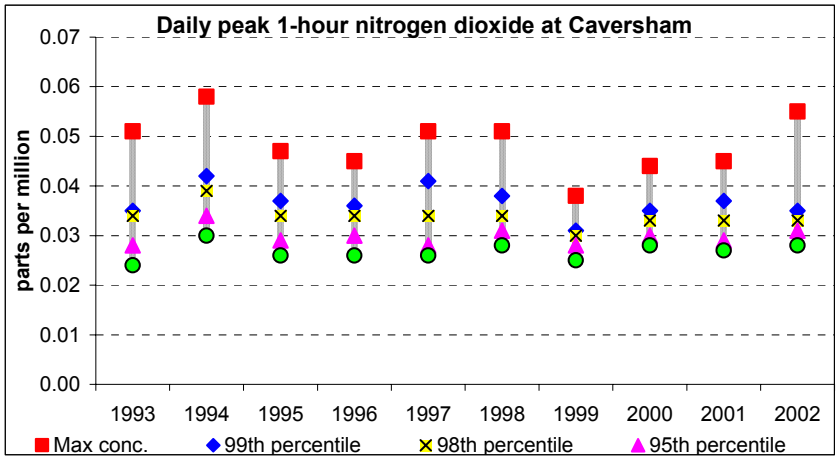


Figure 6 - 1-hour nitrogen dioxide at Caversham

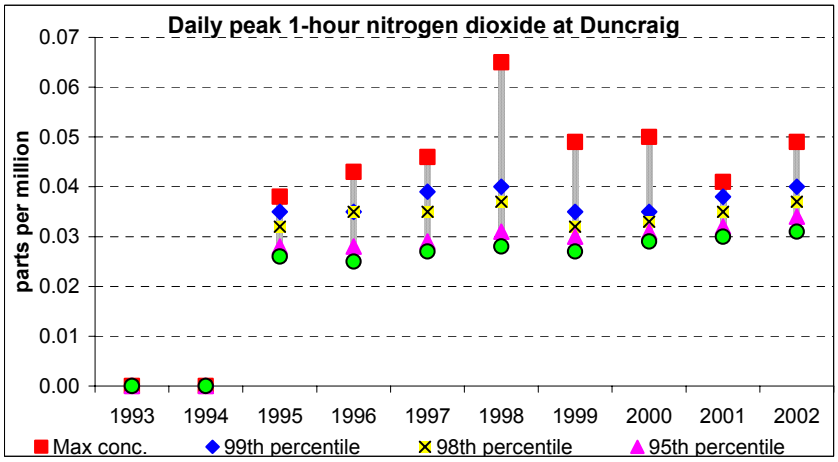


Figure 7 - 1-hour nitrogen dioxide at Duncraig

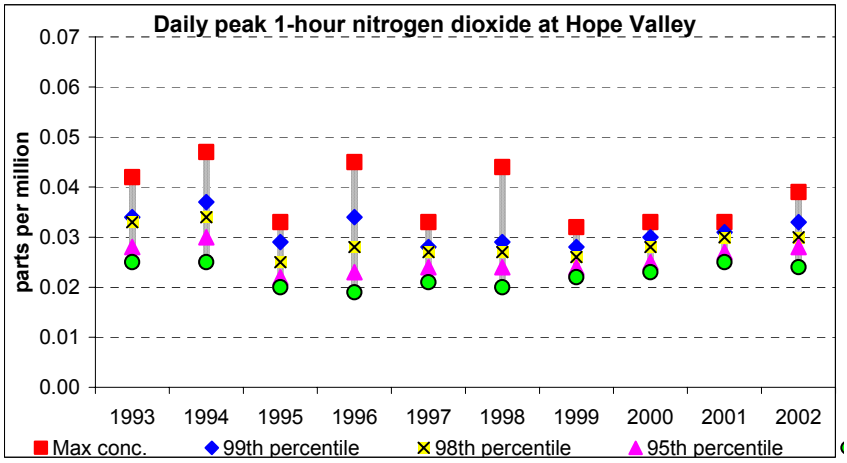


Figure 8 - 1-hour nitrogen dioxide at Hope Valley

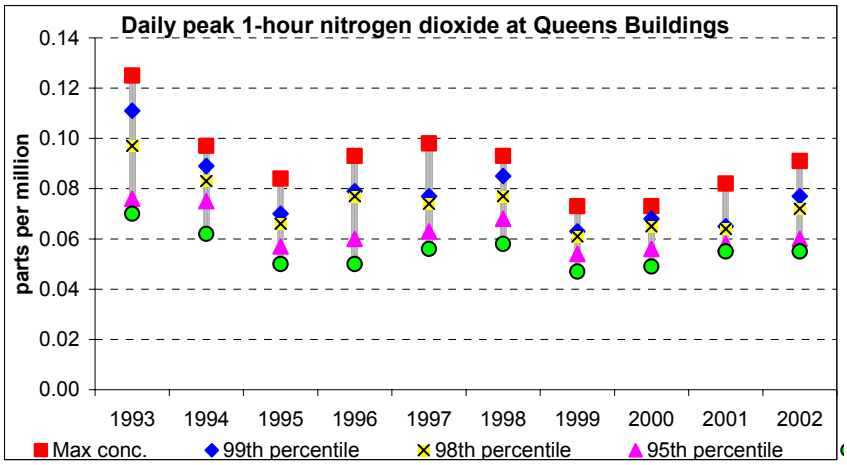


Figure 9 - 1-hour nitrogen dioxide at Queens Buildings

