Department of Environment

2004

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Air Monitoring Report

Written to comply with the

National Environment Protection Measure

(Ambient Air Quality)

Technical Report 122

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Table of Contents

SECTION A – MONITORING SUMMARY 7
Current Monitoring Stations 7
Carbon Monoxide 10
Photochemical Oxidants as Ozone 11
Nitrogen Dioxide 11
Sulfur Dioxide 11
Lead 12
Particles as PM_{10} 12
Status of NATA Accreditation 12

SECTION B – ASSESSMENT OF COMPLIANCE WITH STANDARDS AND GOALS 13

SECTION C – ANALYSIS OF AIR QUALITY MONITORING 16
Carbon Monoxide 16
Nitrogen Dioxide 17
Photochemical Smog as Ozone 18
Sulfur Dioxide 19
Particles as PM_{10} 20
Particles as $PM_{2.5}$ 21

SECTION D – DATA ANALYSIS 22
Maxima and Percentiles by Pollutant in 2004 22
Maxima and Percentiles by Site 1995 to 2004 25
Maxima by Pollutant 1995 to 2004 39

ATTACHMENT 1 – O_3 EXCEEDANCE ON 12TH FEBRUARY 2004 43

ATTACHMENT 2 – O_3 EXCEEDANCE ON 18TH FEBRUARY 2004 44

ATTACHMENT 3 - PM_{10} & $PM_{2.5}$ EXCEEDANCES ON 8TH APRIL 2004..... 45

ATTACHMENT 4 – PM_{10} & $PM_{2.5}$ EXCEEDANCES ON 17TH APRIL 2004.. 46

ATTACHMENT 5 – PM_{10} & $PM_{2.5}$ EXCEEDANCES ON 28-29 APRIL 2004 47

ATTACHMENT 6 – $PM_{2.5}$ EXCEEDANCE ON 5TH MAY 2004 48

ATTACHMENT 7 – PM_{10} EXCEEDANCE ON 14TH OCTOBER 2004 49

ATTACHMENT 8 – PM_{10} EXCEEDANCE ON 20TH DECEMBER 2004..... 50

ATTACHMENT 9 – GRAPHICAL TRENDS 52
Carbon Monoxide 53
Nitrogen Dioxide 55
Ozone 60
Sulfur Dioxide 66
Particles as PM_{10} 70
Particles as $PM_{2.5}$ 72

List of Figures

Figure A1 - DoE air quality monitoring stations which are currently operating in the Perth metropolitan region. 7
Figure A2 - DoE air quality monitoring stations which are currently operating in Bunbury 8
Figure A9-1 - 8-hour carbon monoxide at Caversham 53
Figure A9-2 - 8-hour carbon monoxide at Duncraig 53
Figure A9-3 - 8-hour carbon monoxide at Queens Buildings 54
Figure A9-4 - 8-hour carbon monoxide at South Lake 54
Figure A9-5 - 1-hour nitrogen dioxide at Caversham 55
Figure A9-6 - 1-hour nitrogen dioxide at Duncraig 55
Figure A9-7 - 1-hour nitrogen dioxide at Hope Valley 56
Figure A9-8 - 1-hour nitrogen dioxide at Queens Buildings 56
Figure A9-9 - 1-hour nitrogen dioxide at Quinns Rocks 57
Figure A9-10 - 1-hour nitrogen dioxide at Rockingham 57
Figure A9-11 - 1-hour nitrogen dioxide at Rolling Green 58
Figure A9-12 - 1-hour nitrogen dioxide at South Lake 58
Figure A9-13 - 1-hour nitrogen dioxide at Swanbourne 59
Figure A9-14 - 1-hour ozone at Caversham 60
Figure A9-15 - 1-hour ozone at Quinns Rocks 60
Figure A9-16 - 1-hour ozone at Rockingham 61
Figure A9-17 - 1-hour ozone at Rolling Green 61
Figure A9-18 - 1-hour ozone at South Lake 62
Figure A9-19 - 1-hour ozone at Swanbourne 62
Figure A9-20 - 4-hour ozone at Caversham 63
Figure A9-21 - 4-hour ozone at Quinns Rocks 63
Figure A9-22 - 4-hour ozone at Rockingham 64
Figure A9-23 - 4-hour ozone at Rolling Green 64
Figure A9-24 - 4-hour ozone at South Lake 65
Figure A9-25 - 4-hour ozone at Swanbourne 65
Figure A9-26 - 1-hour sulfur dioxide at Hope valley 66
Figure A9-27 - 1-hour sulfur dioxide at Rockingham 66
Figure A9-28 - 1-hour sulfur dioxide at South Lake 67
Figure A9-29 - 1-hour sulfur dioxide at Wattleup 67
Figure A9-30 - 24-hour sulfur dioxide at Hope Valley 68
Figure A9-31 - 24-hour sulfur dioxide at Rockingham 68
Figure A9-32 - 24-hour sulfur dioxide at South Lake 69
Figure A9-33 - 24-hour sulfur dioxide at Wattleup 69
Figure A9-34 - 24-hour PM_{10} at Caversham 70
Figure A9-35 - 24-hour PM_{10} at Duncraig 70
Figure A9-36 - 24-hour PM_{10} at South Lake 71
Figure A9-37 - 24-hour PM_{10} at Bunbury 71
Figure A9-38 - 24-hour $PM_{2.5}$ at Caversham 72
Figure A9-39 - 24-hour $PM_{2.5}$ at Duncraig 72
Figure A9-40 - 24-hour $PM_{2.5}$ at Bunbury 73

List of Tables

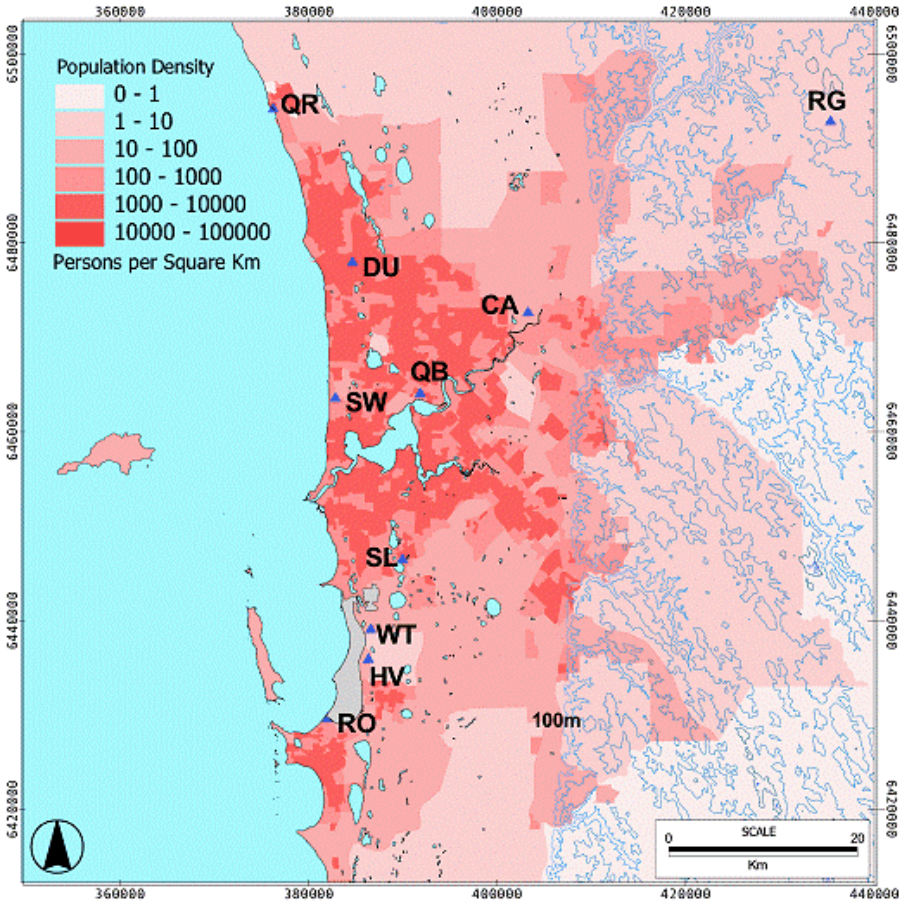
Table A1. Air quality parameters measured at DoE monitoring stations. 9
Table A2. Monitoring in Western Australia. 9
Table A3. Stations site compliance with AS 2922 - 1987 10
Table B1. 2004 compliance summary for carbon monoxide 13
Table B2. 2004 compliance summary for nitrogen dioxide 13
Table B3. 2004 compliance summary for ozone 14
Table B4. 2004 compliance summary for sulfur dioxide 14
Table B5. 2004 compliance summary for particles as PM_{10} 15
Table B6. 2004 compliance summary for particles as $PM_{2.5}$ 15
Table C1. 2004 summary statistics for daily peak 8-hour carbon monoxide 16
Table C2. 2004 summary statistics for daily peak 1-hour nitrogen dioxide 17
Table C3. 2004 summary statistics for daily peak 1-hour ozone 18
Table C4. 2004 summary statistics for daily peak 4-hour ozone 18
Table C5. 2004 summary statistics for daily peak 1-hour sulfur dioxide 19
Table C6. 2004 summary statistics for 24-hour sulfur dioxide 19
Table C7. 2004 summary statistics for 24-hour particles as PM_{10} 20
Table C8. 2004 summary statistics for 24-hour particles as $PM_{2.5}$ 21
Table C9. 2004 summary statistics for annual particles as $PM_{2.5}$ 21
Table D1. 2004 percentiles of daily peak 1-hour carbon monoxide concentrations ... 22
Table D2. 2004 percentiles of daily peak 1-hour nitrogen dioxide concentrations 22
Table D3. 2004 percentiles of daily peak 1-hour ozone concentrations 23
Table D4. 2004 percentiles Percentiles of daily peak 4-hour ozone concentrations ... 23
Table D5. 2004 percentiles of daily peak 1-hour sulfur dioxide concentrations 23
Table D6. 2004 percentiles of daily peak 24-hour sulfur dioxide concentrations 24
Table D7. 2004 percentiles of daily peak 24-hour particles as PM_{10} concentrations .. 24
Table D8. 2004 percentiles of daily peak 24-hour particles as PM_{10} concentrations .. 24
Table D9. Daily peak 8-hour carbon monoxide at Caversham (1995-2004) 25
Table D10. Daily peak 8-hour carbon monoxide at Duncraig (1995-2004) 25
Table D11. Daily peak 8-hour carbon monoxide at Queens Building (1995-2004) 26
Table D12. Daily peak 8-hour carbon monoxide at South Lake (1995-2004) 26
Table D13. Daily peak 1-hour nitrogen dioxide at Caversham (1995-2004) 26
Table D14. Daily peak 1-hour nitrogen dioxide at Duncraig (1995-2004) 27
Table D15. Daily peak 1-hour nitrogen dioxide at Hope Valley (1995-2004) 27
Table D16. Daily peak 1-hour nitrogen dioxide at Queens Building (1995-2004) 27
Table D17. Daily peak 1-hour nitrogen dioxide at Quinns Rocks (1995-2004) 28
Table D18. Daily peak 1-hour nitrogen dioxide at Rockingham (1995-2004) 28
Table D19. Daily peak 1-hour nitrogen dioxide at Rolling Green (1995-2004) 28
Table D20. Daily peak 1-hour nitrogen dioxide at South Lake (1995-2004) 29
Table D21. Daily peak 1-hour nitrogen dioxide at Swanbourne (1995-2004) 29
Table D22. Daily peak 1-hour ozone at Caversham (1995-2004) 29
Table D23. Daily peak 1-hour ozone at Quinns Rocks (1995-2004) 30
Table D24. Daily peak 1-hour ozone at Rockingham (1995-2004) 30
Table D25. Daily peak 1-hour ozone at Rolling Green (1995-2004) 30
Table D26. Daily peak 1-hour ozone at South Lake (1995-2004) 31
Table D27. Daily peak 1-hour ozone at Swanbourne (1995-2004) 31
Table D28. Daily peak 4-hour ozone at Caversham (1995-2004) 31
Table D29. Daily peak 4-hour ozone at Quinns Rocks (1995-2004) 32
Table D30. Daily peak 4-hour ozone at Rockingham (1995-2004) 32

Table D31. Daily peak 4-hour ozone at Rolling Green (1995-2004) 32
Table D32. Daily peak 4-hour ozone at South Lake (1995-2004)..... 33
Table D33. Daily peak 1-hour ozone at Swanbourne (1995-2004) 33
Table D34. Daily peak 1-hour sulfur dioxide at Hope Valley (1995-2004)..... 33
Table D35. Daily peak 1-hour sulfur dioxide at Rockingham (1995-2004)..... 34
Table D36. Daily peak 1-hour sulfur dioxide at South Lake (1995-2004)..... 34
Table D37. Daily peak 1-hour sulfur dioxide at Wattleup (1995-2004)..... 34
Table D38. Daily peak 24-hour sulfur dioxide at Hope Valley (1995-2004)..... 35
Table D39. Daily peak 24-hour sulfur dioxide at Rockingham (1995-2004)..... 35
Table D40. Daily peak 24-hour sulfur dioxide at South Lake (1995-2004)..... 35
Table D41. Daily peak 24-hour sulfur dioxide at Wattleup (1995-2004)..... 36
Table D42. Daily peak 24-hour particles as PM_{10} at Caversham (1995-2004) 36
Table D43. Daily peak 24-hour particles as PM_{10} at Duncraig (1995-2004) 36
Table D44. Daily peak 24-hour particles as PM_{10} at South Lake (1995-2004)..... 37
Table D45. Daily peak 24-hour particles as PM_{10} at Bunbury (1995-2004) 37
Table D46. Daily peak 24-hour particles as $PM_{2.5}$ at Caversham (1995-2004)..... 37
Table D47. Daily peak 24-hour particles as $PM_{2.5}$ at Duncraig (1995-2004)..... 38
Table D48. Daily peak 24-hour particles as $PM_{2.5}$ at Bunbury (1995-2004)..... 38
Table D49. Annual daily peak 8-hour carbon monoxide concentrations (ppm) for 1995-2004 39
Table D50. Annual daily peak 1-hour nitrogen dioxide concentrations (ppm) for 1995-2004..... 39
Table D51. Annual daily peak 1-hour ozone concentrations (ppm) for 1995-2004 40
Table D52. Annual daily peak 4-hour ozone concentrations (ppm) for 1995-2004 40
Table D53. Annual daily peak 1-hour sulfur dioxide concentrations (ppm) for 1995-2004..... 40
Table D54. Annual daily peak 24-hour sulfur dioxide concentrations (ppm) for 1995-2004..... 41
Table D55. Annual daily peak 24-hour particles as PM_{10} concentrations (ug/m^3) for 1995-2004 41
Table D56. Annual daily peak 24-hour particles as $PM_{2.5}$ concentrations (ug/m^3) for 1995-2004 41
Table D57. Annual averaged particles as $PM_{2.5}$ concentrations (ug/m^3) for 1995-2004 42
Table D58. Annual averaged lead concentrations (ug/m^3) for 1995-2004 42

SECTION A – MONITORING SUMMARY

Current Monitoring Stations

The Department of Environment (DoE) 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. The Bunbury station was established in the southwest of the state to monitor fuel reduction burns. 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.

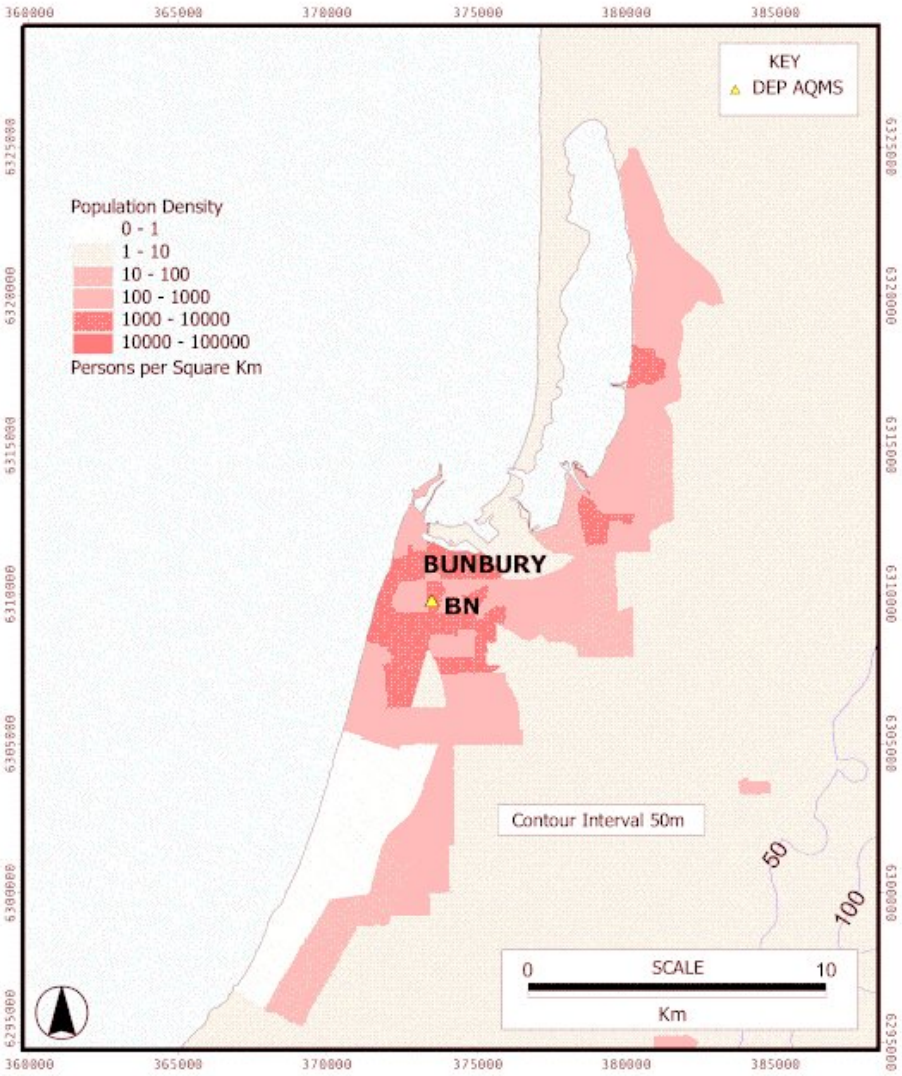


Figure A2 - DoE air quality monitoring stations which are currently operating in Bunbury

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 present	02/97 to present
CA Caversham	08/93 to present	11/89 to present	09/90 to present			05/93 to present	01/04 to present	03/94 to 01/04	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 07/03
WT Wattleup				01/88 to present					

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

The orange font indicates those pollutants that are fully reported in the 2004 Western Australia Air Monitoring Report (Supplementary) (Technical Report 123) and are not the subject of this report.

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			P
DU - Duncraig	P/T		DoE			T
HV – Hope Valley			DoE	DoE		
QB - Queens Building	P		DoE		$P^{(1)}$	DoE
QR - Quinns Rock		DoE	DoE			
RG - Rolling Green		DoE	DoE			
RO - Rockingham		DoE	DoE	DoE		
SL - South Lake	P	P	P	T		P
SW - Swanbourne		P	P			DoE
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 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.
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 pooling in the depression is likely to lead to elevated concentrations. This feature would be found in many other places across the coastal plain.

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

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

The 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.

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 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.

