NATIONAL ENVIRONMENT PROTECTION (AMBIENT AIR QUALITY) MEASURE

ANNUAL COMPLIANCE REPORT 2003

(Prepared July 2004)

DEPARTMENT OF ENVIRONMENT AND CONSERVATION (NEW SOUTH WALES)

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Contents

Introduction

The goal of the NEPM for Ambient Air Quality (AAQ NEPM) is to meet the NEPM standards (within the maximum number of allowable exceedences) by 2008.

This report, required under Clause (18) of the AAQ NEPM, demonstrates that in 2003 NSW has met the requirements of the AAQ NEPM for most pollutants. Non-compliance has been demonstrated for ozone in Sydney, and the Illawarra region, and for particles as PM_{10} in all regions except the lower Hunter.

The severe drought conditions experienced during 2003 adversely impacted on air quality across NSW, particularly in the south of the state. Extraordinary natural events such as bushfires and dust storms contributed to the AAQ NEPM standards for ozone and particles being exceeded.

Meeting the AAQ NEPM goal for ozone will be a challenge for the major urban areas of NSW given pressures from a growing population, urban expansion and associated increase in motor vehicle use. However, NSW has a broad range of strategies to reduce precursor pollutants in place, or being developed, under its twenty-five year air quality management plan, Action for Air. These include the requirement for Stage 1 vapour controls at service stations in Sydney, the NSW Cleaner Vehicles Action Plan as well as initiatives under the Cleaner Industries Program and the Clean Air Fund. The latter two focus on reducing precursor emissions from smaller, commercial/industrial sources and, in the case of the Clean Air Fund, also domestic sources. A review of the regulatory framework covering larger industry is underway. These measures, together with stricter motor vehicle emission standards, tighter fuel regulations, including the introduction of regulated limits on summer petrol volatility in Sydney, and NSW Diesel NEPM programs will help move NSW towards meeting the NEPM goal for ozone in the longer term.

Over and above the impacts of drought, bushfires and dust storms, meeting the AAQ NEPM for particles, measured as PM_{10}, presents a similar challenge in NSW, particularly in rural population centres where a combination of topography, climate, and relatively high use of solid fuel heaters, combine to produce elevated levels of particles in winter. In addition to the Department of Environment and Conservation (DEC) ongoing public education campaign "Don't light tonight unless your heater is right", which informs people how to use their wood heaters more efficiently, a Woodsmoke Reduction Program has been established in regional NSW. These woodsmoke initiatives are supported by the Clean Air Regulation under the Protection of the Environment Operations (POEO) Act, which requires that new wood heaters meet the emissions limits in the Australian Standard. Under the POEO Act councils have the power to take action against people creating excessive smoke from wood heaters and under the State's planning legislation councils have the power to limit or ban the installation of wood heaters.

This year also sees the inclusion of fine particle data, measured as $PM_{2.5}$, for the first time. Unlike the main criteria pollutants these data are reported against an advisory reporting standard and not an AAQ NEPM standard. Hence they are included as Appendix A of this report.

Formation of the DEC

In September 2003 the NSW Environment Protection Authority (EPA) was brought together with the National Parks and Wildlife Service (NPWS), Resource NSW, and the Botanic Gardens and Domain Trust to form the NSW Department of Environment and Conservation (DEC). The former Environment Protection Authority's air programme has been incorporated into the new department.

Monitoring summary

NSW Air Quality Monitoring Plan (AQMP)

Under the AAQ NEPM, jurisdictions were required to prepare a Monitoring Plan to meet the monitoring requirements detailed in the AAQ NEPM. The approved NSW AAQ NEPM monitoring plan outlines the monitoring network for each of the required pollutants and is available on the EPA website www.epa.nsw.gov.au/air/nepm/index.htm

The NSW AAQ NEPM Monitoring Plan was approved as consistent with the AAQ NEPM by NEPC on 29 June 2001. Twenty-seven monitoring stations are nominated in the plan, being a mixture of permanent and campaign stations. Twenty-one stations are currently operational and six stations will be established according to a staged schedule.

The Sydney region

The NSW AAQ NEPM Monitoring Plan provides for monitoring in the Sydney region to be undertaken at seven trend stations, three performance stations, and two campaign stations. The new Macarthur station will be installed in 2004 and will replace the Liverpool station as an AAQ NEPM station. The Central Coast station is not expected to be installed until late 2005. The CBD station is a peak station as defined in AS 2922-1987 rather than a neighbourhood station.

The trend station at Lidcombe was closed due to construction activity in May 2002. A new station was established nearby at Chullora in December 2002.

AAQ NEPM screening guidelines allow for carbon monoxide and lead to be monitored at fewer stations. For carbon monoxide four trend stations and the peak CBD station are used, and for lead the Rozelle trend station and the CBD peak station are used.

Table 1: Sydney region AAQ NEPM monitoring network

Station	Station type [1]	Number of parameters	Ozone	Nitrogen dioxide	PM_{10}	Carbon monoxide	Sulfur dioxide	Lead
Blacktown	T	5	X	X	X	X	X	
Bringelly	T	4	X	X	X		X	
Central Coast [2]	C	4	X	X	X		X	
Chullora [3]	T	5	X	X	X	X	X [7]	
Liverpool [4]	C	5	X	X	X	X	X [7]	
Macarthur [5]	T	5	X	X	X	X	X	
Oakdale	P	2	X		X [8]			
Richmond	T	4	X	X	X		X	
Rozelle	T	5	X	X	X	X		X
St Marys	P	1	X					
Woolooware	T	4	X	X	X		X	
CBD [6]	P	2				X		X

(1) P denotes performance; T denotes trend; C denotes campaign.
(2) Scheduled to begin operation in 2005.
(3) Replaced the Lidcombe trend station.
(4) Data from the Liverpool station will be reported at least until the Macarthur station is established.
(5) Scheduled to begin operation in 2004.
(6) Peak station.
(7) Instrument to be installed in 2005.
(8) Instrument to be installed in 2004.

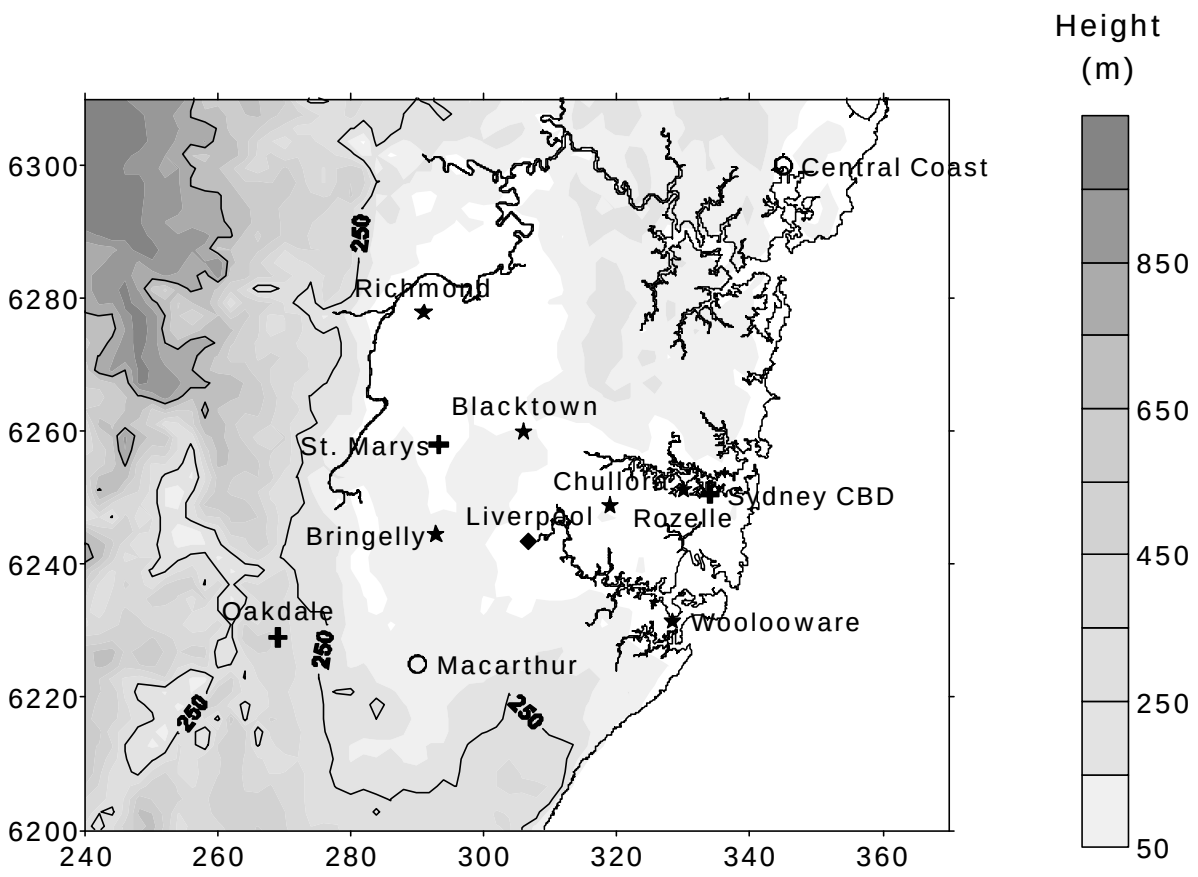

Figure 1: AAQ NEPM Monitoring in the Sydney region (AMG co-ordinates)

★ trend station; + performance station; ◆ campaign station; ○ proposed station;

The Lower Hunter region

The NSW AAQ NEPM Monitoring Plan provides for monitoring at two stations in the Lower Hunter region. Current monitoring has focussed on Newcastle and its environs. The installation of the planned trend station in the Maitland area has been delayed. Until this station is established, data from the existing stations at Wallsend and Beresfield will be reported.

AAQ NEPM screening guidelines allow for carbon monoxide to be monitored at fewer stations. Carbon monoxide is monitored only at the Newcastle trend station.

Table 2: Lower Hunter region AAQ NEPM monitoring network

Station	Station Type (1)	Number of parameters	Ozone	Nitrogen dioxide	PM_{10}	Carbon monoxide	Sulfur dioxide	Lead
Newcastle	T	5	X	X	X (4)	X	X (5)	
Maitland (2)	T	5	X	X	X		X	X (C)
Beresfield (3)	C	1			X			
Wallsend (3)	C	4	X	X			X	X (C)

(1) P denotes performance; T denotes trend, C denotes campaign.
(2) Scheduled to begin operation in 2004, but delayed.
(3) Data from Beresfield and Wallsend will be reported at least until the Maitland station is established.
(4) Instrument to be installed in 2004.
(5) Instrument to be installed in 2005.

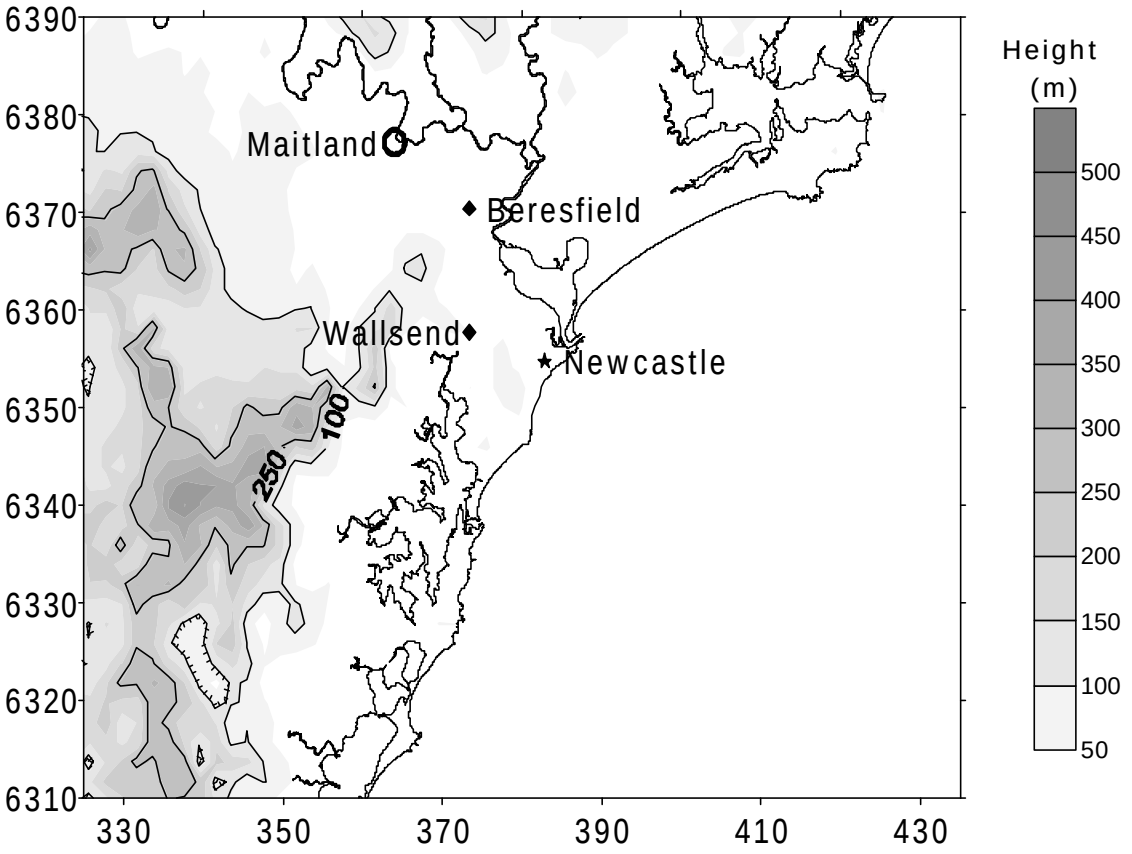

Figure 2: AAQ NEPM Monitoring in the Lower Hunter region (AMG co-ordinates)

★ trend station; ◆ campaign station; ○ proposed station;

The Illawarra region

In the Illawarra, the presence of industrial sources in the region, the occurrence of emissions transport from Sydney, and the complexity of the region together result in a need for a greater monitoring effort than that indicated purely on the basis of population. Accordingly, the general air quality to which the urban population is exposed will be characterised by monitoring all pollutants of interest at the trend station at Wollongong and the performance station at Albion Park. Two additional stations represent the local conditions at Kembla Grange and Warrawong.

AAQ NEPM screening guidelines allow for carbon monoxide to be monitored at fewer stations. Carbon monoxide is monitored only at the Wollongong trend station.

Table 3: Illawarra region AAQ NEPM monitoring network

Station	Station type (1)	Number of parameters	Ozone	Nitrogen dioxide	PM_{10}	Carbon monoxide	Sulfur dioxide	Lead
Albion Park	P	4	X	X	X		X	
Kembla Grange	P	2	X		X (2)			
Warrawong	P	2					X	X(C)
Wollongong	T	5	X	X	X	X	X	

(1) P denotes performance; T denotes trend; C denotes campaign.
(2) Instrument to be installed in 2004.

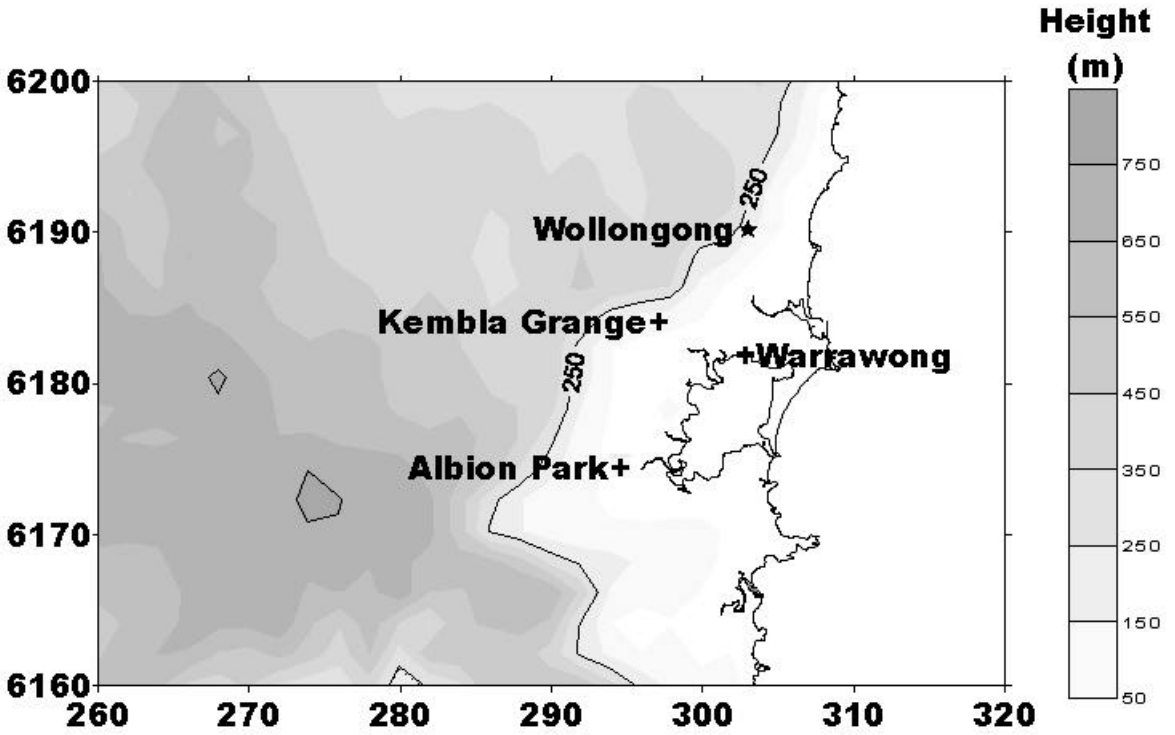

Figure 3: AAQ NEPM Monitoring in the Illawarra region (AMG co-ordinates)

★ trend station; + performance station;

Other regions

The NSW AAQ NEPM Monitoring Plan provides for monitoring at several regional centres of NSW. AAQ NEPM screening guidelines allow for carbon monoxide, nitrogen dioxide, ozone, sulfur dioxide and lead not to be monitored at these rural population centres.

Several regional centres are located on the tablelands where smoke from wood fires may be of concern during winter. As there is the potential for exceedences of the AAQ NEPM goal for particles, the Department of Environment and Conservation (DEC) has begun campaign monitoring at Albury, Bathurst, Tamworth and Wagga Wagga. On completion of these campaigns the data will be evaluated against the screening procedures. A decision will be made whether it is necessary to establish further campaign stations at Dubbo, Lismore, and Orange as originally proposed.

Table 4: Rural NSW AAQ NEPM monitoring network

Station	Station type (1)	Number of parameters	Ozone	Nitrogen dioxide	PM_{10}	Carbon monoxide	Sulfur dioxide	Lead
Albury	C	1			X			
Bathurst	C	2	X		X			
Dubbo (2)	C	1			X			
Lismore (2)	C	1			X			
Orange (2)	C	1			X			
Tamworth	C	1			X			
Wagga Wagga	C	1			X			

(1) C denotes campaign.
(2) Monitoring subject to results from initial campaign monitoring.

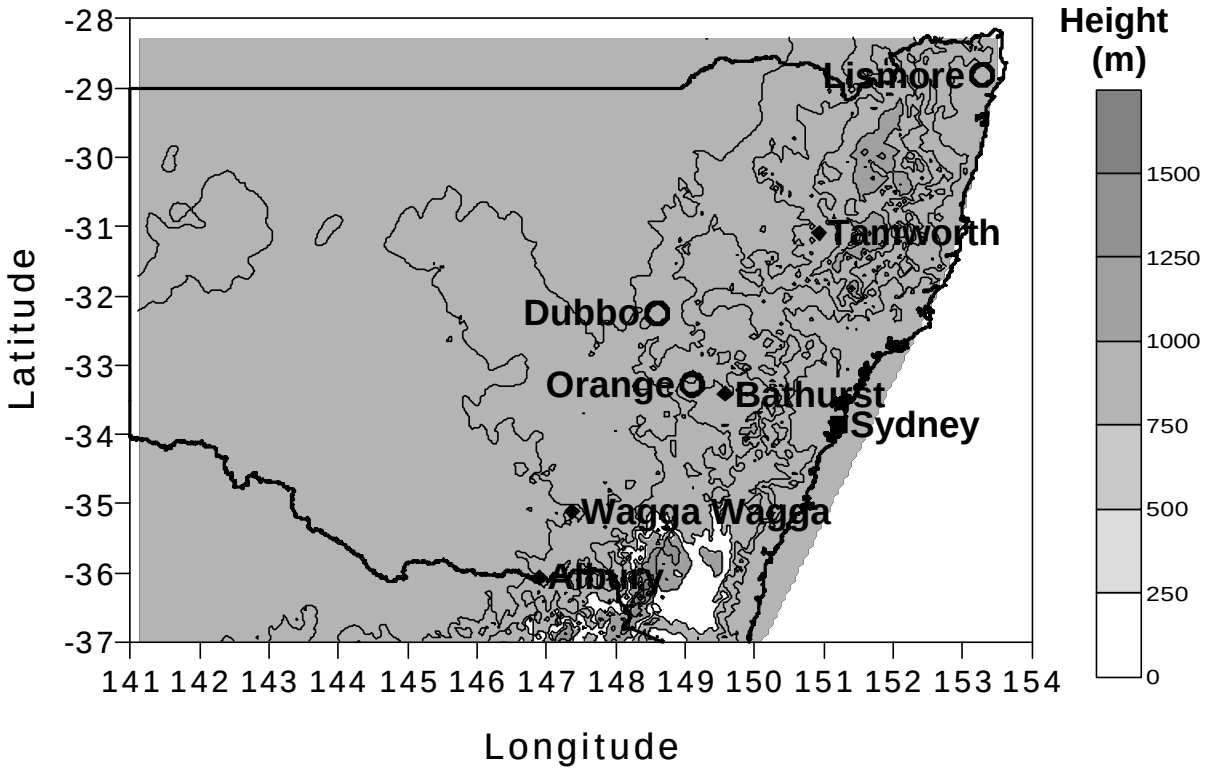

Figure 4: AAQ NEPM Monitoring in rural New South Wales

◆ campaign station; ○ proposed station;

Population exposure

Under the NSW AAQ NEPM Monitoring Plan, monitoring stations have been distributed to provide a reasonable coverage of the population while capturing the spatial variability of pollution events. The monitoring network covers a population of about 4 million in the greater metropolitan area of the Sydney, lower Hunter and Illawarra regions. The current monitoring in regional NSW covers an additional population of about 140 000. Information about the characteristics of individual monitoring stations and exposed population is given in the NSW Monitoring Plan, available on the EPA website www.epa.nsw.gov.au/air/nepm/index.htm

Table 5: Population exposure

Station	Exposed population
Sydney Region	
Blacktown	Trend station in a largely residential area in the northwest sub-region.
Bringelly	Trend station in a rural area in the southwest of the Sydney basin.
Chullora	Trend station in a mixed residential and commercial area. Replaced the Lidcombe trend station, which had operated since 1970.
Macarthur (1)	Trend station in the southwest of the Sydney basin. Data from Liverpool will be reported until this station is established.
Oakdale	Rural area on the SW edge of the Sydney basin - upper bound station for ozone.
Richmond	Trend station representing the residential area in the north of the Hawkesbury basin.
Rozelle	Trend station within the Parramatta River valley. Existing long-term station.
St Marys	Upper bound station for ozone in a residential area.
Sydney CBD	Upper bound station for CO and Pb in the central business district. This is a peak station adjacent to a heavily trafficked road in an urban canyon.
Woolooware	Trend station in a residential area on the south of Botany Bay and within five kilometres of a major industrial complex. Represents coastal conditions south of the CBD, reporting peak levels when precursors are trapped within coastal circulations.
Central Coast (2)	Trend station representing residential areas of the Central Coast.
Lower Hunter	
Beresfield	Performance station in a semi-rural area used as a proxy for the Maitland station.
Maitland (3)	Trend station representing residential area.
Newcastle	Trend station within the main population centre.
Wallsend	Performance station in a residential area used as a proxy for the yet-to-be-established Maitland station.
Illawarra	
Albion Park	Performance station in a semi-rural area in the south of the region.
Kembla Grange	Upper bound station in a residential area to the west of Lake Illawarra.
Warrawong	Upper bound station in an industrial-residential area.
Wollongong	Trend station in the main population/commercial centre.
Rural Population centres	
Tamworth	Rural township campaign station established 2000.
Bathurst	Rural township campaign station established 2000.
Wagga Wagga	Rural township campaign station established 2001.
Albury	Rural township campaign station established 2000.
Dubbo (4)	Rural township campaign station.
Orange (4)	Rural township campaign station.
Lismore (4)	Rural township campaign station.