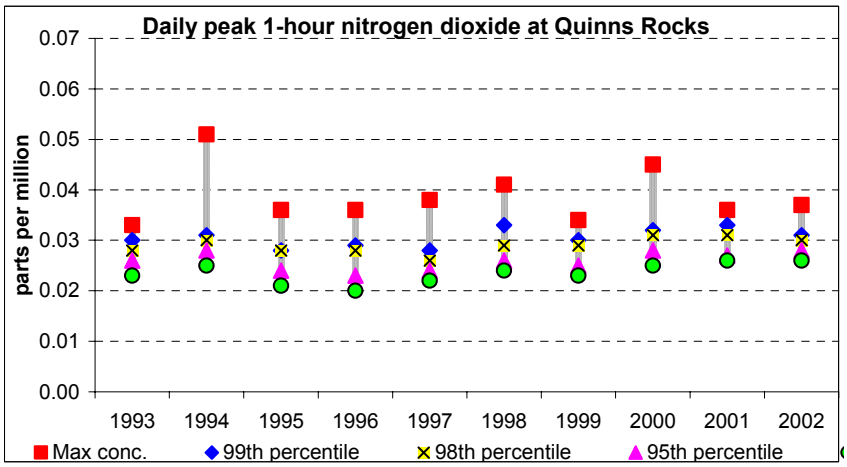


Figure 10 - 1-hour nitrogen dioxide at Quinns Rocks

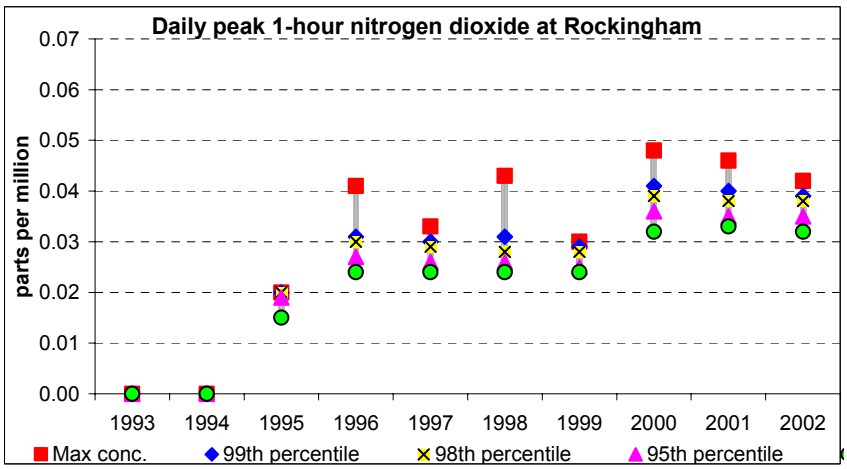


Figure 11 - 1-hour nitrogen dioxide at Rockingham

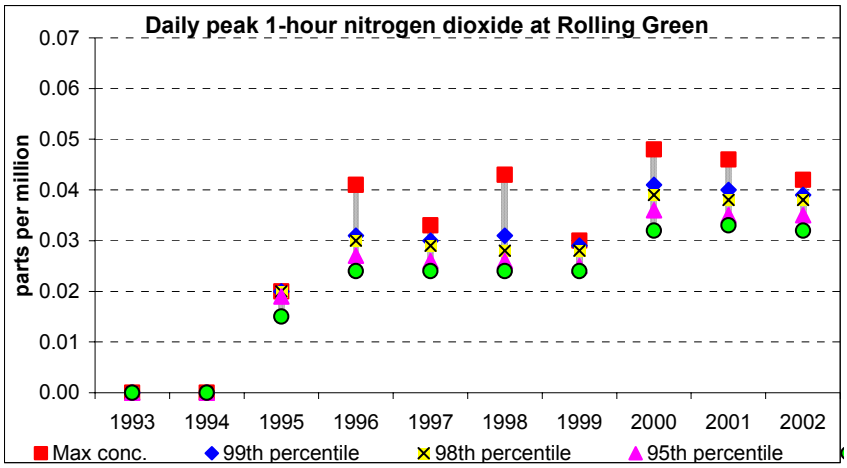


Figure 12 - 1-hour nitrogen dioxide at Rolling Green

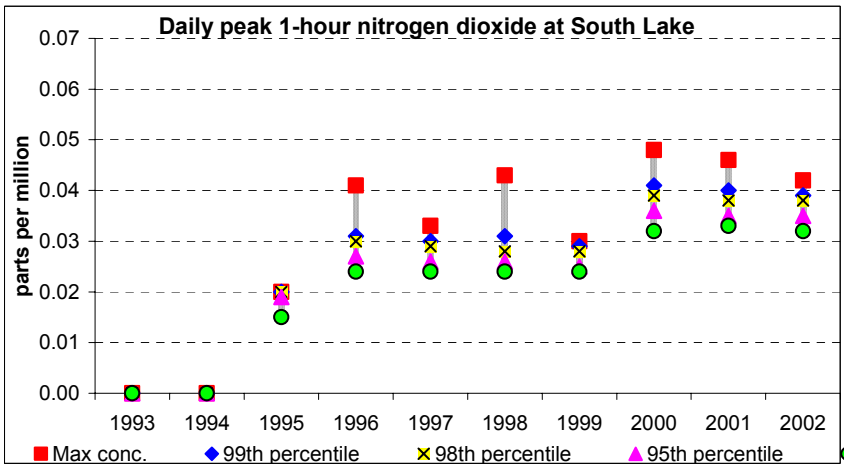