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 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 home fire 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 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. 2004 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 exceedances (days)	Performance against the standards and goal
	Q1	Q2	Q3	Q4	Annual		
Perth Region							
Caversham (North East Metro)	97.6	88.3	99.0	99.8	96.2	0	met
Duncraig (North Metro)	99.2	99.1	98.4	99.7	99.1	0	met
Queens Building (CBD)	99.4	99.6	99.5	99.6	99.5	0	met
South Lake (South East Metro)	99.5	99.4	99.5	99.5	99.5	0	met

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

Table B2. 2004 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	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)	97.6	99.3	99	99.8	98.9	0.006	0	met	met
Duncraig (North Metro)	81.2	99.2	98.4	99.2	94.5	0.008	0	met	met
Hope Valley (South Metro)	99.7	99.7	99.4	99.5	99.6	0.005	0	met	met
Queens Building (CBD)	99.5	99.7	99.5	99.5	99.5	0.015	0	met	met
Quinns Rocks (Outer North Coast)	99.4	93.5	87.2	83.2	90.8	0.003	0	met	met
Rockingham (South Coast)	99.5	99.5	99.5	99.3	99.4	0.006	0	met	met
Rolling Green (Outer East Rural)	96.4	87.4	98.8	99.8	95.6	0.002	0	met	met
South Lake (South East Metro)	99.6	99.5	95.2	99.6	98.4	0.007	0	met	met
Swanbourne (Inner West Coast)	98.9	99.5	12.0	70.8	70.2	0.005	0	not demonstrated	not demonstrated

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

Table B3. 2004 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 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)	97.5	99.3	99.0	99.8	98.9	0	0	met	met
Quinns Rocks (Outer North Coast)	99.4	93.5	99.2	99.7	97.9	0	0	met	met
Rockingham (South Coast)	99.5	99.5	99.5	98.1	99.1	1	0	met	met
Rolling Green (Outer East Rural)	96.4	96.5	98.8	99.8	97.9	1	0	met	met
South Lake (South East Metro)	99.5	99.5	99.5	97.6	99.0	0	0	met	met
Swanbourne (Inner West Coast)	98.9	99.5	99.6	99.6	99.4	0	0	met	met

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

Table B4. 2004 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 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	99.7	99.4	99.5	99.6	0.001	0	0	met	met	met
Rockingham (South Coast)	99.5	99.5	99.5	99.0	99.4	0.001	0	0	met	met	met
South Lake (South East Metro)	99.5	99.4	99.5	99.6	99.5	0.001	0	0	met	met	met
Wattleup (South Metro)	99.1	99.7	92.7	99.4	97.7	0.001	0	0	met	met	met

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

Table B5. 2004 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 exceedances (Days)	Performance against the standards and goal
	Q1	Q2	Q3	Q4	Annual		
Perth Region							
Caversham (North East Metro)	74.8	98.9	99.5	99.6	93.2	1	not demonstrated
Duncraig (North Metro)	97.9	99.3	99.3	99.6	99.0	0	met
South Lake (South East Metro)	97.0	99.6	99.4	99.2	98.8	1	met
Bunbury Region							
Bunbury (South West Region)	94.6	93.7	92.1	89.3	92.4	4	met

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

Table B6. 2004 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 exceedances (Days)	Performance against the standards and goal
	Q1	Q2	Q3	Q4	Annual		
Perth Region							
Caversham (North East Metro)	21.2	0	0	0	5.3	0	N/A
Duncraig (North Metro)	98.7	99.1	99.2	99.7	99.2	0	N/A
Bunbury Region	94.2	98.7	99.5	99.5	98	5	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 2004. 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. 2004 summary statistics for daily peak 8-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)	96.2	1.3	29/05/2004	0300	1.2	30/05/2004	0300
Duncraig (North Metro)	99.1	4.5	29/05/2004	0600	3.6	28/05/2004	0500
Queens Building (CBD)	99.5	2.8	28/07/2004	2300	2.4	18/05/2004	2400
South Lake (South East Metro)	99.5	3.5	29/05/2004	0300	2.4	30/05/2004	0200

Nitrogen Dioxide

The NEPM standard for nitrogen dioxide of 0.12 ppm averaged over 1 hour and the 0.03 ppm annual average were not exceeded at any site during 2004. 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. 2004 summary statistics for daily peak 1-hour nitrogen dioxide

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)	98.9	0.046	07/04/2004	1900	0.042	16/04/2004	2000
Duncraig (North Metro)	94.5	0.043	16/04/2004	2000	0.042	22/11/2004	2100
Hope Valley (South Metro)	99.6	0.034	27/04/2004	1800	0.034	23/03/2004	0700
Queens Building (CBD)	99.5	0.075	02/04/2004	1600	0.073	24/02/2004	1800
Quinns Rocks (Outer North Coast)	90.8	0.041	16/04/2004	2000	0.032	03/05/2004	2000
Rockingham (South Coast)	99.4	0.055	16/04/2004	2000	0.045	21/03/2004	2100
Rolling Green (Outer East Rural)	95.6	0.025	25/05/2004	1900	0.024	16/04/2004	2000
South Lake (South East Metro)	98.4	0.043	13/03/2004	1700	0.042	07/04/2004	1700
Swanbourne (Inner West Coast)	70.2	0.042	29/05/2004	2100	0.042	14/05/2004	2000

Photochemical Smog as Ozone

The NEPM standard for ozone of 0.10 ppm averaged over 1 hour was exceeded once at each of two sites during 2004. Attachments 1 and 2 contain descriptions of the circumstances which lead to the exceedances. 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. 2004 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)	98.9	0.079	12/02/2004	1400	0.078	07/02/2004	1400
Quinns Rocks (Outer North Coast)	97.9	0.079	10/01/2004	1500	0.073	11/01/2004	1800
Rockingham (South Coast)	99.1	0.102	18/02/2004	1400	0.076	22/03/2004	1600
Rolling Green (Outer East Rural)	97.9	0.101	12/02/2004	1700	0.084	04/02/2004	1300
South Lake (South East Metro)	99.0	0.076	09/12/2004	1400	0.072	18/02/2004	1200
Swanbourne (Inner West Coast)	99.4	0.077	21/03/2004	1700	0.070	18/02/2004	1400

The NEPM standard for ozone of 0.08 ppm averaged over 4 hours was not exceeded at any site during 2004. 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. 2004 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)	98.9	0.067	12/02/2004	1700	0.064	07/02/2004	1600
Quinns Rocks (Outer North Coast)	97.9	0.068	11/01/2004	1900	0.066	10/01/2004	1700
Rockingham (South Coast)	99.1	0.079	18/02/2004	1600	0.066	21/03/2004	1700
Rolling Green (Outer East Rural)	97.9	0.077	12/02/2004	2000	0.077	04/02/2004	1500
South Lake (South East Metro)	99.0	0.064	18/02/2004	1500	0.060	09/12/2004	1500
Swanbourne (Inner West Coast)	99.4	0.067	21/03/2004	1800	0.065	18/02/2004	1600

Sulfur Dioxide

The NEPM standard for sulfur dioxide of 0.20 ppm averaged over 1 hour was not exceeded at any site during 2004. The NEPM goal of no more than 1 exceedance at each site was met. Table C5 contains the summary statistics for daily peak 1-hour SO_2 in Western Australia.

Table C5. 2004 summary statistics for daily peak 1-hour sulfur dioxide

AAQ NEPM Standard
0.20 ppm (1-hour average)

Regional Performance Monitoring Station	Data Recovery Rates (%)	Highest (ppm)	Highest (date)	Highest (time)	2nd Highest (ppm)	2nd Highest (date)	2nd Highest (time)
Perth Region							
Hope Valley (South Metro)	99.6	0.061	09/12/2004	1600	0.057	20/09/2004	1400
Rockingham (South Coast)	99.4	0.039	16/06/2004	0100	0.034	15/06/2004	1100
South Lake (South East Metro)	99.5	0.042	18/03/2004	1600	0.034	07/04/2004	1600
Wattleup (South Metro)	97.7	0.076	27/10/2004	1200	0.050	18/03/2004	1300

The NEPM standard for sulfur dioxide of 0.08 ppm averaged over 24 hours was not exceeded at any site during 2004. The NEPM goal of no more than 1 exceedance at each site was met. Table C6 contains the summary statistics for daily peak 24-hour SO_2 in Western Australia.

Table C6. 2004 summary statistics for 24-hour sulfur dioxide

AAQ NEPM Standard
0.08 ppm (24-hour average)

Regional Performance Monitoring Station	Data Recovery Rates (%)	Highest (ppm)	Highest (date)	Highest (time)	2nd Highest (ppm)	2nd Highest (date)	2nd Highest (time)
Perth Region							
Hope Valley (South Metro)	99.6	0.009	12/08/2004	2400	0.007	10/12/2004	2400
Rockingham (South Coast)	99.4	0.006	16/06/2004	2400	0.004	11/08/2004	2400
South Lake (South East Metro)	99.5	0.005	04/02/2004	2400	0.005	26/02/2004	2400
Wattleup (South Metro)	97.7	0.009	25/02/2004	2400	0.008	23/01/2004	2400

Particles as PM_{10}

The NEPM standard for particles as PM_{10} of 50 µg/m^3 averaged over 24 hours was exceeded during 2004 once at Caversham (58.0 µg/m^3 on 14/12/2004), once at South Lake (50.5 µg/m^3 on 20/12/2004) and 4 times at Bunbury (53.6 µg/m^3 on 18/04/2004, 99.5 µg/m^3 on 17/04/2004, 60.1 µg/m^3 on 28/04/2004 and 56.5 µg/m^3 on 29/04/2004). Attachments 3, 4, 5, 7 and 8 contain descriptions of the circumstances that led to each exceedance. The NEPM goal of no more than 5 exceedance at each site was met. Table C7 contains the summary statistics for daily peak 24-hour PM_{10} in Western Australia.

Table C7. 2004 summary statistics for 24-hour particles as PM_{10}

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 [2] (North East Metro)	93.2	58.0	14/12/2004	2400	37.8	08/04/2004	2400
Duncraig [2] (North Metro)	99.0	45.1	20/12/2004	2400	30.3	12/01/2004	2400
Queens Buildings [1] (CBD)	100	40	06/10/2004	2400	30	18/09/2004	2400
South Lake [2] (South East Metro)	98.8	50.5	20/12/2004	2400	34.6	14/12/2004	2400
Swanbourne [1] (Inner West Coast)	100	41	25/08/2004	2400	25	23/11/2004	2400
Bunbury Region							
Bunbury [2](South West Region)	92.4	99.5	17/04/2004	2400	39.3	10/12/2004	2400

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

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 during 2004 five times at Bunbury (31.4 ug/m^3 on 08/04/2004, 94.8 ug/m^3 on 17/04/2004, 47.9 µg/m^3 on 28/04/2004, 48.2 µg/m^3 on 29/04/2004 and 32.0 µg/m^3 on 05/05/2004). Attachments 3, 4, 5 and 6 contain descriptions of the circumstances that led to the exceedances. Table C8 contains the summary statistics for daily peak 24-hour $PM_{2.5}$ in Western Australia.

Table C8. 2004 summary statistics for 24-hour particles as $PM_{2.5}$

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[1] (North East Metro)	5.3	16.5	03/01/2004	2400	9.0	02/01/2004	2400
Duncraig [1] (North Metro)	99.2	24.4	20/12/2004	2400	17.0	16/08/2004	2400
Bunbury Region							
Bunbury[1] (South West Region)	98.0	94.8	17/04/2004	2400	22.9	20/12/2004	2400

1 - Tapered Element Oscillating Microbalance (TEOM) operating continuously (unadjusted)

The NEPM advisory standard for particles as $PM_{2.5}$ of 8 micrograms per cubic metre averaged over one year was exceeded during 2004 at Bunbury (9.2 µg/m^3).

Table C9. 2004 summary statistics for annual particles as $PM_{2.5}$

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[1] (North East Metro)	5.3	7.7
Duncraig [1] (North Metro)	99.2	7.9
Bunbury Region		
Bunbury[1] (South West Region)	98.0	9.2

1 - Tapered Element Oscillating Microbalance (TEOM) operating continuously (unadjusted)

SECTION D – DATA ANALYSIS

Maxima and Percentiles by Pollutant in 2004

Table D1. 2004 percentiles of daily peak 1-hour carbon monoxide concentrations

Regional Performance Monitoring Station	Data availability rates (%)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)	75th percentile (ppm)	50th percentile (ppm)
Perth Region								
Caversham (North East Metro)	96.2	1.3	0.9	0.9	0.7	0.5	0.3	0.2
Duncraig (North Metro)	99.1	4.5	3.2	2.7	2.1	1.2	0.6	0.3
Queens Building (CBD)	99.5	2.8	2.1	2.0	1.7	1.6	1.3	1.0
South Lake (South East Metro)	99.5	3.5	2.3	2.1	1.5	1.0	0.5	0.3

Table D2. 2004 percentiles of daily peak 1-hour nitrogen dioxide concentrations

Regional Performance Monitoring Station	Data availability rates (%)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)	75th percentile (ppm)	50th percentile (ppm)
Perth Region								
Caversham (North East Metro)	98.9	0.046	0.036	0.033	0.029	0.028	0.023	0.018
Duncraig (North Metro)	94.5	0.043	0.037	0.035	0.031	0.029	0.025	0.021
Hope Valley (South Metro)	99.6	0.034	0.032	0.028	0.024	0.021	0.018	0.012
Queens Building (CBD)	99.5	0.075	0.070	0.064	0.058	0.050	0.041	0.028
Quinns Rocks (Outer North Coast)	90.8	0.041	0.032	0.030	0.028	0.025	0.019	0.012
Rockingham (South Coast)	99.4	0.055	0.043	0.039	0.035	0.031	0.026	0.018
Rolling Green (Outer East Rural)	95.6	0.025	0.023	0.021	0.018	0.016	0.012	0.008
South Lake (South East Metro)	98.4	0.043	0.038	0.036	0.032	0.029	0.024	0.019
Swanbourne (Inner West Coast)	70.2	0.042	0.039	0.035	0.032	0.028	0.022	0.015

Table D3. 2004 percentiles of daily peak 1-hour ozone concentrations

Regional Performance Monitoring Station	Data availability rates (%)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)	75th percentile (ppm)	50th percentile (ppm)
Perth Region								
Caversham (North East Metro)	98.9	0.079	0.070	0.062	0.052	0.045	0.034	0.029
Quinns Rocks (Outer North Coast)	97.9	0.079	0.064	0.060	0.056	0.046	0.037	0.032
Rockingham (South Coast)	99.1	0.102	0.067	0.059	0.048	0.040	0.033	0.030
Rolling Green (Outer East Rural)	97.9	0.101	0.076	0.071	0.060	0.049	0.036	0.031
South Lake (South East Metro)	99.0	0.076	0.061	0.057	0.047	0.041	0.033	0.029
Swanbourne (Inner West Coast)	99.4	0.077	0.065	0.059	0.049	0.042	0.034	0.030

Table D4. 2004 percentiles Percentiles of daily peak 4-hour ozone concentrations

Regional Performance Monitoring Station	Data availability rates (%)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)	75th percentile (ppm)	50th percentile (ppm)
Perth Region								
Caversham (North East Metro)	98.9	0.067	0.057	0.052	0.047	0.040	0.032	0.028
Quinns Rocks (Outer North Coast)	97.9	0.068	0.059	0.055	0.048	0.041	0.035	0.031
Rockingham (South Coast)	99.1	0.079	0.060	0.052	0.045	0.038	0.032	0.029
Rolling Green (Outer East Rural)	97.9	0.077	0.064	0.061	0.051	0.042	0.034	0.030
South Lake (South East Metro)	99.0	0.064	0.053	0.049	0.042	0.035	0.031	0.027
Swanbourne (Inner West Coast)	99.4	0.067	0.057	0.054	0.044	0.038	0.032	0.029

Table D5. 2004 percentiles of daily peak 1-hour sulfur dioxide concentrations

Regional Performance Monitoring Station	Data availability rates (%)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)	75th percentile (ppm)	50th percentile (ppm)
Perth Region								
Hope Valley (South Metro)	99.6	0.061	0.045	0.040	0.031	0.022	0.012	0.004
Rockingham (South Coast)	99.4	0.039	0.021	0.018	0.011	0.006	0.003	0.001
South Lake (South East Metro)	99.5	0.042	0.028	0.024	0.019	0.013	0.007	0.002
Wattleup (South Metro)	97.7	0.076	0.044	0.041	0.030	0.021	0.013	0.005

Table D6. 2004 percentiles of daily peak 24-hour sulfur dioxide concentrations

Regional Performance Monitoring Station	Data availability rates (%)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)	75th percentile (ppm)	50th percentile (ppm)
Perth Region								
Hope Valley (South Metro)	99.6	0.009	0.006	0.006	0.004	0.003	0.002	0.001
Rockingham (South Coast)	99.4	0.006	0.003	0.003	0.002	0.001	0.001	0.000
South Lake (South East Metro)	99.5	0.005	0.004	0.004	0.003	0.002	0.001	0.001
Wattleup (South Metro)	97.7	0.009	0.007	0.005	0.004	0.003	0.002	0.001

Table D7. 2004 percentiles of daily peak 24-hour particles as PM_{10} concentrations

Regional Performance Monitoring Station	Data availability rates (%)	Max conc. ($\mu g/m^3$)	99th percentile ($\mu g/m^3$)	98th percentile ($\mu g/m^3$)	95th percentile ($\mu g/m^3$)	90th percentile ($\mu g/m^3$)	75th percentile ($\mu g/m^3$)	50th percentile ($\mu g/m^3$)
Perth Region								
Caversham (North East Metro)	93.2	58.0	39.0	34.4	29.7	25.4	20.9	16.1
Duncraig (North Metro)	99.0	45.1	30.9	30.2	27.6	24.1	19.6	15.9
South Lake (South East Metro)	98.8	50.5	35.8	32.8	30.2	26.2	22.1	17.6
Bunbury (South West Region)	92.4	99.5	51.8	38.2	29.9	26.3	21.5	17.2

Table D8. 2004 percentiles of daily peak 24-hour particles as PM_{10} concentrations

Regional Performance Monitoring Station	Data availability rates (%)	Max conc. ($\mu g/m^3$)	99th percentile ($\mu g/m^3$)	98th percentile ($\mu g/m^3$)	95th percentile ($\mu g/m^3$)	90th percentile ($\mu g/m^3$)	75th percentile ($\mu g/m^3$)	50th percentile ($\mu g/m^3$)
Perth Region								
Caversham (North East Metro)	5.3	16.5	15.7	14.9	12.6	10.4	9.0	6.6
Duncraig (North Metro)	99.2	24.4	17.9	15.6	14.1	11.6	9.3	7.4
Bunbury (South West Region)	98.0	94.8	31.7	21.5	15.8	13.2	9.9	7.9

Maxima and Percentiles by Site 1995 to 2004

Table D9. Daily peak 8-hour carbon monoxide at Caversham (1995-2004)
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)
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
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

Table D10. Daily peak 8-hour carbon monoxide at Duncraig (1995-2004)
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)
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
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

Table D11. Daily peak 8-hour carbon monoxide at Queens Building (1995-2004)
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)
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
2003	95.9	0	2.8	2.2	2.2	2.0	1.8
2004	99.5	0	2.8	2.1	2.0	1.7	1.6

Table D12. Daily peak 8-hour carbon monoxide at South Lake (1995-2004)
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)
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
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

Table D13. Daily peak 1-hour nitrogen dioxide at Caversham (1995-2004)
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)
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
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

Table D14. Daily peak 1-hour nitrogen dioxide at Duncraig (1995-2004)
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)
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
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

Table D15. Daily peak 1-hour nitrogen dioxide at Hope Valley (1995-2004)
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)
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
2003	94.6	0	0.039	0.034	0.028	0.024	0.021
2004	99.6	0	0.034	0.032	0.028	0.024	0.021

Table D16. Daily peak 1-hour nitrogen dioxide at Queens Building (1995-2004)
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)
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
2003	95.9	1	0.121	0.075	0.067	0.058	0.055
2004	99.5	0	0.075	0.070	0.064	0.058	0.050

Table D17. Daily peak 1-hour nitrogen dioxide at Quinns Rocks (1995-2004)
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)
1995	60.9	0	0.036	0.028	0.027	0.024	0.021
1996	94.8	0	0.036	0.029	0.028	0.023	0.020
1997	99.5	0	0.039	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
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

Table D18. Daily peak 1-hour nitrogen dioxide at Rockingham (1995-2004)
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)
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
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

Table D19. Daily peak 1-hour nitrogen dioxide at Rolling Green (1995-2004)
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)
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
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

Table D20. Daily peak 1-hour nitrogen dioxide at South Lake (1995-2004)
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)
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
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

Table D21. Daily peak 1-hour nitrogen dioxide at Swanbourne (1995-2004)
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)
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
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

Table D22. Daily peak 1-hour ozone at Caversham (1995-2004)
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)
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
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

Table D23. Daily peak 1-hour ozone at Quinns Rocks (1995-2004)

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)
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
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

Table D24. Daily peak 1-hour ozone at Rockingham (1995-2004)

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)
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
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

Table D25. Daily peak 1-hour ozone at Rolling Green (1995-2004)

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)
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
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

Table D26. Daily peak 1-hour ozone at South Lake (1995-2004)

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)
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
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

Table D27. Daily peak 1-hour ozone at Swanbourne (1995-2004)

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)
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	0.074	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

Table D28. Daily peak 4-hour ozone at Caversham (1995-2004)

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)
1995	96.8	1	0.083	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
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

Table D29. Daily peak 4-hour ozone at Quinns Rocks (1995-2004)

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)
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
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

Table D30. Daily peak 4-hour ozone at Rockingham (1995-2004)

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)
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
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

Table D31. Daily peak 4-hour ozone at Rolling Green (1995-2004)

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)
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
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

Table D32. Daily peak 4-hour ozone at South Lake (1995-2004)

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)
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
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

Table D33. Daily peak 1-hour ozone at Swanbourne (1995-2004)

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)
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
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

Table D34. Daily peak 1-hour sulfur dioxide at Hope Valley (1995-2004)