(1) Data reported from Liverpool in the interim.

(2) Station to be established.

(3) Data reported from Beresfield and Wallsend in the interim.

(4) Future campaign stations are subject to evaluation of initial campaign monitoring.

Pollutant screening criteria

Clause 14(2) of NEPM allows for fewer performance monitoring stations where it can be demonstrated that pollutant levels are reasonably expected to be consistently lower than the NEPM standards. These screening criteria have been used for carbon monoxide, nitrogen dioxide, ozone, sulfur dioxide, and lead, at several regions in NSW. More detailed information regarding screening of pollutants for specific regions is given in the NSW Monitoring Plan, available on the EPA website www.epa.nsw.gov.au/air/nepm/index.htm

NATA accreditation

As required under Clause 12 of the AAQ NEPM, the DEC is accredited by the National Association of Testing Authorities (NATA) for the measurement of all AAQ NEPM parameters. The biennial reassessment of the Air Quality Monitoring Laboratory and associated monitoring stations was undertaken by NATA in May 2004. The DEC's accreditation has been continued.

Monitoring methods

The NSW network is comprised of instruments that are in accordance with the relevant Australian standard. It will be noted that, in the case of PM_{10}, the Tapered Element Oscillating Microbalance (TEOM) method is used for NEPM monitoring and reporting. PM_{10} data from the TEOM are presented as measured and unadjusted.

Table 6: Instruments used in NSW for NEPM monitoring

Pollutant	Standard	Title	Method used
Carbon monoxide	AS3580.7.1-1992	Ambient Air - Determination of Carbon Monoxide - Direct Reading Instrument Method	Gas Filter Correlation /Infra-Red
Nitrogen dioxide	AS3580.5.1-1993	Ambient Air - Determination of Oxides of Nitrogen - Chemiluminescence Method	Gas Phase Chemi-luminescence
Photochemical oxidant (ozone)	AS3580.6.1-1990	Ambient Air - Determination of Ozone - Direct Reading Instrument Method	Non Dispersive Ultra-violet
Sulfur dioxide	AS3580.4.1-1990	Ambient Air - Determination of Sulfur Dioxide - Direct Reading Instrument Method	Pulsed Fluorescence
Lead	AS2800-1985	Ambient Air - Determination of Particulate Lead-High Volume Sampler - Gravimetric Method	Atomic Absorption
Particles as PM_{10}	AS 3580.9.8-2001	Determination of Suspended particulate matter - PM_{10} continuous direct mass method using a tapered element oscillating microbalance analyser.	Tapered Element Oscillating Microbalance (TEOM)

Station siting and exposure

All stations within the network meet all of the AAQ NEPM siting and exposure criteria with the exceptions of Blacktown, CBD, Liverpool, Rozelle, Woolooware, Warrawong, Tamworth, and Wagga Wagga.

Table 7: Stations not complying with all siting and exposure criteria

Station	Siting criteria not met	Comments
Blacktown	Less than 20m from trees.	Best site in very limited area on Blacktown ridge
CBD	Clear sky angle <120°, restricted airflow.	Attributes typical of peak site in CBD.
Liverpool	Clear sky angle <120°.	Trees have grown since establishment of station.
Rozelle	Clear sky angle <120°. Less than 20m from trees.	Trees have grown since establishment of station.
Woolooware	Clear sky angle <120°. Less than 20m from trees.	Trees have grown since establishment of station.
Warrawong	Less than 20m from trees.	Best location in urban area specifically targeted for monitoring.
Tamworth	Less than 20m from trees.	Best location in urban area specifically targeted for monitoring.
Wagga Wagga	Less than 20m from trees.	Street trees within about 15 m of station

Data availability

Throughout this report data availability rates are presented as either percentages of available data, or as days available. These two rates are calculated using different methods. When presented as a percentage, the value is the number of averaging periods where data is valid, divided by the total number of averaging periods in the year. When presented as number of valid days, this value represents the number of days during the year when at least seventy-five percent of averaging periods during the day are valid.

For example the carbon monoxide standard is based on eight hour rolling averages. A valid hour is the average, over the preceding eight hours, of the valid one-hour averages, when at least six of those hours hold valid data. A valid day has at least eighteen valid hours. If we hypothesize that on each day throughout the year we had *exactly* eighteen valid hours, then annual data availability would be seventy-five percent. The number of valid days would be 365.

For the gaseous pollutants, carbon monoxide, nitrogen dioxide, ozone and sulfur dioxide, the NSW DEC undertakes daily an automated instrument calibration check. This occurs during the early hours of the morning, and sample data obtained during the calibration check is considered as invalid data. Hence for these pollutants the maximum number of valid one-hour averages in a day is twenty-three. All calculations for data availability given in this report *include* the invalid calibration hour (i.e. calculations assume that there are twenty-four *possible* valid hours in a day). Therefore for these pollutants the maximum that the annual one-hour data availability can be is 95.8 %.

For a pollutant that is reported against more than one standard, data availability rates may not be the same for each standard. For instance when measuring ozone, one hour of each day is lost during instrument calibration checks. This affects the data availability rates when reporting against the one hour standard but does not affect data availability rates when reporting against the four hour standard. The maximum data availability rates are thus 95.8% and 100% respectively.

For compliance reporting on standards with averaging periods less than twenty-four hours, peak daily values are given regardless of the number of valid hours in that day. For reporting of statistics, such as percentiles of daily maxima, on standards with averaging periods less than twenty-four hours, only days that have at least seventy-five percent of valid hours are used.

No significant amounts of data were lost during 2003. The Chullora station was established in December 2002 and some low data availability during the first quarter of 2003 was due to site/instrument commissioning problems. A PM_{10} monitor was installed at Rozelle during November 2003, hence data availability from this station does not meet the AAQ NEPM goal.

Some instrument failures led to data availability rates lower than the AAQ NEPM goal. These included the CO monitor at the CBD peak station, the NO_x monitor at Wallsend, the PM_{10} monitor at Beresfield, and the ozone monitor at Bathurst.

Assessment of compliance with standards and goal

The following tables summarise compliance with AAQ NEPM standards. For each pollutant, data availability, both quarterly and annual, the number of days when standards were exceeded, annual averages (where an annual standard exists), and an assessment of compliance, are given for each monitoring station within each region.

A station is assessed as complying with the AAQ NEPM standard if less than the allowed number of exceedences are recorded at the station, and data availability is greater than seventy-five percent both for the year, and for each quarter of the year. A station can demonstrate non-compliance if a greater number of days than allowed exceed the relevant standard, even if that station does not comply with data availability rates. If a station records no exceedences, or exceedences on a number of days less than that allowed, but has not complied with data availability rates, then the station is assessed as compliance not demonstrated.

A region demonstrates compliance when either all stations in the region demonstrate compliance, or when the region meets approved pollutant screening criteria.

Carbon monoxide

Table 8: 2003 compliance summary for CO in New South Wales

						AAQ NEPM Standard 9.0 ppm (8-hour average)	
Region/ Performance monitoring Station	Data availability rates (% of hours)					Number of exceedences (days)	Performance against the standards and goal
	Q1	Q2	Q3	Q4	Annual		
Sydney							
CBD	74.4	64.0	99.4	91.0	82.3	0	ND
Rozelle	92.7	94.0	90.1	95.5	93.1	0	Met
Chullora	41.0	48.6	77.3	86.3	63.5	0	ND
Blacktown	92.2	95.2	88.4	98.4	93.6	0	Met
Liverpool Macarthur (1)	99.0	96.9	83.2	94.8	93.4	0	Met
Illawarra							
Wollongong	99.6	97.0	90.5	98.6	96.4	0	Met
Lower Hunter							
Newcastle	98.3	97.2	76.6	100.0	93.0	0	Met

ND Not demonstrated.

(1) Station to be established. Data reported from Liverpool in the interim.

During 2003, the carbon monoxide standard was not exceeded anywhere within NSW where monitoring took place. Compliance with the AAQ NEPM goal was demonstrated in the Illawarra and lower Hunter regions, and by screening in rural population centres. Compliance was not demonstrated in Sydney because the data availability criteria were not met at Chullora (due to site commissioning) and the CBD peak station (due to filter wheel correlation problems).

Nitrogen dioxide

Table 9: 2003 compliance summary for NO_2 in New South Wales

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

Region/ Performance monitoring Station	Data availability rates (% of hours)					Number of Exceed-ences (days)	Annual mean (ppm)	Performance against the standards and goal	
	Q1	Q2	Q3	Q4	Annual			1-hour	1-year
Sydney									
Rozelle	77.6	92.5	89.8	94.2	88.6	0	0.014	Met	Met
Chullora	42.5	87.1	89.7	84.1	76.0	0	0.016	ND	ND
Woolooware	95.0	94.6	89.7	93.9	93.3	0	0.009	Met	Met
Blacktown	78.9	93.8	94.5	91.9	89.8	0	0.013	Met	Met
Richmond	86.9	94.7	95.5	94.6	93.0	0	0.007	Met	Met
Liverpool	89.2	81.2	93.0	93.4	89.2	0	0.013	Met	Met
Bringelly	92.6	90.2	83.6	82.0	87.1	0	0.007	Met	Met
Macarthur (1)									
Central Coast (2)									
Illawarra									
Wollongong	94.9	92.8	91.3	94.4	93.3	0	0.010	Met	Met
Albion Park	95.0	91.3	87.0	87.1	90.0	0	0.005	Met	Met
Lower Hunter									
Wallsend	86.3	68.9	95.2	93.3	85.9	0	0.008	ND	ND
Newcastle	95.0	94.7	94.9	95.4	95.0	0	0.008	Met	Met
Maitland (3)									

ND Not demonstrated.

(1) Station to be established. Data reported from Liverpool in the interim.

(2) Station to be established.

(3) Station to be established. Data reported from Wallsend in the interim.

During 2003, the nitrogen dioxide 1-hour and annual standards were not exceeded anywhere within NSW where monitoring took place. Compliance with the AAQ NEPM goal was demonstrated in Sydney (with the exception of the Chullora station which was being commissioned during the first quarter of the year and hence did not meet the data availability criteria) and the Illawarra, and through screening in rural population centres. Compliance was not demonstrated in the lower Hunter because the data availability criteria were not met at the Wallsend station due to major instrument faults.

Ozone

Table 10: 2003 compliance summary for O_3 in New South Wales

Region/ Performance monitoring Station	Data availability rates (% of hours)					Number of exceedences (days)		Performance against the standards and goal	
						AAQ NEPM standard 0.10 ppm (1-hour average) 0.08 ppm (4-hour average)			
	Q1	Q2	Q3	Q4	Annual	1-hour	4-hour	1-hour	4-hour
Sydney									
Rozelle	84.0	92.1	94.0	94.3	91.2	0	0	Met	Met
Chullora	56.0	88.8	92.3	85.0	80.6	0	0	ND	ND
Woolooware	95.1	86.4	92.0	90.3	90.9	1	1	Met	Met
Blacktown	87.7	95.1	82.9	95.6	90.3	**3**	**3**	Not met	Not met
St Marys	84.9	95.3	95.1	95.4	92.7	0	**2**	Met	Not met
Richmond	71.6	93.6	88.7	90.1	86.1	**2**	**3**	Not met	Not met
Liverpool	94.4	92.9	93.3	92.5	93.3	**4**	**3**	Not met	Not met
Bringelly	93.8	94.8	82.0	94.6	91.3	**3**	**5**	Not met	Not met
Oakdale	93.8	94.6	95.0	81.0	91.1	1	**3**	Met	Not met
Macarthur (1)									
Central Coast (2)									
Illawarra									
Wollongong	94.9	90.9	93.8	91.4	92.8	0	1	Met	Met
Kembla Grange	93.6	94.2	90.6	94.9	93.3	**2**	**3**	Not met	Not met
Albion Park	95.1	91.3	93.1	91.8	92.8	**4**	**4**	Not met	Not met
Lower Hunter									
Wallsend	85.0	91.6	95.5	94.1	91.6	0	0	Met	Met
Newcastle	95.2	92.5	86.3	95.5	92.4	0	0	Met	Met
Maitland (3)									
Regional									
Bathurst	23.1	90.6	95.3	95.6	76.4	0	0	ND	ND

ND Not demonstrated.

Bold font indicates values that exceed the AAQ NEPM standard

(1) Station to be established. Data reported from Liverpool in the interim.

(2) Station to be established

(3) Station to be established. Data reported from Wallsend in the interim.

Both the 1-hour and 4-hour standards for ozone were exceeded in NSW during 2003. Sydney and the Illawarra region did not comply with the AAQ NEPM goal. Compliance was demonstrated in the lower Hunter by monitoring and through screening in rural population centres. Compliance was not demonstrated in Bathurst because the data availability criteria were not met as a result of an instrument fault.

Sulfur dioxide

Table 11: 2003 compliance summary for SO_2 in New South Wales

Region/ Performance monitoring Station	Data availability rates (% of hours)					Number of exceedences (days)		Annual Mean (ppm)	Performance against the standards and goal		
	Q1	Q2	Q3	Q4	Annual	1-hour	24-hour		1-hour	24-hour	1-year
								AAQ NEPM standards	**0.20 ppm (1-hour average)**	**0.08 ppm (24-hour average)**	**0.02 ppm (1-year average)**
Sydney											
Chullora [4]											
Woolooware	95.0	93.5	91.8	92.5	93.2	0	0	0.001	Met	Met	Met
Blacktown	81.8	92.8	95.2	95.3	91.3	0	0	0.001	Met	Met	Met
Richmond	87.3	94.7	95.4	94.6	93.0	0	0	0.000	Met	Met	Met
Liverpool [4]											
Bringelly	94.3	94.6	90.0	93.1	93.0	0	0	0.000	Met	Met	Met
Macarthur [1]											
Central Coast [2]											
Illawarra											
Wollongong	94.9	92.8	93.5	93.7	93.7	0	0	0.001	Met	Met	Met
Warrawong	94.0	93.3	94.9	92.5	93.7	0	0	0.001	Met	Met	Met
Albion Park	93.8	94.3	93.0	93.7	93.7	0	0	0.001	Met	Met	Met
Lower Hunter											
Wallsend	86.3	92.0	94.2	88.4	90.3	0	0	0.002	Met	Met	Met
Newcastle											
Maitland [3]											

ND Not demonstrated.

(1) Station to be established. Data reported from Liverpool in the interim.

(2) Station to be established.

(3) Station to be established. Data reported from Wallsend in the interim.

(4) Instrument to be installed in 2005.

During 2003, the sulfur dioxide 1-hour, 24-hour and annual standards were not exceeded anywhere within NSW where monitoring took place. Compliance with the AAQ NEPM goal was demonstrated in Sydney, the Illawarra and lower Hunter regions, and through screening in rural population centres.

Particles as PM_{10}

Table 12: 2003 compliance summary for PM_{10} in New South Wales

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

Region/ Performance monitoring Station	Data availability rates (% of days)					Number of exceedences (days)	Performance against the standards and goal
	Q1	Q2	Q3	Q4	Annual		
Sydney							
Rozelle (4)	00.0	00.0	00.0	39.1	09.9	0	ND
Chullora	81.1	94.5	96.7	69.6	85.5	**10**	Not met
Woolooware	88.9	100.0	95.7	98.9	95.9	2	Met
Blacktown	95.6	97.8	95.7	91.3	95.1	4	Met
St Marys	87.8	96.7	80.4	93.5	89.6	4	Met
Richmond	91.1	97.8	100.0	100.0	97.3	**7**	Not met
Liverpool	92.2	94.5	82.6	92.4	90.4	**6**	Not met
Bringelly	97.8	98.9	97.8	97.8	98.1	4	Met
Oakdale (3)							
Central Coast (1)							
Illawarra							
Wollongong	100.0	96.7	97.8	100.0	98.6	**7**	Not met
Warrawong	100.0	98.9	100.0	97.8	99.2	5	Met
Albion Park	94.4	98.9	97.8	98.9	97.5	4	Met
Lower Hunter							
Beresfield	68.9	100.0	98.9	100.0	92.1	5	ND
Newcastle (3)							
Wallsend	85.6	86.8	90.2	98.9	90.4	5	Met
Maitland (2)							
Regional							
Tamworth	98.9	98.9	97.8	76.1	92.9	**7**	Not met
Bathurst	71.1	92.3	98.9	98.9	90.4	**12**	Not met
Wagga Wagga	65.6	97.8	97.8	92.4	88.5	**23**	Not met
Albury	94.4	97.8	92.4	42.4	81.6	**28**	Not met
Orange (1)							
Dubbo (1)							
Lismore (1)							

ND Not demonstrated. **Bold** font indicates values that exceed the AAQ NEPM standard

(1) Station to be established.

(2) Station to be established. Data reported from Beresfield and Wallsend in the interim.

(3) Instrument to be installed.

(4) Instrument installed November 2003.

During 2003 the PM_{10} standard was exceeded in all regions where monitoring took place. Sydney, Illawarra, Tamworth, Bathurst, Albury and Wagga Wagga did not comply with the AAQ NEPM goal. Compliance with the AAQ NEPM goal was not demonstrated in the lower Hunter region.

Lead

Table 13: 2003 compliance summary for Pb in New South Wales

Region/ Performance monitoring Station	Data availability rates (% of days)					AAQ NEPM Standard 0.5 µg/m^3 (1-year average)	
	Q1	Q2	Q3	Q4	Annual	Annual Mean (µg/m^3)	Performance against the standards and goal
Sydney							
CBD	100.0	80.0	100.0	100.0	93.4	0.03	Met
Rozelle	100.0	93.3	93.8	93.3	95.1	0.02	Met
Illawarra							
Warrawong	93.3	93.3	81.3	93.3	90.2	0.02	Met
Lower Hunter							
Wallsend Maitland (1)	86.7	100.0	81.3	100.0	91.8	0.09	Met

ND Not demonstrated.

(1) Station to be established. Data reported from Wallsend in the interim.

The lead standard was not exceeded in any region in 2003 where monitoring took place. Compliance with the AAQ NEPM goal was demonstrated through monitoring in the Sydney, Illawarra and lower Hunter regions, and by screening in rural population centres. Highest lead readings were at the Wallsend station where an annual average of 0.09 µg/m^3 was recorded. Nevertheless this value is still very low representing only 18% of the AAQ NEPM standard.

Analysis of air quality monitoring

The AAQ NEPM states that short-term standards should not be exceeded on more than one day per year for carbon monoxide, nitrogen dioxide, ozone and sulfur dioxide, and on no more than five days per year for particles (PM_{10}). With this form of standard, the non-overlapping second highest daily value (or the sixth for PM_{10}) becomes the value against which compliance is assessed. If this value is greater than the standard then non-compliance is reported.

All days where a particular standard for a pollutant has been exceeded are listed. Also listed are the stations that recorded an exceedence of the standard on that day, and for averaging periods less than twenty-four hours, the number of averaging periods in the day that the standard was exceeded.

Where possible a brief comment is given for particular pollution events. Events that have been clearly influenced by extraordinary natural events, such as bushfires and dust storms, are highlighted. It should be noted that the absence of a comment does not necessarily indicate the absence of such influences, rather that there is no clear information available. In some cases it is likely that there has been some influence, but the extent of this influence cannot be absolutely determined.

Carbon monoxide

Table 14: Summary for CO - Daily maximum rolling 8-hour average concentrations (2003)

Region/ Performance monitoring Station	Data availability rates (%)	Number of valid days	Maximum values (ppm)			
			Highest Value	Highest Date	2nd Highest Value	2nd Highest Date
Sydney						
CBD	82.3	274	4.7	08-May	4.7	17-Jul
Rozelle	93.1	325	2.2	04-Jul	1.8	08-May
Chullora	63.5	185	2.3	08-May	1.8	04-Jul
Blacktown	93.6	343	2.5	04-Jul	2.3	19-Jun
Liverpool Macarthur (1)	93.4	334	5.5	09-Jul	3.9	31-May
Illawarra						
Wollongong	96.4	347	2.1	19-Jun	2.0	03-Aug
Lower Hunter						
Newcastle	93.0	333	2.8	12-Jun	2.6	31-May

AAQ NEPM Standard - 9.0 ppm (rolling 8-hour average)

(1) Station to be established. Data reported from Liverpool in the interim.

Carbon monoxide levels are well below the AAQ NEPM standard. The highest recorded value in the state was at the Liverpool monitoring station, and was only 61 per cent of the standard. Levels in all other regions, with the exception of the CBD peak station, are significantly lower.

Nitrogen dioxide

Table 15: Summary for NO_2 - Daily maximum 1-hour average concentrations (2003)

Region/ Performance monitoring Station	Data availability rates (%)	Number of valid days	Maximum values (ppm)			
			Highest Value	Highest Date	2nd Highest Value	2nd Highest Date
Sydney						
Rozelle	88.6	337	0.052	05-Sep	0.051	05-Nov
Chullora	76.0	280	0.066	08-Jul	0.061	11-Dec
Woolooware	93.3	355	0.054	04-Aug	0.053	11-Dec
Blacktown	89.8	340	0.055	20-Nov	0.051	10-Sep
Richmond	93.0	355	0.036	10-Sep	0.036	08-Apr
Liverpool	89.2	336	0.064	20-Nov	0.055	08-Jul
Bringelly	87.1	327	0.044	20-Nov	0.036	08-Jul
Macarthur (1)						
Central Coast (2)						
Illawarra						
Wollongong	93.3	357	0.049	20-Nov	0.048	04-Jun
Albion Park	90.0	344	0.048	22-Aug	0.042	12-Aug
Lower Hunter						
Wallsend	85.9	326	0.050	26-Sep	0.044	13-Feb
Newcastle	95.0	364	0.039	26-Sep	0.036	21-Sep
Maitland (3)						

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

(1) Station to be established. Data reported from Liverpool in the interim.

(2) Station to be established.

(3) Station to be established. Data reported from Wallsend in the interim.

Levels of nitrogen dioxide are well below the AAQ NEPM standard in most regions of NSW. The highest recorded value in the state was 0.066 ppm (55 per cent of the standard) at the Chullora station.

Ozone

Table 16: Summary for O_3 - Daily maximum 1-hour average concentrations (2003)

Region/ Performance monitoring Station	Data availability rates (%)	Number of valid days	Maximum values (ppm)			
			Highest Value	Highest Date	2nd Highest Value	2nd Highest Date
Sydney						
Rozelle	91.2	349	0.083	26-Jan	0.076	25-Dec
Chullora	80.6	307	0.084	15-Nov	0.081	31-Dec
Wooloowaré	90.9	349	**0.106**	26-Jan	0.084	04-Dec
Blacktown	90.3	344	**0.181**	21-Jan	**0.124**	26-Jan
St Marys	92.7	354	0.093	31-Dec	0.091	20-Nov
Richmond	86.1	326	**0.148**	21-Jan	**0.115**	26-Jan
Liverpool	93.3	353	**0.151**	26-Jan	**0.149**	21-Jan
Bringelly	91.3	347	**0.155**	21-Jan	**0.136**	26-Jan
Oakdale	91.1	346	**0.102**	17-Jan	0.099	25-Jan
Macarthur (1)						
Central Coast (2)						
Illawarra						
Wollongong	92.8	355	0.097	19-Dec	0.091	15-Nov
Kembla Grange	93.3	356	**0.113**	26-Jan	**0.110**	15-Nov
Albion Park	92.8	356	**0.130**	26-Jan	**0.114**	18-Jan
Lower Hunter						
Wallsend	91.6	347	0.077	26-Jan	0.073	31-Dec
Newcastle	92.4	352	0.079	11-Dec	0.069	13-Dec
Maitland (3)						
Regional						
Bathurst	76.4	288	0.056	16-Jan	0.055	25-Dec

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

Bold font indicates values that exceed the AAQ NEPM standard

(1) Station to be established. Data reported from Liverpool in the interim.