Figure 13 - 1-hour nitrogen dioxide at South Lake

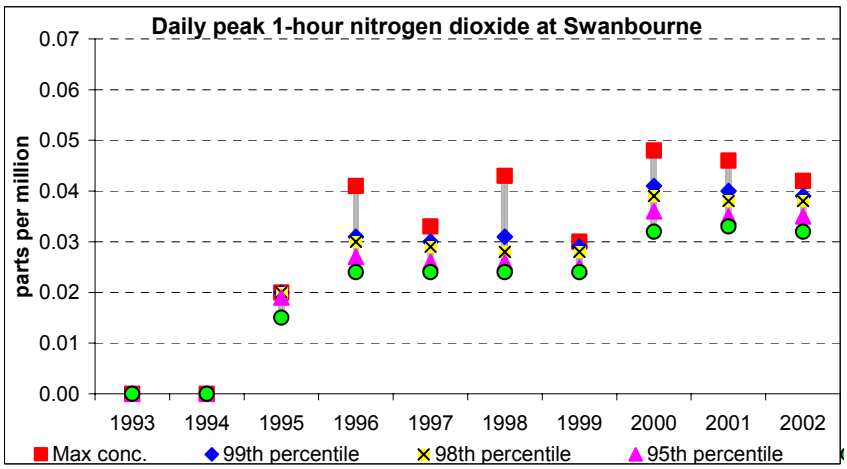


Figure 14 - 1-hour nitrogen dioxide at Swanbourne

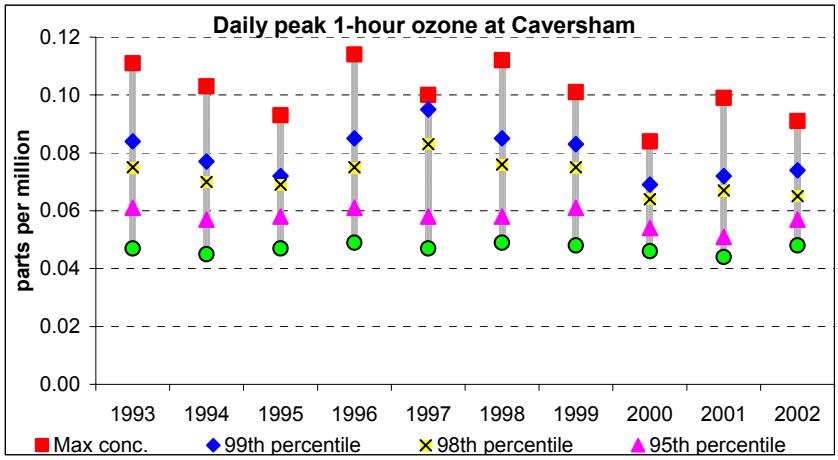


Figure 15 - 1-hour ozone at Caversham

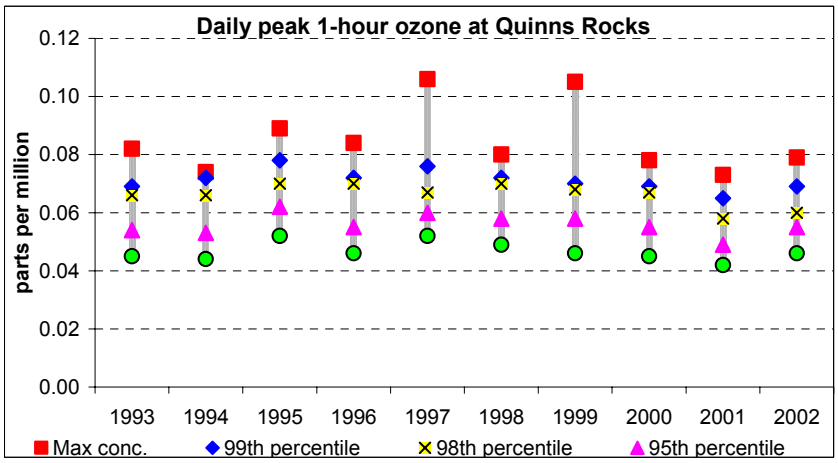


Figure 16 - 1-hour ozone at Quinns Rocks

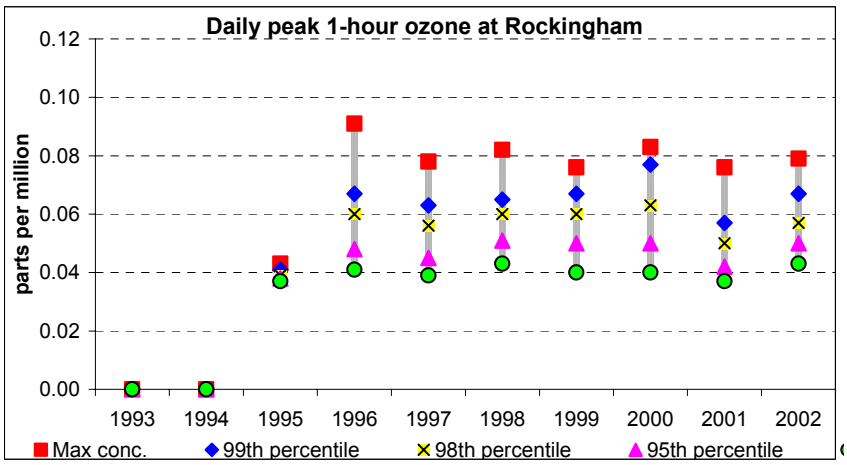