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)
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
2003	94.1	0	0.060	0.041	0.031	0.024	0.017
2004	99.6	0	0.061	0.045	0.040	0.031	0.022

Table D35. Daily peak 1-hour sulfur dioxide at Rockingham (1995-2004)
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)
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
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

Table D36. Daily peak 1-hour sulfur dioxide at South Lake (1995-2004)
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)
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
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

Table D37. Daily peak 1-hour sulfur dioxide at Wattleup (1995-2004)
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)
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	0.039	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
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

Table D38. Daily peak 24-hour sulfur dioxide at Hope Valley (1995-2004)
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)
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
2003	94.1	0	0.006	0.005	0.004	0.003	0.002
2004	99.6	0	0.009	0.006	0.006	0.004	0.003

Table D39. Daily peak 24-hour sulfur dioxide at Rockingham (1995-2004)
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)
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
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

Table D40. Daily peak 24-hour sulfur dioxide at South Lake (1995-2004)
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)
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
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

Table D41. Daily peak 24-hour sulfur dioxide at Wattleup (1995-2004)
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)
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
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

Table D42. Daily peak 24-hour particles as PM_{10} at Caversham (1995-2004)
Trend station/region: Caversham AAQ NEPM Standard 50 ug/m3 (24-hour average)

Year	Data Recovery (%)	No. of exceedances (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 ($\mu g/m^3$)
1995	0.0	0	-	-	-	-	-
1996	0.0	0	-	-	-	-	-
1997	0.0	0	-	-	-	-	-
1998	0.0	0	-	-	-	-	-
1999	0.0	0	-	-	-	-	-
2000	0.0	0	-	-	-	-	-
2001	0.0	0	-	-	-	-	-
2002	0.0	0	-	-	-	-	-
2003	0.0	0	-	-	-	-	-
2004	93.2	1	58.0	39.0	34.4	29.7	25.4

Table D43. Daily peak 24-hour particles as PM_{10} at Duncraig (1995-2004)
Trend station/region: Duncraig AAQ NEPM Standard 50 ug/m3 (24-hour average)

Year	Data Recovery (%)	No. of exceedances (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 ($\mu g/m^3$)
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
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

Table D44. Daily peak 24-hour particles as PM_{10} at South Lake (1995-2004)
Trend station/region: South Lake — AAQ NEPM Standard 50 ug/m3 (24-hour average)

Year	Data Recovery (%)	No. of exceedances (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 ($\mu g/m^3$)
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
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

Table D45. Daily peak 24-hour particles as PM_{10} at Bunbury (1995-2004)
Trend station/region: Bunbury — AAQ NEPM Standard 50 ug/m3 (24-hour average)

Year	Data Recovery (%)	No. of exceedances (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 ($\mu g/m^3$)
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
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

Table D46. Daily peak 24-hour particles as $PM_{2.5}$ at Caversham (1995-2004)
Trend station/region: Caversham — AAQ NEPM Advisory Standard 25 ug/m3 (24-hour average)

Year	Data Recovery (%)	No. of exceedances (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 ($\mu g/m^3$)
1995	95.3	0	21.4	16.3	15.6	13.4	12.2
1996	98.1	1	37.6	19.7	17.2	13.9	12.0
1997	92.1	1	28.1	22.1	18.0	14.2	12.5
1998	97.6	0	21.2	16.5	14.9	12.8	10.9
1999	98.2	0	20.3	14.3	13.6	12.4	10.9
2000	93.7	0	20.1	16.5	14.8	11.9	10.5
2001	97.2	1	31.8	15.9	15.1	12.9	11.3
2002	99.6	1	25.7	16.2	15.0	13.4	12.0
2003	98.6	1	27.3	16.3	14.4	13.4	11.6
2004	5.3	0	16.5	15.7	14.9	12.6	10.4

Table D47. Daily peak 24-hour particles as $PM_{2.5}$ at Duncraig (1995-2004)

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

Year	Data Recovery (%)	No. of exceedances (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 ($\mu g/m^3$)
1995	97.7	8	39.7	28.7	25.3	20.4	13.1
1996	98.3	4	30.1	24.8	22.2	17.6	14.2
1997	86.1	15	44.2	39.2	35.6	24.0	18.2
1998	98.2	3	31.8	23.9	21.2	17.1	15.2
1999	96.9	2	26.3	21.3	17.3	14.5	12.4
2000	79.2	0	22.2	17.1	15.0	13.4	11.5
2001	93.8	4	27.0	25.5	22.6	16.1	13.4
2002	98.9	1	28.3	20.3	17.4	15.7	13.3
2003	98.4	1	25.2	19.2	16.1	14.9	13.1
2004	99.2	0	24.4	17.9	15.6	14.1	11.6

Table D48. Daily peak 24-hour particles as $PM_{2.5}$ at Bunbury (1995-2004)

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

Year	Data Recovery (%)	No. of exceedances (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 ($\mu g/m^3$)
1995	0.0	0	-	-	-	-	-
1996	0.0	0	-	-	-	-	-
1997	78.9	5	35.4	26.4	24.3	20.7	17.1
1998	99.5	3	33.2	22.8	20.0	16.1	13.6
1999	88.9	1	30.0	21.7	18.4	15.0	12.9
2000	99.6	3	29.2	23.3	20.4	16.0	13.7
2001	92.7	2	47.3	19.6	17.4	15.4	13.1
2002	99.5	4	36.1	24.5	20.2	15.7	14.0
2003	98.9	3	37.6	20.7	18.3	15.7	13.1
2004	98.0	5	94.8	31.7	21.5	15.8	13.2

Maxima by Pollutant 1995 to 2004

Table D49. Annual daily peak 8-hour carbon monoxide concentrations (ppm) for 1995-2004

AAQ NEPM Standard
9.0 ppm (8-hour average)

Regional Performance Monitoring Station	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Perth Region										
Caversham (North East Metro)	2.2	2.7	2.3	1.7	1.6	1.4	1.5	1.3	1.1	1.3
Duncraig (North Metro)	5.2	7.2	6.8	6.1	6.6	4.8	5.9	5.4	4.1	4.5
Queens Building (CBD)	8.5	7.2	5.6	6.1	5.0	4.3	4.8	4.7	2.8	2.8
South Lake (South East Metro)	-	-	-	-	-	3.6	4.0	3.2	3.1	3.5

Highlighted cells indicate NEPM exceedances.

Table D50. Annual daily peak 1-hour nitrogen dioxide concentrations (ppm) for 1995-2004

AAQ NEPM Standard
0.12 ppm (1-hour average)

Regional Performance Monitoring Station	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Perth Region										
Caversham (North East Metro)	0.047	0.045	0.051	0.051	0.038	0.044	0.045	0.055	0.043	0.046
Duncraig (North Metro)	0.038	0.043	0.046	0.065	0.049	0.050	0.041	0.049	0.057	0.043
Hope Valley (South Metro)	0.033	0.045	0.033	0.044	0.032	0.033	0.033	0.039	0.039	0.034
Queens Building (CBD)	0.084	0.093	0.098	0.093	0.073	0.073	0.082	0.091	0.121	0.075
Quinns Rocks (Outer North Coast)	0.036	0.036	0.039	0.041	0.034	0.045	0.036	0.037	0.035	0.041
Rockingham (South Coast)	0.020	0.041	0.033	0.043	0.030	0.048	0.046	0.042	0.051	0.055
Rolling Green (Outer East Rural)	0.035	0.022	0.035	0.029	0.024	0.027	0.026	0.025	0.032	0.025
South Lake (South East Metro)	-	-	-	-	-	0.041	0.039	0.048	0.048	0.043
Swanbourne (Inner West Coast)	0.038	0.046	0.040	0.051	0.037	0.045	0.037	0.051	0.048	0.042

Highlighted cells indicate NEPM exceedances.

Table D51. Annual daily peak 1-hour ozone concentrations (ppm) for 1995-2004

AAQ NEPM Standard
0.10 ppm (1-hour average)

Regional Performance Monitoring Station	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Perth Region										
Caversham (North East Metro)	0.093	0.114	0.100	0.112	0.101	0.084	0.099	0.091	0.083	0.079
Quinns Rocks (Outer North Coast)	0.089	0.084	0.106	0.080	0.105	0.078	0.073	0.079	0.086	0.079
Rockingham (South Coast)	0.043	0.091	0.078	0.082	0.076	0.083	0.076	0.079	0.064	0.102
Rolling Green (Outer East Rural)	0.088	0.104	0.134	0.109	0.096	0.092	0.097	0.091	0.087	0.101
South Lake (South East Metro)	-	-	-	-	-	0.077	0.079	0.067	0.071	0.076
Swanbourne (Inner West Coast)	0.098	0.089	0.109	0.081	0.088	0.079	0.074	0.081	0.082	0.077

Highlighted cells indicate NEPM exceedances.

Table D52. Annual daily peak 4-hour ozone concentrations (ppm) for 1995-2004

AAQ NEPM Standard
0.08 ppm (4-hour average)

Regional Performance Monitoring Station	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Perth Region										
Caversham (North East Metro)	0.083	0.090	0.084	0.087	0.080	0.058	0.079	0.068	0.069	0.067
Quinns Rocks (Outer North Coast)	0.078	0.075	0.100	0.077	0.083	0.072	0.066	0.069	0.071	0.068
Rockingham (South Coast)	0.039	0.085	0.069	0.074	0.067	0.078	0.071	0.071	0.059	0.079
Rolling Green (Outer East Rural)	0.080	0.085	0.124	0.095	0.077	0.075	0.094	0.071	0.075	0.077
South Lake (South East Metro)	-	-	-	-	-	0.067	0.076	0.058	0.063	0.064
Swanbourne (Inner West Coast)	0.082	0.081	0.104	0.078	0.074	0.073	0.069	0.066	0.066	0.067

Highlighted cells indicate NEPM exceedances.

Table D53. Annual daily peak 1-hour sulfur dioxide concentrations (ppm) for 1995-2004

AAQ NEPM Standard
0.20 ppm (1-hour average)

Regional Performance Monitoring Station	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Perth Region										
Hope Valley (South Metro)	0.076	0.076	0.047	0.061	0.064	0.079	0.044	0.058	0.060	0.061
Rockingham (South Coast)	0.017	0.057	0.039	0.047	0.047	0.034	0.028	0.035	0.026	0.039
South Lake (South East Metro)	-	-	-	-	-	0.042	0.046	0.043	0.038	0.042
Wattleup (South Metro)	0.090	0.082	0.065	0.061	0.060	0.046	0.074	0.081	0.062	0.076

Highlighted cells indicate NEPM exceedances.

Table D54. Annual daily peak 24-hour sulfur dioxide concentrations (ppm) for 1995-2004

AAQ NEPM Standard
0.08 ppm (24-hour average)

Regional Performance Monitoring Station	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Perth Region										
Hope Valley (South Metro)	0.011	0.008	0.005	0.008	0.007	0.007	0.004	0.007	0.006	0.009
Rockingham (South Coast)	0.002	0.022	0.014	0.009	0.016	0.012	0.009	0.006	0.005	0.006
South Lake (South East Metro)	-	-	-	-	-	0.004	0.006	0.006	0.006	0.005
Wattleup (South Metro)	0.012	0.011	0.010	0.008	0.007	0.006	0.009	0.008	0.006	0.009

Highlighted cells indicate NEPM exceedances.

Table D55. Annual daily peak 24-hour particles as PM_{10} concentrations (ug/m^3) for 1995-2004

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

Regional Performance Monitoring Station	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Perth Region										
Caversham (North East Metro)	-	-	-	-	-	-	-	-	-	58.0
Duncraig (North Metro)	-	37.7	56.2	68.9	35.2	29.8	53.6	54.0	66.7	45.1
South Lake (South East Metro)	-	-	-	-	-	39.6	56.7	82.6	44.5	50.5
Bunbury Region										
Bunbury (South West Region)	-	-	-	-	40.0	42.4	57.6	42.5	54.5	99.5

Highlighted cells indicate NEPM exceedances.

Table D56. Annual daily peak 24-hour particles as $PM_{2.5}$ concentrations (ug/m^3) for 1995-2004

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

Regional Performance Monitoring Station	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Perth Region										
Caversham (North East Metro)	21.4	37.6	28.1	21.2	20.3	20.1	31.8	25.7	27.3	16.5
Duncraig (North Metro)	39.7	30.1	44.2	31.8	26.3	22.2	27.0	28.3	25.2	24.4
Bunbury Region										
Bunbury (South West Region)	-	-	35.4	33.2	30.0	29.2	47.3	36.1	37.6	94.8

Highlighted cells indicate NEPM exceedances.

Table D57. Annual averaged particles as $PM_{2.5}$ concentrations (ug/m^3) for 1995-2004

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

Regional Performance Monitoring Station	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Perth Region										
Caversham (North East Metro)	7.5	7.7	7.6	7.0	7.1	7.3	7.7	8.3	8.2	7.7
Duncraig (North Metro)	7.6	9.7	12.3	10.4	8.6	8.0	8.6	9.2	8.9	7.9
Bunbury Region										
Bunbury (South West Region)	-	-	10.5	9.2	9.3	9.3	8.7	9.0	8.6	9.2

Highlighted cells indicate NEPM exceedances.

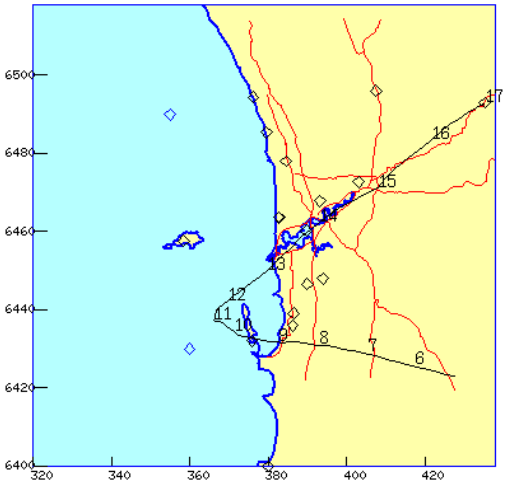
Table D58. Annual averaged lead concentrations (ug/m^3) for 1995-2004

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

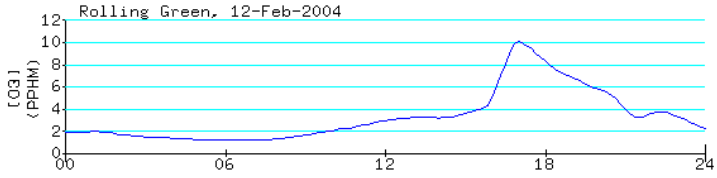
Regional Performance Monitoring Station	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Perth Region										
Queens Building (CBD)	0.28	0.18	0.13	0.10	0.08	0.03	0.02	-	-	-

Monitoring for lead ceased at the end of 2001.

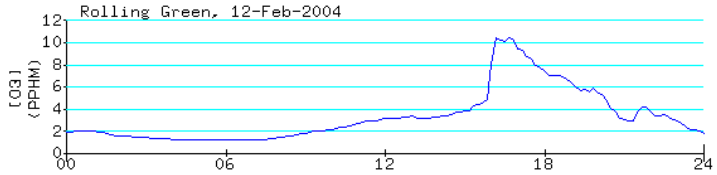
Attachment 1 – O_3 Exceedance on 12th February 2004



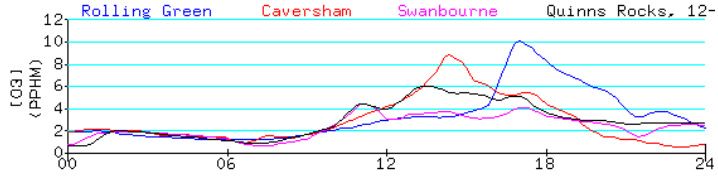
1 hour averaged



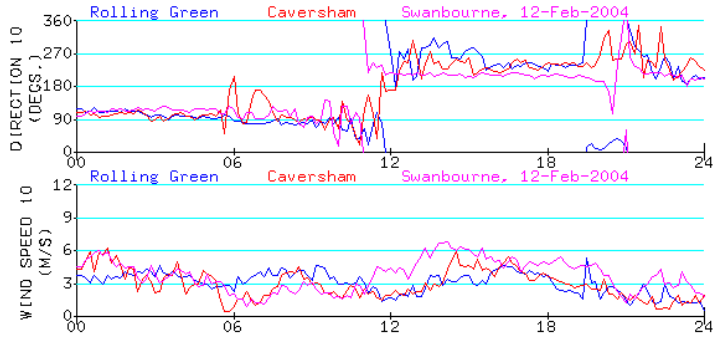
10-minute averaged



1-hour averaged



Wind data



Pollutant
Ozone

Monitoring Site
Rolling Green

Highest Concentration
0.101 ppm

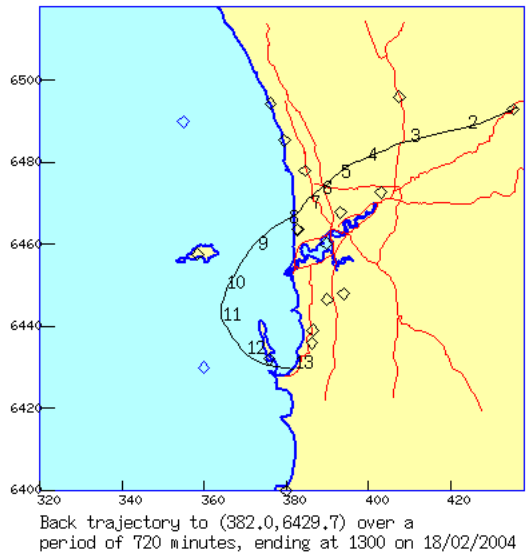
Averaging Period
1 hour

NEPM Standard
0.10 ppm

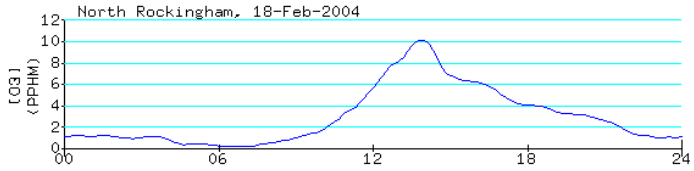
Description of Event
Morning winds were from east south-east. Morning emissions from the southern metropolitan area were still on the land side of the sea breeze when it developed at about 11am. These emissions were subsequently returned to shore on a south westerly flow, combining with Perth CBD emissions, resulting in elevated inland ozone concentrations.

The 4-hour average at Rolling Green reached 0.076 ppm.

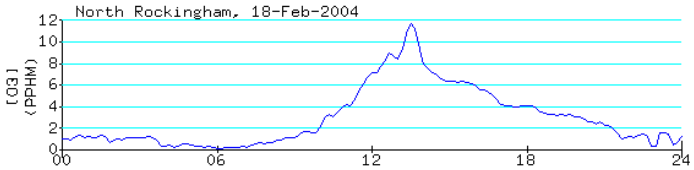
Attachment 2 – O_3 Exceedance on 18th February 2004



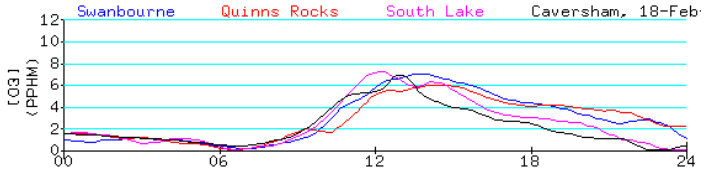
1 hour averaged



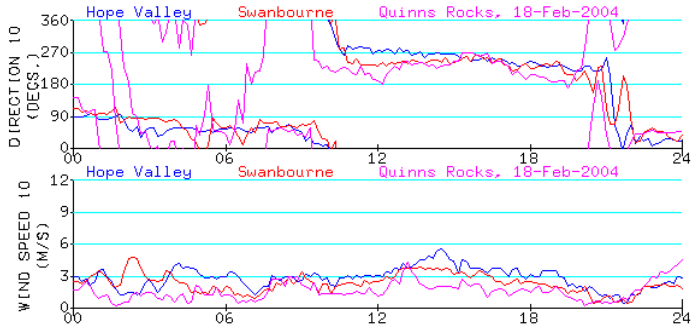
10-minute averaged



1-hour averaged



Wind data



Pollutant

Ozone

Monitoring Site

Rockingham

Highest Concentration

0.102 ppm

Averaging Period

1 hour

NEPM Standard

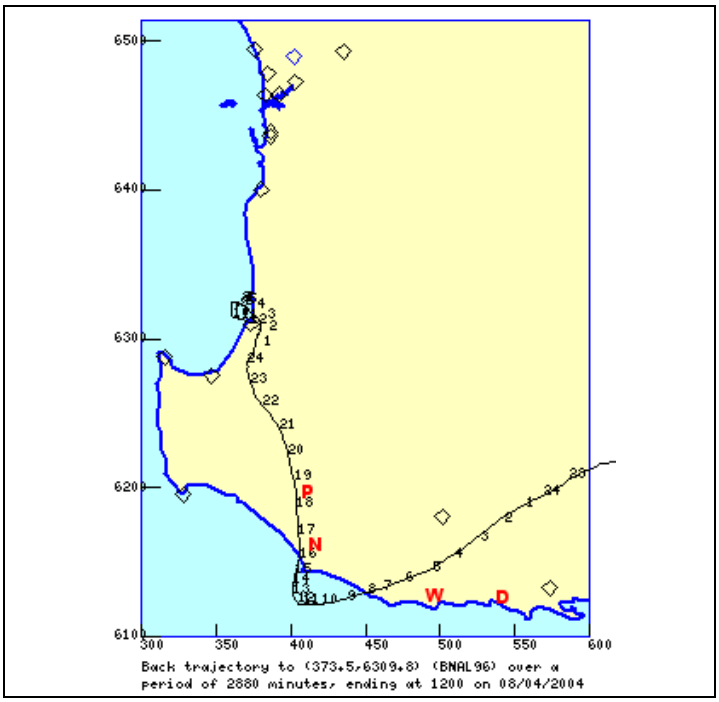
0.10 ppm

Description of Event

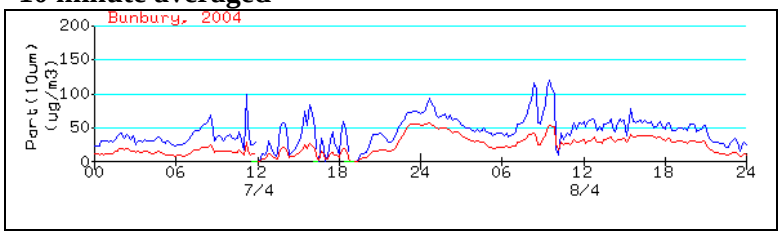
Morning winds were from north of east. Morning emissions from the Perth CBD were still on the land side of the sea breeze when it developed at about 11am. These emissions were subsequently returned to shore on a north westerly flow resulting in elevated ozone concentrations on the southern coastal plane.