(2) Station to be established

(3) Station to be established. Data reported from Wallsend in the interim.

Table 17: Summary for O_3 - Daily maximum rolling 4-hour average concentrations (2003)

Region/ Performance monitoring Station	Data availability rates (%)	Number of valid days	Maximum values (ppm)			
			Highest Value	Highest Date	2nd Highest Value	2nd Highest Date
Sydney						
Rozelle	95.3	349	0.070	25-Dec	0.068	26-Jan
Chullora	84.2	307	0.077	15-Nov	0.070	31-Dec
Woolooware	95.0	349	**0.089**	26-Jan	0.072	15-Nov
Blacktown	94.3	344	**0.157**	21-Jan	**0.116**	26-Jan
St Marys	96.8	354	**0.091**	31-Dec	**0.081**	20-Nov
Richmond	89.5	328	**0.138**	21-Jan	**0.105**	26-Jan
Liverpool	97.1	351	**0.132**	26-Jan	**0.108**	21-Jan
Bringelly	95.3	347	**0.133**	21-Jan	**0.115**	26-Jan
Oakdale	95.0	346	**0.089**	21-Jan	**0.085**	17-Jan
Macarthur (1)						
Central Coast (2)						
Illawarra						
Wollongong	96.4	355	**0.080**	26-Jan	0.080	19-Dec
Kembla Grange	97.4	356	**0.107**	26-Jan	**0.090**	15-Nov
Albion Park	96.8	356	**0.111**	26-Jan	**0.103**	18-Jan
Lower Hunter						
Wallsend	95.7	347	0.059	18-Jan	0.059	31-Dec
Newcastle	96.3	352	0.061	13-Dec	0.061	11-Dec
Maitland (3)						
Regional						
Bathurst	79.6	288	0.053	25-Dec	0.050	10-Dec

AAQ NEPM Standard - 0.08 ppm (rolling 4-hour average)

Bold font indicates values that exceed the AAQ NEPM standard

(1) Station to be established. Data reported from Liverpool in the interim.

(2) Station to be established.

(3) Station to be established. Data reported from Wallsend in the interim.

Table 18: Days when O_3 1-hour AAQ NEPM standard exceeded

Date	Stations where standard exceeded (and number of hours)	Comments(#)
17-Jan-2003	Oakdale (1)	Bushfires
18-Jan-2003	Albion Park (3)	Bushfires
21-Jan-2003	Blacktown (5), Bringelly (5), Liverpool (2), Richmond (4)	Bushfires
26-Jan-2003	Albion Park (3), Blacktown (7), Bringelly (7), Kembla Grange (3), Liverpool (4), Richmond (4), Woolooware (1)	Bushfires
15-Nov-2003	Albion Park (1), Kembla Grange (1)	
20-Nov-2003	Bringelly (1), Liverpool (1)	
19-Dec-2003	Albion Park (2)	
31-Dec-2003	Blacktown (1), Liverpool (2)	

(#) Events that can be clearly identified as influencing pollution levels

Table 19: Days when O_3 4-hour AAQ NEPM standard exceeded

Date	Stations where standard exceeded (and number of 4-hour periods)	Comments(#)
17-Jan-2003	Oakdale (2)	Bushfires
18-Jan-2003	Albion Park (5)	Bushfires
21-Jan-2003	Blacktown (6), Bringelly (6), Liverpool (4), Oakdale (3), Richmond (7)	Bushfires
25-Jan-2003	Bringelly (1), Oakdale (1)	Bushfires
26-Jan-2003	Albion Park (5), Blacktown (8), Bringelly (7), Kembla Grange (5), Liverpool (4), Richmond (8), Wollongong (1), Woolooware (3)	Bushfires
15-Nov-2003	Albion Park (3), Kembla Grange (3)	
20-Nov-2003	Bringelly (3), St Marys (1)	
19-Dec-2003	Albion Park (2), Kembla Grange (2)	
31-Dec-2003	Blacktown (3), Bringelly (2), Liverpool (3), St Marys (1), Richmond (4)	

(#) Events that can be clearly identified as influencing pollution levels

Ozone events in the Sydney and Illawarra regions are highly variable in terms of both frequency and severity. This is largely the result of the variability in annual meteorological conditions, which has the greatest effect on measures of frequency but can also have some influence on measures of peak concentrations. In the Sydney region emissions of ozone precursors (NOx and VOCs) are sufficient to generate concentrations of ozone well above the AAQ NEPM standards (EPA 2003).

Both the 1-hour and 4-hour AAQ NEPM standards were exceeded in the Sydney and the Illawarra regions. There were no exceedences of either standard in Bathurst or the lower Hunter region.

The 1-hour standard was exceeded at six stations in the Sydney region, and at Albion Park and Kembla Grange stations in the Illawarra region. Of the Sydney stations, the standard was exceeded on four days at Liverpool, three days at Blacktown and Bringelly, two days at Richmond, and one day at Oakdale and Woolooware. In the Illawarra region the standard was exceeded on four days at Albion Park and two days at Kembla Grange. The maximum value recorded in Sydney was 0.181 ppm at Blacktown on the 21st January. The maximum value in the Illawarra was 0.130 ppm recorded at Albion Park on the 26th January.

The 4-hour standard was exceeded at seven stations in the Sydney region and all stations in the Illawarra. Six stations in Sydney (Blacktown, Bringelly, Liverpool, Oakdale, St Marys, Richmond) and two stations in the Illawarra (Albion Park, Kembla Grange) exceeded the standard on two or more days. The maximum value recorded in Sydney was 0.157 ppm at Blacktown on the 21st January. The maximum in the Illawarra was 0.111 ppm recorded at Albion Park on the 26th January.

Conditions associated with bushfires during January 2003 influenced a number of ozone events. If these bushfire days are excluded, then the 1-hour and 4-hour standards were exceeded in the Sydney region on two days, the 20th November and the 31st December and in the Illawarra on two days, the 15th November and the 19th December.

Action for Air, the NSW Government's Air Quality Management Plan for Sydney, the Lower Hunter and the Illawarra, sets out a program of measures that target ground level ozone in summer. The Plan covers strategies designed to reduce emissions from industry, motor vehicles and domestic/commercial sources. These include the Cleaner Vehicles Action Plan; load based licensing for industrial facilities; the Cleaner Industries Program; and the Clean Air Program. A number of other measures are also being pursued as part of the ozone management strategy, including reducing the volatility of petrol in summer and vapour recovery at service stations and bulk terminals.

Sulfur dioxide

Table 20: Summary for SO_2 - Daily maximum 1-hour average concentrations (2003)

Region/ Performance monitoring Station	Data availability rates (%)	Number of valid days	Maximum values (ppm)			
			Highest Value	Highest Date	2nd Highest Value	2nd Highest Date
Sydney						
Chullora (4)						
Woolooware	93.2	358	0.022	26-Sep	0.022	12-Aug
Blacktown	91.3	347	0.016	30-Nov	0.016	21-Jan
Richmond	93.0	354	0.012	21-Jul	0.011	29-Jun
Liverpool (4)						
Bringelly	93.0	355	0.017	06-Feb	0.014	05-Dec
Macarthur (1)						
Central Coast (2)						
Illawarra						
Wollongong	93.7	359	0.031	02-Jan	0.031	04-Jan
Warrawong	93.7	359	0.063	21-Sep	0.058	05-Aug
Albion Park	93.7	361	0.035	31-Dec	0.032	20-Nov
Lower Hunter						
Wallsend	90.3	342	0.047	15-Jan	0.046	13-Feb
Newcastle						
Maitland (3)						

AAQ NEPM Standard - 0.20 ppm (1-hour average)

(1) Station to be established. Data reported from Liverpool in the interim.
(2) Station to be established.
(3) Station to be established. Data reported from Wallsend in the interim.
(4) Instrument to be installed.

Table 21: Summary for SO_2 - Maximum 24-hour average concentrations (2003)

Region/ Performance monitoring Station	Data availability rates (%)	Number of valid days	Maximum values (ppm)			
			Highest Value	Highest Date	2nd Highest Value	2nd Highest Date
Sydney						
Chullora (4)						
Woolooware	98.1	358	0.004	20-Nov	0.004	26-Jan
Blacktown	95.1	347	0.004	30-Nov	0.003	22-Aug
Richmond	97.0	354	0.003	17-Jan	0.003	25-Jan
Liverpool Bringelly Macarthur (1)	97.3	355	0.002	15-Oct	0.002	18-Dec
Central Coast (2)						
Illawarra						
Wollongong	98.4	359	0.006	04-Jan	0.006	27-Jan
Warrawong	98.4	359	0.012	05-Aug	0.012	21-Sep
Albion Park	98.9	361	0.009	31-Dec	0.008	30-Dec
Lower Hunter						
Wallsend Newcastle Maitland (3)	93.7	342	0.011	10-Aug	0.010	19-Jul

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

(1) Station to be established. Data reported from Liverpool in the interim.
(2) Station to be established.
(3) Station to be established. Data reported from Wallsend in the interim.
(4) Instrument to be installed.

SO_2 levels are significantly below the 1-hour, 24-hour and annual AAQ NEPM standards. Warrawong recorded the highest values with 0.063 and 0.012 ppm for the 1-hour and 24-hour standards respectively.

Particles as PM_{10}

Table 22: Summary for PM_{10} – Maximum 24-hour average concentrations (2003)

Region/ Performance monitoring Station	Data availability rates (%)	Number of valid days	Maximum values (µg/m³)			
			Highest Value	Highest Date	6th Highest Value	6th Highest Date
Sydney						
Rozelle	9.9	36	33.9	31-Dec	24.9	25-Dec
Chullora	85.5	312	**212.8**	20-Mar	**56.9**	23-Sep
Wooloowaare	95.9	350	**102.5**	20-Mar	39.5	05-Sep
Blacktown	95.1	347	**186.8**	20-Mar	48.8	06-Sep
St Marys	89.6	327	**211.3**	20-Mar	47.8	12-Apr
Richmond	97.3	355	**194.3**	20-Mar	**56.4**	06-Sep
Liverpool	90.4	330	**282.6**	20-Mar	**55.6**	18-Jan
Bringelly	98.1	358	**274.7**	20-Mar	48.6	31-Jan
Oakdale (3)						
Central Coast (1)						
Illawarra						
Wollongong	98.6	360	**280.5**	20-Mar	**52.1**	31-Dec
Warrawong	99.2	362	**308.4**	20-Mar	48.6	05-Aug
Albion Park	97.5	356	**281.0**	20-Mar	47.1	31-Dec
Lower Hunter						
Beresfield	92.1	336	**88.0**	29-Oct	49.1	16-Nov
Newcastle (3)						
Wallsend	90.4	330	**105.2**	29-Oct	49.4	01-Feb
Maitland (2)						
Regional						
Tamworth	92.9	339	**243.3**	29-Oct	**53.5**	22-Jan
Bathurst	90.4	330	**621.7**	20-Mar	**82.9**	21-Jan
Wagga Wagga	88.5	323	**837.0**	19-Mar	**111.1**	10-Feb
Albury	81.6	298	**921.4**	19-Mar	**204.3**	06-Feb
Orange (1)						
Dubbo (1)						
Lismore (1)						

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

Bold font indicates values that exceed the AAQ NEPM standard

(1) Station to be established.

(2) Station to be established. Data reported from Beresfield and Wallsend in the interim.

(3) Instrument to be installed.

(4) Instrument installed November 2003.

Table 23: Days when PM_{10} 24-hour AAQ NEPM standard exceeded

Date	Stations where standard exceeded	Comments(#)
8-Jan-2003	Tamworth, Wagga Wagga	Bushfires
9-Jan-2003	Tamworth	Bushfires
10-Jan-2003	Wagga Wagga	Bushfires
11-Jan-2003	Albury	Bushfires
12-Jan-2003	Albury	Bushfires
15-Jan-2003	Wagga Wagga	Bushfires
16-Jan-2003	Albury, Wagga Wagga	Bushfires
17-Jan-2003	Wagga Wagga	Bushfires
18-Jan-2003	Bathurst, Bringelly, Chullora, Liverpool, Richmond, Wagga Wagga, Warrawong, Wollongong	Bushfires
19-Jan-2003	Albury, Bathurst, Tamworth, Wagga Wagga	Bushfires
20-Jan-2003	Bathurst	
21-Jan-2003	Albion Park, Albury, Bathurst, Blacktown, Chullora, Liverpool, Richmond, St Marys, Wallsend, Warrawong, Wollongong, Woolooware	Bushfires
22-Jan-2003	Albury, Bathurst, Tamworth, Wagga Wagga	Bushfires
23-Jan-2003	Wagga Wagga	Bushfires
24-Jan-2003	Bathurst, Wagga Wagga	Bushfires
25-Jan-2003	Albury, Bathurst, Wagga Wagga	Bushfires
26-Jan-2003	Albion Park, Albury, Bathurst, Blacktown, Bringelly, Chullora, Liverpool, Richmond, St Marys, Wagga Wagga, Wollongong	Bushfires
27-Jan-2003	Albury, Wallsend	Bushfires
28-Jan-2003	Albury	Bushfires
29-Jan-2003	Albury	Bushfires
30-Jan-2003	Albion Park, Albury, Bathurst, Beresfield, Blacktown, Bringelly, Chullora, Liverpool, Richmond, Wallsend, Warrawong, Wollongong	Bushfires
31-Jan-2003	Bathurst, Beresfield, Richmond, Tamworth, Wallsend, Warrawong	Bushfires
1-Feb-2003	Albury	Bushfires
2-Feb-2003	Albury	Bushfires
3-Feb-2003	Albury	Bushfires
4-Feb-2003	Albury	Bushfires
5-Feb-2003	Albury	Bushfires
6-Feb-2003	Albury	Bushfires
8-Feb-2003	Albury	Bushfires
9-Feb-2003	Albury	Bushfires
10-Feb-2003	Albury, Wagga Wagga	Bushfires
11-Feb-2003	Albury	Bushfires
14-Feb-2003	Albury	Bushfires
16-Feb-2003	Albury, Wagga Wagga	Bushfires
19-Feb-2003	Albury	Bushfires
19-Mar-2003	Albury, Wagga Wagga	Dust storms
20-Mar-2003	Albion Park, Albury, Bathurst, Blacktown, Bringelly, Chullora, Liverpool, Richmond, St Marys, Wagga Wagga, Warrawong, Wollongong, Woolooware	Dust storms
21-Mar-2003	Beresfield, Tamworth	Dust storms
26-Mar-2003	Wagga Wagga	
8-Apr-2003	Wagga Wagga	
11-Apr-2003	St Marys	
6-May-2003	Wagga Wagga	
7-May-2003	Wagga Wagga	
8-May-2003	Wagga Wagga	
30-May-2003	Wagga Wagga	
5-Jun-2003	Albury	
7-Jul-2003	Chullora	
8-Jul-2003	Liverpool	

(#) Events that can be clearly identified as influencing pollution levels

Table 23 (continued)

Date	Stations where standard exceeded	Comments(#)
23-Jul-2003	Wagga Wagga	Dust storms
4-Sep-2003	Beresfield	
6-Sep-2003	Chullora, Richmond	Hazard reduction burning
22-Sep-2003	Chullora	
23-Sep-2003	Chullora	
27-Sep-2003	Chullora	
29-Oct-2003	Bathurst, Beresfield, Tamworth, Wallsend	Dust storms
19-Dec-2003	Wollongong	
31-Dec-2003	Wollongong	

(#) Events that can be clearly identified as influencing pollution levels

The severe drought conditions across NSW were a major influence on particle levels across the state during 2003. Bushfires during January and February, particularly on the southwest slopes, and dust storms during March, July and October, had significant impact on particle levels throughout NSW. All regions recorded exceedences of the AAQ NEPM standard, and all regions, except the lower Hunter, recorded exceedences on more than the five days allowed. Wagga Wagga recorded exceedences on twenty-eight days during 2003.

Extreme levels of particles recorded throughout Sydney, the Illawarra, and at Albury, Bathurst and Wagga Wagga on the 19th-20th March were associated with a severe, widespread dust storm event. The peak daily average associated with this event was 921.4 $\mu g/m^3$ recorded at Albury on the 19th March. This represents levels of fine particles that are greater than eighteen times the NEPM standard.

If extreme events such as bushfires and dust storms are excluded from the analysis only two regions recorded more than five days above the standard, Wagga Wagga (7 days) and Sydney (6 days). Excluding extreme events the highest recorded daily average was 86.0 $\mu g/m^3$ at Wagga Wagga on the 7th May.

While in the absence of these extreme events levels of particles are generally below the AAQ NEPM goal, the DEC continues to work towards reducing the levels of anthropogenically produced particles. Recently, the management of particles from burning, particularly from the use of domestic solid fuel heaters, has been a major focus of these strategies.

In addition to the DEC ongoing public education campaign "Don't light tonight unless your heater is right", which informs people how to use their wood heaters more efficiently, a Woodsmoke reduction program has been established in regional NSW. In 2002 this program operated in six regional council areas: Armidale, Orange, Cooma, Tumut, Lithgow and the Blue Mountains. The objective of the program is to improve heater operation and reduce smoke emissions, and encourage the use of cleaner forms of heating by offering a financial incentive to owners of older wood heaters to upgrade to new, cleaner alternatives. In 2002, the program achieved the replacement of 744 wood heaters. A further three councils – Goulburn, Wagga Wagga and Wingecarribee joined the program in 2003 resulting in the replacement of a further 638 wood heaters. The following 14 councils and one grouping of councils will receive funding to run a woodsmoke reduction program in 2004: Bathurst, Cooma Monaro, Dubbo, Eurobodalla, Greater Argyle (Goulburn), Upper Lachlan (Gunning), Hastings, Inverell, Lithgow, Mudgee, Queanbeyan, Shoalhaven, Wagga Wagga, Wingecarribee and Hunter Councils Inc.

These woodsmoke initiatives are supported by the Clean Air Regulation under the Protection of the Environment Operations (POEO) Act, which requires that new wood heaters meet the emissions limits in the Australian Standard. Under the POEO Act, councils have the power to take action against people creating excessive smoke from wood heaters and under the State's planning legislation, councils have the power to limit or ban the installation of wood heaters.

Under particular meteorological conditions, open burning can make a significant contribution to particle pollution. State legislation and guidelines are in place to help minimise the impact of open

burning. For example, regulations are in place that ban backyard burning and require approval for other burning in the open, although hazard reduction burning is specifically exempted from these regulations. In addition, on specific days when elevated levels of particles are expected, the DEC has the power to ban burning in the open through "No Burn" notices. However, the DEC consults with NSW Rural Fire service to ensure that strategic hazard reduction burns are exempted from such bans where appropriate.

Lead

Lead levels throughout NSW are significantly below the AAQ NEPM standard. The highest annual average recorded was 0.09 $\mu g/m^3$ at the Wallsend monitoring station, which is less than 20 per cent of the standard.

Statistical summary and trends

The following section provides a basic statistical summary, using percentiles, for each station and for each standard. Percentiles for daily maximum values are presented. As discussed earlier in Data availability, only valid days are used in calculating these statistics.

For stations that have data sets of several years or more, trend data, in the form of annual maximums, are provided for each standard for each pollutant. Data are presented if any monitoring of a particular pollutant occurred at a station in a given year and the annual data availability rate for the pollutant at that station is fifteen percent or greater.

Carbon Monoxide

Statistical summary

Table 24: Statistical summary for CO - Daily maximum rolling 8-hour average concentrations (2003)

Region/ Performance monitoring Station	Data availability rates (%)	Maximum conc. (ppm)	Percentiles (ppm)						
			99th	98th	95th	90th	75th	50th	25th
Sydney									
CBD	82.3	4.7	4.2	4.2	3.8	3.5	3.1	2.6	1.9
Rozelle	93.1	2.2	1.5	1.4	1.1	0.9	0.6	0.4	0.3
Chullora	63.5	2.3	1.8	1.6	1.0	0.8	0.5	0.3	0.2
Blacktown	93.6	2.5	1.9	1.6	1.2	0.8	0.4	0.1	0.0
Liverpool	93.4	5.5	3.1	2.8	2.2	1.6	1.0	0.6	0.4
Macarthur (1)									
Illawarra									
Wollongong	96.4	2.1	1.7	1.5	1.3	1.0	0.7	0.5	0.3
Lower Hunter									
Newcastle	93.0	2.8	2.0	1.8	1.5	1.0	0.6	0.3	0.2
AAQ NEPM Standard - 9.0 ppm (rolling 8-hour average)									

(1) Station to be established. Data reported from Liverpool in the interim.