Figure 17 - 1-hour ozone at Rockingham

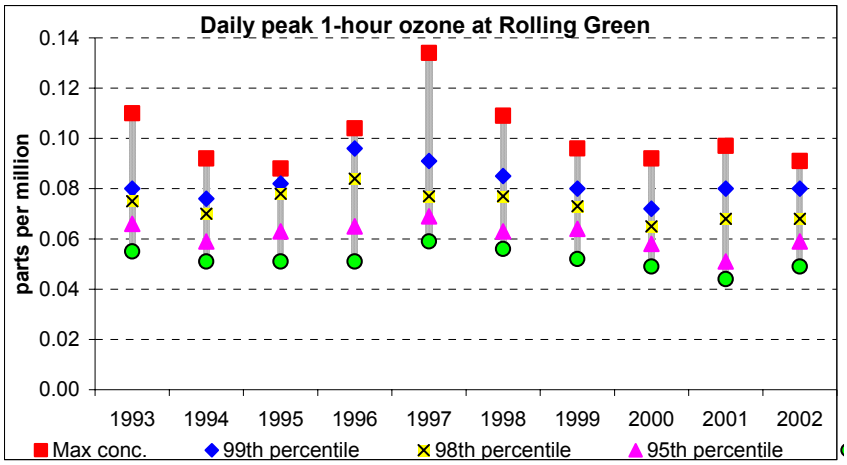


Figure 18 - 1-hour ozone at Rolling Green

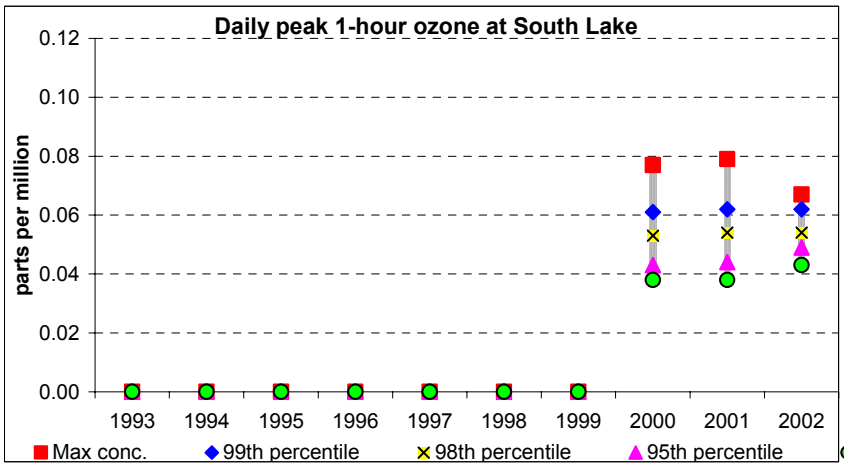


Figure 19 - 1-hour ozone at South Lake

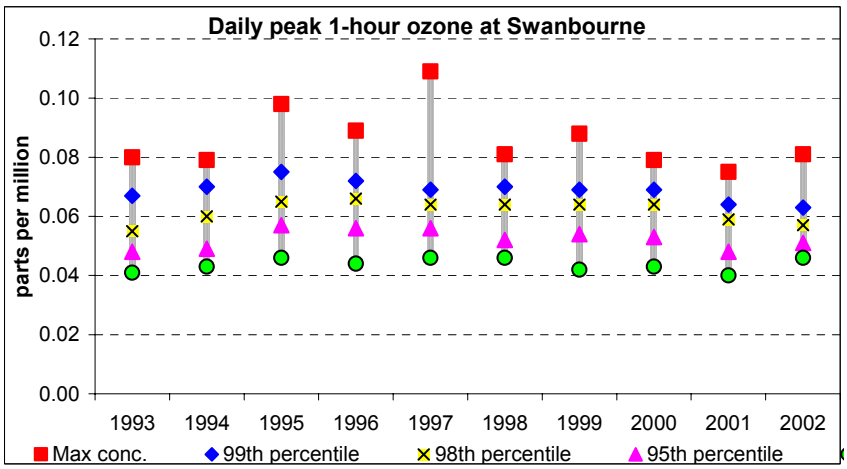


Figure 20 - 1-hour ozone at Swanbourne

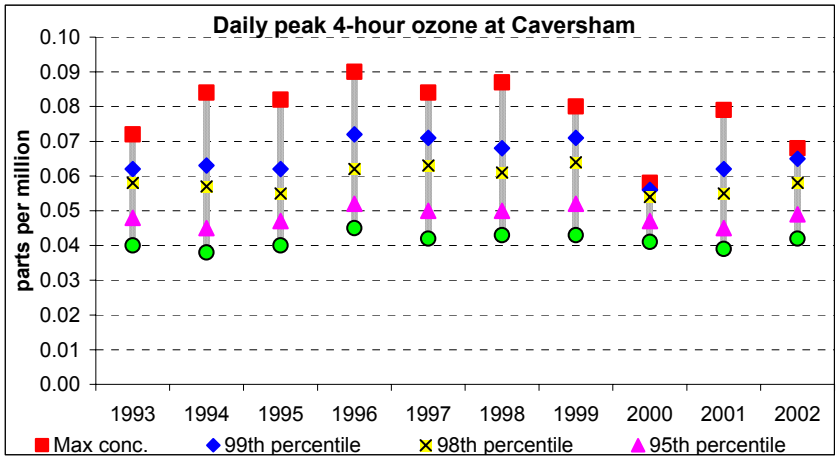


Figure 21 - 4-hour ozone at Caversham