The 4-hour average at Rockingham reached 0.079 ppm.

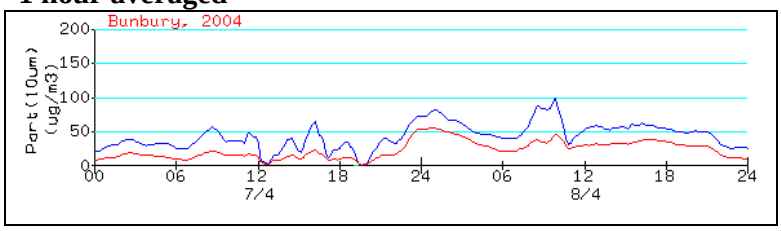
Attachment 3 - PM_{10} & $PM_{2.5}$ Exceedances on 8th April 2004



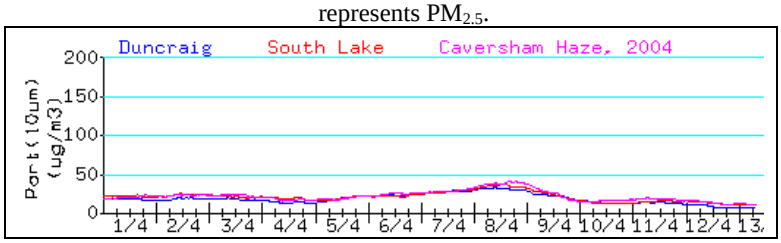
10 minute averaged



1 hour averaged



NOTE: The **blue** (upper) trace represents PM_{10} and the **red** (lower) trace represents $PM_{2.5}$.



Pollutant

PM_{10}, $PM_{2.5}$

Monitoring Site

Bunbury

Highest Concentration

PM_{10} – 53.6 ug/m^3
$PM_{2.5}$ – 31.4 ug/m^3

Averaging Period

24 hours

NEPM Standard

PM_{10} – 50.0 ug/m^3
$PM_{2.5}$ – 25.0 ug/m^3 (advisory)

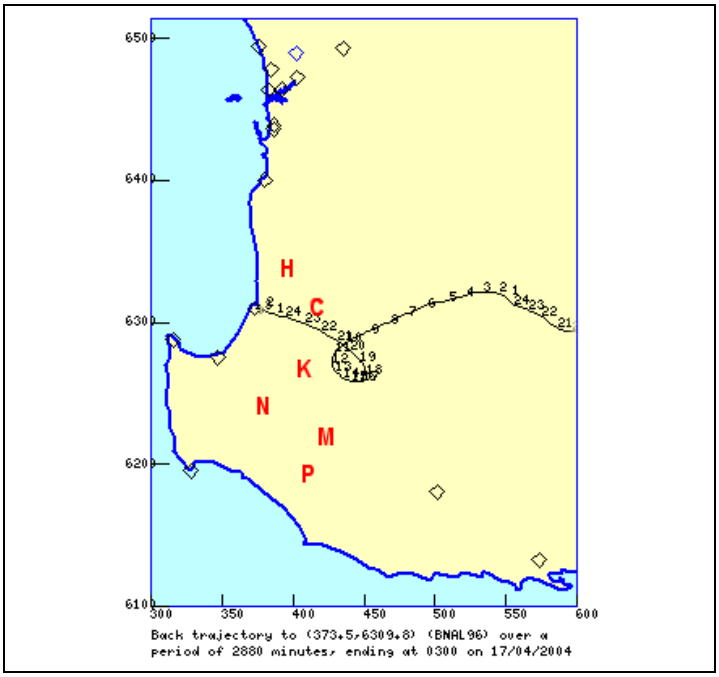
Description of Event

Department of Conservation and Land Management conducted controlled burns at Northcliffe (**N**), Pemberton (**P**), Denmark (**D**), Walpole (**W**) and Ravensthorpe on 7/4/2004 and Northcliffe (**N**) and Denmark (**D**) on 8/4/2004.

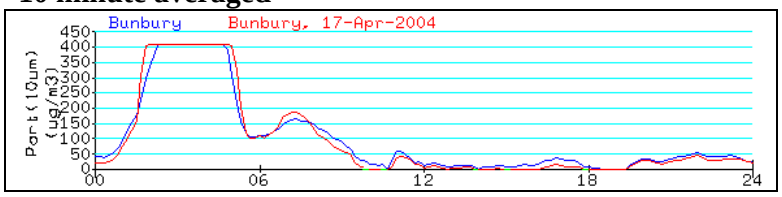
The wind trajectory indicates that a likely cause to the PM_{10} exceedance at Bunbury was controlled burns conducted in the southwest.

Various metropolitan sites experienced slightly elevated PM_{10} concentrations during the 7th and 8th with Caversham, South Lake and Duncraig recording 24-hour averages of 37.8 µg/m^3, 32.2 µg/m^3 and 30.0 µg/m^3 respectively.

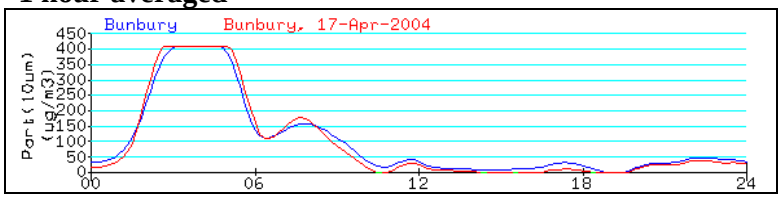
Attachment 4 – PM_{10} & $PM_{2.5}$ Exceedances on 17th April 2004



10 minute averaged

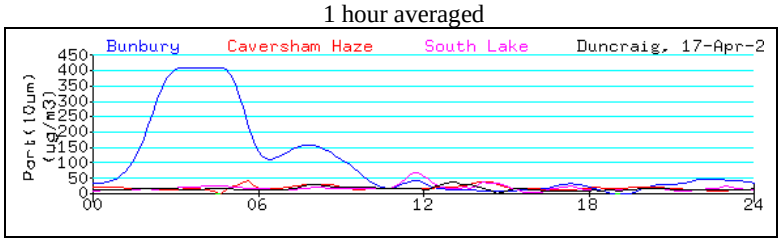


1 hour averaged



NOTE: The **blue** (upper) trace represents PM_{10} and the **red** (lower) trace represents $PM_{2.5}$. Monitor maximum recorded between 0230 and 0440 hours.

1 hour averaged



Pollutant

PM_{10}, $PM_{2.5}$

Monitoring Site

Bunbury

Highest Concentration

PM_{10} – 99.5 ug/m^3
$PM_{2.5}$ – 94.9 ug/m^3

Averaging Period

24 hours

NEPM Standard

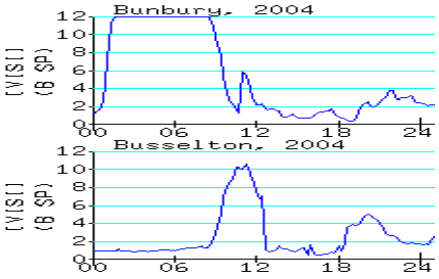
PM_{10} – 50.0 ug/m^3
$PM_{2.5}$ – 25.0 ug/m^3 (advisory)

Description of Event

Department of Conservation and Land Management conducted controlled burns at Collie (**C**), Manjimup (**M**), Pemberton (**P**), Harvey (**H**), Kirup (**K**) and Nannup (**N**) on 17/4/2004.

The wind trajectory indicates that a likely cause to the PM_{10} exceedance at Bunbury was controlled burns conducted in the southwest.

Metropolitan sites experienced no elevated PM_{10} concentrations. Visibility levels for 17/4 shown below.



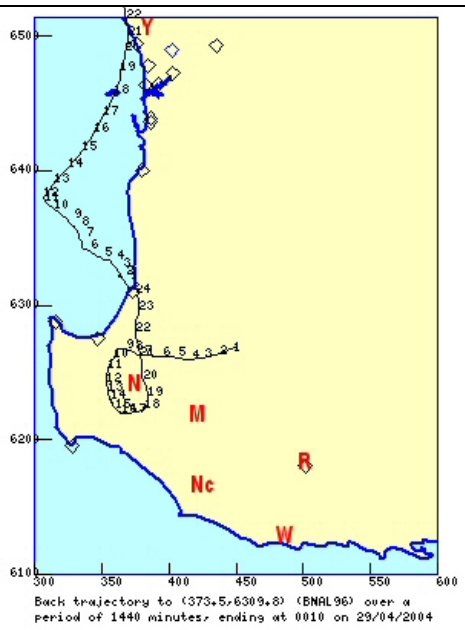
Haze from burn-off

THE Department of Conservation and Land Management said haze south of Mandurah yesterday was caused by burn-offs around Collie, Manjimup, Pemberton, Harvey, Kirup and Nannup.

CALM said the smoke would disperse quickly. Rain during the week had enabled CALM to get its autumn burn-off program under way.

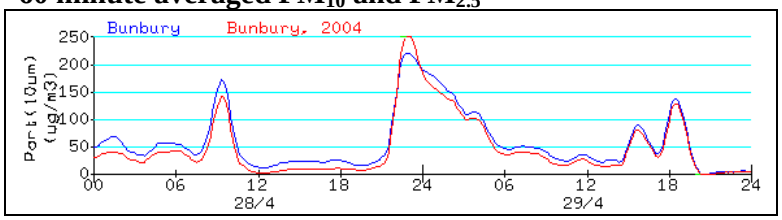
Sunday Times 17th April 2004

Attachment 5 – PM_{10} & $PM_{2.5}$ Exceedances on 28-29 April 2004



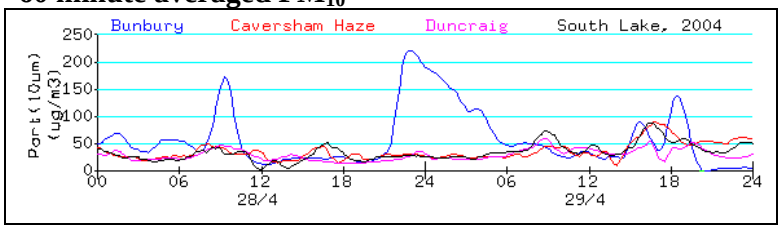
Back trajectory from Bunbury over a period of 24-hours.
Forward trajectory from Bunbury over a period of 24-hours.

60 minute averaged PM_{10} and $PM_{2.5}$

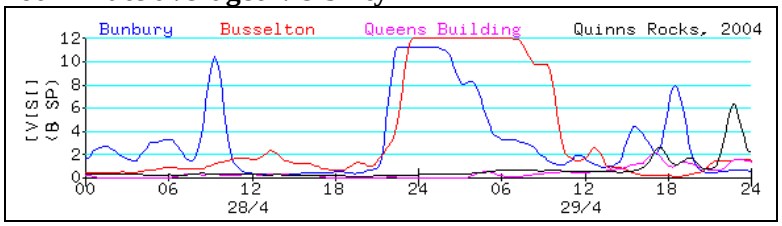


NOTE: The **blue** (upper) trace represents PM_{10} and the **red** (lower) trace represents $PM_{2.5}$. Monitor maximum recorded between 2300 and 2400 hours.

60 minute averaged PM_{10}



60 minute averaged visibility



Pollutant

PM_{10}, $PM_{2.5}$

Monitoring Site

Bunbury

Highest Concentration

ug/m^3	28/04	29/04
PM_{10}	60.1	56.5
$PM_{2.5}$	47.9	48.2

Averaging Period

24 hours

NEPM Standard

PM_{10} – 50.0 ug/m^3
$PM_{2.5}$ – 25.0 ug/m^3 (advisory)

Description of Event

Department of Conservation and Land Management conducted controlled burns at Nannup (**N**), Manjimup (**M**), Walpole (**W**), Northcliffe (**Nc**), Rocky Gully (**R**) and Yanchep (**Y**) on 28/4/2004.

The wind trajectory indicates that a likely cause to the PM_{10} exceedance at Bunbury was controlled burns conducted in the southwest.

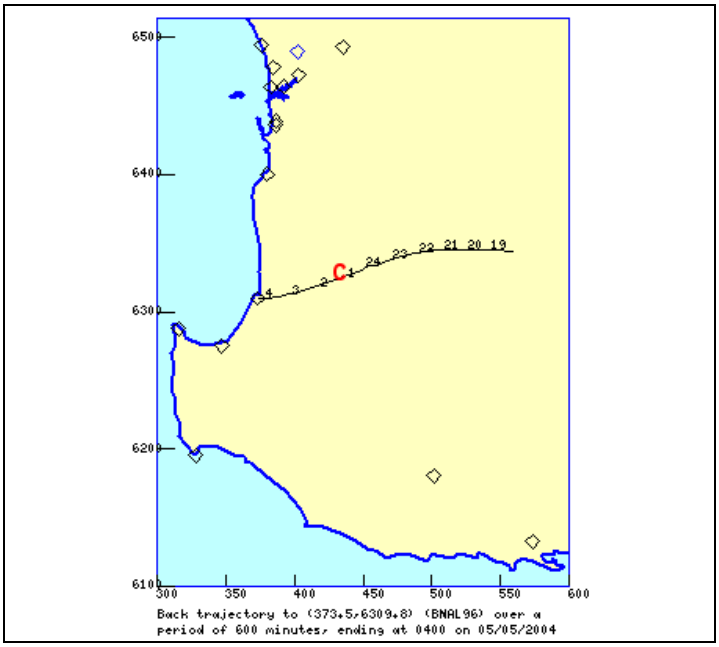
As the following table shows, metropolitan sites experienced slightly elevated particle concentrations.

PM_{10}	28/04	29/04
Caversham	28.5	42.4
Duncraig	25.2	33.5
South Lake	28.2	42.8
Fancote Ave.*	33.2	51.6

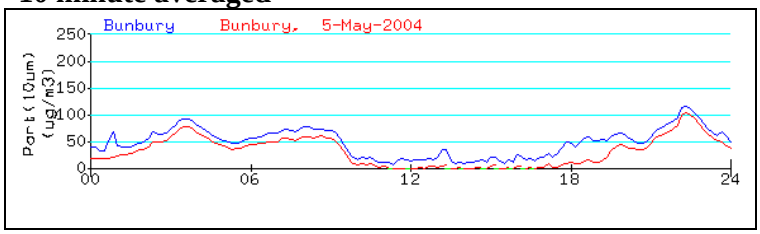
* - Industry operated TEOM

$PM_{2.5}$	28/04	29/04
Duncraig	10.4	20.3

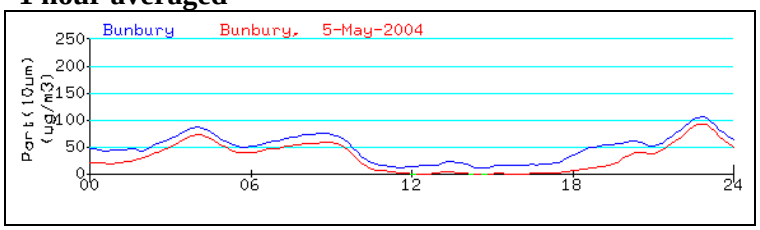
Attachment 6 – $PM_{2.5}$ Exceedance on 5th May 2004



10 minute averaged

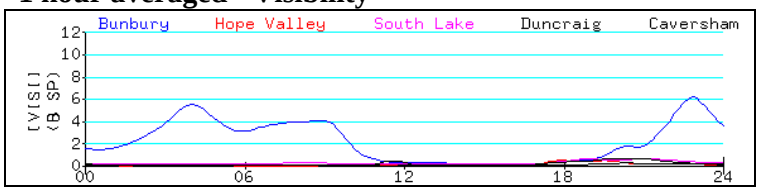


1 hour averaged



NOTE: The **blue** (upper) trace represents PM_{10} and the **red** (lower) trace represents $PM_{2.5}$.

1 hour averaged - Visibility



Pollutant

$PM_{2.5}$

Monitoring Site

Bunbury

Highest Concentration

$PM_{2.5}$ – 32.0 ug/m^3

Averaging Period

24 hours

NEPM Standard

$PM_{2.5}$ – 25.0 ug/m^3 (advisory)

Description of Event

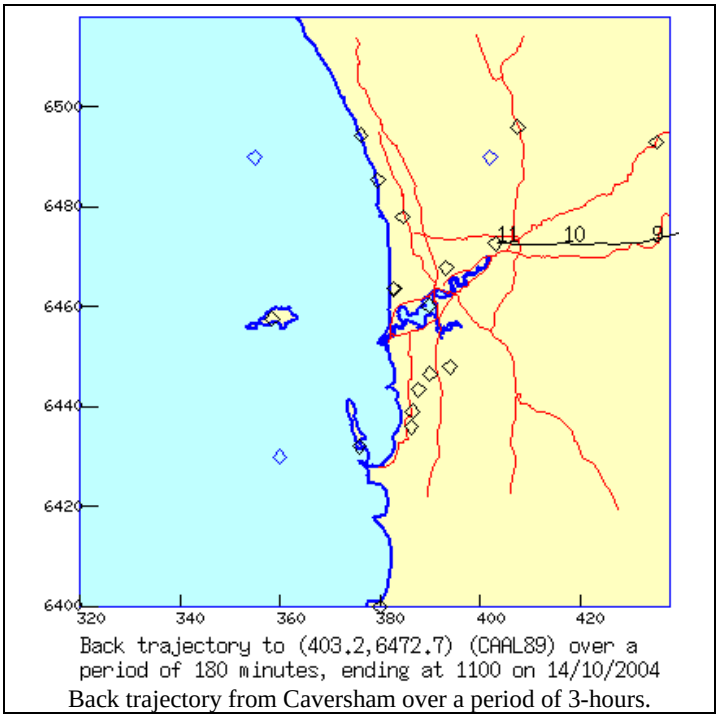
Department of Conservation and Land Management conducted controlled burns in the Chalk forest 30km north of Collie(**C**). A Smoke Alert was issued by CALM at 4pm on 4 May 2004 advising haze accumulation over the Australind-Bunbury area.

The wind trajectory indicates that a likely cause to the $PM_{2.5}$ exceedance at Bunbury was controlled burns conducted in the southwest.

The maximum PM_{10} concentration recorded at Bunbury was 48.7 µg/m^3 averaged over 24 hours. This is below the NEPM standard of 50 µg/m^3.

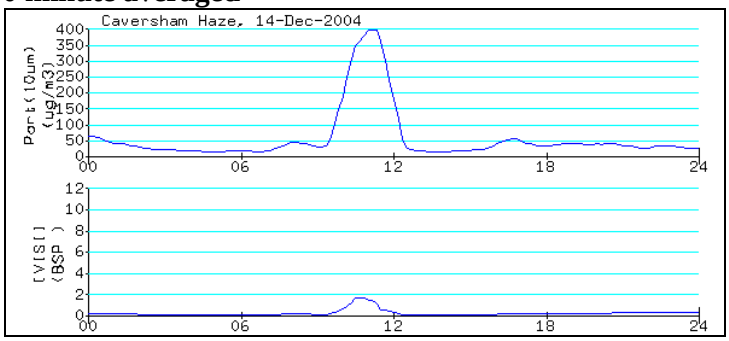
Metropolitan sites experienced no elevated particle levels due to this event.