Trend analysis

Table 25: Daily maximum rolling 8-hour average concentrations for CO (ppm)

Region/ Performance monitoring Station	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Sydney										
CBD	**11.2**	**9.4**	**9.1**				8.0	5.1	4.8	4.7
Rozelle	4.9	6.1	5.7	6.5	5.9	4.0	4.5	3.2	2.8	2.2
Chullora										2.3
Blacktown	6.7	4.9	4.2	4.5	4.7	3.5	3.1	2.6	3.0	2.5
Liverpool	5.9	5.7	4.3	5.9	5.4	4.0	4.8	3.5	3.6	5.5
Illawarra										
Wollongong	3.0	4.9	3.2	3.5	2.2	2.4	2.4	4.2	2.3	2.1
Lower Hunter										
Newcastle	5.3	4.4	4.8	2.9	4.3	3.3	3.1	4.0	3.2	2.8

AAQ NEPM Standard - 9.0 ppm (rolling 8-hour average)

Bold font indicates values that exceed the AAQ NEPM standard

Table 26: Statistical summary for CO - Daily maximum rolling 8-hour average concentrations

Station: Blacktown

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
1994	79.3	0	6.7	3.9	3.2	2.6	2.3	1.5	1.0	0.6
1995	95.4	0	4.9	3.6	3.4	2.9	2.3	1.5	0.9	0.6
1996	83.6	0	4.2	3.0	2.8	2.1	1.6	1.1	0.7	0.5
1997	91.9	0	4.5	3.2	2.5	2.1	1.8	1.4	0.9	0.6
1998	89.6	0	4.7	4.0	3.8	2.5	2.1	1.2	0.7	0.4
1999	98.2	0	3.5	3.0	2.7	2.1	1.8	1.2	0.6	0.2
2000	92.3	0	3.1	2.4	2.3	2.0	1.6	1.0	0.4	0.2
2001	95.5	0	2.6	1.9	1.8	1.6	1.3	0.8	0.3	0.2
2002	94.5	0	3.0	2.4	2.0	1.8	1.3	0.6	0.3	0.1
2003	93.6	0	2.5	1.9	1.6	1.2	0.8	0.4	0.1	0.0

AAQ NEPM Standard - 9.0 ppm (rolling 8-hour average)

Table 27: Statistical summary for CO - Daily maximum rolling 8-hour average concentrations

Station: CBD

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
1994	94.9	**19**	**11.2**	**10.1**	**9.6**	**9.1**	8.5	7.7	6.8	5.7
1995	91.0	**7**	**9.4**	**9.2**	8.9	8.4	8.0	7.4	6.6	5.4
1996	27.4	1	**9.1**	8.7	8.6	8.2	7.8	7.3	6.3	5.3
1997	0.0									
1998	0.0									
1999	0.0									
2000	69.5	0	8.0	6.5	5.5	4.7	4.3	3.7	3.0	2.3
2001	81.6	0	5.1	4.5	4.4	4.0	3.7	3.3	2.7	2.1
2002	82.9	0	4.8	3.9	3.8	3.6	3.4	3.0	2.5	2.1
2003	82.3	0	4.7	4.2	4.2	3.8	3.5	3.1	2.6	1.9

AAQ NEPM Standard - 9.0 ppm (rolling 8-hour average)

Bold font indicates values that exceed the AAQ NEPM standard

Table 28: Statistical summary for CO - Daily maximum rolling 8-hour average concentrations

Station: Liverpool

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
1994	84.9	0	5.9	4.5	4.3	3.8	3.2	2.2	1.2	0.8
1995	92.5	0	5.7	5.1	4.7	4.0	3.2	2.2	1.1	0.7
1996	73.7	0	4.3	3.7	3.5	2.7	2.0	1.4	0.9	0.6
1997	75.7	0	5.9	5.0	4.6	3.6	2.9	1.8	0.9	0.5
1998	74.6	0	5.4	4.5	4.1	3.1	2.5	1.5	0.9	0.6
1999	81.6	0	4.0	3.9	3.6	3.1	2.5	1.6	0.8	0.5
2000	98.0	0	4.8	3.6	3.3	2.8	2.1	1.3	0.9	0.5
2001	98.1	0	3.5	2.9	2.8	2.6	1.8	1.1	0.7	0.5
2002	85.6	0	3.6	3.0	2.9	2.4	1.9	1.2	0.7	0.5
2003	93.4	0	5.5	3.1	2.8	2.2	1.6	1.0	0.6	0.4

AAQ NEPM Standard - 9.0 ppm (rolling 8-hour average)

Table 29: Statistical summary for CO - Daily maximum rolling 8-hour average concentrations

Station: Rozelle

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
1994	93.9	0	4.9	4.3	3.9	3.3	2.8	1.7	1.1	0.7
1995	87.0	0	6.1	4.4	3.8	3.2	2.3	1.5	0.9	0.6
1996	82.1	0	5.7	3.5	3.4	3.0	2.1	1.2	0.8	0.6
1997	84.7	0	6.5	5.7	3.8	2.5	2.0	1.2	0.8	0.6
1998	92.9	0	5.9	5.0	4.0	2.8	2.2	1.3	0.9	0.6
1999	83.3	0	4.0	2.5	2.5	2.0	1.6	1.0	0.6	0.4
2000	90.0	0	4.5	2.4	2.3	1.7	1.3	0.8	0.5	0.4
2001	95.0	0	3.2	2.4	2.1	1.7	1.3	0.7	0.5	0.3
2002	87.5	0	2.8	1.7	1.6	1.3	1.1	0.7	0.5	0.3
2003	93.1	0	2.2	1.5	1.4	1.1	0.9	0.6	0.4	0.3

AAQ NEPM Standard - 9.0 ppm (rolling 8-hour average)

Table 30: Statistical summary for CO - Daily maximum rolling 8-hour average concentrations

Station: Newcastle

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
1994	95.5	0	5.3	4.1	3.8	3.3	2.4	1.2	0.6	0.3
1995	53.0	0	4.4	3.9	3.4	2.6	2.1	1.0	0.6	0.3
1996	48.8	0	4.8	4.0	3.6	1.9	1.5	0.9	0.5	0.3
1997	15.8	0	2.9	2.4	2.2	2.1	1.6	1.0	0.5	0.3
1998	75.5	0	4.3	3.0	2.7	2.1	1.4	0.7	0.3	0.1
1999	67.6	0	3.3	2.8	2.5	1.7	1.0	0.3	0.1	0.0
2000	83.1	0	3.1	2.8	2.6	2.0	1.3	0.7	0.4	0.2
2001	96.7	0	4.0	2.6	2.4	1.7	1.4	0.7	0.4	0.3
2002	94.6	0	3.2	2.1	1.9	1.4	1.0	0.6	0.4	0.3
2003	93.0	0	2.8	2.0	1.8	1.5	1.0	0.6	0.3	0.2

AAQ NEPM Standard - 9.0 ppm (rolling 8-hour average)

Table 31: Statistical summary for CO - Daily maximum rolling 8-hour average concentrations

Station: Wollongong

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
1994	36.4	0	3.0	2.7	2.6	2.1	1.7	1.2	0.8	0.6
1995	57.1	0	4.9	3.2	2.7	2.5	2.1	1.4	1.0	0.6
1996	93.2	0	3.2	2.7	2.5	2.0	1.7	1.2	0.7	0.5
1997	36.3	0	3.5	3.1	2.9	2.6	2.1	1.3	0.7	0.5
1998	97.1	0	2.2	2.1	2.0	1.8	1.4	1.0	0.6	0.4
1999	98.2	0	2.4	2.2	2.1	1.6	1.3	0.9	0.6	0.4
2000	98.7	0	2.4	1.9	1.7	1.4	1.2	0.8	0.5	0.3
2001	97.6	0	4.2	1.7	1.5	1.1	1.0	0.7	0.5	0.3
2002	91.2	0	2.3	1.9	1.7	1.5	1.2	0.9	0.5	0.3
2003	96.4	0	2.1	1.7	1.5	1.3	1.0	0.7	0.5	0.3

AAQ NEPM Standard - 9.0 ppm (rolling 8-hour average)

Nitrogen Dioxide

Statistical summary

Table 32: Statistical summary for NO_2 - Daily maximum 1-hour average concentrations (2003)

Region/ Performance monitoring Station	Data availability rates (%)	Maximum conc. (ppm)	Percentiles (ppm)						
			99th	98th	95th	90th	75th	50th	25th
Sydney									
Rozelle	88.6	0.052	0.047	0.046	0.041	0.038	0.032	0.026	0.020
Chullora	76.0	0.066	0.054	0.048	0.043	0.038	0.033	0.028	0.022
Wooloowaare	93.3	0.054	0.047	0.044	0.038	0.033	0.026	0.020	0.013
Blacktown	89.8	0.055	0.049	0.047	0.038	0.035	0.030	0.025	0.020
Richmond	93.0	0.036	0.031	0.029	0.026	0.024	0.021	0.016	0.012
Liverpool	89.2	0.064	0.047	0.042	0.038	0.034	0.028	0.024	0.020
Bringelly	87.1	0.044	0.031	0.028	0.023	0.021	0.017	0.013	0.010
Macarthur (1)									
Central Coast (2)									
Illawarra									
Wollongong	93.3	0.049	0.039	0.036	0.035	0.032	0.027	0.022	0.017
Albion Park	90.0	0.048	0.039	0.036	0.030	0.023	0.017	0.011	0.006
Lower Hunter									
Wallsend	85.9	0.050	0.037	0.034	0.029	0.027	0.022	0.016	0.013
Newcastle	95.0	0.039	0.035	0.034	0.032	0.029	0.025	0.019	0.011
Maitland (3)									

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

(1) Station to be established. Data reported from Liverpool in the interim.

(2) Station to be established.

(3) Station to be established. Data reported from Wallsend in the interim.

Trend analysis

Table 33: Maximum 1-hour average concentrations for NO_2 (ppm)

Region/ Performance monitoring Station	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Sydney										
Rozelle	0.084	0.089	0.075	0.082	0.081	0.062	0.070	0.066	0.086	0.052
Chullora										0.066
Lidcombe	0.076	0.099	0.070	0.080	**0.126**	0.073	0.070	0.071	0.052	
Woolooware	0.069	0.075	0.063	0.090	0.067	0.060	0.060	0.060	0.066	0.054
Blacktown	0.081	0.063	0.059	0.096	0.060	0.058	0.070	0.058	0.057	0.055
Richmond	0.051	0.045	0.040	0.064	0.053	0.044	0.037	0.038	0.048	0.036
Liverpool	0.093	0.088	0.054	0.060	0.063	0.054	0.079	0.067	0.068	0.064
Bringelly	0.058	0.052	**0.133**	0.060	0.050	0.045	0.045	0.048	0.052	0.044
Illawarra										
Wollongong	0.074	0.066	0.081	0.064	0.058	0.062	0.065	0.056	0.056	0.049
Albion Park	0.070	0.060	0.067	0.044	0.081	0.049	0.055	0.051	0.048	0.048
Lower Hunter										
Wallsend	0.048	0.057	0.044	0.058	0.035	0.034	0.054	0.044	0.043	0.050
Newcastle	0.070	0.049	0.044	0.048	0.039	0.049	0.044	0.040	0.047	0.039

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

Bold font indicates values that exceed the AAQ NEPM standard

Table 34: Annual average concentrations for NO_2 (ppm)

Region/ Performance monitoring Station	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Sydney										
Rozelle	0.017	0.018	0.019	0.020	0.016	0.015	0.014	0.014	0.015	0.014
Chullora										0.016
Lidcombe	0.015	0.017	0.015	0.015	0.016	0.016	0.015	0.016	0.013	
Woolooware	0.010	0.011	0.010	0.011	0.010	0.010	0.010	0.009	0.010	0.009
Blacktown	0.015	0.016	0.014	0.015	0.015	0.014	0.013	0.013	0.014	0.013
Richmond	0.008	0.007	0.008	0.008	0.007	0.007	0.006	0.007	0.007	0.007
Liverpool	0.016	0.015	0.012	0.014	0.014	0.014	0.014	0.014	0.015	0.013
Bringelly	0.008	0.008	0.007	0.007	0.006	0.007	0.007	0.006	0.009	0.007
Illawarra										
Wollongong	0.012	0.011	0.011	0.011	0.010	0.011	0.010	0.010	0.011	0.010
Albion Park	0.006	0.006	0.005	0.004	0.004	0.004	0.005	0.004	0.004	0.005
Lower Hunter										
Wallsend	0.009	0.010	0.009	0.006	0.008	0.009	0.008	0.009	0.009	0.008
Newcastle	0.011	0.011	0.010	0.009	0.008	0.009	0.009	0.009	0.009	0.008

AAQ NEPM Standard - 0.03 ppm (Annual average)

Table 35: Statistical summary for NO_2 - Annual daily maximum 1-hour average concentrations

Station: Blacktown

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
1994	83.6	0	0.081	0.068	0.062	0.055	0.047	0.036	0.028	0.020
1995	89.9	0	0.063	0.056	0.052	0.048	0.042	0.035	0.028	0.023
1996	77.8	0	0.059	0.049	0.047	0.042	0.039	0.032	0.026	0.021
1997	73.0	0	0.096	0.055	0.051	0.045	0.039	0.033	0.028	0.022
1998	84.6	0	0.060	0.050	0.048	0.043	0.039	0.031	0.026	0.021
1999	90.8	0	0.058	0.048	0.047	0.040	0.035	0.030	0.026	0.021
2000	90.3	0	0.070	0.054	0.043	0.039	0.034	0.029	0.024	0.019
2001	93.3	0	0.058	0.047	0.045	0.037	0.034	0.030	0.025	0.020
2002	92.4	0	0.057	0.050	0.046	0.043	0.037	0.032	0.026	0.020
2003	89.8	0	0.055	0.049	0.046	0.038	0.035	0.030	0.025	0.020

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

Table 36: Statistical summary for NO_2 - Annual daily maximum 1-hour average concentrations

Station: Bringelly

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
1994	83.6	0	0.058	0.046	0.043	0.036	0.030	0.023	0.018	0.014
1995	67.1	0	0.052	0.043	0.040	0.033	0.029	0.022	0.016	0.011
1996	73.5	1	**0.133**	0.038	0.035	0.028	0.025	0.018	0.014	0.011
1997	78.6	0	0.060	0.040	0.034	0.029	0.026	0.020	0.015	0.011
1998	85.1	0	0.050	0.032	0.031	0.028	0.024	0.018	0.014	0.010
1999	90.4	0	0.045	0.037	0.034	0.027	0.025	0.020	0.015	0.011
2000	93.4	0	0.045	0.033	0.029	0.026	0.022	0.019	0.015	0.011
2001	94.4	0	0.048	0.033	0.031	0.026	0.023	0.019	0.015	0.011
2002	93.1	0	0.052	0.041	0.038	0.033	0.029	0.022	0.017	0.012
2003	87.1	0	0.044	0.031	0.027	0.023	0.021	0.017	0.013	0.010

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

Table 37: Statistical summary for NO_2 - Annual daily maximum 1-hour average concentrations

Station: Lidcombe(1) / Chullora(2)

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
1994 (1)	72.2	0	0.076	0.054	0.053	0.047	0.044	0.036	0.028	0.021
1995 (1)	80.3	0	0.099	0.069	0.062	0.052	0.046	0.037	0.030	0.022
1996 (1)	64.1	0	0.070	0.049	0.047	0.042	0.038	0.031	0.026	0.022
1997 (1)	83.1	0	0.080	0.060	0.055	0.048	0.042	0.034	0.027	0.021
1998 (1)	69.4	1	**0.126**	0.052	0.050	0.046	0.040	0.031	0.026	0.021
1999 (1)	88.9	0	0.073	0.051	0.047	0.043	0.039	0.035	0.028	0.021
2000 (1)	91.7	0	0.070	0.055	0.051	0.042	0.036	0.030	0.025	0.021
2001 (1)	93.8	0	0.071	0.055	0.050	0.042	0.038	0.033	0.028	0.022
2002 (1)	30.8	0	0.052	0.044	0.040	0.036	0.032	0.027	0.022	0.018
2003 (2)	76.0	0	0.066	0.054	0.048	0.043	0.038	0.033	0.028	0.022

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

(1) Lidcombe station closed 2nd quarter 2002

(2) Chullora station commissioned December 2002

Table 38: Statistical summary for NO_2 - Annual daily maximum 1-hour average concentrations

Station: Liverpool

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
1994	89.5	0	0.093	0.068	0.064	0.057	0.050	0.039	0.030	0.021
1995	89.3	0	0.088	0.061	0.057	0.048	0.041	0.033	0.027	0.021
1996	88.0	0	0.054	0.049	0.042	0.038	0.035	0.028	0.022	0.018
1997	86.2	0	0.060	0.055	0.051	0.043	0.039	0.031	0.026	0.019
1998	85.1	0	0.063	0.050	0.046	0.040	0.035	0.028	0.022	0.018
1999	87.9	0	0.054	0.046	0.044	0.041	0.038	0.032	0.027	0.021
2000	89.2	0	0.079	0.057	0.049	0.042	0.036	0.030	0.025	0.021
2001	94.3	0	0.067	0.051	0.045	0.043	0.037	0.031	0.027	0.021
2002	93.0	0	0.068	0.051	0.047	0.045	0.040	0.033	0.028	0.022
2003	89.2	0	0.064	0.046	0.042	0.037	0.034	0.029	0.025	0.020

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

Table 39: Statistical summary for NO_2 - Annual daily maximum 1-hour average concentrations

Station: Richmond

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
1994	88.6	0	0.051	0.037	0.035	0.032	0.028	0.024	0.019	0.014
1995	58.1	0	0.045	0.032	0.031	0.029	0.027	0.021	0.016	0.011
1996	81.3	0	0.040	0.031	0.031	0.027	0.025	0.022	0.017	0.013
1997	85.9	0	0.064	0.038	0.035	0.031	0.028	0.023	0.020	0.014
1998	84.2	0	0.053	0.037	0.033	0.028	0.025	0.021	0.017	0.013
1999	89.2	0	0.044	0.032	0.029	0.026	0.024	0.021	0.016	0.011
2000	93.3	0	0.037	0.027	0.027	0.025	0.023	0.019	0.015	0.011
2001	92.3	0	0.038	0.031	0.030	0.027	0.025	0.020	0.016	0.011
2002	92.9	0	0.048	0.037	0.032	0.029	0.027	0.023	0.018	0.012
2003	93.0	0	0.036	0.031	0.029	0.026	0.024	0.021	0.016	0.012

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

Table 40: Statistical summary for NO_2 - Annual daily maximum 1-hour average concentrations

Station: Rozelle

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
1994	85.7	0	0.084	0.074	0.068	0.059	0.051	0.040	0.030	0.022
1995	80.7	0	0.089	0.067	0.063	0.057	0.050	0.037	0.029	0.023
1996	74.2	0	0.075	0.062	0.058	0.048	0.044	0.036	0.030	0.025
1997	70.6	0	0.082	0.076	0.066	0.059	0.051	0.039	0.030	0.026
1998	72.0	0	0.081	0.057	0.053	0.046	0.042	0.033	0.027	0.020
1999	87.4	0	0.062	0.047	0.044	0.041	0.037	0.030	0.025	0.019
2000	94.3	0	0.070	0.057	0.051	0.044	0.038	0.031	0.025	0.020
2001	93.2	0	0.066	0.051	0.049	0.040	0.037	0.032	0.026	0.019
2002	87.1	0	0.086	0.058	0.053	0.045	0.041	0.035	0.027	0.019
2003	88.6	0	0.052	0.047	0.046	0.042	0.038	0.033	0.026	0.020

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

Table 41: Statistical summary for NO_2 - Annual daily maximum 1-hour average concentrations

Station: Woolooware

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
1994	84.3	0	0.069	0.063	0.058	0.045	0.040	0.031	0.022	0.014
1995	69.4	0	0.075	0.062	0.055	0.049	0.038	0.030	0.021	0.013
1996	78.0	0	0.063	0.048	0.044	0.038	0.033	0.027	0.022	0.014
1997	73.8	0	0.090	0.078	0.069	0.051	0.044	0.037	0.024	0.013
1998	83.7	0	0.067	0.047	0.045	0.039	0.034	0.026	0.020	0.014
1999	91.0	0	0.060	0.049	0.045	0.036	0.032	0.026	0.019	0.012
2000	93.3	0	0.060	0.048	0.046	0.040	0.034	0.026	0.021	0.014
2001	92.9	0	0.060	0.043	0.040	0.036	0.033	0.027	0.021	0.013
2002	92.8	0	0.066	0.051	0.047	0.039	0.035	0.028	0.021	0.012
2003	93.3	0	0.054	0.047	0.044	0.038	0.034	0.026	0.020	0.013

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

Table 42: Statistical summary for NO_2 - Annual daily maximum 1-hour average concentrations

Station: Albion Park

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
1994	71.2	0	0.070	0.057	0.046	0.035	0.030	0.022	0.016	0.010
1995	85.9	0	0.060	0.053	0.049	0.040	0.028	0.022	0.015	0.008
1996	76.8	0	0.067	0.041	0.038	0.031	0.024	0.020	0.014	0.009
1997	29.5	0	0.044	0.033	0.030	0.027	0.024	0.017	0.009	0.003
1998	87.4	0	0.081	0.042	0.038	0.033	0.024	0.017	0.010	0.004
1999	90.4	0	0.049	0.042	0.037	0.031	0.025	0.015	0.009	0.005
2000	90.3	0	0.055	0.044	0.041	0.031	0.024	0.017	0.010	0.005
2001	93.0	0	0.051	0.040	0.035	0.028	0.024	0.017	0.010	0.004
2002	57.5	0	0.048	0.035	0.034	0.029	0.024	0.015	0.008	0.005
2003	90.0	0	0.048	0.039	0.035	0.030	0.023	0.017	0.011	0.006

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

Table 43: Statistical summary for NO_2 - Annual daily maximum 1-hour average concentrations

Station: Wollongong

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
1994	90.4	0	0.074	0.059	0.049	0.044	0.040	0.033	0.027	0.019
1995	66.6	0	0.066	0.050	0.047	0.042	0.038	0.032	0.023	0.018
1996	88.9	0	0.081	0.043	0.040	0.034	0.030	0.025	0.021	0.017
1997	82.8	0	0.064	0.054	0.047	0.040	0.036	0.028	0.023	0.017
1998	86.9	0	0.058	0.044	0.042	0.036	0.031	0.025	0.021	0.016
1999	90.8	0	0.062	0.046	0.042	0.037	0.032	0.027	0.022	0.016
2000	93.0	0	0.065	0.049	0.043	0.034	0.030	0.025	0.021	0.017
2001	93.6	0	0.056	0.043	0.040	0.037	0.031	0.027	0.022	0.016
2002	94.2	0	0.056	0.048	0.044	0.039	0.036	0.029	0.023	0.016
2003	93.3	0	0.049	0.039	0.036	0.035	0.032	0.027	0.022	0.017

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

Table 44: Statistical summary for NO_2 - Annual daily maximum 1-hour average concentrations

Station: Newcastle

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
1994	69.6	0	0.070	0.057	0.047	0.042	0.038	0.032	0.025	0.014
1995	80.9	0	0.049	0.042	0.041	0.039	0.036	0.030	0.023	0.015
1996	54.6	0	0.044	0.043	0.037	0.032	0.028	0.024	0.020	0.014
1997	69.3	0	0.048	0.040	0.039	0.035	0.031	0.027	0.020	0.014
1998	83.4	0	0.039	0.035	0.034	0.031	0.029	0.024	0.019	0.011
1999	90.2	0	0.049	0.040	0.038	0.034	0.030	0.025	0.020	0.012
2000	90.1	0	0.044	0.038	0.034	0.031	0.028	0.024	0.018	0.011
2001	91.5	0	0.040	0.034	0.032	0.030	0.029	0.026	0.020	0.012
2002	85.9	0	0.047	0.040	0.037	0.034	0.031	0.025	0.019	0.012
2003	95.0	0	0.039	0.035	0.034	0.032	0.029	0.025	0.019	0.011

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

Table 45: Statistical summary for NO_2 - Annual daily maximum 1-hour average concentrations

Station: Wallsend

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
1994	85.7	0	0.048	0.047	0.043	0.037	0.033	0.027	0.021	0.015
1995	79.6	0	0.057	0.047	0.045	0.039	0.033	0.028	0.022	0.016
1996	74.9	0	0.044	0.036	0.033	0.030	0.028	0.023	0.018	0.014
1997	11.1	0	0.058	0.028	0.025	0.021	0.019	0.014	0.013	0.011
1998	78.6	0	0.035	0.034	0.030	0.028	0.025	0.022	0.017	0.013
1999	85.6	0	0.034	0.033	0.030	0.027	0.025	0.021	0.017	0.012
2000	91.8	0	0.054	0.037	0.033	0.029	0.026	0.022	0.017	0.012
2001	87.5	0	0.044	0.039	0.036	0.032	0.030	0.024	0.018	0.014
2002	63.2	0	0.043	0.038	0.034	0.029	0.027	0.024	0.018	0.014
2003	85.9	0	0.050	0.037	0.034	0.029	0.027	0.022	0.016	0.013

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

Ozone

Statistical summary

Table 46: Statistical summary for O_3 - Daily maximum 1-hour average concentrations (2003)

Region/ Performance monitoring Station	Data availability rates (%)	Maximum conc. (ppm)	Percentiles (ppm)						
			99th	98th	95th	90th	75th	50th	25th
Sydney									
Rozelle	91.2	0.083	0.064	0.058	0.045	0.037	0.031	0.027	0.023
Chullora	80.6	0.084	0.066	0.063	0.046	0.040	0.034	0.028	0.023
Wooloowaare	90.9	**0.106**	0.070	0.054	0.045	0.037	0.032	0.028	0.024
Blacktown	90.3	**0.181**	0.085	0.073	0.061	0.050	0.037	0.029	0.025
St Marys	92.7	0.093	0.071	0.066	0.058	0.052	0.037	0.030	0.026
Richmond	86.1	**0.148**	0.083	0.078	0.061	0.053	0.039	0.030	0.026
Liverpool	93.3	**0.151**	0.087	0.065	0.054	0.045	0.035	0.029	0.024
Bringelly	91.3	**0.155**	0.095	0.076	0.065	0.056	0.041	0.032	0.028
Oakdale	91.1	**0.102**	0.079	0.073	0.063	0.054	0.041	0.033	0.029
Macarthur (1)									
Central Coast (2)									
Illawarra									
Wollongong	92.8	0.097	0.080	0.070	0.046	0.040	0.033	0.029	0.025
Kembla Grange	93.3	**0.113**	0.092	0.066	0.044	0.038	0.033	0.030	0.026
Albion Park	92.8	**0.130**	0.081	0.063	0.044	0.040	0.034	0.030	0.027
Lower Hunter									
Wallsend	91.6	0.077	0.064	0.060	0.049	0.042	0.034	0.029	0.025
Newcastle	92.4	0.079	0.061	0.054	0.045	0.039	0.035	0.030	0.025
Maitland (3)									
Regional									
Bathurst	76.4	0.056	0.051	0.049	0.046	0.042	0.036	0.032	0.029

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

Bold font indicates values that exceed the AAQ NEPM standard

(1) Station to be established. Data reported from Liverpool in the interim.