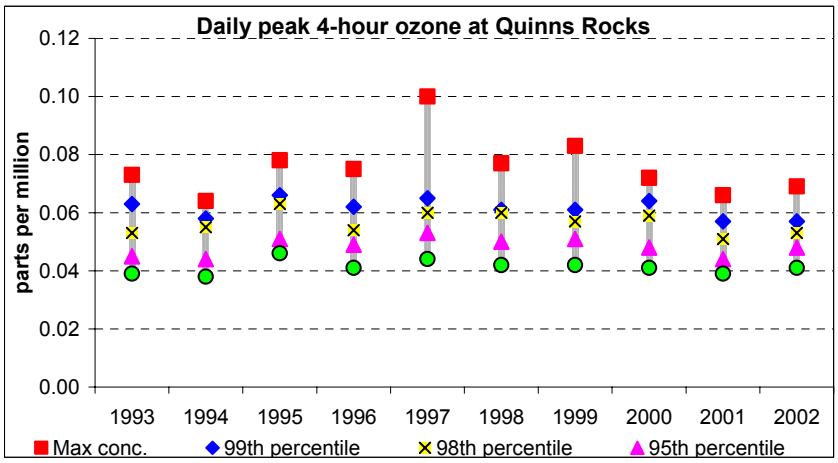


Figure 22 - 4-hour ozone at Quinns Rocks

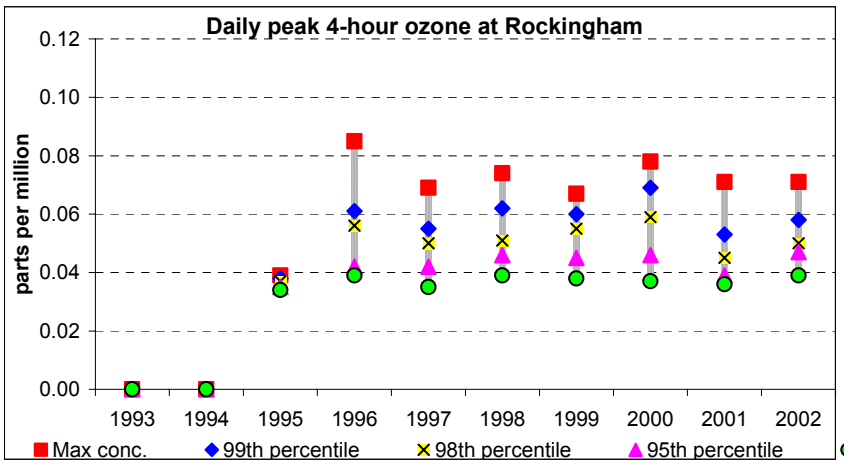


Figure 23 - 4-hour ozone at Rockingham

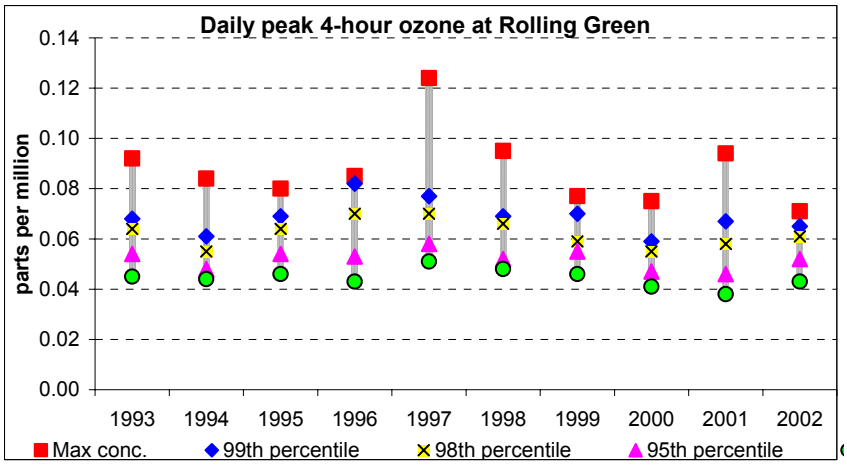


Figure 24 - 4-hour ozone at Rolling Green

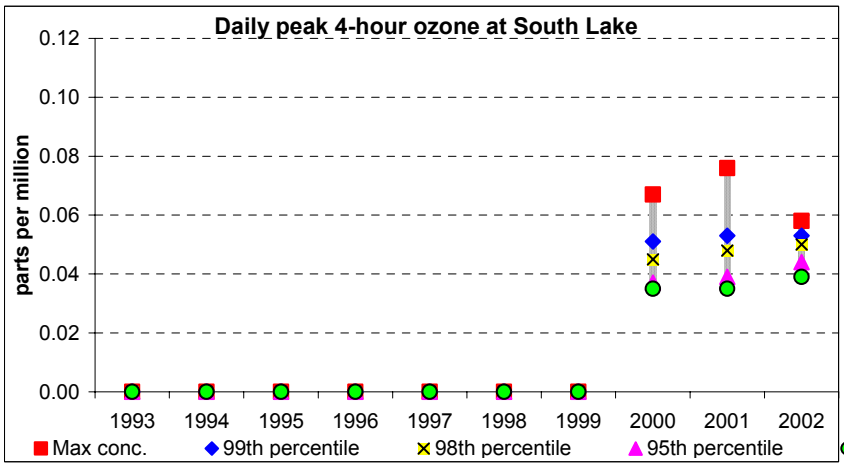


Figure 25 - 4-hour ozone at South Lake

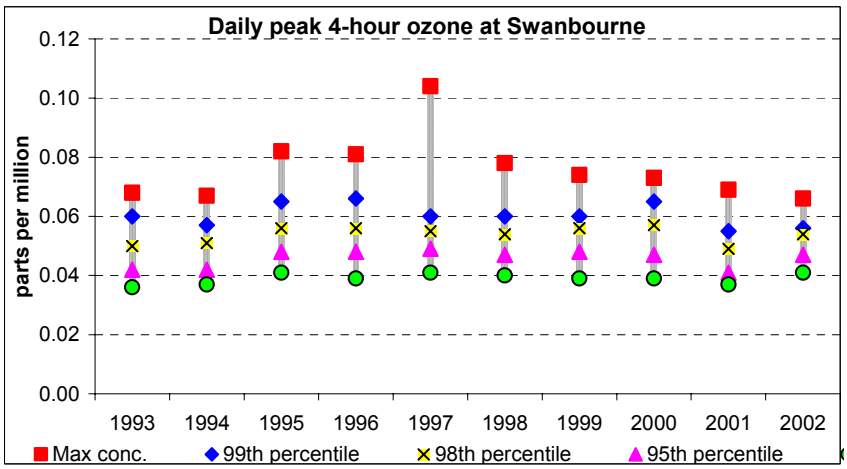