Attachment 7 – PM_{10} Exceedance on 14th October 2004



Back trajectory from Caversham over a period of 3-hours.

60 minute averaged



Pollutant

PM_{10}

Monitoring Site

Caversham

Highest Concentration

58.0 µg/m^3

Averaging Period

24-hours

NEPM Standard

50 µg/m^3

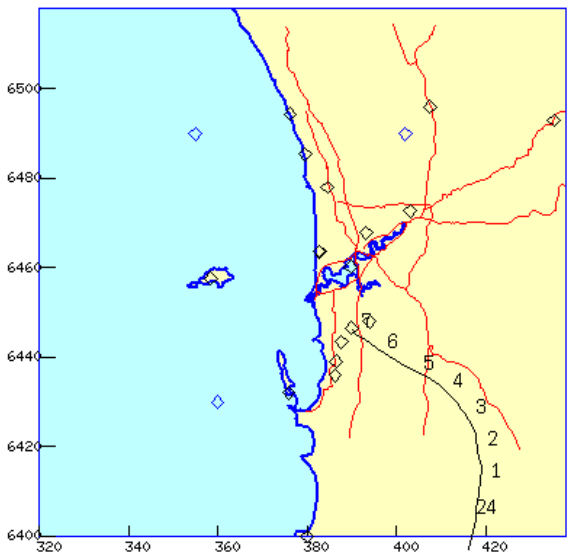
Description of Event

High proportion of larger sized particles is evidenced by the low visibility index. The cause of the exceedance was most likely due to farming activities in the adjacent fields located east of the monitoring station.

	Visibility	PM10
0900	0.14	26.74
0910	0.19	44.69
0920	0.14	37.61
0930	0.77	160.20
0940	0.55	315.02
0950	0.66	308.43
1000	1.75	268.74
1010	1.69	399.39
1020	2.41	399.76
1030	3.33	399.76
1040	0.20	399.39
1050	0.64	396.09
1100	0.94	399.51
1110	1.08	399.39
1120	0.51	396.34
1130	0.16	182.17
1140	0.14	52.02
1150	0.15	36.75
1200	0.13	25.76

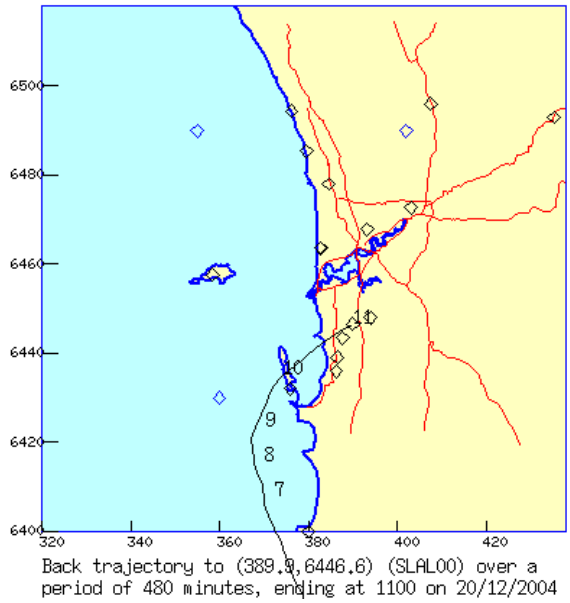
The above figures have been extracted from the AQ data base. Highlighted figures above represent 10-minute periods when particle concentrations may have exceeded the maximum range of the monitor.

Attachment 8 – PM_{10} Exceedance on 20th December 2004



Back trajectory to (389.9,6446.6) (SLAL00) over a period of 480 minutes, ending at 0700 on 20/12/2004

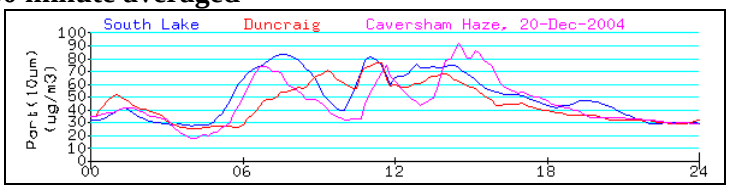
Back trajectory from 7 am at South Lake over a period of 8 hours



Back trajectory to (389.9,6446.6) (SLAL00) over a period of 480 minutes, ending at 1100 on 20/12/2004

Back trajectory from 11 am at South Lake over a period of 12 hours

60 minute averaged



Pollutant

PM_{10}

Monitoring Site

South Lake
Fancote Avenue*

Highest Concentration

50.5 µg/m^3 South Lake
117.9 µg/m^3 Fancote Avenue*

Averaging Period

24-hours

NEPM Standard

50 µg/m^3

Description of Event

Numerous fires around the Perth metropolitan region has contributed to the high haze levels. The following table shows the 24-hour averaged particle concentrations in micrograms per cubic metre at each monitoring site

	PM_{10}	$PM_{2.5}$
SL	**50.5**	-
FC*	**117.9**	-
DU	45.1	24.4
CA	45.6	-
BN	37.9	22.9

Latest news this morning indicate that 2000 hectares of pine plantation was currently burning out of control in the Kelmscott area approximately 25 kilometres SE of Perth.

* Fancote Avenue is an industry operated site.

WA bushfire threatens homes. 19/12/2004. ABC News Online

[This is the print version of story http://www.abc.net.au/news/newsitems/200412/s1268377.htm]

Firefighters in Western Australia have been battling a big bushfire that threatened homes north-east of Perth.
The fire has already burnt through about 400 hectares of land near Bullock.
Bill Rose from the Fire and Emergency Services Authority says more than 120 firefighters are battling the blaze which threatened several homes earlier in the night.
"They haven't been evacuated," he said. "They're obviously aware of what's going on and we're supporting them.
"We've also got four helitacs and two fixed-winged water bombers up here as well."

WA fire crews battle bushfire. 19/12/2004. ABC News Online

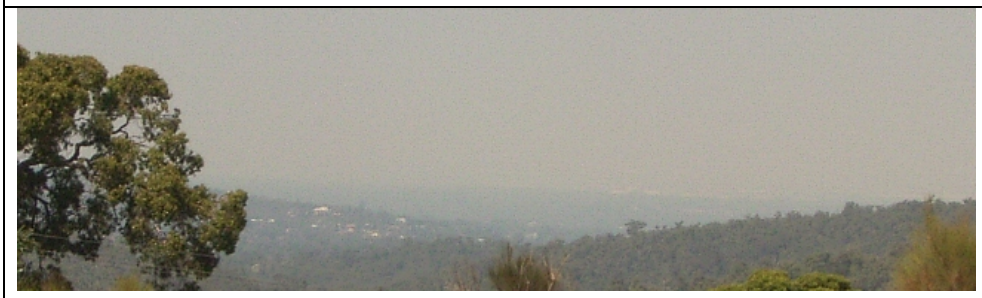
[This is the print version of story http://www.abc.net.au/news/newsitems/200412/s1268595.htm]

Firefighters are battling a large blaze at Wandi, south of Perth.
The fire started at 2:00pm AWST at bushland near Bodeman Road.
Fifteen fire trucks and two water bombing aircraft are being used to fight the fire.

Fire crews battle blaze in outer Perth. 20/12/2004. ABC News Online

[This is the print version of story http://www.abc.net.au/news/newsitems/200412/s1269401.htm]

A fire is continuing to burn out of control towards Brookton Highway in the Jarrahdale area, south-east of Perth.
The highway will be closed tonight between Ashendon Road and Metro Road due to the intense smoke.
All traffic will be forced to divert along alternative forest roads.
The fire is not expected to be brought under control until tomorrow morning.

	Tuesday 21/12/2004 10:30am Looking towards the CBD from the lookout on the Toodyay Road (the white building in the foreground is the cycling complex in Midvale).
	Tuesday 21/12/2004 10:30am Looking towards Kwinana from the Red Hill landfill site (apparently on a clear day you can see the chimney stacks at Kwinana).

ATTACHMENT 9 – 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)