(2) Station to be established

(3) Station to be established. Data reported from Wallsend in the interim.

Table 47: Statistical summary for O_3 - Daily maximum rolling 4-hour average concentrations (2003)

Region/ Performance monitoring Station	Data availability rates (%)	Maximum conc. (ppm)	Percentiles (ppm)						
			99th	98th	95th	90th	75th	50th	25th
Sydney									
Rozelle	95.3	0.070	0.057	0.052	0.039	0.034	0.030	0.025	0.021
Chullora	84.2	0.077	0.057	0.053	0.041	0.037	0.032	0.026	0.021
Wooloowaare	95.0	**0.089**	0.063	0.049	0.041	0.035	0.030	0.027	0.023
Blacktown	94.3	**0.157**	0.078	0.066	0.056	0.045	0.035	0.028	0.023
St Marys	96.8	**0.091**	0.062	0.059	0.051	0.046	0.035	0.029	0.025
Richmond	89.5	**0.138**	0.076	0.067	0.055	0.048	0.037	0.029	0.025
Liverpool	97.1	**0.132**	0.073	0.054	0.048	0.040	0.033	0.028	0.022
Bringelly	95.3	**0.133**	**0.082**	0.068	0.057	0.050	0.038	0.031	0.027
Oakdale	95.0	**0.089**	0.072	0.064	0.056	0.048	0.039	0.032	0.028
Macarthur (1)									
Central Coast (2)									
Illawarra									
Wollongong	96.4	**0.080**	0.072	0.059	0.042	0.037	0.032	0.028	0.024
Kembla Grange	97.4	**0.107**	0.073	0.056	0.041	0.036	0.032	0.028	0.025
Albion Park	96.8	**0.111**	0.070	0.058	0.040	0.037	0.033	0.029	0.025
Lower Hunter									
Wallsend	95.7	0.059	0.057	0.054	0.044	0.039	0.032	0.028	0.024
Newcastle	96.3	0.061	0.052	0.049	0.041	0.038	0.033	0.028	0.024
Maitland (3)									
Regional									
Bathurst	79.6	0.053	0.049	0.047	0.044	0.040	0.036	0.031	0.028

AAQ NEPM Standard - 0.08 ppm (rolling 4-hour average)

Bold font indicates values that exceed the AAQ NEPM standard

(1) Station to be established. Data reported from Liverpool in the interim.

(2) Station to be established

(3) Station to be established. Data reported from Wallsend in the interim.

Table 48: Maximum 1-hour average concentrations for O_3 (ppm)

Region/ Performance monitoring Station	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Sydney										
Rozelle	0.080	0.078			0.088	0.059	0.080	**0.115**	0.100	0.083
Chullora										0.084
Lidcombe	0.077	0.083	0.075	**0.168**	**0.142**	0.092	**0.118**	**0.156**	0.100	
Woolooware	**0.114**	0.098	0.069	**0.159**	**0.115**	0.075	0.095	**0.126**	**0.104**	**0.106**
Blacktown	**0.114**	0.059	0.082	**0.149**	**0.109**	0.091	**0.113**	**0.153**	**0.130**	**0.181**
St Marys	**0.127**	0.068	0.087	**0.124**	**0.122**	**0.113**	**0.158**	**0.146**	**0.119**	0.093
Richmond	**0.101**	0.076	0.093	**0.120**	**0.113**	**0.127**	0.088	**0.117**	**0.125**	**0.148**
Liverpool	**0.113**	0.079	0.092	**0.151**	**0.130**	**0.102**	**0.133**	**0.141**	**0.100**	**0.151**
Bringelly	**0.130**	0.081	0.098	**0.135**	**0.113**	**0.114**	**0.130**	**0.175**	**0.118**	**0.155**
Oakdale			**0.111**	**0.152**	**0.109**	**0.107**	**0.126**	**0.135**	0.094	**0.102**
Illawarra										
Wollongong	**0.120**	0.097	0.066	**0.120**	**0.105**	0.087	**0.108**	**0.116**	**0.121**	0.097
Kembla Grange	**0.112**	0.089	0.083	**0.124**	**0.137**	**0.101**	**0.117**	**0.119**	0.099	**0.113**
Albion Park	**0.101**	0.080	0.062	**0.144**	**0.140**	0.090	**0.106**	0.088	0.094	**0.130**
Lower Hunter										
Wallsend	0.083	0.052	0.056	**0.129**	0.095	0.069	0.073	0.078	0.081	0.077
Newcastle	0.062	0.069	0.056	**0.141**	0.080	0.066	0.071	0.072	0.083	0.079
Regional										
Bathurst								0.063	0.064	0.056

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

Bold font indicates values that exceed the AAQ NEPM standard

Table 49: Maximum rolling 4-hour average concentrations for O_3 (ppm)

Region/ Performance monitoring Station	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Sydney										
Rozelle	0.059	0.069			0.079	0.053	0.073	**0.083**	**0.087**	0.070
Chullora										0.077
Lidcombe	0.063	0.062	0.065	**0.121**	**0.119**	0.077	**0.095**	**0.137**	**0.084**	
Woolooware	**0.089**	0.073	0.064	**0.131**	**0.094**	0.071	**0.083**	**0.096**	**0.088**	**0.089**
Blacktown	**0.082**	0.052	0.071	**0.100**	**0.097**	0.077	**0.101**	**0.120**	**0.107**	**0.157**
St Marys	**0.096**	0.058	0.080	**0.104**	**0.091**	**0.091**	**0.136**	**0.125**	**0.093**	**0.091**
Richmond	**0.097**	0.061	0.075	**0.103**	**0.097**	**0.098**	0.078	**0.111**	**0.112**	**0.138**
Liverpool	**0.096**	0.067	0.078	**0.116**	**0.108**	**0.084**	**0.107**	**0.120**	**0.089**	**0.132**
Bringelly	**0.108**	0.066	0.076	**0.102**	**0.089**	**0.092**	**0.115**	**0.128**	**0.099**	**0.133**
Oakdale			**0.088**	**0.133**	**0.092**	**0.090**	**0.098**	**0.105**	**0.080**	**0.089**
Illawarra										
Wollongong	**0.086**	0.070	0.055	**0.113**	**0.082**	0.073	**0.086**	**0.091**	**0.099**	**0.080**
Kembla Grange	**0.089**	0.063	0.062	**0.099**	**0.117**	**0.081**	**0.089**	**0.092**	**0.083**	**0.107**
Albion Park	0.079	0.063	0.053	**0.124**	**0.116**	**0.081**	**0.083**	**0.082**	**0.083**	**0.111**
Lower Hunter										
Wallsend	0.064	0.048	0.053	**0.105**	**0.084**	0.059	0.070	0.073	0.074	0.059
Newcastle	0.051	0.063	0.054	**0.125**	0.068	0.065	0.065	0.069	0.077	0.061
Regional										
Bathurst								0.060	0.062	0.053

AAQ NEPM Standard - 0.08 ppm (rolling 4-hour average)

Bold font indicates values that exceed the AAQ NEPM standard

Table 50: Statistical summary for O_3 - Annual daily maximum 1-hour average concentrations

Station: Blacktown

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
1994	94.5	1	**0.114**	0.090	0.074	0.058	0.046	0.033	0.025	0.019
1995	95.3	0	0.059	0.054	0.052	0.048	0.042	0.032	0.023	0.017
1996	85.7	0	0.082	0.065	0.060	0.052	0.046	0.033	0.024	0.018
1997	93.7	**4**	**0.149**	0.088	0.075	0.064	0.053	0.036	0.026	0.021
1998	83.8	**3**	**0.109**	0.093	0.083	0.063	0.052	0.038	0.024	0.018
1999	95.1	0	0.091	0.079	0.075	0.063	0.050	0.035	0.026	0.020
2000	91.5	**2**	**0.113**	0.088	0.075	0.061	0.051	0.037	0.028	0.024
2001	93.6	**5**	**0.153**	**0.107**	0.088	0.075	0.054	0.040	0.030	0.024
2002	91.7	**2**	**0.130**	0.093	0.083	0.068	0.059	0.043	0.033	0.026
2003	90.3	**3**	**0.181**	0.085	0.073	0.061	0.050	0.037	0.029	0.025

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

Bold font indicates values that exceed the AAQ NEPM standard

Table 51: Statistical summary for O_3 - Annual daily maximum 1-hour average concentrations

Station: Bringelly

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
1994	96.2	**7**	**0.130**	**0.113**	0.094	0.077	0.062	0.042	0.030	0.025
1995	94.6	0	0.081	0.075	0.064	0.057	0.050	0.036	0.026	0.022
1996	94.2	0	0.098	0.077	0.071	0.057	0.049	0.036	0.027	0.022
1997	93.7	**5**	**0.135**	**0.102**	0.087	0.069	0.058	0.044	0.029	0.024
1998	74.5	**4**	**0.113**	**0.101**	0.098	0.078	0.066	0.044	0.029	0.024
1999	92.1	**3**	**0.114**	0.100	0.094	0.073	0.055	0.037	0.029	0.024
2000	94.9	**3**	**0.130**	0.096	0.092	0.070	0.059	0.039	0.032	0.027
2001	91.5	**9**	**0.175**	**0.115**	**0.102**	0.074	0.059	0.042	0.033	0.027
2002	93.0	**2**	**0.118**	0.098	0.090	0.074	0.064	0.045	0.034	0.028
2003	91.3	**3**	**0.155**	0.095	0.076	0.065	0.056	0.041	0.032	0.028

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

Bold font indicates values that exceed the AAQ NEPM standard

Table 52: Statistical summary for O_3 - Annual daily maximum 1-hour average concentrations

Station: Lidcombe[(1)] / Chullora[(2)]

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
1994 (1)	80.3	0	0.077	0.067	0.058	0.048	0.035	0.026	0.018	0.010
1995 (1)	91.6	0	0.083	0.058	0.055	0.045	0.036	0.028	0.019	0.014
1996 (1)	82.1	0	0.075	0.062	0.057	0.047	0.042	0.031	0.022	0.015
1997 (1)	95.1	**2**	**0.168**	0.087	0.083	0.064	0.050	0.034	0.023	0.019
1998 (1)	89.5	**5**	**0.142**	**0.106**	0.080	0.070	0.051	0.034	0.025	0.020
1999 (1)	89.4	0	0.092	0.076	0.065	0.055	0.043	0.031	0.025	0.020
2000 (1)	94.7	1	**0.118**	0.080	0.071	0.058	0.048	0.033	0.026	0.021
2001 (1)	94.5	**4**	**0.156**	0.094	0.085	0.066	0.050	0.035	0.025	0.020
2002 (1)	31.0	0	0.100	0.078	0.074	0.061	0.046	0.037	0.029	0.021
2003 (2)	80.6	0	0.084	0.066	0.063	0.046	0.040	0.034	0.028	0.023

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

Bold font indicates values that exceed the AAQ NEPM standard

(1) Lidcombe station closed 2nd quarter 2002

(2) Chullora station commissioned December 2002

Table 53: Statistical summary for O_3 - Annual daily maximum 1-hour average concentrations

Station: Liverpool

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
1994	96.9	**2**	**0.113**	0.089	0.078	0.062	0.047	0.033	0.023	0.017
1995	95.6	0	0.079	0.064	0.056	0.048	0.040	0.029	0.020	0.014
1996	95.1	0	0.092	0.069	0.065	0.048	0.039	0.027	0.021	0.015
1997	88.5	**2**	**0.151**	0.090	0.083	0.055	0.044	0.033	0.022	0.016
1998	93.1	**4**	**0.130**	0.098	0.091	0.069	0.055	0.035	0.023	0.018
1999	83.6	1	**0.102**	0.086	0.077	0.064	0.045	0.032	0.025	0.020
2000	93.3	**2**	**0.133**	0.088	0.079	0.069	0.058	0.035	0.028	0.024
2001	94.7	**5**	**0.141**	**0.103**	0.089	0.071	0.053	0.039	0.030	0.025
2002	93.6	1	**0.100**	0.087	0.084	0.064	0.054	0.039	0.030	0.025
2003	93.3	**4**	**0.151**	0.087	0.065	0.054	0.045	0.035	0.029	0.024

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

Bold font indicates values that exceed the AAQ NEPM standard

Table 54: Statistical summary for O_3 - Annual daily maximum 1-hour average concentrations

Station: Oakdale

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
1994	0.0									
1995	0.0									
1996	60.7	1	**0.111**	0.068	0.057	0.049	0.041	0.032	0.026	0.023
1997	89.6	**8**	**0.152**	**0.111**	**0.105**	0.079	0.063	0.045	0.031	0.027
1998	54.5	**2**	**0.109**	0.086	0.082	0.062	0.051	0.037	0.027	0.014
1999	89.6	**5**	**0.107**	**0.104**	0.090	0.068	0.055	0.041	0.031	0.027
2000	90.1	**4**	**0.126**	0.100	0.086	0.065	0.055	0.039	0.030	0.027
2001	34.8	**8**	**0.135**	**0.116**	**0.102**	0.072	0.057	0.041	0.034	0.028
2002	18.6	0	0.094	0.088	0.088	0.082	0.075	0.060	0.044	0.033
2003	91.1	1	**0.102**	0.079	0.073	0.063	0.054	0.041	0.033	0.029

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

Bold font indicates values that exceed the AAQ NEPM standard

Table 55: Statistical summary for O_3 - Annual daily maximum 1-hour average concentrations

Station: Richmond

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
1994	94.5	1	**0.101**	0.083	0.064	0.053	0.041	0.031	0.025	0.020
1995	86.2	0	0.076	0.053	0.048	0.044	0.039	0.031	0.025	0.019
1996	91.6	0	0.093	0.065	0.059	0.052	0.046	0.036	0.029	0.023
1997	79.4	**3**	**0.120**	0.094	0.077	0.066	0.056	0.041	0.030	0.026
1998	91.1	1	**0.113**	0.090	0.078	0.067	0.056	0.041	0.031	0.025
1999	92.0	1	**0.127**	0.076	0.074	0.064	0.054	0.040	0.032	0.027
2000	89.7	0	0.088	0.080	0.071	0.062	0.051	0.039	0.030	0.025
2001	90.8	**5**	**0.117**	**0.106**	0.095	0.074	0.057	0.042	0.034	0.028
2002	92.5	**2**	**0.125**	0.094	0.084	0.070	0.063	0.045	0.034	0.029
2003	86.1	**2**	**0.148**	0.083	0.078	0.061	0.053	0.039	0.030	0.026

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

Bold font indicates values that exceed the AAQ NEPM standard

Table 56: Statistical summary for O_3 - Annual daily maximum 1-hour average concentrations

Station: Rozelle

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
1994	90.5	0	0.080	0.059	0.049	0.041	0.035	0.027	0.021	0.015
1995	83.6	0	0.078	0.044	0.042	0.034	0.027	0.022	0.017	0.013
1996	0.0									
1997	0.0									
1998	72.5	0	0.088	0.056	0.050	0.045	0.040	0.027	0.020	0.015
1999	89.9	0	0.059	0.050	0.047	0.038	0.032	0.025	0.020	0.015
2000	87.8	0	0.080	0.068	0.058	0.048	0.036	0.030	0.026	0.021
2001	93.4	1	**0.115**	0.066	0.057	0.047	0.040	0.032	0.026	0.021
2002	88.1	0	0.100	0.073	0.066	0.053	0.043	0.035	0.028	0.023
2003	91.2	0	0.083	0.064	0.058	0.045	0.037	0.031	0.027	0.023

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

Bold font indicates values that exceed the AAQ NEPM standard

Table 57: Statistical summary for O_3 - Annual daily maximum 1-hour average concentrations

Station: St Marys

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
1994	95.5	**6**	**0.127**	**0.110**	0.098	0.069	0.058	0.040	0.030	0.025
1995	88.2	0	0.068	0.064	0.060	0.055	0.047	0.036	0.028	0.021
1996	94.7	0	0.087	0.067	0.063	0.055	0.048	0.034	0.027	0.021
1997	81.8	**3**	**0.124**	0.095	0.087	0.070	0.059	0.044	0.029	0.023
1998	84.9	**3**	**0.122**	0.097	0.081	0.065	0.056	0.039	0.027	0.023
1999	88.3	**2**	**0.113**	0.091	0.083	0.062	0.052	0.034	0.026	0.021
2000	91.5	**3**	**0.158**	0.096	0.086	0.069	0.058	0.041	0.032	0.027
2001	90.3	**6**	**0.146**	**0.111**	0.099	0.076	0.059	0.042	0.033	0.028
2002	95.3	1	**0.119**	0.091	0.082	0.067	0.059	0.046	0.034	0.028
2003	92.7	0	0.093	0.071	0.066	0.058	0.052	0.037	0.030	0.026

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

Bold font indicates values that exceed the AAQ NEPM standard

Table 58: Statistical summary for O_3 - Annual daily maximum 1-hour average concentrations

Station: Woolooware

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
1994	92.0	**2**	**0.114**	0.082	0.072	0.052	0.039	0.031	0.025	0.020
1995	88.7	0	0.098	0.069	0.066	0.048	0.039	0.031	0.025	0.020
1996	95.3	0	0.069	0.056	0.052	0.046	0.038	0.030	0.024	0.021
1997	92.5	**3**	**0.159**	0.087	0.076	0.056	0.046	0.032	0.025	0.021
1998	81.9	1	**0.115**	0.077	0.073	0.056	0.046	0.031	0.024	0.021
1999	73.8	0	0.075	0.059	0.052	0.041	0.037	0.032	0.027	0.022
2000	88.4	0	0.095	0.087	0.071	0.056	0.044	0.032	0.027	0.023
2001	92.7	**2**	**0.126**	0.082	0.063	0.053	0.045	0.035	0.030	0.025
2002	92.3	1	**0.104**	0.074	0.070	0.052	0.041	0.033	0.027	0.023
2003	90.9	1	**0.106**	0.070	0.054	0.045	0.037	0.032	0.028	0.024

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

Bold font indicates values that exceed the AAQ NEPM standard

Table 59: Statistical summary for O_3 - Annual daily maximum 1-hour average concentration

Station: Newcastle

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
1994	92.6	0	0.062	0.049	0.046	0.041	0.037	0.029	0.024	0.018
1995	68.7	0	0.069	0.056	0.042	0.037	0.033	0.025	0.021	0.017
1996	88.3	0	0.056	0.041	0.039	0.034	0.031	0.025	0.021	0.018
1997	92.0	1	**0.141**	0.062	0.055	0.048	0.041	0.030	0.025	0.020
1998	94.6	0	0.080	0.065	0.054	0.044	0.040	0.031	0.026	0.021
1999	92.0	0	0.066	0.055	0.051	0.046	0.040	0.033	0.027	0.022
2000	88.4	0	0.071	0.065	0.058	0.048	0.042	0.032	0.027	0.023
2001	93.3	0	0.072	0.063	0.057	0.047	0.040	0.034	0.029	0.025
2002	94.0	0	0.083	0.077	0.061	0.054	0.046	0.037	0.030	0.025
2003	92.4	0	0.079	0.061	0.054	0.045	0.039	0.035	0.030	0.025

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

Bold font indicates values that exceed the AAQ NEPM standard

Table 60: Statistical summary for O_3 - Annual daily maximum 1-hour average concentration

Station: Wallsend

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
1994	96.3	0	0.083	0.051	0.050	0.044	0.037	0.029	0.022	0.016
1995	84.4	0	0.052	0.043	0.038	0.034	0.031	0.025	0.019	0.015
1996	91.9	0	0.056	0.045	0.043	0.037	0.033	0.025	0.020	0.015
1997	76.8	1	**0.129**	0.065	0.054	0.048	0.042	0.034	0.027	0.020
1998	86.6	0	0.095	0.072	0.063	0.050	0.041	0.033	0.027	0.022
1999	83.2	0	0.069	0.057	0.054	0.047	0.042	0.033	0.027	0.021
2000	90.4	0	0.073	0.066	0.060	0.048	0.042	0.032	0.027	0.023
2001	87.9	0	0.078	0.070	0.063	0.053	0.046	0.036	0.028	0.023
2002	81.9	0	0.081	0.074	0.069	0.056	0.049	0.038	0.031	0.025
2003	91.6	0	0.077	0.064	0.060	0.050	0.042	0.034	0.029	0.025

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

Bold font indicates values that exceed the AAQ NEPM standard

Table 61: Statistical summary for O_3 - Annual daily maximum 1-hour average concentration

Station: Albion Park

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
1994	95.1	1	**0.101**	0.068	0.056	0.042	0.032	0.025	0.021	0.016
1995	94.0	0	0.080	0.058	0.056	0.043	0.037	0.030	0.025	0.019
1996	83.3	0	0.062	0.053	0.052	0.046	0.040	0.030	0.025	0.021
1997	41.0	**5**	**0.144**	**0.115**	**0.111**	0.068	0.056	0.037	0.028	0.025
1998	89.9	**2**	**0.140**	0.099	0.086	0.062	0.050	0.036	0.029	0.026
1999	90.4	0	0.090	0.084	0.067	0.051	0.043	0.034	0.029	0.025
2000	90.0	1	**0.106**	0.086	0.079	0.059	0.045	0.035	0.030	0.026
2001	93.6	0	0.088	0.074	0.065	0.054	0.044	0.037	0.032	0.027
2002	57.6	0	0.094	0.077	0.068	0.048	0.043	0.033	0.027	0.024
2003	92.8	**4**	**0.130**	0.081	0.063	0.044	0.040	0.034	0.030	0.027

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

Bold font indicates values that exceed the AAQ NEPM standard

Table 62: Statistical summary for O_3 - Annual daily maximum 1-hour average concentrations

Station: Kembla Grange

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
1994	96.5	1	**0.112**	0.076	0.069	0.054	0.042	0.030	0.024	0.020
1995	92.7	0	0.089	0.065	0.058	0.044	0.037	0.028	0.024	0.019
1996	95.0	0	0.083	0.056	0.054	0.047	0.039	0.029	0.024	0.020
1997	89.7	**4**	**0.124**	0.095	0.070	0.056	0.047	0.032	0.028	0.023
1998	87.1	**2**	**0.137**	0.098	0.092	0.063	0.050	0.036	0.029	0.025
1999	91.1	1	**0.101**	0.079	0.065	0.051	0.042	0.033	0.028	0.024
2000	93.9	**3**	**0.117**	0.087	0.077	0.056	0.045	0.034	0.029	0.025
2001	82.3	**2**	**0.119**	0.085	0.078	0.056	0.046	0.036	0.030	0.025
2002	91.7	0	0.099	0.084	0.079	0.053	0.044	0.036	0.031	0.026
2003	93.3	**2**	**0.113**	0.092	0.066	0.044	0.038	0.033	0.030	0.026

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

Bold font indicates values that exceed the AAQ NEPM standard

Table 63: Statistical summary for O_3 - Annual daily maximum 1-hour average concentrations

Station: Wollongong

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
1994	92.7	**2**	**0.120**	0.081	0.070	0.058	0.045	0.030	0.024	0.020
1995	59.7	0	0.097	0.076	0.074	0.052	0.044	0.032	0.026	0.021
1996	94.4	0	0.066	0.060	0.054	0.046	0.037	0.026	0.018	0.013
1997	90.6	**4**	**0.120**	0.094	0.064	0.055	0.047	0.032	0.026	0.023
1998	87.0	1	**0.105**	0.082	0.071	0.060	0.048	0.034	0.027	0.023
1999	87.7	0	0.087	0.067	0.062	0.046	0.041	0.032	0.027	0.021
2000	94.1	1	**0.108**	0.083	0.074	0.061	0.046	0.034	0.028	0.024
2001	94.0	1	**0.116**	0.074	0.071	0.061	0.050	0.037	0.030	0.025
2002	90.7	**2**	**0.121**	0.084	0.081	0.062	0.048	0.036	0.030	0.024
2003	92.8	0	0.097	0.080	0.070	0.046	0.040	0.033	0.029	0.025