Figure 26 - 4-hour ozone at Swanbourne

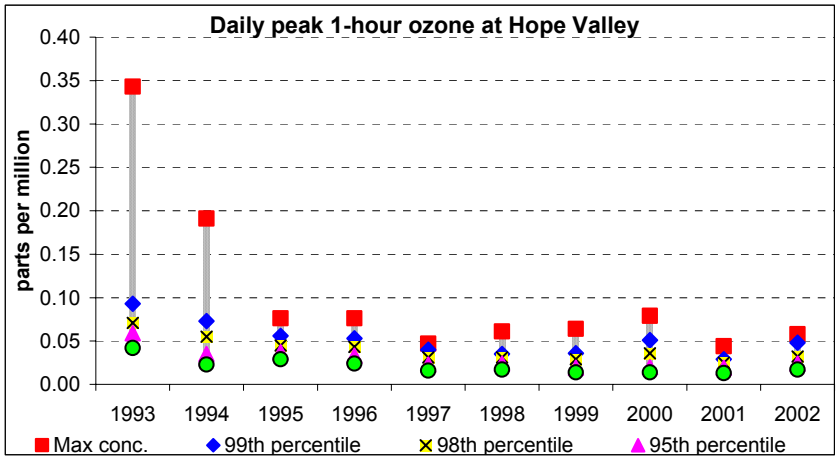


Figure 27 - 1-hour sulfur dioxide at Hope Valley

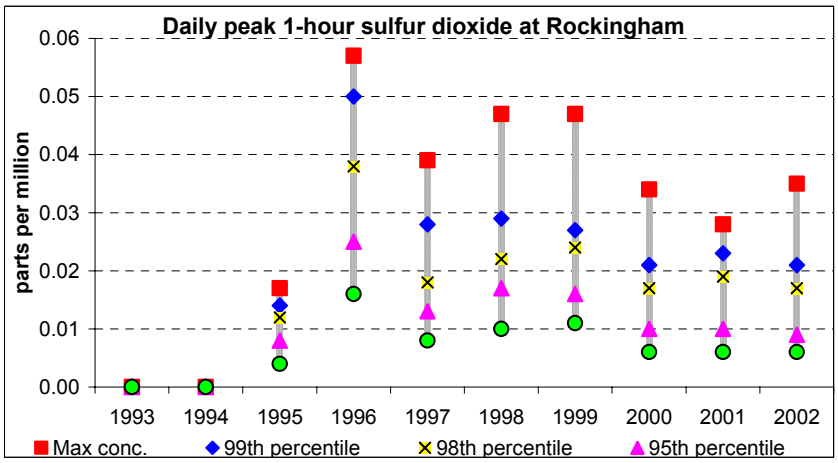


Figure 28 - 1-hour sulfur dioxide at Rockingham

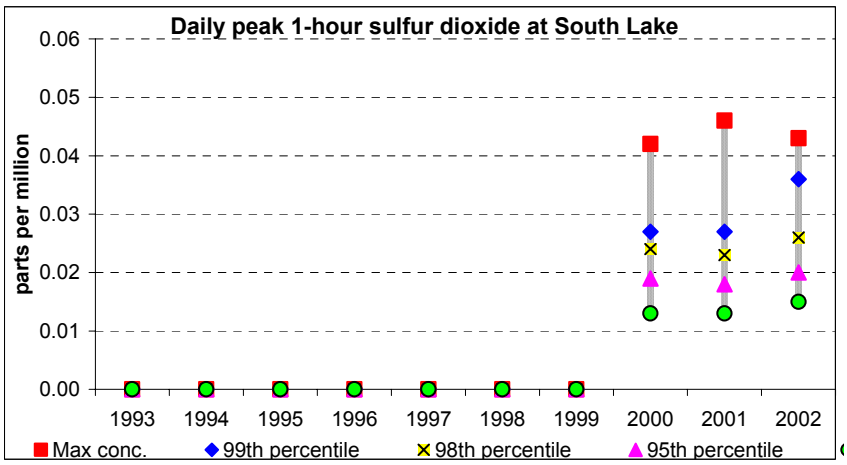


Figure 29 - 1-hour sulfur dioxide at South Lake

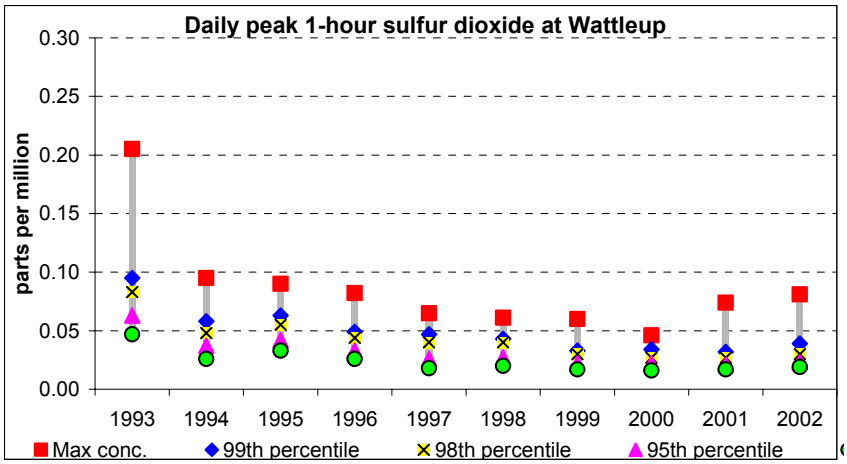