Carbon Monoxide

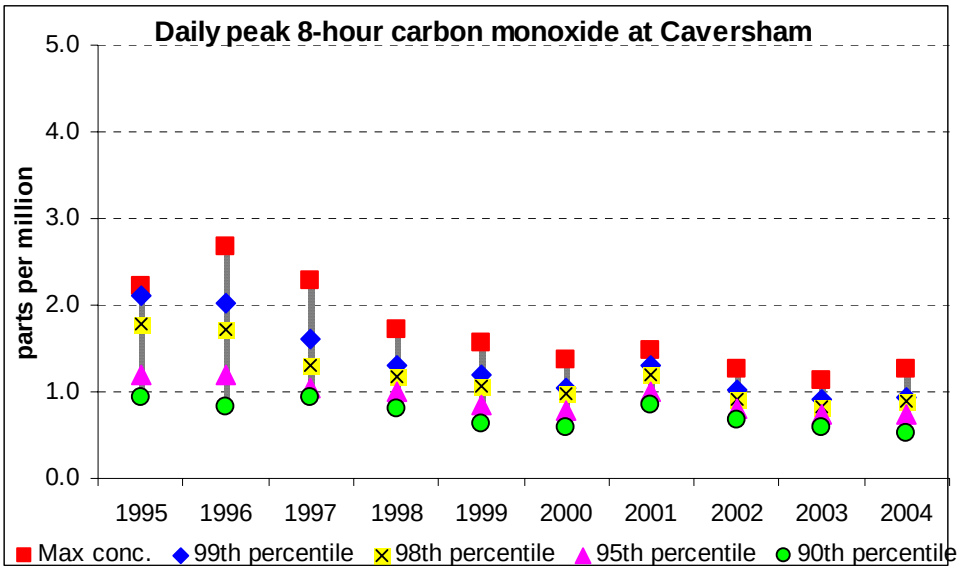


Figure A9-1 - 8-hour carbon monoxide at Caversham

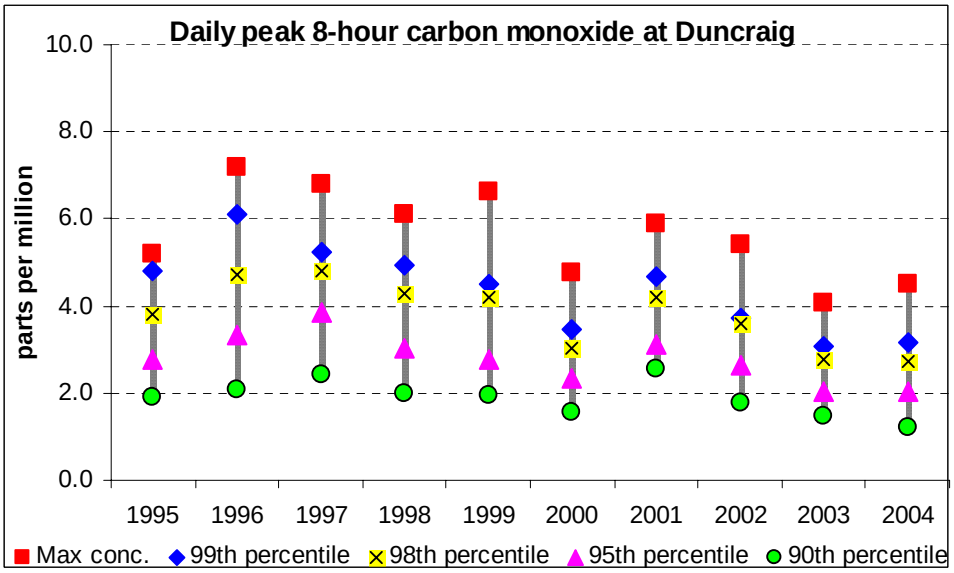


Figure A9-2 - 8-hour carbon monoxide at Duncraig

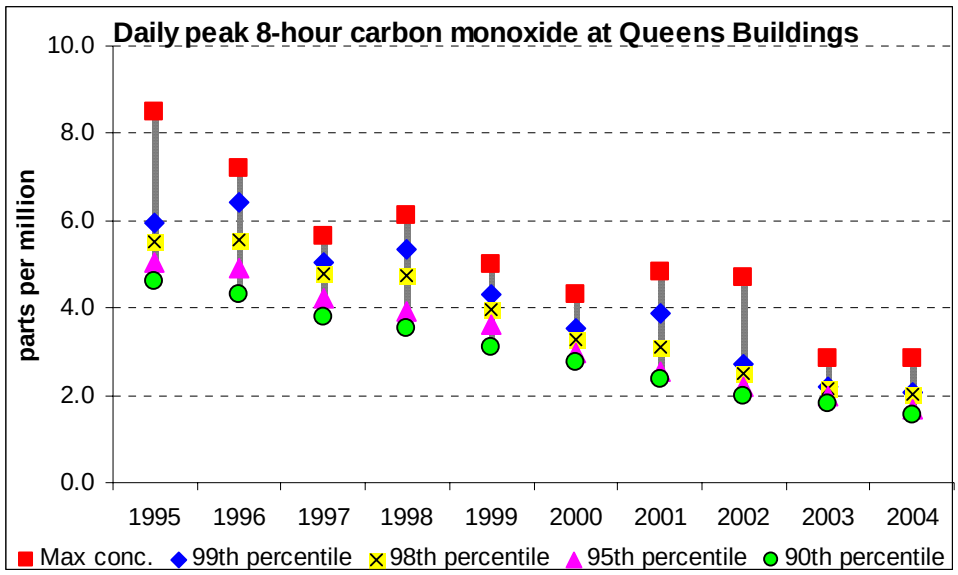


Figure A9-3 - 8-hour carbon monoxide at Queens Buildings

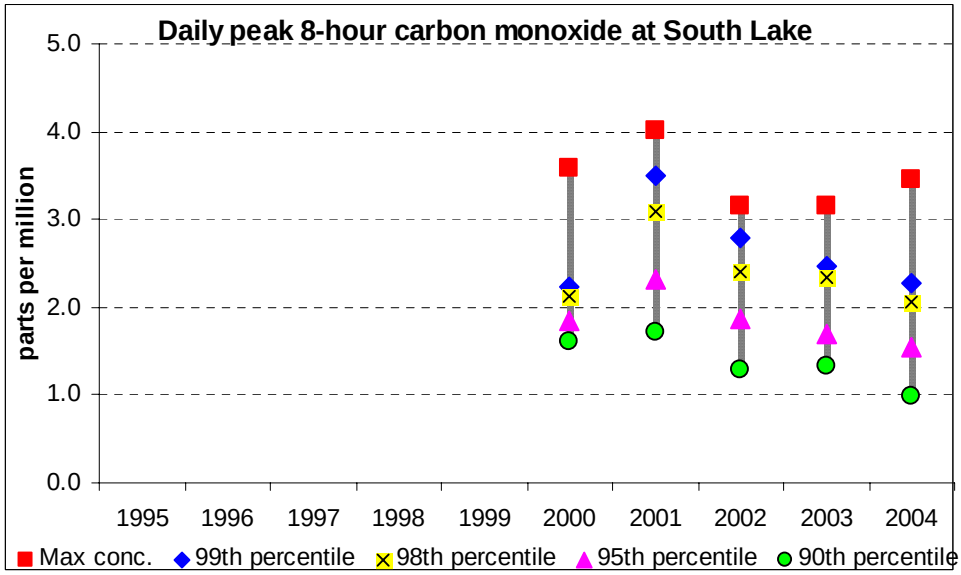


Figure A9-4 - 8-hour carbon monoxide at South Lake

Nitrogen Dioxide

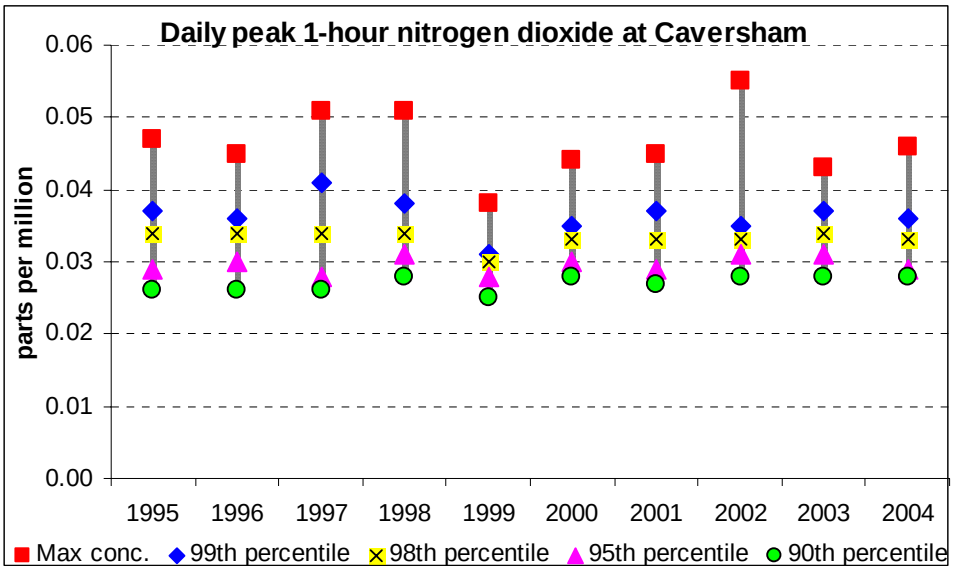


Figure A9-5 - 1-hour nitrogen dioxide at Caversham

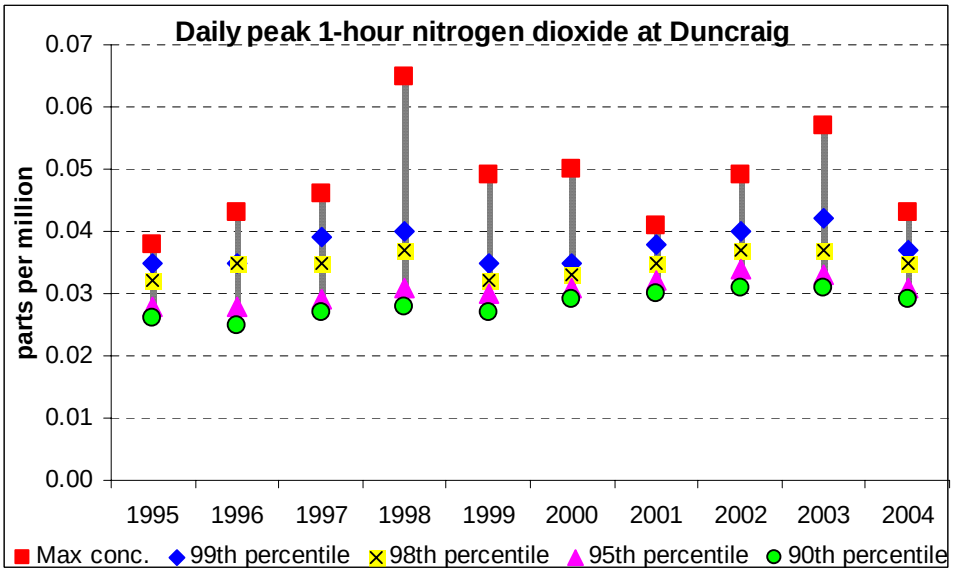


Figure A9-6 - 1-hour nitrogen dioxide at Duncraig

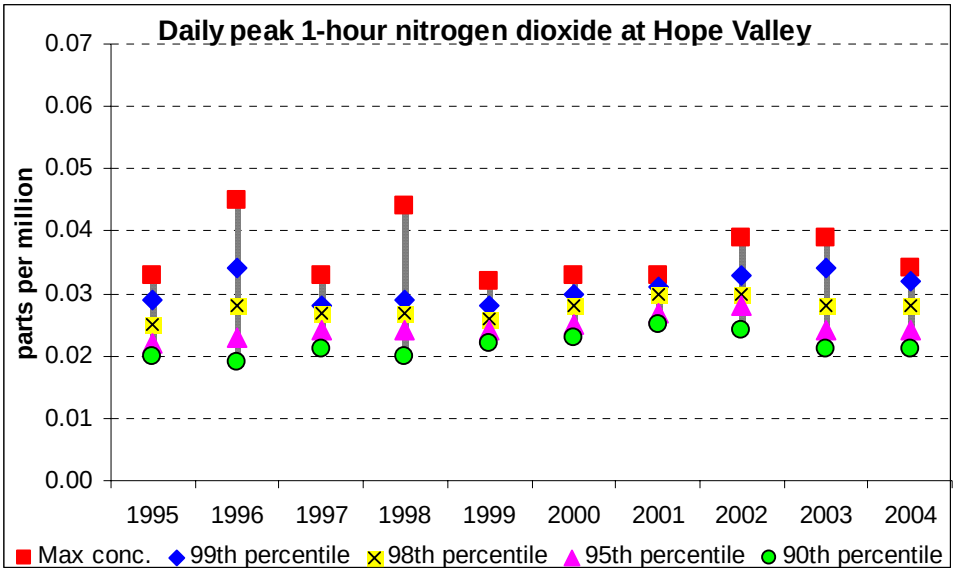


Figure A9-7 - 1-hour nitrogen dioxide at Hope Valley

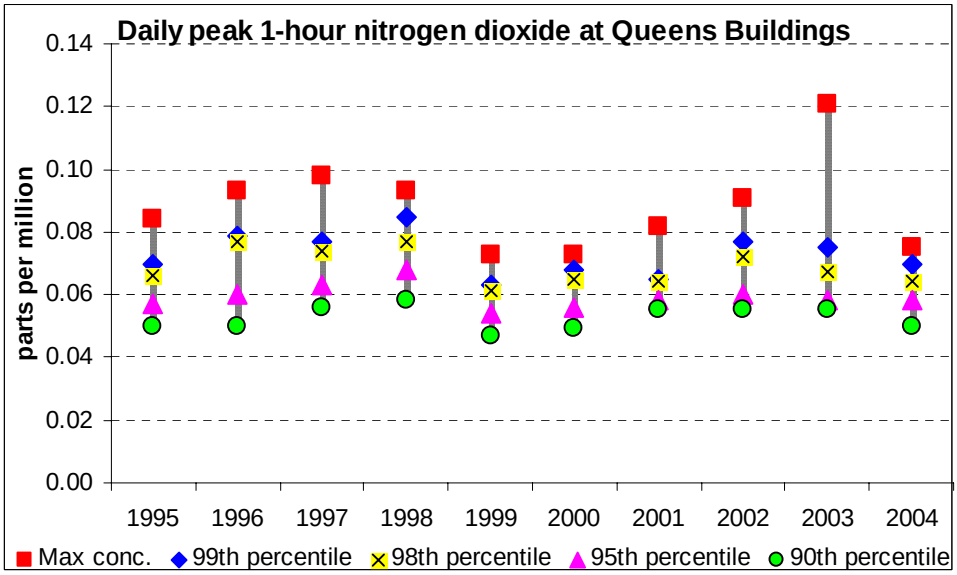


Figure A9-8 - 1-hour nitrogen dioxide at Queens Buildings

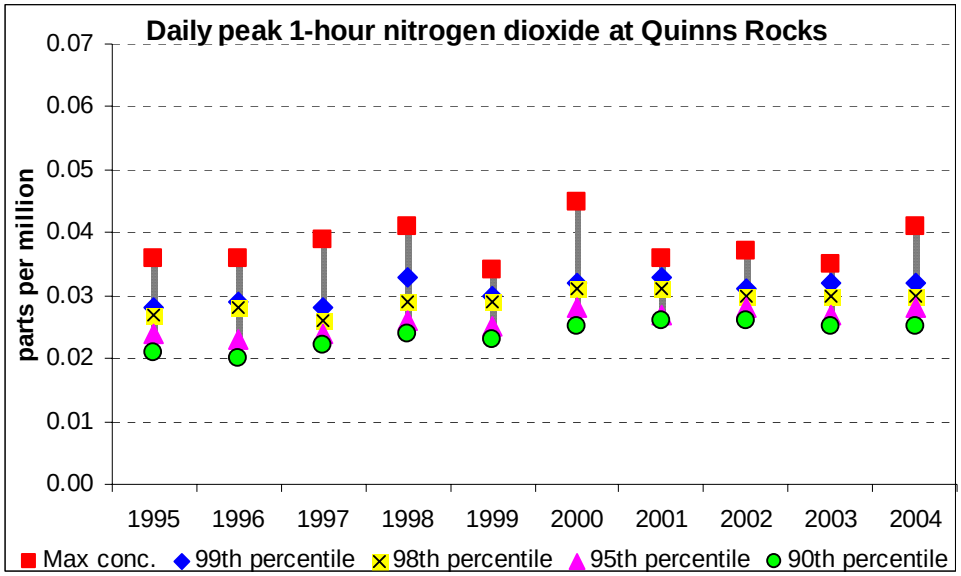


Figure A9-9 - 1-hour nitrogen dioxide at Quinns Rocks

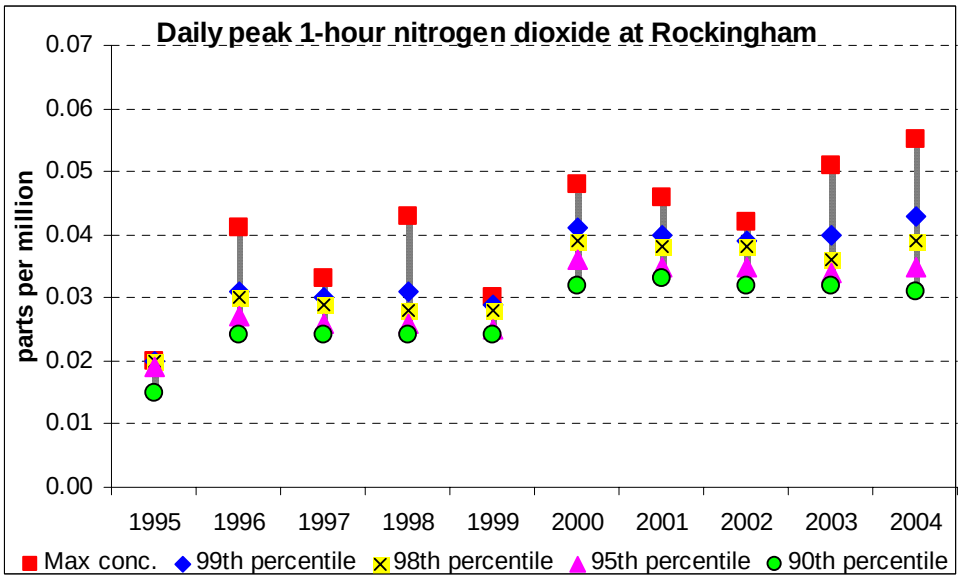


Figure A9-10 - 1-hour nitrogen dioxide at Rockingham

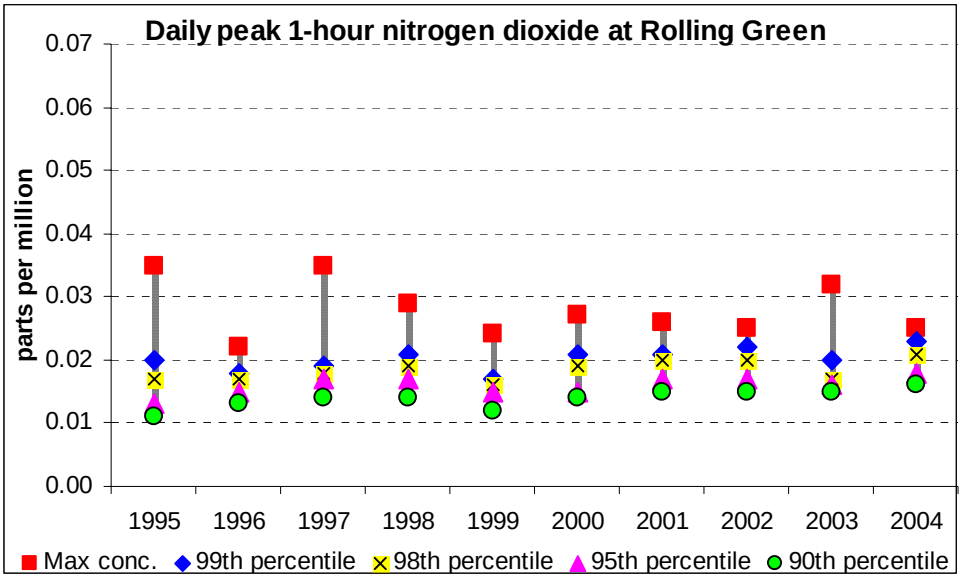


Figure A9-11 - 1-hour nitrogen dioxide at Rolling Green

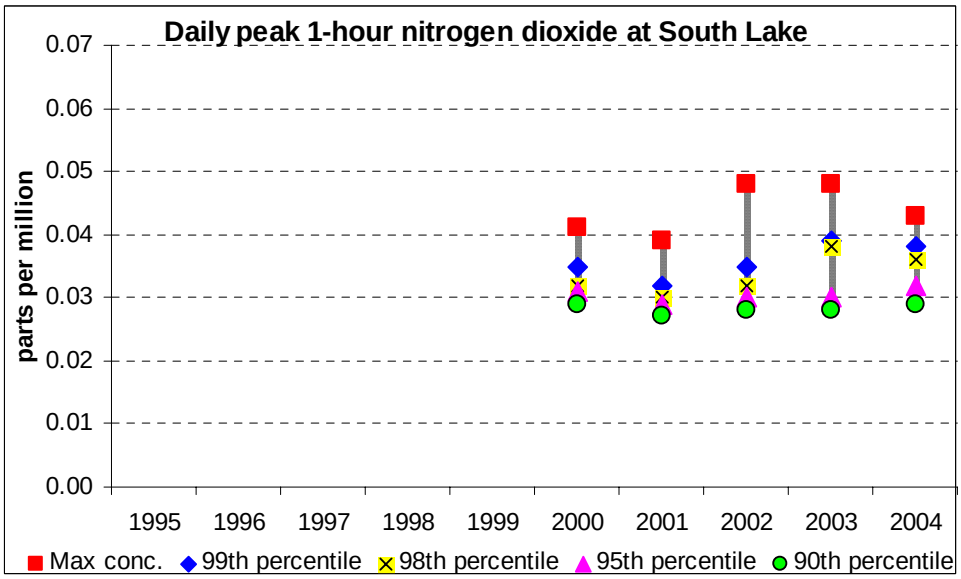


Figure A9-12 - 1-hour nitrogen dioxide at South Lake

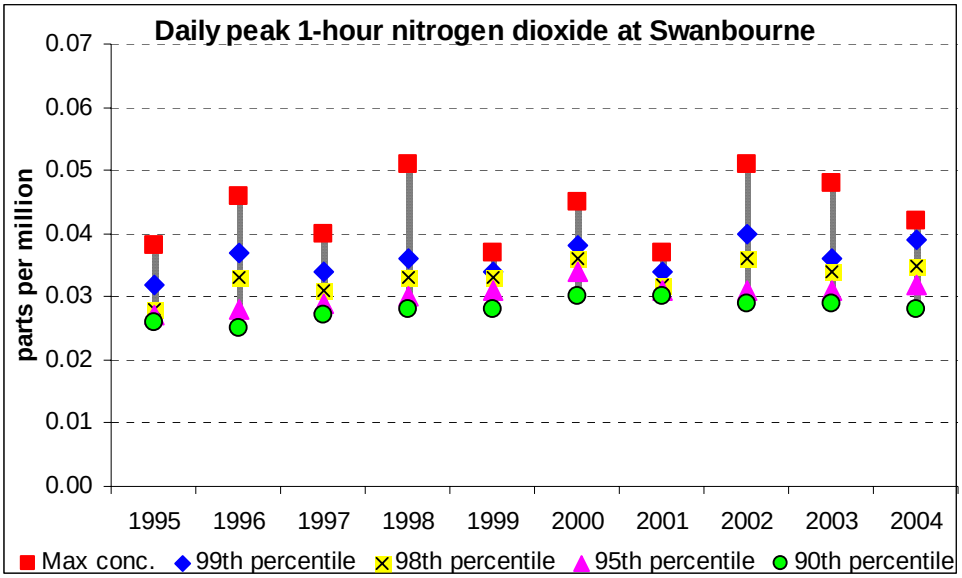