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

Bold font indicates values that exceed the AAQ NEPM standard

Table 64: Statistical summary for O_3 - Daily maximum rolling 4-hour average concentration

Station: Blacktown

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
1994	92.3	1	**0.082**	0.073	0.060	0.050	0.040	0.030	0.023	0.017
1995	94.9	0	0.052	0.049	0.047	0.043	0.038	0.029	0.022	0.015
1996	86.4	0	0.071	0.053	0.050	0.046	0.040	0.030	0.022	0.016
1997	94.8	**2**	**0.100**	0.076	0.064	0.057	0.046	0.033	0.024	0.019
1998	84.9	**3**	**0.097**	0.079	0.069	0.055	0.047	0.035	0.023	0.017
1999	99.3	0	0.077	0.064	0.061	0.054	0.045	0.031	0.024	0.018
2000	95.3	**3**	**0.101**	0.078	0.065	0.054	0.045	0.034	0.026	0.021
2001	97.7	**8**	**0.120**	**0.091**	**0.080**	0.065	0.048	0.036	0.029	0.022
2002	95.7	**6**	**0.107**	**0.083**	0.077	0.061	0.054	0.040	0.031	0.024
2003	94.3	**3**	**0.157**	0.078	0.066	0.056	0.045	0.035	0.028	0.023

AAQ NEPM Standard - 0.08 ppm (rolling 4-hour average)

Bold font indicates values that exceed the AAQ NEPM standard

Table 65: Statistical summary for O_3 - Daily maximum rolling 4-hour average concentration

Station: Bringelly

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
1994	84.5	**9**	**0.108**	**0.092**	**0.085**	0.071	0.057	0.039	0.029	0.024
1995	87.3	0	0.066	0.061	0.056	0.049	0.043	0.033	0.025	0.021
1996	82.9	0	0.076	0.060	0.058	0.050	0.045	0.034	0.026	0.021
1997	87.3	**5**	**0.102**	**0.081**	0.074	0.060	0.050	0.040	0.028	0.024
1998	77.6	**9**	**0.089**	**0.085**	**0.083**	0.064	0.056	0.038	0.027	0.023
1999	96.0	**4**	**0.092**	0.078	0.074	0.061	0.049	0.034	0.028	0.023
2000	99.3	**6**	**0.115**	**0.086**	0.076	0.063	0.052	0.037	0.030	0.026
2001	95.4	**12**	**0.128**	**0.098**	**0.086**	0.069	0.054	0.039	0.032	0.026
2002	96.8	**7**	**0.099**	**0.088**	0.078	0.066	0.055	0.041	0.033	0.026
2003	95.3	**5**	**0.133**	**0.082**	0.068	0.057	0.050	0.038	0.031	0.027

AAQ NEPM Standard - 0.08 ppm (rolling 4-hour average)

Bold font indicates values that exceed the AAQ NEPM standard

Table 66: Statistical summary for O_3 - Daily maximum rolling 4-hour average concentration

Station: Lidcombe[(1)] / Chullora[(2)]

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
1994 (1)	66.8	0	0.063	0.057	0.050	0.040	0.032	0.025	0.017	0.012
1995 (1)	92.8	0	0.062	0.051	0.045	0.039	0.033	0.026	0.018	0.012
1996 (1)	81.6	0	0.065	0.056	0.050	0.043	0.037	0.028	0.021	0.014
1997 (1)	90.2	**4**	**0.121**	0.078	0.070	0.058	0.045	0.032	0.022	0.017
1998 (1)	87.8	**5**	**0.119**	**0.082**	0.073	0.056	0.045	0.031	0.023	0.017
1999 (1)	91.0	0	0.077	0.065	0.056	0.050	0.039	0.029	0.023	0.018
2000 (1)	98.7	**2**	**0.095**	0.074	0.066	0.053	0.043	0.031	0.025	0.019
2001 (1)	98.5	**4**	**0.137**	**0.080**	0.076	0.057	0.044	0.032	0.024	0.019
2002 (1)	32.4	1	**0.084**	0.072	0.063	0.052	0.043	0.035	0.027	0.020
2003 (2)	84.2	0	0.077	0.057	0.053	0.041	0.037	0.032	0.026	0.021

AAQ NEPM Standard - 0.08 ppm (rolling 4-hour average)

Bold font indicates values that exceed the AAQ NEPM standard

(1) Lidcombe station closed 2nd quarter 2002

(2) Chullora station commissioned December 2002

Table 67: Statistical summary for O_3 - Daily maximum rolling 4-hour average concentration

Station: Liverpool

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
1994	75.7	**3**	**0.096**	0.077	0.063	0.051	0.041	0.026	0.021	0.016
1995	73.4	0	0.067	0.051	0.049	0.036	0.032	0.024	0.019	0.014
1996	78.3	0	0.078	0.062	0.056	0.046	0.035	0.025	0.019	0.014
1997	73.3	**2**	**0.116**	0.076	0.067	0.048	0.039	0.025	0.020	0.015
1998	97.2	**5**	**0.108**	**0.084**	0.077	0.058	0.046	0.031	0.022	0.016
1999	87.3	1	**0.084**	0.068	0.065	0.054	0.041	0.030	0.023	0.018
2000	97.5	**3**	**0.107**	0.076	0.070	0.059	0.047	0.033	0.027	0.022
2001	99.0	**7**	**0.120**	**0.093**	0.078	0.064	0.048	0.036	0.029	0.023
2002	97.7	**5**	**0.089**	0.078	0.068	0.058	0.048	0.035	0.028	0.023
2003	97.1	**3**	**0.132**	0.073	0.054	0.048	0.040	0.033	0.028	0.022

AAQ NEPM Standard - 0.08 ppm (rolling 4-hour average)

Bold font indicates values that exceed the AAQ NEPM standard

Table 68: Statistical summary for O_3 - Daily maximum rolling 4-hour average concentration

Station: Oakdale

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
1994	0.0									
1995	0.0									
1996	63.1	1	**0.088**	0.062	0.053	0.044	0.038	0.030	0.025	0.022
1997	93.2	**12**	**0.133**	**0.090**	**0.081**	0.068	0.055	0.041	0.030	0.026
1998	88.6	**2**	**0.092**	0.077	0.065	0.054	0.045	0.034	0.026	0.013
1999	92.9	**6**	**0.090**	**0.083**	0.075	0.059	0.050	0.038	0.030	0.027
2000	94.0	**4**	**0.098**	**0.082**	0.072	0.055	0.047	0.037	0.029	0.026
2001	92.2	**9**	**0.105**	**0.094**	**0.088**	0.059	0.052	0.040	0.033	0.027
2002	25.7	1	**0.080**	0.078	0.074	0.072	0.065	0.053	0.039	0.032
2003	95.0	**3**	**0.089**	0.072	0.064	0.056	0.048	0.039	0.032	0.028

AAQ NEPM Standard - 0.08 ppm (rolling 4-hour average)

Bold font indicates values that exceed the AAQ NEPM standard

Table 69: Statistical summary for O_3 - Daily maximum rolling 4-hour average concentration

Station: Richmond

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
1994	95.9	**3**	**0.097**	0.067	0.049	0.040	0.036	0.029	0.024	0.019
1995	87.3	0	0.061	0.046	0.044	0.039	0.036	0.029	0.024	0.018
1996	92.9	0	0.075	0.055	0.052	0.047	0.041	0.034	0.027	0.022
1997	76.6	**4**	**0.103**	**0.082**	0.067	0.058	0.051	0.039	0.029	0.025
1998	94.8	**2**	**0.097**	0.074	0.068	0.058	0.050	0.037	0.029	0.024
1999	95.9	1	**0.098**	0.071	0.064	0.053	0.048	0.038	0.031	0.025
2000	93.2	0	0.078	0.065	0.061	0.054	0.046	0.036	0.028	0.024
2001	94.5	**6**	**0.111**	**0.084**	0.074	0.065	0.051	0.039	0.032	0.026
2002	96.3	**4**	**0.112**	**0.080**	0.073	0.062	0.056	0.042	0.032	0.027
2003	89.5	**3**	**0.138**	0.076	0.067	0.055	0.048	0.037	0.029	0.025

AAQ NEPM Standard - 0.08 ppm (rolling 4-hour average)

Bold font indicates values that exceed the AAQ NEPM standard

Table 70: Statistical summary for O_3 - Daily maximum rolling 4-hour average concentration

Station: Rozelle

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
1994	86.0	0	0.059	0.049	0.042	0.034	0.030	0.025	0.019	0.014
1995	86.4	0	0.069	0.039	0.037	0.030	0.024	0.020	0.015	0.011
1996	0.0									
1997	0.0									
1998	75.1	0	0.079	0.046	0.044	0.039	0.034	0.025	0.019	0.014
1999	92.6	0	0.053	0.043	0.039	0.035	0.029	0.023	0.019	0.014
2000	91.5	0	0.073	0.058	0.050	0.042	0.034	0.028	0.024	0.019
2001	97.4	1	**0.083**	0.055	0.050	0.040	0.036	0.030	0.024	0.020
2002	92.1	1	**0.087**	0.061	0.054	0.047	0.040	0.032	0.026	0.021
2003	95.3	0	0.070	0.057	0.052	0.039	0.034	0.030	0.025	0.021

AAQ NEPM Standard - 0.08 ppm (rolling 4-hour average)

Bold font indicates values that exceed the AAQ NEPM standard

Table 71: Statistical summary for O_3 - Daily maximum rolling 4-hour average concentration

Station: St Marys

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
1994	34.4	**4**	**0.096**	**0.089**	0.079	0.058	0.049	0.040	0.026	0.020
1995	85.1	0	0.058	0.053	0.052	0.047	0.042	0.033	0.026	0.020
1996	89.9	0	0.080	0.056	0.052	0.049	0.043	0.033	0.026	0.020
1997	78.9	**4**	**0.104**	**0.084**	0.071	0.062	0.053	0.040	0.028	0.022
1998	88.6	**4**	**0.091**	0.080	0.071	0.057	0.049	0.034	0.026	0.021
1999	92.2	**3**	**0.091**	0.073	0.065	0.057	0.046	0.031	0.025	0.019
2000	95.6	**5**	**0.136**	**0.083**	0.076	0.063	0.053	0.038	0.030	0.025
2001	94.2	**11**	**0.125**	**0.092**	**0.085**	0.067	0.051	0.040	0.031	0.027
2002	99.7	**7**	**0.093**	**0.084**	0.070	0.060	0.053	0.042	0.032	0.026
2003	96.8	**2**	**0.091**	0.062	0.059	0.051	0.046	0.035	0.029	0.025

AAQ NEPM Standard - 0.08 ppm (rolling 4-hour average)

Bold font indicates values that exceed the AAQ NEPM standard

Table 72: Statistical summary for O_3 - Daily maximum rolling 4-hour average concentration

Station: Woolooware

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
1994	88.6	**3**	**0.089**	0.073	0.061	0.045	0.037	0.029	0.024	0.019
1995	90.5	0	0.073	0.057	0.051	0.042	0.036	0.029	0.024	0.019
1996	97.9	0	0.064	0.048	0.045	0.038	0.033	0.028	0.023	0.019
1997	95.4	**4**	**0.131**	0.071	0.062	0.047	0.041	0.029	0.024	0.020
1998	81.2	**2**	**0.094**	0.067	0.064	0.050	0.040	0.029	0.023	0.019
1999	73.1	0	0.071	0.052	0.045	0.038	0.034	0.030	0.026	0.020
2000	92.3	**2**	**0.083**	0.068	0.064	0.047	0.040	0.030	0.026	0.022
2001	96.8	**2**	**0.096**	0.068	0.057	0.046	0.041	0.033	0.028	0.024
2002	96.5	**2**	**0.088**	0.068	0.056	0.047	0.038	0.031	0.026	0.022
2003	95.0	1	**0.089**	0.063	0.049	0.041	0.035	0.030	0.027	0.023

AAQ NEPM Standard - 0.08 ppm (rolling 4-hour average)

Bold font indicates values that exceed the AAQ NEPM standard

Table 73: Statistical summary for O_3 - Daily maximum rolling 4-hour average concentrations

Station: Newcastle

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
1994	92.1	0	0.051	0.044	0.041	0.036	0.033	0.027	0.021	0.016
1995	70.6	0	0.063	0.052	0.041	0.034	0.030	0.023	0.019	0.015
1996	91.9	0	0.054	0.037	0.035	0.031	0.027	0.023	0.019	0.016
1997	95.4	1	**0.125**	0.056	0.050	0.043	0.037	0.029	0.023	0.018
1998	98.6	0	0.068	0.058	0.049	0.040	0.034	0.029	0.024	0.019
1999	96.0	0	0.065	0.050	0.047	0.042	0.037	0.032	0.026	0.021
2000	92.1	0	0.065	0.059	0.051	0.043	0.038	0.030	0.025	0.021
2001	97.4	0	0.069	0.057	0.051	0.042	0.037	0.032	0.027	0.023
2002	98.2	0	0.077	0.063	0.054	0.050	0.041	0.034	0.028	0.023
2003	96.3	0	0.061	0.052	0.049	0.041	0.038	0.033	0.028	0.024

AAQ NEPM Standard - 0.08 ppm (rolling 4-hour average)

Bold font indicates values that exceed the AAQ NEPM standard

Table 74: Statistical summary for O_3 - Daily maximum rolling 4-hour average concentration

Station: Wallsend

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
1994	87.8	0	0.064	0.048	0.045	0.039	0.033	0.027	0.021	0.015
1995	75.3	0	0.048	0.039	0.036	0.030	0.027	0.022	0.017	0.013
1996	83.1	0	0.053	0.041	0.039	0.033	0.028	0.023	0.019	0.014
1997	76.0	**2**	**0.105**	0.054	0.049	0.044	0.039	0.032	0.026	0.019
1998	90.2	1	**0.084**	0.061	0.052	0.043	0.037	0.030	0.026	0.020
1999	86.7	0	0.059	0.050	0.047	0.042	0.038	0.031	0.024	0.020
2000	94.2	0	0.070	0.059	0.056	0.045	0.038	0.030	0.026	0.022
2001	91.7	0	0.073	0.062	0.056	0.048	0.041	0.033	0.027	0.022
2002	85.6	0	0.074	0.067	0.065	0.052	0.043	0.035	0.029	0.023
2003	95.7	0	0.059	0.057	0.054	0.044	0.039	0.032	0.028	0.024

AAQ NEPM Standard - 0.08 ppm (rolling 4-hour average)

Bold font indicates values that exceed the AAQ NEPM standard

Table 75: Statistical summary for O_3 - Daily maximum rolling 4-hour average concentration

Station: Albion Park

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
1994	90.8	0	0.079	0.052	0.048	0.033	0.027	0.024	0.020	0.015
1995	96.5	0	0.063	0.049	0.045	0.037	0.033	0.028	0.024	0.018
1996	85.9	0	0.053	0.045	0.042	0.038	0.033	0.028	0.024	0.020
1997	43.3	**5**	**0.124**	**0.099**	**0.087**	0.063	0.049	0.033	0.027	0.024
1998	91.2	**5**	**0.116**	**0.084**	0.065	0.052	0.044	0.033	0.028	0.025
1999	89.4	1	**0.081**	0.070	0.056	0.045	0.038	0.032	0.028	0.024
2000	93.7	**4**	**0.083**	0.080	0.065	0.051	0.041	0.034	0.028	0.025
2001	97.7	1	**0.082**	0.064	0.059	0.049	0.041	0.036	0.031	0.026
2002	60.0	1	**0.083**	0.069	0.065	0.043	0.039	0.031	0.026	0.023
2003	96.8	**4**	**0.111**	0.070	0.058	0.040	0.037	0.033	0.029	0.025

AAQ NEPM Standard - 0.08 ppm (rolling 4-hour average)

Bold font indicates values that exceed the AAQ NEPM standard

Table 76: Statistical summary for O_3 - Daily maximum rolling 4-hour average concentration

Station: Kembla Grange

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
1994	95.1	1	**0.089**	0.068	0.058	0.043	0.035	0.027	0.023	0.019
1995	93.5	0	0.063	0.052	0.046	0.039	0.033	0.027	0.023	0.018
1996	96.0	0	0.062	0.048	0.047	0.039	0.034	0.027	0.023	0.019
1997	92.3	**5**	**0.099**	**0.084**	0.060	0.048	0.042	0.030	0.026	0.022
1998	87.7	**6**	**0.117**	**0.081**	0.074	0.053	0.044	0.033	0.027	0.023
1999	88.9	1	**0.081**	0.067	0.056	0.044	0.037	0.031	0.027	0.023
2000	97.9	**4**	**0.089**	0.077	0.067	0.050	0.039	0.032	0.028	0.024
2001	85.7	**2**	**0.092**	0.071	0.061	0.051	0.042	0.034	0.029	0.024
2002	95.8	1	**0.083**	0.071	0.070	0.046	0.040	0.034	0.029	0.024
2003	97.4	**3**	**0.107**	0.073	0.056	0.041	0.036	0.032	0.028	0.025

AAQ NEPM Standard - 0.08 ppm (rolling 4-hour average)

Bold font indicates values that exceed the AAQ NEPM standard

Table 77: Statistical summary for O_3 - Daily maximum rolling 4-hour average concentration

Station: Wollongong

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
1994	94.1	**3**	**0.086**	0.063	0.057	0.047	0.038	0.028	0.022	0.018
1995	59.8	0	0.070	0.064	0.062	0.046	0.037	0.030	0.025	0.020
1996	92.4	0	0.055	0.046	0.043	0.038	0.032	0.023	0.016	0.011
1997	91.6	**4**	**0.113**	**0.081**	0.062	0.050	0.042	0.030	0.025	0.021
1998	87.3	1	**0.082**	0.076	0.067	0.050	0.042	0.031	0.026	0.022
1999	85.4	0	0.073	0.058	0.054	0.043	0.037	0.030	0.025	0.019
2000	98.2	**3**	**0.086**	0.076	0.067	0.056	0.040	0.031	0.027	0.023
2001	98.0	1	**0.091**	0.068	0.064	0.052	0.044	0.034	0.029	0.024
2002	94.6	**2**	**0.099**	0.076	0.068	0.056	0.043	0.034	0.028	0.023
2003	96.4	1	**0.080**	0.072	0.059	0.042	0.037	0.032	0.028	0.024

AAQ NEPM Standard - 0.08 ppm (rolling 4-hour average)

Bold font indicates values that exceed the AAQ NEPM standard

Sulfur Dioxide

Statistical summary

Table 78: Statistical summary for SO_2 - Daily maximum 1-hour average concentrations (2003)

Region/ Performance monitoring Station	Data availability rates (%)	Maximum conc. (ppm)	Percentiles (ppm)						
			99th	98th	95th	90th	75th	50th	25th
Sydney									
Chullora [4]									
Woolooware	93.2	0.022	0.018	0.013	0.010	0.007	0.004	0.002	0.001
Blacktown	91.3	0.016	0.012	0.010	0.007	0.005	0.004	0.003	0.002
Richmond	93.0	0.012	0.010	0.008	0.006	0.004	0.003	0.001	0.001
Liverpool Bringelly	93.0	0.017	0.006	0.006	0.004	0.003	0.002	0.001	0.001
Macarthur [1]									
Central Coast [2]									
Illawarra									
Wollongong	93.7	0.031	0.025	0.022	0.015	0.013	0.008	0.004	0.002
Warrawong	93.7	0.063	0.048	0.040	0.020	0.016	0.009	0.002	0.000
Albion Park	93.7	0.035	0.025	0.021	0.015	0.012	0.005	0.001	0.000
Lower Hunter									
Wallsend	90.3	0.047	0.032	0.028	0.021	0.016	0.011	0.006	0.003
Newcastle Maitland [3]									

AAQ NEPM Standard - 0.20 ppm (1-hour average)

(1) Station to be established. Data reported from Liverpool in the interim.

(2) Station to be established.

(3) Station to be established. Data reported from Wallsend in the interim.

(4) Instrument to be installed.

Table 79: Statistical summary for SO_2 - Daily 24-hour average concentrations (2003)

Region/ Performance monitoring Station	Data availability rates (%)	Maximum conc. (ppm)	Percentiles (ppm)						
			99th	98th	95th	90th	75th	50th	25th
Sydney									
Chullora (4)									
Woolooware	98.1	0.004	0.003	0.003	0.002	0.002	0.001	0.001	0.000
Blacktown	95.1	0.004	0.003	0.003	0.002	0.002	0.001	0.001	0.001
Richmond	97.0	0.003	0.002	0.002	0.001	0.001	0.001	0.000	0.000
Liverpool Bringelly Macarthur (1)	97.3	0.002	0.002	0.002	0.001	0.001	0.000	0.000	0.000
Central Coast (2)									
Illawarra									
Wollongong	98.4	0.006	0.005	0.004	0.003	0.003	0.001	0.001	0.000
Warrawong	98.4	0.012	0.009	0.007	0.004	0.003	0.002	0.000	0.000
Albion Park	98.9	0.009	0.007	0.005	0.004	0.003	0.001	0.000	0.000
Lower Hunter									
Wallsend	93.7	0.011	0.006	0.005	0.004	0.003	0.002	0.001	0.001
Newcastle Maitland (3)									

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

(1) Station to be established. Data reported from Liverpool in the interim.

(2) Station to be established.

(3) Station to be established. Data reported from Wallsend in the interim.

(4) Instrument to be installed.