Figure 30 - 1-hour sulfur dioxide at Wattleup

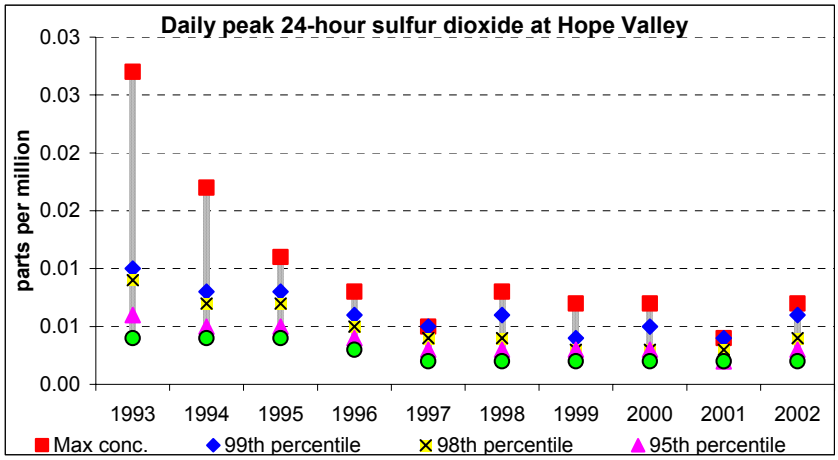


Figure 31 - 24-hour sulfur dioxide at Hope Valley

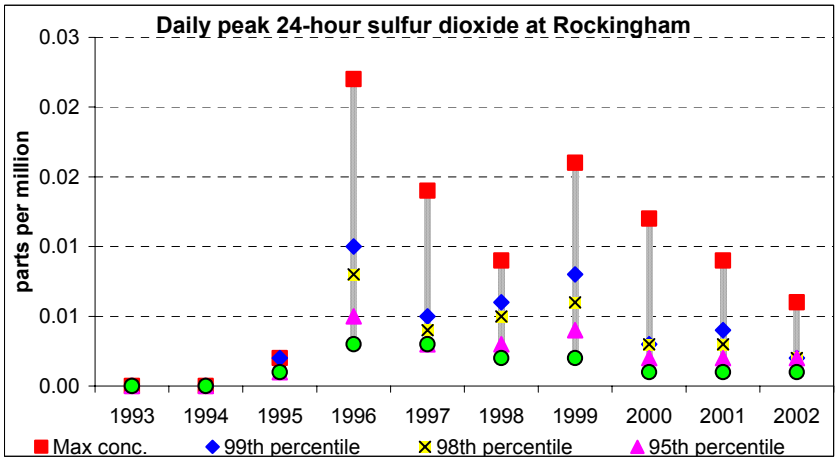


Figure 32 - 24-hour sulfur dioxide at Rockingham

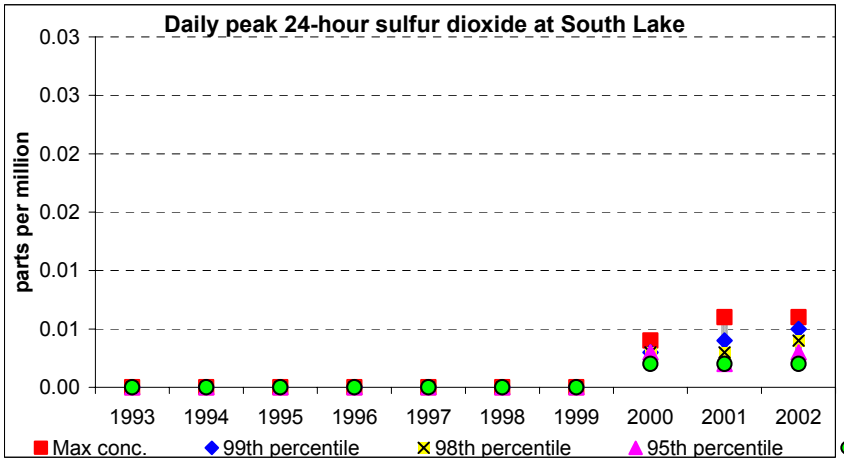


Figure 33 - 24-hour sulfur dioxide at South Lake