Figure A9-13 - 1-hour nitrogen dioxide at Swanbourne

Ozone

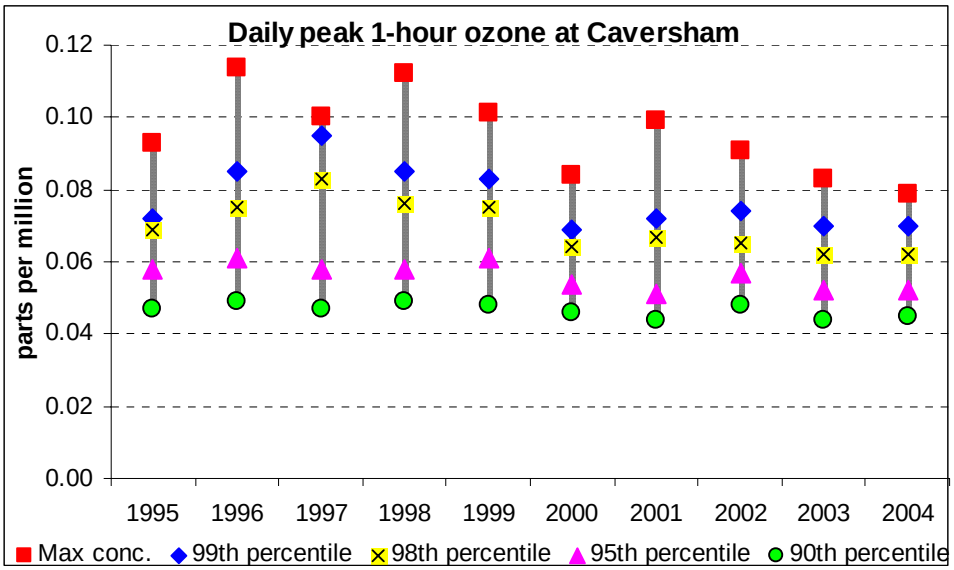


Figure A9-14 - 1-hour ozone at Caversham

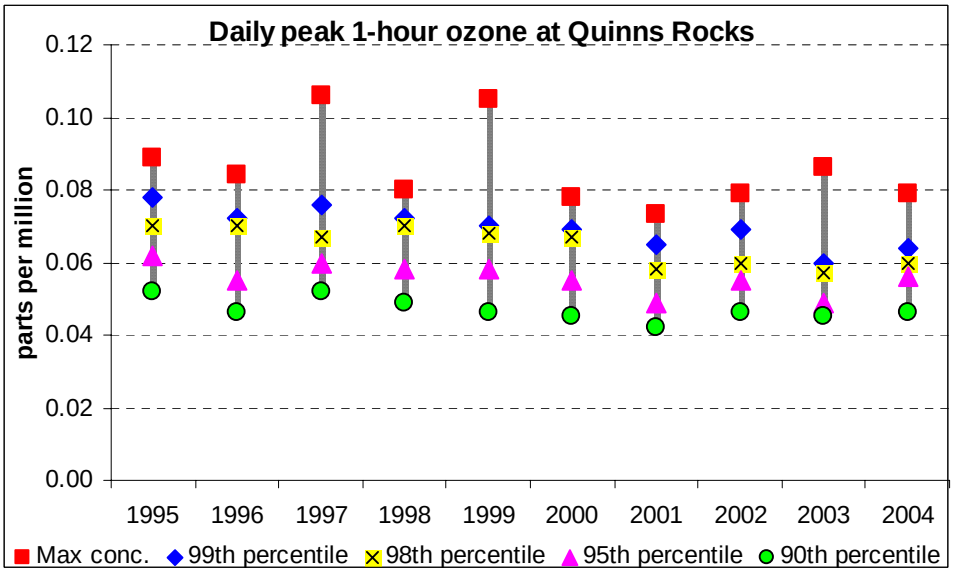


Figure A9-15 - 1-hour ozone at Quinns Rocks

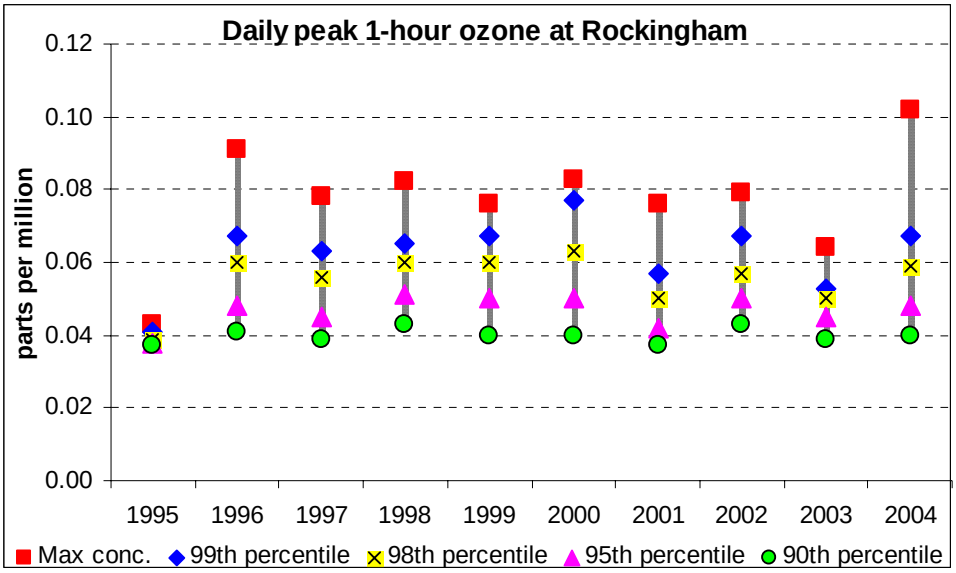


Figure A9-16 - 1-hour ozone at Rockingham

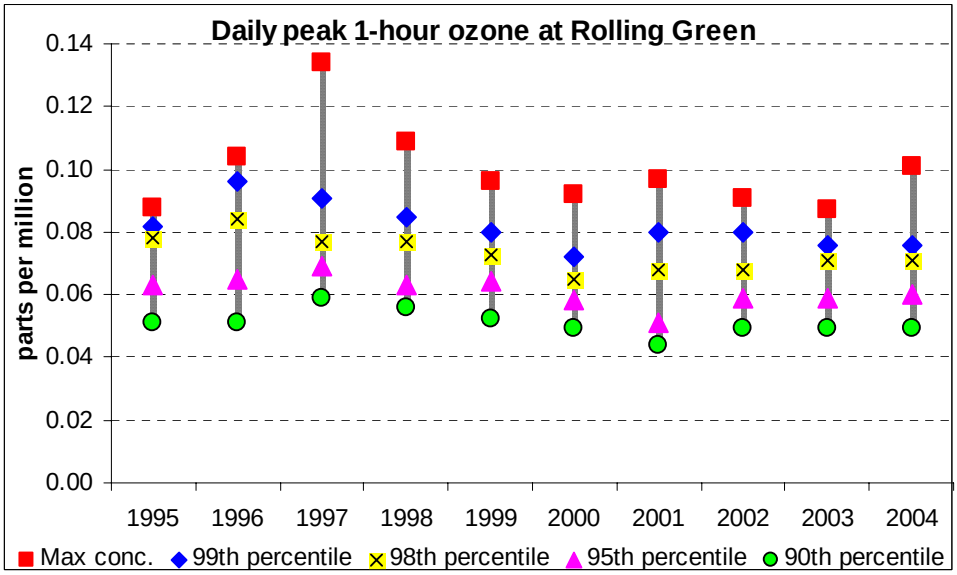


Figure A9-17 - 1-hour ozone at Rolling Green

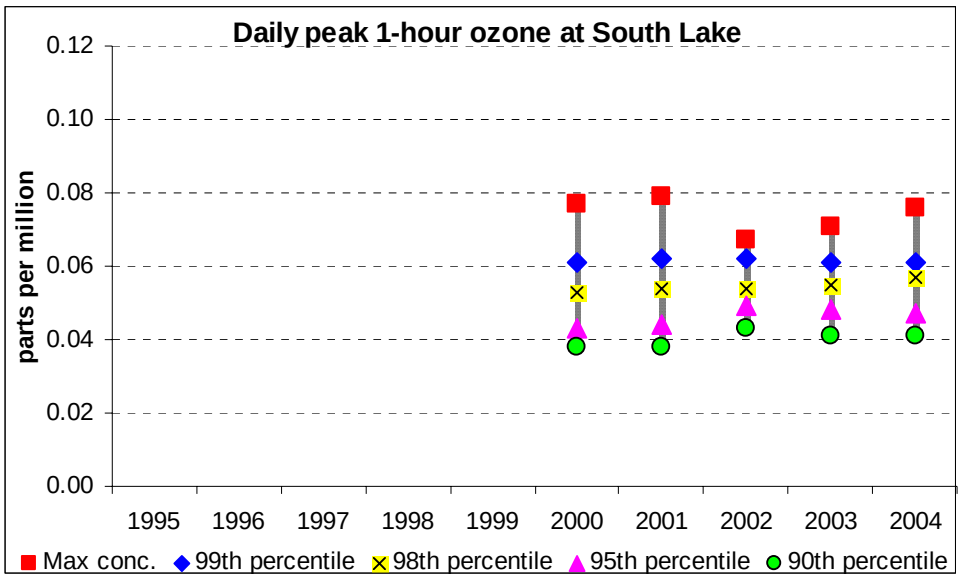


Figure A9-18 - 1-hour ozone at South Lake

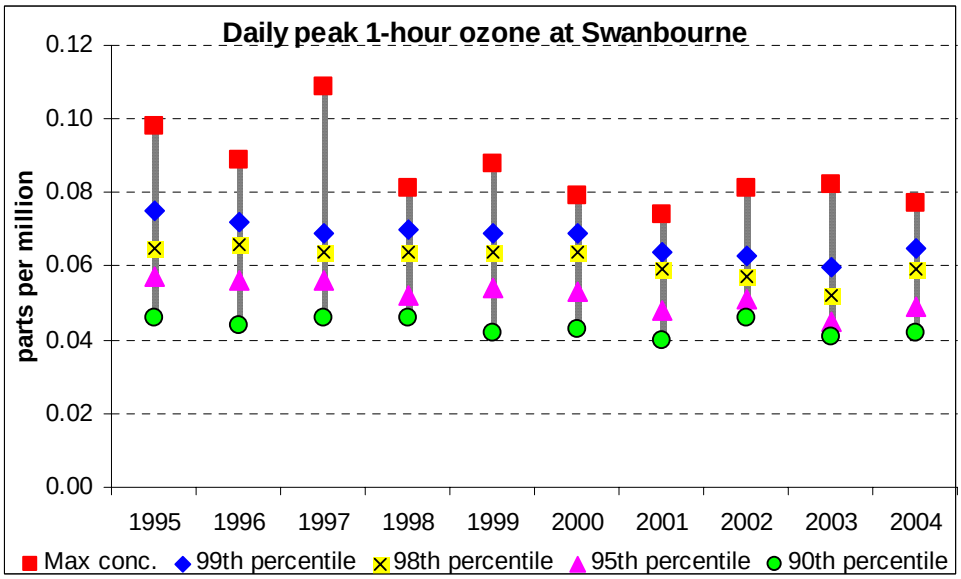


Figure A9-19 - 1-hour ozone at Swanbourne

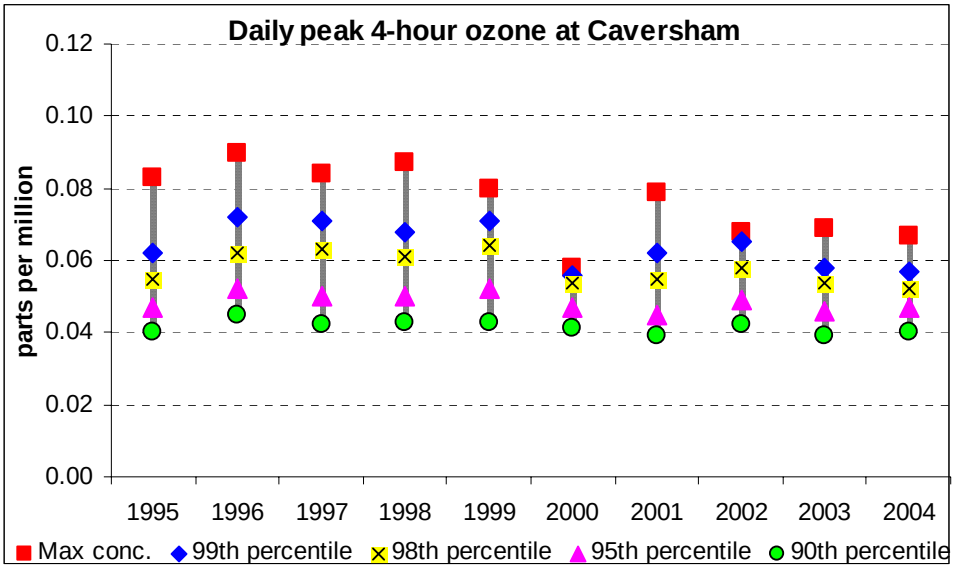


Figure A9-20 - 4-hour ozone at Caversham

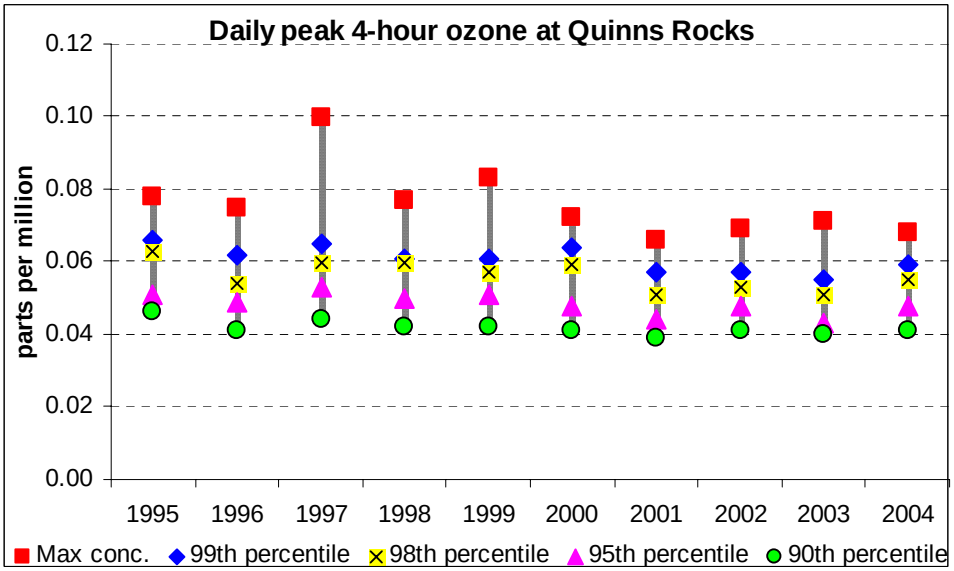


Figure A9-21 - 4-hour ozone at Quinns Rocks

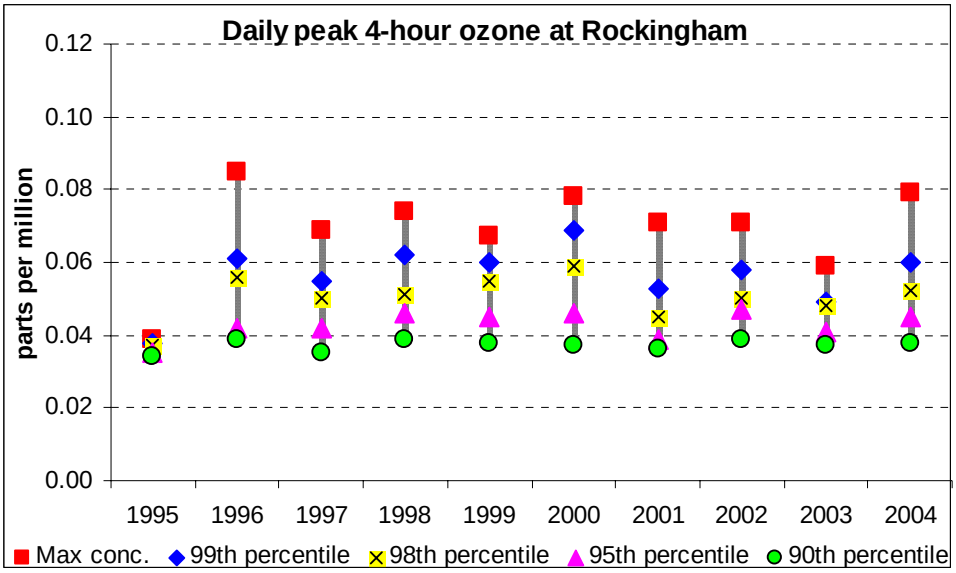


Figure A9-22 - 4-hour ozone at Rockingham

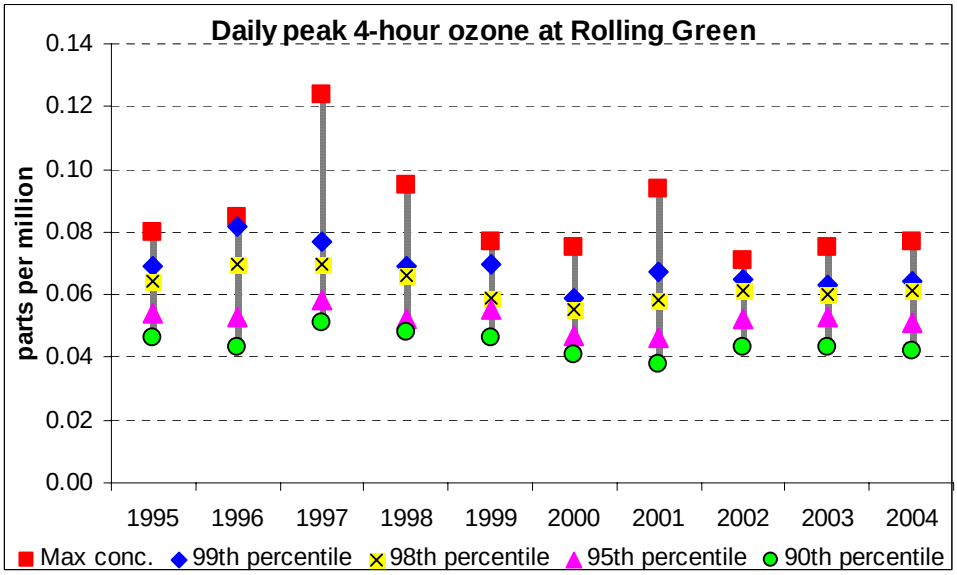


Figure A9-23 - 4-hour ozone at Rolling Green

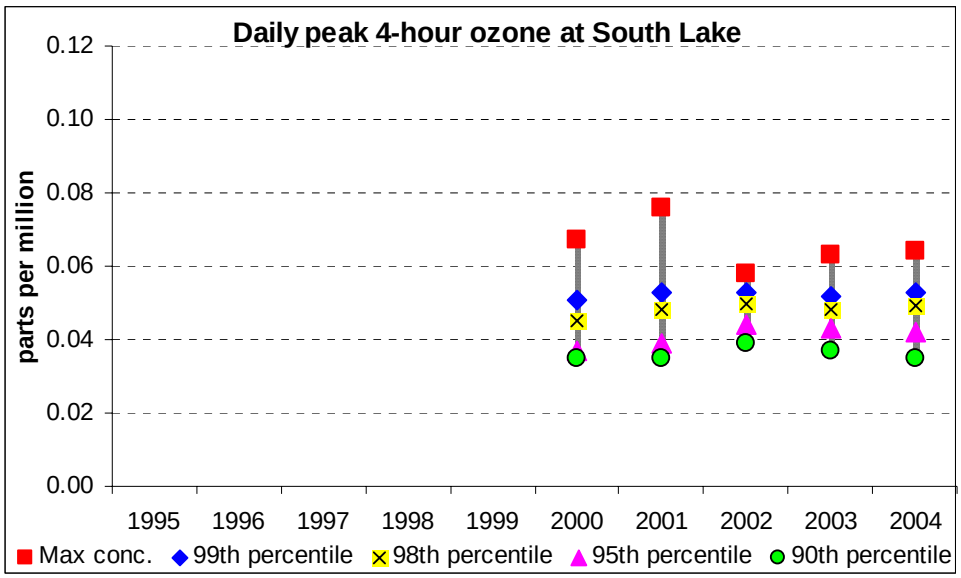


Figure A9-24 - 4-hour ozone at South Lake

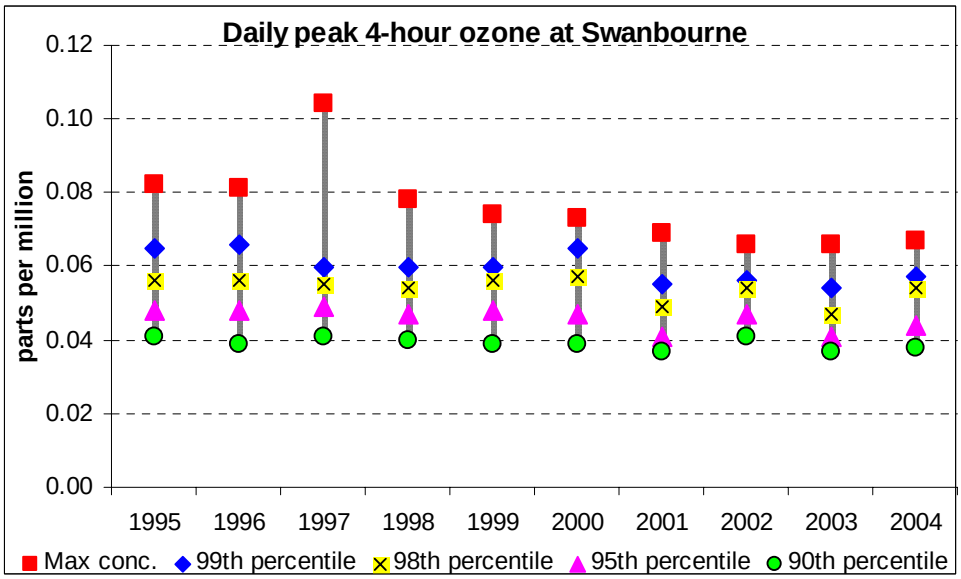


Figure A9-25 - 4-hour ozone at Swanbourne

Sulfur Dioxide

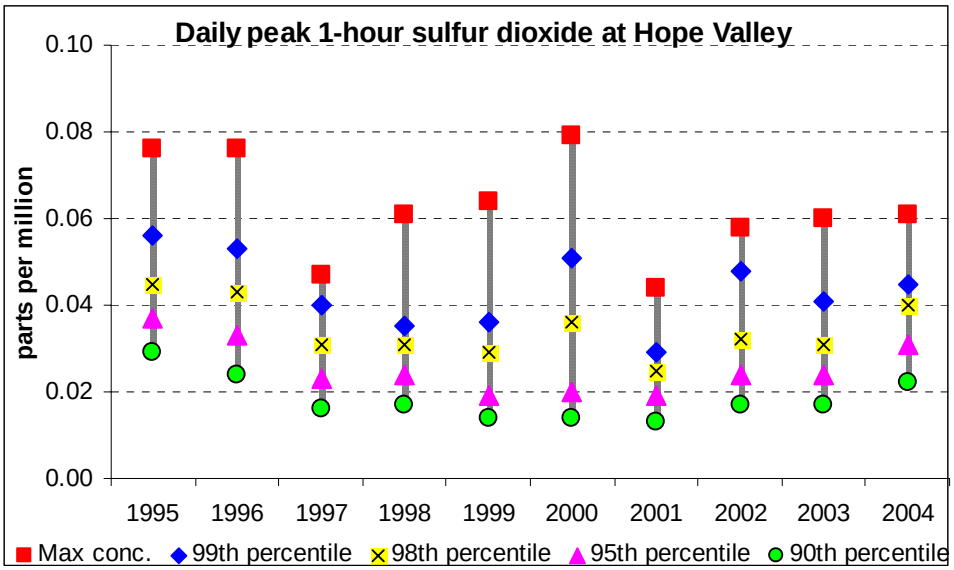


Figure A9-26 - 1-hour sulfur dioxide at Hope valley

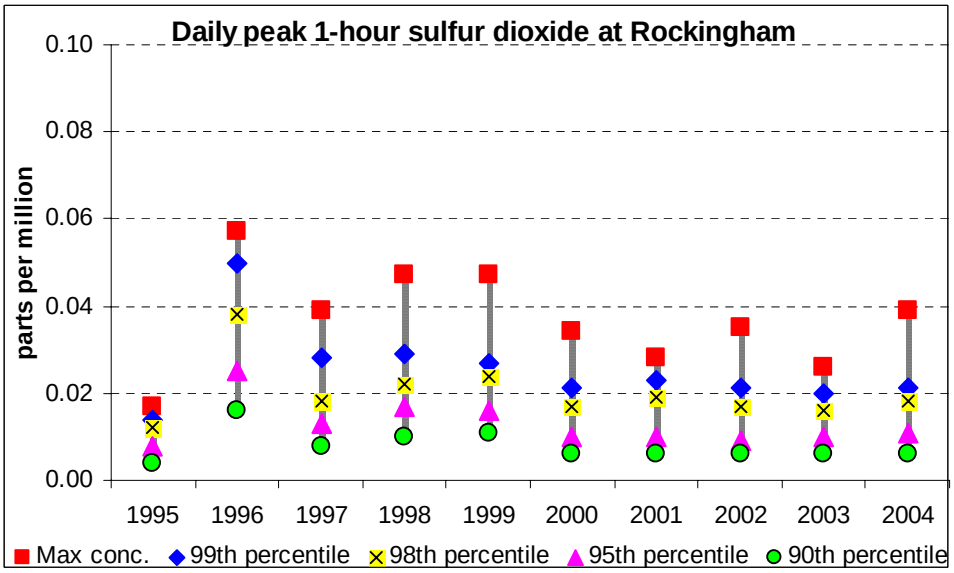


Figure A9-27 - 1-hour sulfur dioxide at Rockingham