Trend analysis

Table 80: Maximum 1-hour average concentrations for SO_2 (ppm)

Region/ Performance monitoring Station	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Sydney										
Woolooware	0.041	0.040	0.034	0.026	0.029	0.030	0.034	0.026	0.038	0.022
Blacktown			0.020	0.018	0.020	0.020	0.015	0.020	0.021	0.016
Richmond	0.012		0.018	0.016	0.012	0.019	0.015	0.012	0.028	0.012
Bringelly			0.009	0.012	0.013	0.012	0.018	0.012	0.010	0.017
Illawarra										
Wollongong	0.192	0.031	0.019	0.043	0.033	0.041	0.031	0.030	0.039	0.031
Warrawong	0.162				0.058	0.051	0.110	0.162	0.046	0.063
Albion Park	0.091	0.038	0.036	0.034	0.055	0.033	0.042	0.034	0.029	0.035
Lower Hunter										
Wallsend	0.073	0.059	0.080	0.101	0.063	0.074	0.041	0.049	0.045	0.047

AAQ NEPM Standard - 0.20 ppm (1-hour average)

Bold font indicates values that exceed the AAQ NEPM standard

Table 81: Maximum 24-hour average concentrations for SO_2 (ppm)

Region/ Performance monitoring Station	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Sydney										
Woolooware	0.009	0.006	0.006	0.005	0.004	0.005	0.005	0.006	0.007	0.004
Blacktown			0.007	0.010	0.008	0.003	0.004	0.005	0.004	0.004
Richmond	0.005		0.003	0.003	0.007	0.003	0.004	0.010	0.004	0.003
Bringelly			0.005	0.003	0.003	0.003	0.004	0.003	0.002	0.002
Illawarra										
Wollongong	0.033	0.009	0.007	0.011	0.009	0.006	0.008	0.008	0.008	0.006
Warrawong	0.019				0.011	0.009	0.010	0.013	0.009	0.012
Albion Park	0.021	0.012	0.011	0.011	0.014	0.009	0.014	0.013	0.009	0.009
Lower Hunter										
Wallsend	0.018	0.020	0.022	0.022	0.016	0.014	0.010	0.013	0.012	0.011

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

Table 82: Annual average concentrations for SO_2 (ppm)

Region/ Performance monitoring Station	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Sydney										
Woolooware	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Blacktown			0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.001
Richmond	0.002		0.001	0.001	0.001	0.001	0.000	0.000	0.001	0.000
Bringelly			0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000
Illawarra										
Wollongong	0.007	0.003	0.002	0.001	0.002	0.001	0.002	0.001	0.001	0.001
Warrawong	0.006				0.001	0.001	0.001	0.002	0.001	0.001
Albion Park	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Lower Hunter										
Wallsend	0.003	0.002	0.003	0.004	0.003	0.002	0.002	0.002	0.002	0.002

AAQ NEPM Standard - 0.02 ppm (Annual average)

Table 83: Statistical summary for SO_2 - Annual daily maximum 1-hour average concentrations

Station: Blacktown

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
1994	0.0									
1995	0.0									
1996	41.3	0	0.020	0.010	0.009	0.008	0.006	0.004	0.003	0.002
1997	82.0	0	0.018	0.015	0.011	0.009	0.007	0.005	0.003	0.002
1998	84.9	0	0.020	0.013	0.011	0.009	0.007	0.004	0.003	0.002
1999	88.8	0	0.020	0.009	0.008	0.007	0.006	0.004	0.003	0.002
2000	85.9	0	0.015	0.011	0.010	0.008	0.006	0.004	0.003	0.002
2001	93.9	0	0.020	0.014	0.012	0.008	0.007	0.005	0.003	0.002
2002	93.2	0	0.021	0.013	0.010	0.008	0.006	0.004	0.003	0.002
2003	91.3	0	0.016	0.012	0.010	0.007	0.005	0.004	0.003	0.002

AAQ NEPM Standard - 0.20 ppm (1-hour average)

Table 84: Statistical summary for SO_2 - Annual daily maximum 1-hour average concentrations

Station: Bringelly

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
1994	0.0									
1995	0.0									
1996	64.2	0	0.009	0.007	0.006	0.005	0.004	0.002	0.001	0.001
1997	92.1	0	0.012	0.008	0.007	0.005	0.004	0.002	0.001	0.001
1998	87.8	0	0.013	0.007	0.006	0.005	0.004	0.002	0.002	0.001
1999	87.8	0	0.012	0.008	0.007	0.005	0.004	0.003	0.002	0.001
2000	90.8	0	0.018	0.007	0.006	0.005	0.004	0.003	0.001	0.001
2001	94.7	0	0.012	0.010	0.008	0.006	0.004	0.003	0.002	0.001
2002	94.6	0	0.010	0.009	0.008	0.006	0.004	0.002	0.001	0.001
2003	93.0	0	0.017	0.006	0.005	0.004	0.003	0.002	0.001	0.001

AAQ NEPM Standard - 0.20 ppm (1-hour average)

Table 85: Statistical summary for SO_2 - Annual daily maximum 1-hour average concentrations

Station: Richmond

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
1994	5.6	0	0.012	0.011	0.011	0.009	0.007	0.006	0.004	0.003
1995	0.0									
1996	64.8	0	0.018	0.007	0.006	0.005	0.004	0.002	0.002	0.001
1997	86.1	0	0.016	0.009	0.008	0.006	0.005	0.003	0.002	0.001
1998	73.0	0	0.012	0.008	0.006	0.005	0.004	0.003	0.001	0.001
1999	90.3	0	0.019	0.018	0.018	0.007	0.005	0.003	0.002	0.001
2000	85.6	0	0.015	0.009	0.007	0.006	0.004	0.002	0.001	0.001
2001	84.7	0	0.012	0.010	0.007	0.005	0.004	0.002	0.001	0.001
2002	93.3	0	0.028	0.009	0.008	0.006	0.004	0.003	0.001	0.001
2003	93.0	0	0.012	0.010	0.009	0.006	0.004	0.003	0.001	0.001

AAQ NEPM Standard - 0.20 ppm (1-hour average)

Table 86: Statistical summary for SO_2 - Annual daily maximum 1-hour average concentrations

Station: Woolooware

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
1994	74.6	0	0.041	0.033	0.027	0.023	0.017	0.009	0.006	0.003
1995	90.8	0	0.040	0.015	0.012	0.010	0.009	0.006	0.003	0.002
1996	72.0	0	0.034	0.015	0.012	0.010	0.007	0.005	0.003	0.001
1997	83.2	0	0.026	0.014	0.011	0.009	0.007	0.004	0.003	0.001
1998	89.9	0	0.029	0.012	0.009	0.008	0.005	0.003	0.001	0.000
1999	91.9	0	0.030	0.016	0.011	0.008	0.006	0.003	0.001	0.001
2000	92.8	0	0.034	0.024	0.017	0.011	0.008	0.005	0.003	0.002
2001	92.5	0	0.026	0.018	0.016	0.010	0.007	0.004	0.002	0.001
2002	93.4	0	0.038	0.017	0.013	0.010	0.007	0.004	0.002	0.001
2003	93.2	0	0.022	0.019	0.012	0.010	0.007	0.004	0.002	0.001

AAQ NEPM Standard - 0.20 ppm (1-hour average)

Table 87: Statistical summary for SO_2 - Annual daily maximum 1-hour average concentrations

Station: Wallsend

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
1994	71.8	0	0.073	0.061	0.053	0.041	0.030	0.019	0.010	0.005
1995	79.4	0	0.059	0.048	0.041	0.029	0.022	0.014	0.007	0.003
1996	52.5	0	0.080	0.057	0.046	0.035	0.024	0.014	0.008	0.005
1997	70.5	0	0.101	0.068	0.062	0.046	0.033	0.021	0.011	0.006
1998	86.6	0	0.063	0.053	0.039	0.034	0.027	0.018	0.009	0.005
1999	80.4	0	0.074	0.042	0.041	0.033	0.024	0.014	0.009	0.004
2000	92.0	0	0.041	0.031	0.030	0.024	0.019	0.012	0.007	0.003
2001	86.9	0	0.049	0.035	0.030	0.025	0.021	0.013	0.008	0.003
2002	80.2	0	0.045	0.034	0.028	0.024	0.019	0.012	0.007	0.004
2003	90.3	0	0.047	0.032	0.028	0.021	0.016	0.011	0.006	0.003

AAQ NEPM Standard - 0.20 ppm (1-hour average)

Table 88: Statistical summary for SO_2 - Annual daily maximum 1-hour average concentrations

Station: Albion Park

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
1994	72.9	0	0.091	0.057	0.044	0.033	0.018	0.007	0.002	0.001
1995	74.9	0	0.038	0.035	0.032	0.024	0.017	0.006	0.002	0.001
1996	78.6	0	0.036	0.028	0.025	0.019	0.012	0.004	0.001	0.001
1997	41.2	0	0.034	0.028	0.025	0.020	0.016	0.007	0.001	0.000
1998	87.7	0	0.055	0.027	0.025	0.018	0.012	0.005	0.001	0.000
1999	90.5	0	0.033	0.025	0.024	0.017	0.013	0.005	0.001	0.000
2000	94.2	0	0.042	0.032	0.030	0.024	0.017	0.008	0.001	0.000
2001	93.7	0	0.034	0.027	0.024	0.018	0.013	0.008	0.001	0.000
2002	57.4	0	0.029	0.027	0.026	0.022	0.016	0.006	0.001	0.000
2003	93.7	0	0.035	0.023	0.020	0.015	0.012	0.005	0.001	0.000

AAQ NEPM Standard - 0.20 ppm (1-hour average)

Bold font indicates values that exceed the AAQ NEPM standard

Table 89: Statistical summary for SO_2 - Annual daily maximum 1-hour average concentrations

Station: Warrawong

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
1994	5.6	0	0.162	0.131	0.121	0.096	0.074	0.021	0.011	0.005
1995	0.0									
1996	0.0									
1997	0.0									
1998	86.8	0	0.058	0.033	0.030	0.019	0.015	0.006	0.002	0.001
1999	89.2	0	0.051	0.036	0.027	0.019	0.013	0.006	0.002	0.001
2000	90.8	0	0.110	0.068	0.038	0.026	0.020	0.011	0.003	0.000
2001	93.1	0	0.162	0.065	0.055	0.042	0.027	0.012	0.003	0.000
2002	94.0	0	0.046	0.031	0.028	0.023	0.019	0.011	0.004	0.000
2003	93.7	0	0.063	0.048	0.041	0.021	0.016	0.009	0.002	0.000

AAQ NEPM Standard - 0.20 ppm (1-hour average)

Table 90: Statistical summary for SO_2 - Annual daily maximum 1-hour average concentrations

Station: Wollongong

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
1994	23.5	0	0.192	0.114	0.077	0.039	0.029	0.018	0.009	0.004
1995	59.8	0	0.031	0.026	0.023	0.018	0.013	0.009	0.006	0.003
1996	35.1	0	0.019	0.019	0.018	0.014	0.011	0.006	0.003	0.002
1997	90.5	0	0.043	0.022	0.018	0.014	0.010	0.007	0.004	0.002
1998	91.3	0	0.033	0.027	0.022	0.017	0.013	0.007	0.004	0.002
1999	91.6	0	0.041	0.018	0.016	0.013	0.011	0.008	0.004	0.002
2000	94.3	0	0.031	0.025	0.021	0.017	0.014	0.009	0.005	0.003
2001	92.6	0	0.030	0.027	0.020	0.016	0.013	0.008	0.004	0.002
2002	91.1	0	0.039	0.030	0.025	0.019	0.015	0.009	0.005	0.002
2003	93.7	0	0.031	0.024	0.021	0.015	0.013	0.008	0.004	0.002

AAQ NEPM Standard - 0.20 ppm (1-hour average)

Bold font indicates values that exceed the AAQ NEPM standard

Table 91: Statistical summary for SO_2 - 24-hour average concentrations

Station: Blacktown

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
1994	0.0									
1995	0.0									
1996	42.9	0	0.007	0.005	0.005	0.004	0.002	0.002	0.001	0.001
1997	83.8	0	0.010	0.005	0.004	0.003	0.003	0.002	0.001	0.001
1998	89.9	0	0.008	0.005	0.004	0.003	0.003	0.002	0.001	0.001
1999	95.3	0	0.003	0.003	0.003	0.002	0.002	0.001	0.001	0.000
2000	84.2	0	0.004	0.003	0.003	0.003	0.002	0.001	0.001	0.000
2001	98.1	0	0.005	0.004	0.003	0.003	0.002	0.001	0.001	0.001
2002	96.4	0	0.004	0.003	0.003	0.002	0.002	0.001	0.001	0.001
2003	95.1	0	0.004	0.003	0.003	0.002	0.002	0.001	0.001	0.001

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

Table 92: Statistical summary for SO_2 - 24-hour average concentrations

Station: Bringelly

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
1994	0.0									
1995	0.0									
1996	64.2	0	0.005	0.004	0.004	0.002	0.001	0.001	0.001	0.000
1997	96.2	0	0.003	0.002	0.002	0.002	0.001	0.001	0.001	0.000
1998	92.1	0	0.003	0.002	0.002	0.002	0.001	0.001	0.001	0.000
1999	94.0	0	0.003	0.002	0.002	0.002	0.002	0.001	0.001	0.000
2000	94.8	0	0.004	0.002	0.001	0.001	0.001	0.001	0.000	0.000
2001	98.6	0	0.003	0.002	0.002	0.001	0.001	0.001	0.000	0.000
2002	99.2	0	0.002	0.002	0.002	0.001	0.001	0.001	0.000	0.000
2003	97.3	0	0.002	0.002	0.002	0.001	0.001	0.000	0.000	0.000

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

Table 93: Statistical summary for SO_2 - 24-hour average concentrations

Station: Richmond

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
1994	5.8	0	0.005	0.004	0.004	0.004	0.004	0.003	0.002	0.001
1995	0.0									
1996	67.5	0	0.003	0.002	0.002	0.002	0.001	0.001	0.001	0.000
1997	89.0	0	0.003	0.003	0.003	0.002	0.002	0.001	0.001	0.001
1998	75.1	0	0.007	0.004	0.003	0.002	0.001	0.001	0.001	0.000
1999	95.6	0	0.003	0.002	0.002	0.002	0.001	0.001	0.001	0.000
2000	89.3	0	0.004	0.002	0.002	0.001	0.001	0.001	0.000	0.000
2001	88.8	0	0.010	0.002	0.002	0.002	0.001	0.001	0.000	0.000
2002	97.5	0	0.004	0.002	0.002	0.002	0.001	0.001	0.000	0.000
2003	97.0	0	0.003	0.002	0.002	0.001	0.001	0.001	0.000	0.000

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

Table 94: Statistical summary for SO_2 - 24-hour average concentrations

Station: Woolooware

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
1994	73.7	0	0.009	0.007	0.006	0.005	0.004	0.003	0.001	0.001
1995	92.6	0	0.006	0.004	0.004	0.004	0.003	0.002	0.001	0.001
1996	73.2	0	0.006	0.004	0.004	0.003	0.002	0.002	0.001	0.001
1997	85.2	0	0.005	0.004	0.004	0.003	0.003	0.002	0.001	0.001
1998	96.2	0	0.004	0.003	0.003	0.002	0.001	0.001	0.001	0.000
1999	98.6	0	0.005	0.003	0.002	0.002	0.002	0.001	0.000	0.000
2000	96.7	0	0.005	0.004	0.003	0.003	0.002	0.001	0.001	0.000
2001	95.9	0	0.006	0.004	0.003	0.002	0.002	0.001	0.000	0.000
2002	97.0	0	0.007	0.003	0.003	0.002	0.002	0.001	0.000	0.000
2003	98.1	0	0.004	0.003	0.003	0.002	0.002	0.001	0.001	0.000

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

Table 95: Statistical summary for SO_2 - 24-hour average concentrations

Station: Wallsend

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
1994	71.5	0	0.018	0.012	0.011	0.009	0.007	0.004	0.002	0.001
1995	78.4	0	0.020	0.011	0.009	0.006	0.005	0.003	0.001	0.001
1996	54.1	0	0.022	0.012	0.011	0.008	0.006	0.004	0.003	0.002
1997	72.6	0	0.022	0.018	0.015	0.012	0.008	0.004	0.003	0.002
1998	91.0	0	0.016	0.014	0.010	0.008	0.006	0.004	0.002	0.002
1999	86.0	0	0.014	0.011	0.009	0.007	0.005	0.003	0.002	0.001
2000	94.5	0	0.010	0.009	0.007	0.006	0.004	0.003	0.002	0.001
2001	89.6	0	0.013	0.009	0.008	0.006	0.005	0.003	0.002	0.001
2002	82.2	0	0.012	0.007	0.007	0.005	0.004	0.003	0.002	0.001
2003	93.7	0	0.011	0.006	0.005	0.004	0.003	0.002	0.001	0.001

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

Table 96: Statistical summary for SO_2 - 24-hour average concentrations

Station: Albion Park

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
1994	0.0	0	0.021	0.011	0.009	0.007	0.005	0.002	0.001	0.000
1995	0.0	0	0.012	0.009	0.009	0.005	0.004	0.002	0.001	0.000
1996	0.0	0	0.011	0.009	0.007	0.004	0.002	0.001	0.001	0.000
1997	33.2	0	0.011	0.008	0.007	0.006	0.003	0.001	0.000	0.000
1998	94.0	0	0.014	0.010	0.008	0.004	0.003	0.001	0.000	0.000
1999	98.6	0	0.009	0.008	0.006	0.004	0.003	0.001	0.000	0.000
2000	98.1	0	0.014	0.009	0.008	0.006	0.004	0.002	0.000	0.000
2001	98.1	0	0.013	0.008	0.007	0.005	0.003	0.002	0.000	0.000
2002	60.0	0	0.009	0.008	0.007	0.006	0.004	0.001	0.000	0.000
2003	98.9	0	0.009	0.007	0.005	0.004	0.003	0.001	0.000	0.000

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

Table 97: Statistical summary for SO_2 - 24-hour average concentrations

Station: Warrawong

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
1994	4.9	0	0.019	0.015	0.014	0.011	0.010	0.008	0.003	0.002
1995	0.0									
1996	0.0									
1997	0.0									
1998	92.6	0	0.011	0.007	0.005	0.004	0.003	0.001	0.000	0.000
1999	95.3	0	0.009	0.007	0.005	0.004	0.003	0.001	0.001	0.000
2000	93.7	0	0.010	0.007	0.006	0.004	0.003	0.002	0.000	0.000
2001	97.3	0	0.013	0.010	0.009	0.006	0.005	0.002	0.000	0.000
2002	98.6	0	0.009	0.006	0.006	0.005	0.003	0.002	0.001	0.000
2003	98.4	0	0.012	0.009	0.007	0.004	0.003	0.002	0.000	0.000

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

Table 98: Statistical summary for SO_2 - 24-hour average concentrations

Station: Wollongong

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
1994	20.3	0	0.033	0.022	0.021	0.020	0.019	0.010	0.004	0.001
1995	61.9	0	0.009	0.008	0.008	0.007	0.006	0.004	0.002	0.002
1996	35.5	0	0.007	0.007	0.005	0.004	0.003	0.002	0.001	0.001
1997	92.6	0	0.011	0.006	0.005	0.003	0.003	0.002	0.001	0.000
1998	97.3	0	0.009	0.005	0.005	0.004	0.003	0.002	0.001	0.001
1999	98.1	0	0.006	0.005	0.004	0.004	0.003	0.002	0.001	0.001
2000	99.2	0	0.008	0.006	0.005	0.004	0.003	0.002	0.001	0.001
2001	95.9	0	0.008	0.006	0.005	0.004	0.003	0.002	0.001	0.000
2002	95.3	0	0.008	0.006	0.006	0.004	0.003	0.002	0.001	0.000
2003	98.4	0	0.006	0.005	0.004	0.003	0.003	0.001	0.001	0.000

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

Particles as PM_{10}

Statistical summary

Table 99: Statistical summary for PM_{10} - 24-hour average concentrations (2003)

Region/ Performance monitoring Station	Data availability rates (%)	Maximum conc. (µg/m³)	Percentiles (µg/m³)						
			99th	98th	95th	90th	75th	50th	25th
Sydney									
Rozelle (4)	9.9	33.9	33.0	32.5	31.2	29.4	21.1	18.5	15.1
Chullora	85.5	**212.8**	**59.5**	**54.8**	45.1	35.7	28.4	20.5	15.5
Woolooware	95.9	**102.5**	43.7	38.6	30.0	26.4	20.2	16.0	12.3
Blacktown	95.1	**186.8**	**52.6**	41.0	34.3	28.9	21.7	17.0	12.3
St Marys	89.6	**211.3**	**51.9**	41.8	32.9	27.7	19.6	14.7	10.4
Richmond	97.3	**194.3**	**66.0**	46.3	34.8	28.5	21.0	15.1	10.7
Liverpool	90.4	**282.6**	**57.5**	43.2	37.0	31.9	25.0	19.3	14.4
Bringelly	98.1	**274.7**	49.7	38.7	33.5	28.1	21.3	16.1	11.2
Oakdale (3)									
Central Coast (1)									
Illawarra									
Wollongong	98.6	**280.5**	**60.3**	46.3	33.7	28.6	21.4	16.5	11.9
Warrawong	99.2	**308.4**	**51.3**	45.8	38.2	32.4	25.4	19.1	13.8
Albion Park	97.5	**281.0**	49.6	37.8	28.2	24.4	18.6	13.3	9.5
Lower Hunter									
Beresfield	92.1	**88.0**	**53.3**	43.8	34.3	29.0	22.2	17.2	13.0
Newcastle (3)									
Wallsend	90.4	**105.2**	**56.3**	43.8	35.1	25.9	20.8	15.4	11.9
Maitland (2)									
Regional									
Tamworth	92.9	**243.3**	**54.5**	48.0	34.3	25.4	19.7	14.9	11.2
Bathurst	90.4	**621.7**	**97.3**	**75.0**	34.4	25.2	17.0	12.7	8.7
Wagga Wagga	88.5	**837.0**	**126.8**	**96.1**	**56.5**	43.7	29.1	18.7	12.3
Albury	81.6	**921.4**	**208.7**	**190.5**	**90.3**	47.1	22.2	13.2	9.7
Orange (1)									
Dubbo (1)									
Lismore (1)									

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

Bold font indicates values that exceed the AAQ NEPM standard

(1) Station to be established.

(2) Station to be established. Data reported from Beresfield and Wallsend in the interim.

(3) Instrument to be installed.

(4) Instrument installed November 2003.

Trend analysis

Table 100: Maximum 24-hour average concentrations for PM_{10} (µg/m^3)

Region/ Performance monitoring Station	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Sydney										
Rozelle										33.9
Chullora										**212.8**
Woolooware	**108.9**	**70.6**	**82.0**	**62.7**	42.3	39.0	46.1	**90.7**	**109.5**	**102.5**
Blacktown	**130.7**	38.6	39.2	**57.3**	**66.9**	37.5	36.2	**127.1**	**122.0**	**186.8**
St Marys	**106.4**	**62.9**	37.5	46.0	**56.7**	**53.2**	37.0	**142.3**	**113.3**	**211.3**
Richmond	**123.8**	**53.6**	**85.8**	**71.5**	**55.6**	44.4	43.2	**119.9**	**126.4**	**194.3**
Liverpool	**117.9**	40.0	37.3	**58.7**	45.7	46.0	**64.1**	**61.4**	**127.6**	**282.6**
Bringelly	**123.0**	47.0	**92.0**	**68.2**	45.9	33.9	36.5	**99.4**	**120.2**	**274.7**
Illawarra										
Wollongong	**104.1**	**61.0**	**69.6**	**64.8**	**56.9**	40.2	**58.1**	**68.2**	**76.7**	**280.5**
Warrawong	**72.9**	**50.3**	**51.5**	**50.8**	42.4	40.6	41.7	**55.3**	**72.6**	**308.4**
Albion Park				**61.6**	**63.6**	48.7	**62.5**	**58.7**	**88.3**	**281.0**
Lower Hunter										
Beresfield	**81.6**	**66.2**	**100.6**	**71.8**	46.1	48.0	**53.6**	**81.0**	**166.4**	**88.0**
Wallsend	**68.0**	**67.1**	**71.1**	**74.7**	47.9	38.4	46.7	**75.8**	**157.4**	**105.2**
Regional										
Tamworth							21.1	34.6	**189.8**	**243.3**
Bathurst							35.2	35.6	**258.2**	**621.7**
Wagga Wagga								**69.8**	**178.2**	**837.0**
Albury								28.8	**81.3**	**921.4**

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

Bold font indicates values that exceed the AAQ NEPM standard

Table 101: Statistical summary for PM_{10} - 24-hour average concentrations

Station: Blacktown

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (µg/m³)	Percentiles (µg/m³)						
				99th	98th	95th	90th	75th	50th	25th
1994	87.1	**9**	**130.7**	**72.4**	**60.0**	37.8	29.9	22.9	18.2	13.5
1995	86.3	0	38.6	37.2	34.3	29.9	26.4	21.1	14.9	11.3
1996	97.3	0	39.2	30.6	30.0	27.2	25.3	19.3	14.7	10.7
1997	74.2	2	**57.3**	44.0	41.7	35.8	31.3	23.6	17.8	13.5
1998	98.1	1	**66.9**	36.3	33.4	30.8	28.3	21.0	16.0	11.4
1999	92.3	0	37.5	29.3	26.4	24.1	22.1	18.3	14.6	11.3
2000	94.8	0	36.2	29.1	27.9	24.2	21.2	18.1	14.4	11.8
2001	92.9	3	**127.1**	43.2	41.7	35.7	32.5	24.8	18.9	13.9
2002	93.4	**11**	**122.0**	**82.4**	**64.5**	42.9	33.6	25.2	18.4	14.6
2003	95.1	4	**186.8**	**52.6**	41.0	34.3	28.9	21.7	17.0	12.3