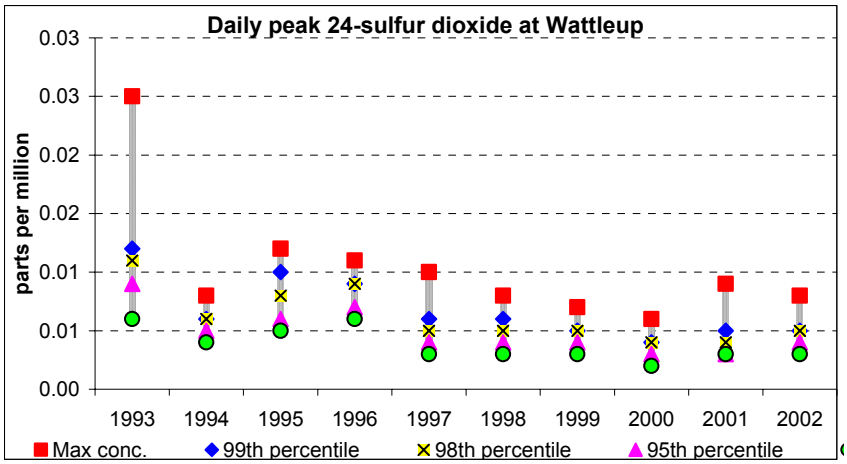


Figure 34 - 24-hour sulfur dioxide at Wattleup

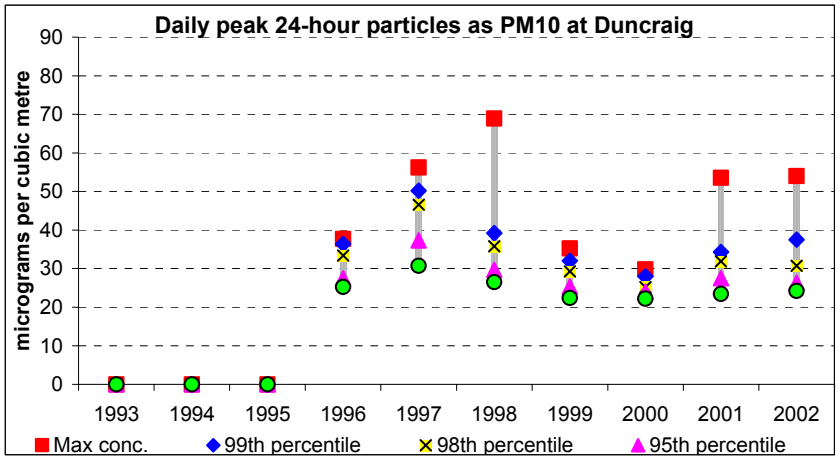


Figure 35 - 24-hour particles as PM10 at Duncraig

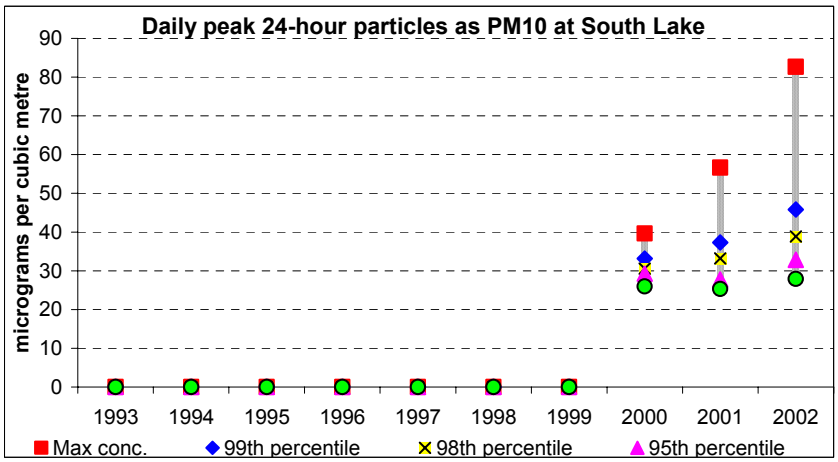


Figure 36 - 24-hour particles as PM10 at South Lake

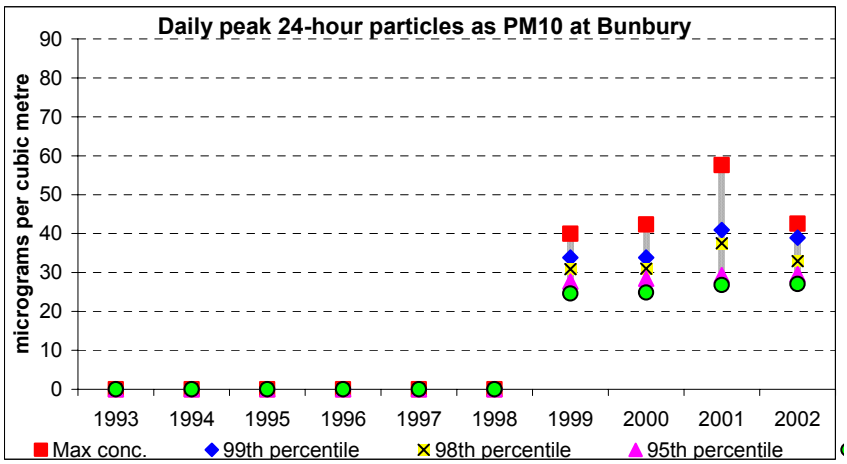


Figure 37 - 24-hour particles as PM10 at Bunbury