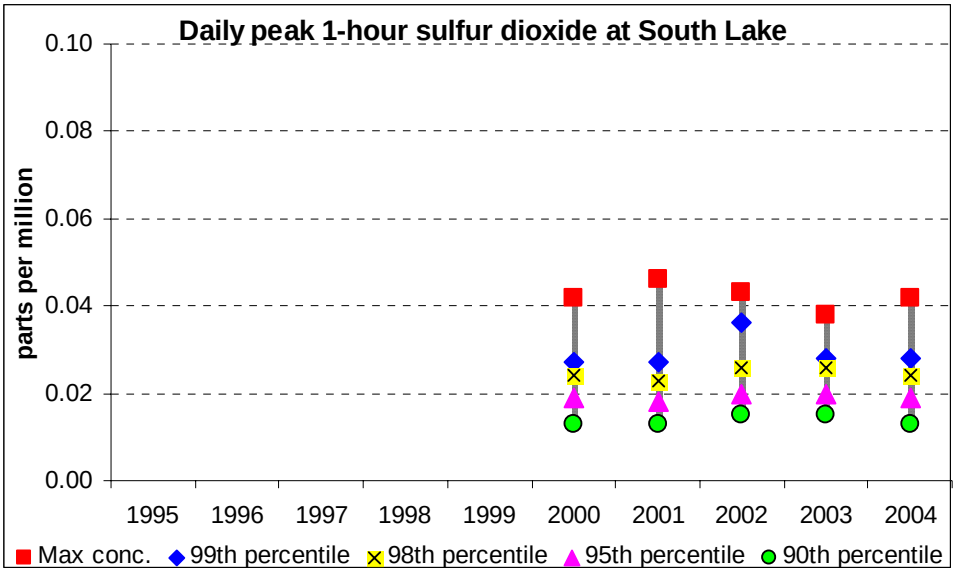


Figure A9-28 - 1-hour sulfur dioxide at South Lake

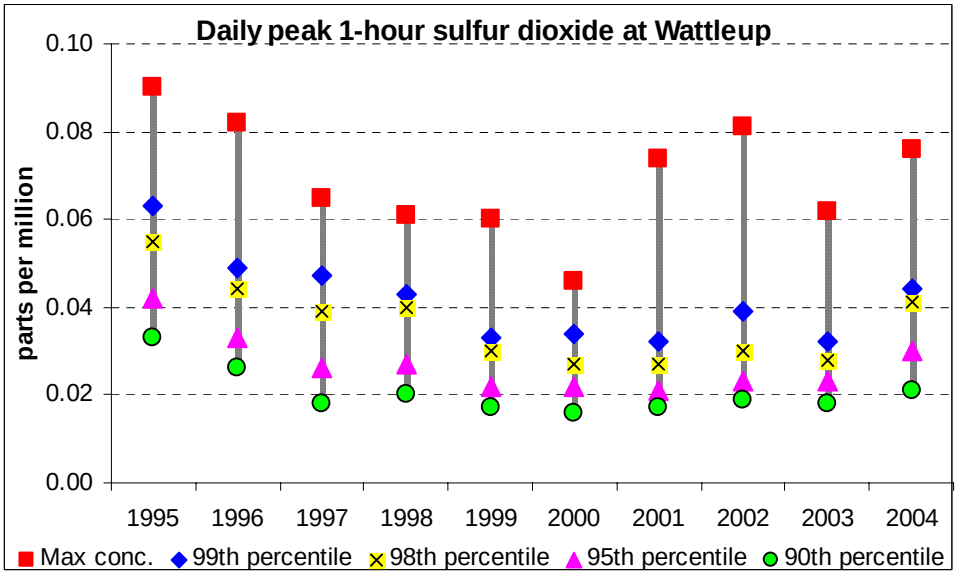


Figure A9-29 - 1-hour sulfur dioxide at Wattleup

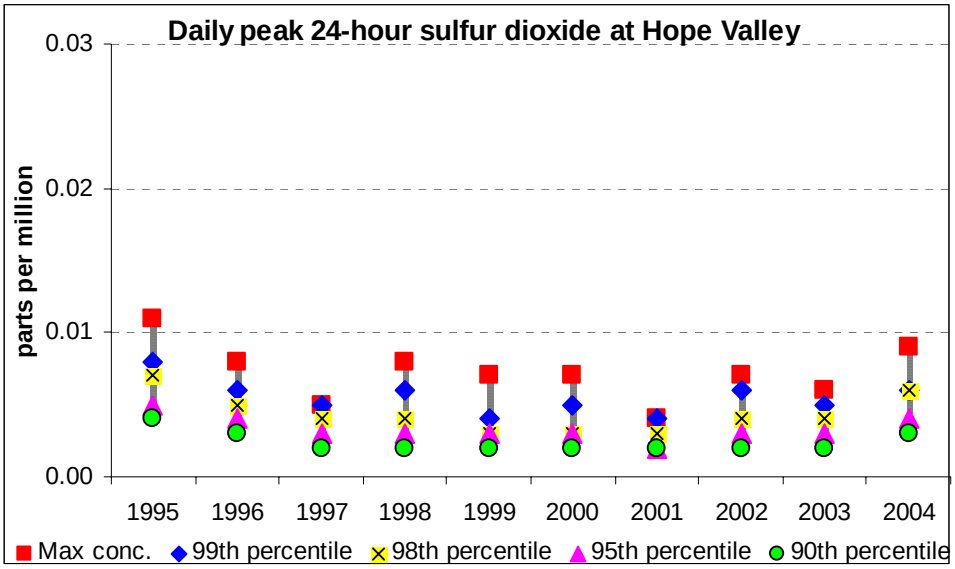


Figure A9-30 - 24-hour sulfur dioxide at Hope Valley

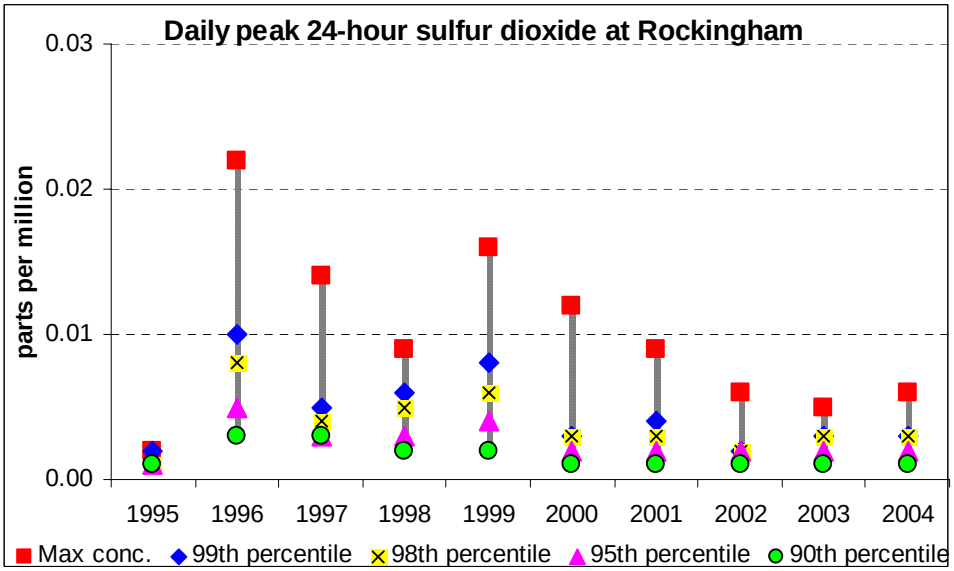


Figure A9-31 - 24-hour sulfur dioxide at Rockingham

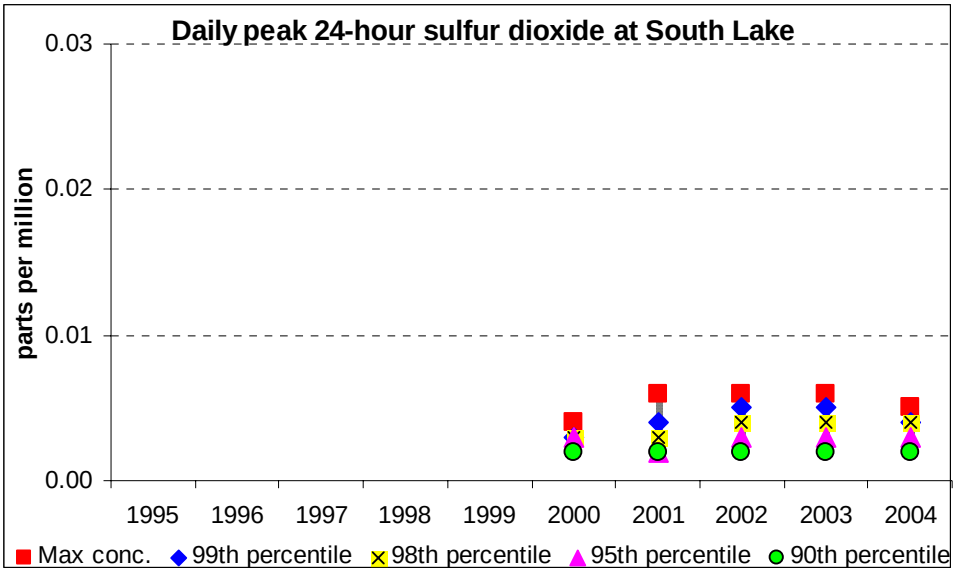


Figure A9-32 - 24-hour sulfur dioxide at South Lake

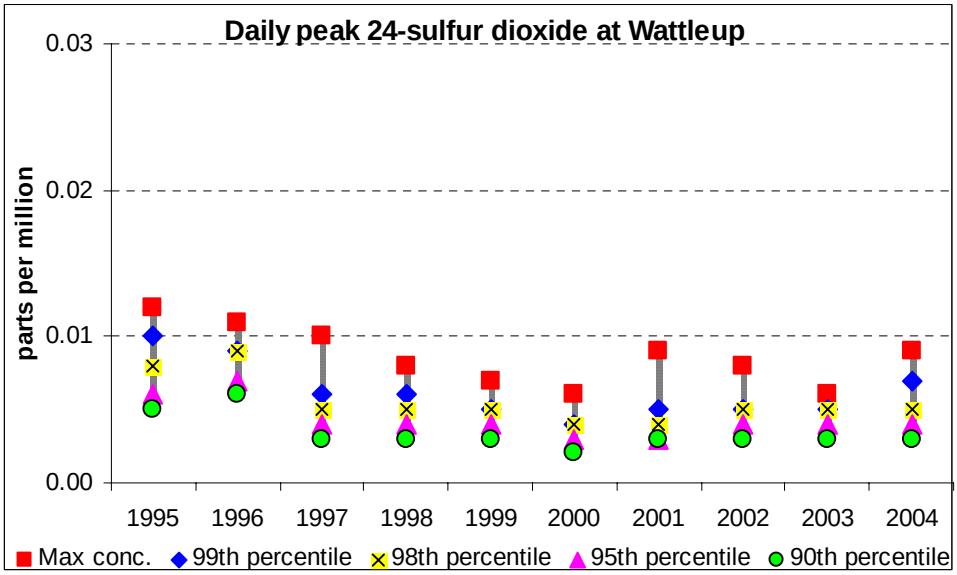


Figure A9-33 - 24-hour sulfur dioxide at Wattleup

Particles as PM_{10}

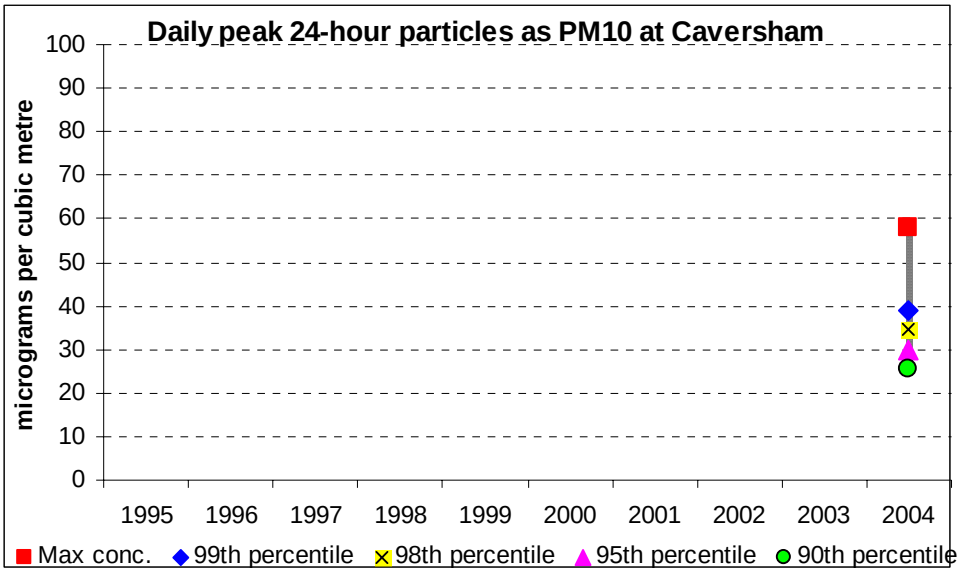


Figure A9-34 - 24-hour PM_{10} at Caversham

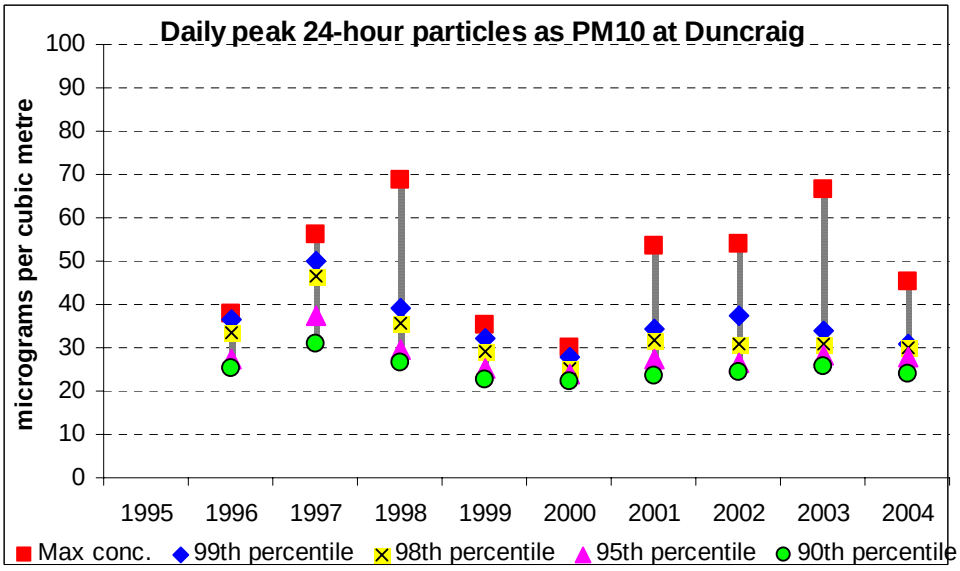


Figure A9-35 - 24-hour PM_{10} at Duncraig

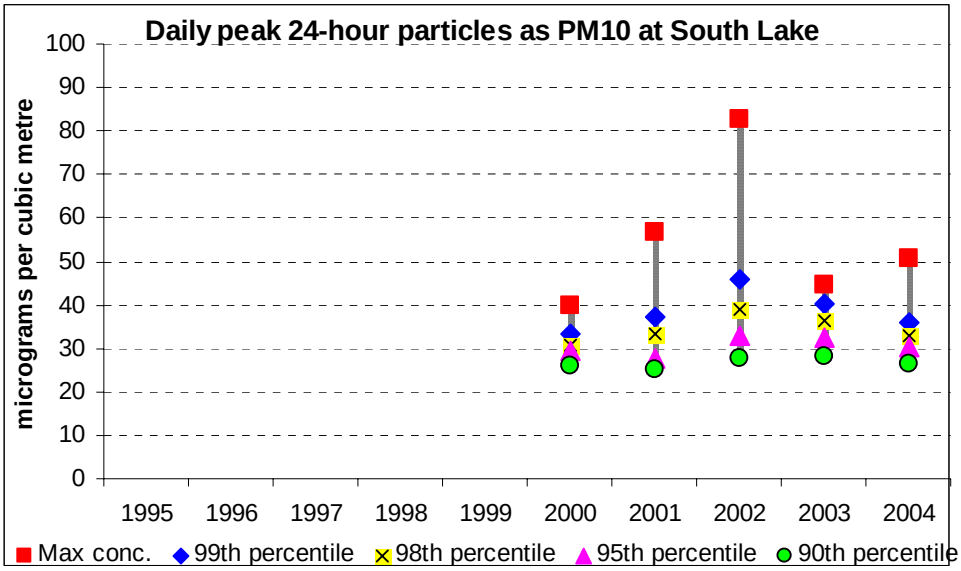


Figure A9-36 - 24-hour PM_{10} at South Lake

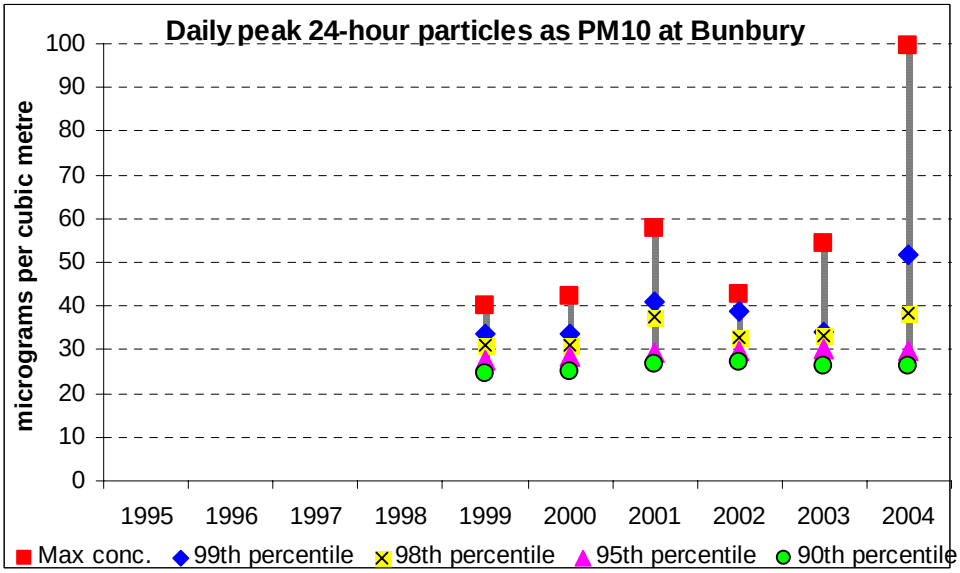


Figure A9-37 - 24-hour PM_{10} at Bunbury

Particles as $PM_{2.5}$

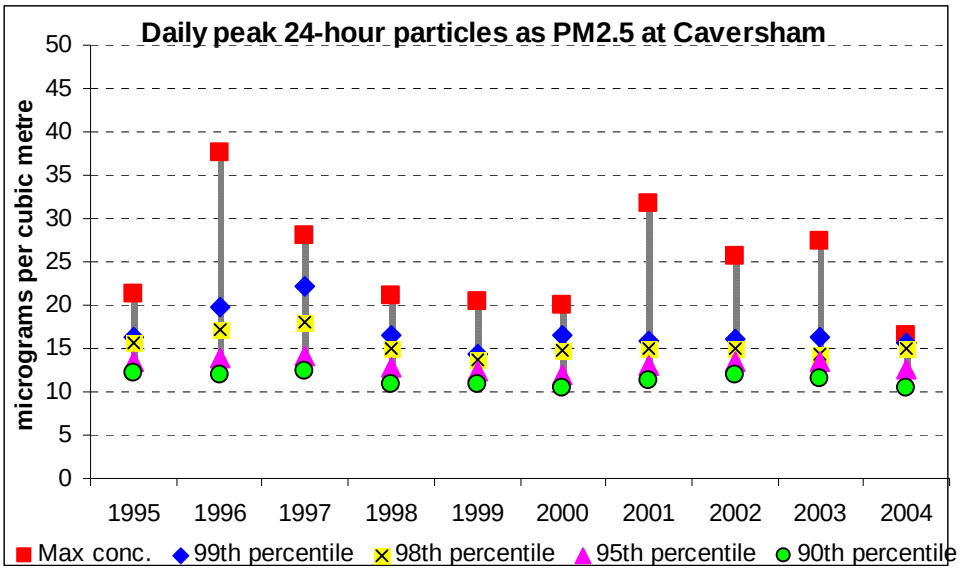


Figure A9-38 - 24-hour $PM_{2.5}$ at Caversham

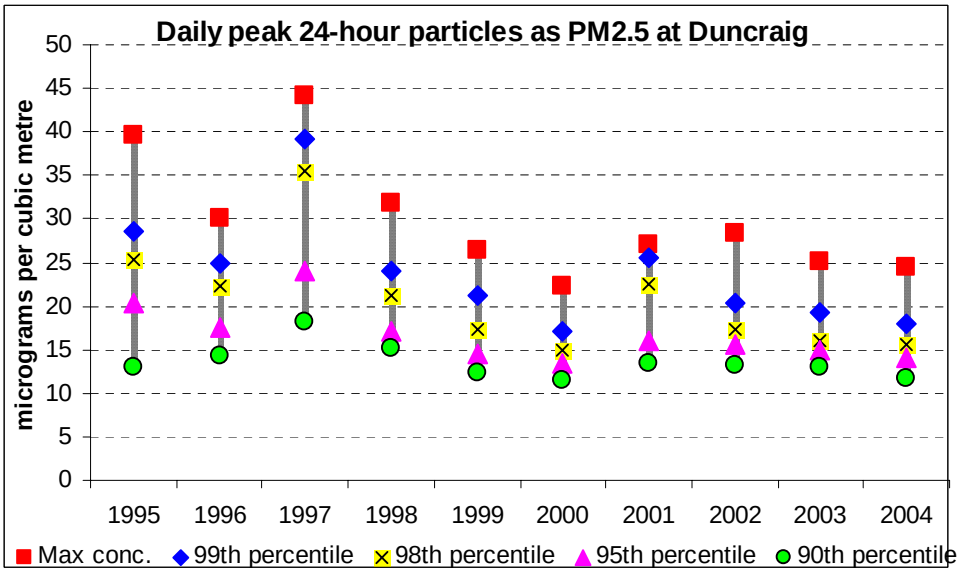


Figure A9-39 - 24-hour $PM_{2.5}$ at Duncraig

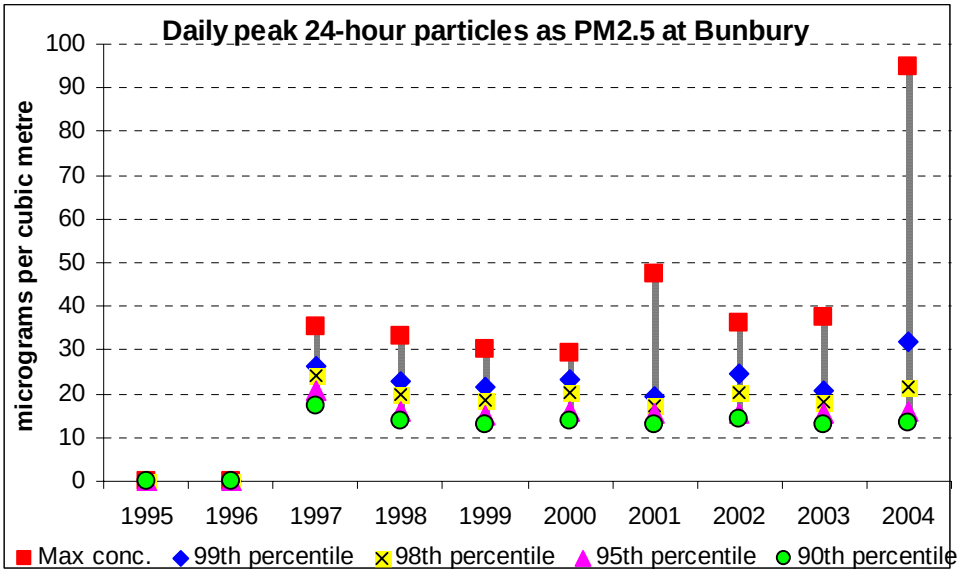


Figure A9-40 - 24-hour $PM_{2.5}$ at Bunbury