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

Bold font indicates values that exceed the AAQ NEPM standard

Table 102: Statistical summary for PM_{10} - 24-hour average concentrations

Station: Bringelly

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (µg/m³)	Percentiles (µg/m³)						
				99th	98th	95th	90th	75th	50th	25th
1994	95.9	**9**	**123.0**	**76.6**	**56.8**	39.5	32.0	25.3	18.4	13.8
1995	86.8	0	47.0	35.7	33.2	28.4	25.6	19.9	14.9	11.3
1996	89.1	1	**92.0**	33.5	30.8	26.0	24.0	18.8	14.0	9.7
1997	98.4	1	**68.2**	40.2	34.3	31.8	27.6	21.1	15.0	10.9
1998	95.9	0	45.9	37.9	36.3	30.6	28.2	20.2	15.1	10.4
1999	85.5	0	33.9	29.3	27.0	24.3	22.2	18.0	14.2	11.0
2000	88.5	0	36.5	33.0	30.6	26.7	23.1	18.4	14.7	12.1
2001	96.7	5	**99.4**	**54.7**	33.6	27.3	24.4	20.2	16.2	12.6
2002	97.0	**12**	**120.2**	**73.6**	**64.4**	40.1	34.5	25.4	18.4	13.6
2003	98.1	4	**274.7**	49.7	38.7	33.5	28.1	21.3	16.1	11.2

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

Bold font indicates values that exceed the AAQ NEPM standard

Table 103: Statistical summary for PM_{10} - 24-hour average concentrations

Station: Lidcombe(1) / Chullora(2)

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (µg/m³)	Percentiles (µg/m³)						
				99th	98th	95th	90th	75th	50th	25th
1994 (1)	37.8	1	**57.9**	35.6	31.8	28.6	24.7	19.6	8.8	5.3
1995 (1)	89.0	0	37.3	35.9	34.2	29.8	25.9	19.8	15.4	11.2
1996 (1)	87.4	0	46.2	35.1	31.4	28.7	26.0	20.0	14.9	11.5
1997 (1)	81.1	0	49.8	39.8	36.8	31.8	27.5	21.2	15.9	11.9
1998 (1)	100.0	0	38.7	32.5	30.8	28.1	23.2	17.8	13.1	10.0
1999 (1)	87.7	0	37.0	31.4	29.6	26.0	23.7	20.0	15.6	11.6
2000 (1)	94.3	1	**52.5**	38.5	34.1	29.5	25.4	20.2	16.2	12.4
2001 (1)	86.0	1	**65.3**	39.5	34.5	30.1	27.8	23.1	17.9	14.0
2002 (1)	30.7	3	**86.4**	**62.3**	47.2	35.5	29.7	20.8	16.0	13.9
2003 (2)	85.5	**10**	**212.8**	**59.5**	**54.8**	45.1	35.7	28.4	20.5	15.5

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

Bold font indicates values that exceed the AAQ NEPM standard

(1) Lidcombe station closed 2nd quarter 2002

(2) Chullora station commissioned December 2002

Table 104: Statistical summary for PM_{10} - 24-hour average concentrations

Station: Liverpool

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (µg/m³)	Percentiles (µg/m³)						
				99th	98th	95th	90th	75th	50th	25th
1994	99.2	**8**	**117.9**	**72.2**	**52.0**	38.6	33.7	25.5	20.2	14.5
1995	93.2	0	40.0	38.8	37.1	33.3	29.4	21.9	16.5	12.0
1996	61.2	0	37.3	34.0	32.9	30.0	26.7	20.7	15.7	11.2
1997	92.6	1	**58.7**	41.4	38.3	35.1	29.8	22.9	16.9	12.3
1998	98.6	0	45.7	40.3	39.2	33.2	29.4	22.5	16.7	11.3
1999	97.3	0	46.0	34.8	32.1	27.9	24.3	20.4	15.9	11.4
2000	94.3	2	**64.1**	41.8	36.9	31.1	26.2	20.6	16.4	12.6
2001	95.3	2	**61.4**	37.0	34.9	30.2	28.1	22.6	18.3	13.3
2002	91.0	**13**	**127.6**	**76.0**	**68.5**	46.1	37.3	27.2	20.2	15.1
2003	90.4	**6**	**282.6**	**57.5**	43.2	37.0	31.9	25.0	19.3	14.4

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

Bold font indicates values that exceed the AAQ NEPM standard

Table 105: Statistical summary for PM_{10} - 24-hour average concentrations

Station: Richmond

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (µg/m³)	Percentiles (µg/m³)						
				99th	98th	95th	90th	75th	50th	25th
1994	95.3	**15**	**123.8**	**89.8**	**67.2**	48.1	38.2	27.5	19.7	13.9
1995	97.0	2	**53.6**	45.3	41.6	34.1	29.8	21.9	15.0	11.1
1996	95.9	1	**85.8**	32.3	31.3	26.3	22.9	18.2	13.4	9.8
1997	94.8	4	**71.5**	49.5	42.8	35.2	28.6	21.4	16.3	11.2
1998	74.8	1	**55.6**	40.0	35.2	31.4	26.4	18.5	13.6	9.4
1999	92.1	0	44.4	27.5	25.0	22.4	19.4	17.0	13.2	9.8
2000	95.4	0	43.2	33.1	30.8	25.1	22.9	17.7	13.9	10.9
2001	87.4	4	**119.9**	**58.1**	32.6	27.9	25.3	20.1	16.0	11.8
2002	94.2	**17**	**126.4**	**102.8**	**84.2**	49.1	34.9	24.5	17.1	12.2
2003	97.3	**7**	**194.3**	**66.0**	46.3	34.8	28.5	21.0	15.1	10.7

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

Bold font indicates values that exceed the AAQ NEPM standard

Table 106: Statistical summary for PM_{10} - 24-hour average concentrations

Station: St Marys

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (µg/m³)	Percentiles (µg/m³)						
				99th	98th	95th	90th	75th	50th	25th
1994	94.8	**7**	**106.4**	**71.6**	47.6	39.5	31.9	23.4	17.0	12.5
1995	56.4	1	**62.9**	39.1	37.2	29.7	25.6	20.6	15.4	11.0
1996	58.7	0	37.5	33.5	31.6	26.0	22.5	17.4	13.6	8.9
1997	94.8	0	46.0	39.3	33.9	29.3	25.4	19.1	13.3	9.3
1998	97.0	1	**56.7**	37.7	33.9	30.8	26.7	18.2	13.8	9.5
1999	95.1	1	**53.2**	27.8	26.2	23.0	20.3	16.7	12.9	9.8
2000	98.6	0	37.0	31.3	30.0	25.6	21.9	18.0	13.6	10.6
2001	85.8	4	**142.3**	**58.4**	32.7	28.8	24.6	19.7	15.1	11.0
2002	89.6	**13**	**113.3**	**74.4**	**66.4**	42.2	34.0	23.3	17.0	12.7
2003	89.6	4	**211.3**	**51.9**	41.8	32.9	27.7	19.6	14.7	10.4

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

Bold font indicates values that exceed the AAQ NEPM standard

Table 107: Statistical summary for PM_{10} - 24-hour average concentrations

Station: Woolooware

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (µg/m³)	Percentiles (µg/m³)						
				99th	98th	95th	90th	75th	50th	25th
1994	75.1	**7**	**108.9**	**71.4**	**55.3**	32.4	27.8	22.2	17.2	12.4
1995	75.6	3	**70.6**	39.7	33.9	31.0	25.5	20.7	15.6	11.7
1996	99.7	1	**82.0**	31.6	29.8	26.9	24.4	20.1	14.9	11.2
1997	97.3	2	**62.7**	39.4	34.1	30.2	27.2	21.1	16.6	12.4
1998	94.8	0	42.3	35.0	32.5	29.9	25.0	20.1	15.3	11.4
1999	99.2	0	39.0	30.1	27.4	24.4	22.2	18.0	14.5	11.7
2000	87.4	0	46.1	38.2	32.4	26.4	23.1	18.5	14.8	11.5
2001	97.8	2	**90.7**	37.0	34.7	31.4	26.7	21.1	16.1	12.4
2002	94.8	**6**	**109.5**	**61.7**	46.9	36.7	30.8	23.7	17.8	13.7
2003	95.9	2	**102.5**	43.7	38.6	30.0	26.4	20.2	16.0	12.3

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

Bold font indicates values that exceed the AAQ NEPM standard

Table 108: Statistical summary for PM_{10} - 24-hour average concentrations

Station: Albion Park

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (µg/m³)	Percentiles (µg/m³)						
				99th	98th	95th	90th	75th	50th	25th
1994	0.0									
1995	0.0									
1996	0.0									
1997	43.8	2	**61.6**	48.5	45.6	39.3	32.6	24.6	15.1	9.8
1998	93.2	5	**63.6**	**56.6**	41.9	33.6	28.9	19.3	12.6	8.0
1999	98.9	0	48.7	36.8	32.6	25.4	22.1	16.3	11.0	7.8
2000	96.4	2	**62.5**	41.3	35.8	29.4	25.1	18.2	12.9	9.6
2001	97.3	1	**58.7**	41.9	38.0	34.5	28.5	20.6	14.9	9.9
2002	59.5	**6**	**88.3**	**65.1**	**53.1**	40.2	34.6	26.1	16.4	10.9
2003	97.5	4	**281.0**	49.6	37.8	28.2	24.4	18.6	13.3	9.5

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

Bold font indicates values that exceed the AAQ NEPM standard

Table 109: Statistical summary for PM_{10} - 24-hour average concentrations

Station: Warrawong

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (µg/m³)	Percentiles (µg/m³)						
				99th	98th	95th	90th	75th	50th	25th
1994	93.7	4	**72.9**	47.0	43.0	31.3	26.1	20.1	14.5	10.7
1995	98.4	1	**50.3**	39.2	34.5	28.4	26.2	21.3	15.1	11.3
1996	97.3	1	**51.5**	34.2	31.9	29.0	26.4	20.6	14.8	11.0
1997	97.5	2	**50.8**	42.1	38.6	32.5	29.3	22.6	16.8	11.5
1998	98.9	0	42.4	38.9	36.1	32.5	28.6	21.7	17.0	12.8
1999	94.8	0	40.6	35.4	31.4	27.2	24.7	20.1	15.5	11.8
2000	98.9	0	41.7	35.9	34.7	29.3	27.1	21.5	16.0	12.2
2001	95.1	1	**55.3**	41.3	40.2	35.2	31.0	25.1	18.5	13.4
2002	84.7	**11**	**72.6**	**64.4**	**54.9**	45.0	38.4	30.1	22.3	16.4
2003	99.2	5	**308.4**	**51.3**	45.8	38.2	32.4	25.4	19.1	13.8

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

Bold font indicates values that exceed the AAQ NEPM standard

Table 110: Statistical summary for PM_{10} - 24-hour average concentrations

Station: Wollongong

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (µg/m³)	Percentiles (µg/m³)						
				99th	98th	95th	90th	75th	50th	25th
1994	83.0	5	**104.1**	**61.0**	47.6	35.8	30.7	24.0	17.8	12.7
1995	71.5	4	**61.0**	**53.5**	43.3	37.2	32.9	25.0	19.0	15.0
1996	91.3	3	**69.6**	39.7	36.9	32.5	28.7	22.0	16.8	12.8
1997	95.3	2	**64.8**	46.7	42.7	38.4	33.0	24.4	18.1	12.9
1998	96.4	1	**56.9**	45.4	42.1	34.9	28.7	22.1	16.8	12.7
1999	96.4	0	40.2	35.4	32.5	28.4	25.4	20.2	15.8	12.4
2000	93.4	3	**58.1**	46.1	42.3	34.2	26.9	20.7	15.5	11.6
2001	97.5	4	**68.2**	48.0	42.6	36.7	31.2	22.6	16.5	12.1
2002	94.5	**9**	**76.7**	**61.9**	**53.1**	43.8	34.1	25.6	18.5	13.7
2003	98.6	**7**	**280.5**	**60.3**	46.3	33.7	28.6	21.4	16.5	11.9

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

Bold font indicates values that exceed the AAQ NEPM standard

Table 111: Statistical summary for PM_{10} - 24-hour average concentrations

Station: Beresfield

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (µg/m³)	Percentiles (µg/m³)						
				99th	98th	95th	90th	75th	50th	25th
1994	23.3	5	**81.6**	**71.2**	**62.2**	49.9	44.4	32.9	22.4	15.6
1995	94.8	**9**	**66.2**	**56.9**	**50.8**	43.3	37.1	27.3	18.9	14.0
1996	91.8	**6**	**100.6**	**54.2**	46.7	39.5	35.5	26.6	18.8	13.4
1997	97.8	**6**	**71.8**	**51.1**	48.0	40.8	33.8	24.4	17.3	11.2
1998	99.7	0	46.1	37.5	36.1	33.1	28.8	23.3	17.1	11.9
1999	98.4	0	48.0	37.8	33.8	28.7	26.3	21.0	16.0	11.5
2000	90.4	1	**53.6**	43.1	38.3	33.8	27.1	20.5	16.2	12.8
2001	90.1	3	**81.0**	47.5	45.6	37.4	31.8	25.8	20.0	15.0
2002	82.5	**25**	**166.4**	**84.6**	**70.8**	**56.8**	46.3	33.1	21.2	15.9
2003	92.1	5	**88.0**	**53.3**	43.8	34.3	29.0	22.2	17.2	13.0

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

Bold font indicates values that exceed the AAQ NEPM standard

Table 112: Statistical summary for PM_{10} - 24-hour average concentrations

Station: Wallsend

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (µg/m³)	Percentiles (µg/m³)						
				99th	98th	95th	90th	75th	50th	25th
1994	83.3	3	**68.0**	47.2	39.2	33.9	31.2	24.7	19.6	14.0
1995	74.2	1	**67.1**	35.5	33.0	29.0	25.6	21.3	17.0	12.1
1996	85.5	2	**71.1**	41.9	36.7	30.7	27.0	21.8	15.7	11.9
1997	87.4	1	**74.7**	40.4	37.2	33.7	28.4	22.3	16.8	12.4
1998	97.0	0	47.9	34.8	32.7	30.9	26.4	21.4	16.2	11.7
1999	91.2	0	38.4	29.8	28.1	24.4	22.0	19.2	15.7	11.9
2000	56.8	0	46.7	33.8	33.3	27.0	23.1	19.3	15.7	13.2
2001	91.2	4	**75.8**	46.3	36.4	29.8	25.3	20.6	16.5	13.3
2002	81.1	**9**	**157.4**	**62.7**	**51.7**	45.2	34.2	23.8	17.5	13.6
2003	90.4	5	**105.2**	**56.3**	43.8	35.1	25.9	20.8	15.4	11.9

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

Bold font indicates values that exceed the AAQ NEPM standard

Table 113: Statistical summary for PM_{10} - 24-hour average concentrations

Station: Albury

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (µg/m³)	Percentiles (µg/m³)						
				99th	98th	95th	90th	75th	50th	25th
2000	0.0									
2001	31.8	0	28.8	26.1	25.3	21.8	20.2	16.8	12.2	9.4
2002	86.6	5	**81.3**	**56.8**	44.4	38.0	31.2	22.9	16.1	12.9
2003	81.6	**28**	**921.4**	**208.7**	**190.5**	**90.3**	47.1	22.2	13.2	9.7

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

Bold font indicates values that exceed the AAQ NEPM standard

Table 114: Statistical summary for PM_{10} - 24-hour average concentrations

Station: Bathurst

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (µg/m³)	Percentiles (µg/m³)						
				99th	98th	95th	90th	75th	50th	25th
2000	32.5	0	35.2	33.6	32.4	27.6	22.4	17.7	12.2	8.9
2001	30.1	0	35.6	35.3	35.0	31.3	27.5	22.7	16.5	12.3
2002	91.8	**15**	**258.2**	**83.6**	**68.8**	45.7	35.2	25.0	16.6	12.5
2003	90.4	**12**	**621.7**	**97.3**	**75.0**	34.4	25.2	17.0	12.7	8.7

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

Bold font indicates values that exceed the AAQ NEPM standard

Table 115: Statistical summary for PM_{10} - 24-hour average concentrations

Station: Tamworth

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (µg/m³)	Percentiles (µg/m³)						
				99th	98th	95th	90th	75th	50th	25th
2000	21.0	0	21.1	20.6	20.4	19.0	18.1	15.0	11.5	8.5
2001	97.3	0	34.6	25.7	24.1	22.6	20.0	16.5	13.0	9.9
2002	99.2	**9**	**189.8**	**66.2**	**51.2**	40.9	33.6	23.4	17.4	13.1
2003	92.9	**7**	**243.3**	**54.5**	48.0	34.3	25.4	19.7	14.9	11.2

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

Bold font indicates values that exceed the AAQ NEPM standard

Table 116: Statistical summary for PM_{10} - 24-hour average concentrations

Station: Wagga Wagga

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (µg/m³)	Percentiles (µg/m³)						
				99th	98th	95th	90th	75th	50th	25th
2000	0.0									
2001	31.2	2	**69.8**	45.4	37.5	31.9	28.7	22.5	16.7	12.4
2002	99.2	**35**	**178.2**	**121.6**	**94.9**	**60.6**	49.3	33.3	24.6	16.9
2003	88.5	**23**	**837.0**	**126.8**	**96.1**	**56.5**	43.7	29.1	18.7	12.3

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

Bold font indicates values that exceed the AAQ NEPM standard

Lead

Trend analysis

Table 117: Annual average concentration for Pb in New South Wales (µg/m^3)

Region/ Performance monitoring Station	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Sydney										
CBD	0.31	0.25	0.20				0.07	0.04	0.03	0.03
Rozelle	0.20	0.09	0.09	0.10	0.09	0.07	0.07	0.04	0.02	0.02
Illawarra										
Warrawong								0.02	0.02	0.02
Lower Hunter										
Wallsend									0.05	0.09

AAQ NEPM Standard – 0.50 µg/m^3 (Annual average)

Changes to fuel formulation have brought marked reductions in the levels of lead in the atmosphere. Annual averages in the Sydney region are now less than 20% of the AAQ NEPM standard of 0.5 µg/m^3. With a complete ban on lead in petrol now in force, the primary source of lead in air at the regional scale has been eliminated.

Assessment of progress towards achieving the goal

The air quality management programs and strategies put in place by the NSW Government are directed at protecting ambient air quality. The AAQ NEPM goal provides additional impetus for the implementation of these strategies and a useful benchmark against which programs to manage the air environment can be assessed.

Meeting the AAQ NEPM goal for photochemical oxidants (as ozone) will be a challenge for NSW, given the pressures from a growing population, urban expansion and associated increase in motor vehicle use. However, NSW has a broad range of strategies to reduce precursor pollutants in place, or being developed, under its 25-year air quality management plan, Action for Air. These include the requirement for Stage 1 vapour controls at service stations in Sydney, the NSW Cleaner Vehicles Action Plan as well as initiatives under the Cleaner Industries Program and the Clean Air Program. The latter two focus on reducing precursor emissions from smaller, commercial/industrial sources and, in the case of the Clean Air Program, also domestic sources. A review of the regulatory framework covering larger industry is underway. These measures, together with stricter motor vehicle emission standards, tighter fuel regulations, including the introduction of regulated limits on summer petrol volatility in Sydney, and NSW Diesel NEPM programs will help move NSW towards meeting the NEPM goal for ozone in the longer term.

More detailed information on Programs

Framework for ozone control in the Sydney Greater Metropolitan Region

Action for Air, the NSW Government's Air Quality Management Plan for Sydney the Lower Hunter and the Illawarra sets out a program of measures which target the pollutants of most concern in the region - ground level ozone in summer, nitrogen dioxide in winter and particles. The Plan covers strategies designed to reduce emissions from industry, motor vehicles and domestic/commercial sources. Reducing the volatility of petrol in summer, while a significant strategy in terms of its emissions benefit, is one of a number of measures being pursued as part of a broader ozone management strategy.

The following outlines the key mechanisms for managing ozone, or more specifically, the precursor emissions from which it is produced.

Motor Vehicle and Motor Vehicle Fuels

a) Stage 1 Vapour Recovery at service stations and bulk terminals in Sydney

Stage 1 Vapour Recovery systems are in place in service stations and bulk terminals across Sydney. These systems collect vapours that would otherwise be released at loading terminals and from underground storage tanks at service stations when they are being filled from road tankers and return them to the road tankers. It is estimated these systems can reduce evaporative emissions associated with filling underground storage tanks by 95%.

b) Low Volatility Petrol

While the Commonwealth Government has introduced the Fuel Quality Standards Act 2000, which provides for national fuel standards to be established as determinations under the Act, the management of petrol volatility has been left to the States because of the need to take account of regional climatic and seasonal factors when setting volatility limits. NSW has amended the Protection of the Environment Operations Clean Air (Motor Vehicle and Motor Vehicle Fuels) Regulation 2002 to limit petrol volatility from the start of the 2004/05 summer.

c) NSW Cleaner Vehicles Action Plan

The traditionally slow turnover of the Australian vehicle fleet has been a limiting factor to the realisation of the air quality benefits from cleaner vehicle technology. To address this, the NSW

Government has taken steps to improve the environmental performance of the NSW fleet by introducing the Cleaner Vehicles Action Plan. The Plan is designed to hasten the uptake of vehicles complying with the most advanced emission standards. It includes Clean Car Benchmarks which rate the environmental performance of new motor vehicles, measures to improve the performance of the Government's fleet, a Clean Fleet Program for private fleets and a web based consumer guide on the environmental performance of passenger vehicles. Consideration is also being given to a proposal to restructure vehicle stamp duty to reward environmental performance.

d) Emissions Standards for Light and Heavy Duty Vehicles

In 1999, the Commonwealth Government announced a timetable for the introduction of progressively more stringent emission standards for light and heavy-duty vehicles as Australian Design Rules under the Motor Vehicles Standards Act 1989. Based on European Standards, from 2003 new model petrol vehicles have been required to meet Euro 2 emissions standards and from 2005, Euro 3 emission standards. For diesel vehicles, Euro 2 applies from 2002/03 for all new diesel vehicles, Euro 3 for all new medium and heavy duty diesel vehicles applies from 2002/03 and Euro 4 for all new diesel vehicles from 2006/07.

Importantly, evaporative emissions from petrol vehicles are set to fall as certification to Euro 3 emission standards involves a more stringent test for evaporative emissions than that applying to Euro 2 and previous Australian Design Rule emission standards. However, Australian research indicates that unless petrol volatility is reduced vehicles do not meet evaporative emission standards once they are in-service.

e) National Fuel Standards

The effective operation of the more advanced emission control technology required to meet the more stringent emissions standards depends upon the availability of fuel of an appropriate quality. The Commonwealth Government has enacted the Fuel Quality Standards Act 2000 and under this legislation has established environmental standards for petrol and diesel covering a comprehensive range of parameters which effect vehicle emissions performance.

In combination, it is expected that the new vehicle emissions and fuel standards will achieve significant emission reductions. For example in Sydney from 2002 to 2020 emissions of VOCs from the motor vehicles fleet are forecast to fall by 46%, NOx by 67%, CO by 75% and PM_{10} by 40%.

f) Smoky vehicle program

The DEC operates the Smoky Vehicle Program that identifies vehicles that emit visible smoke continuously for more than 10 seconds. In the 2002/03 year 1,887 vehicles were fined for excess smoke (most of these vehicles were diesel). The community can also report smoky vehicles, including on the DEC's website. The DEC receives around 500 reports each month from the public.

g) RTA-Clean Fleet Program

The NSW RTA has been working in conjunction with public and private bus and truck fleets to develop maintenance guidelines to reduce excessive emissions from diesel vehicles. The guidelines will form part of a Clean Fleet program for private fleet operators that will focus on maintenance practices for heavy-duty fleets and vehicle purchasing policies for light-duty fleets. These guidelines are now being piloted with a number of NSW fleets. To support this program, the RTA has developed a diesel emissions training course available through TAFE for diesel mechanics and fleet/workshop managers.

h) Greener bus fleets

Alternative fuels can help cut pollution and the NSW Government has the largest fleet of buses fuelled by compressed natural gas in the southern hemisphere. State Transit now owns and operates over 400 compressed natural gas buses.

Licensed Industry

Industrial emissions are a relatively small proportion of total emissions of NOx and VOCs in the Sydney region, at 14% and 18% respectively. The situation changes somewhat when considering the Greater Metropolitan Region (GMR), with industry responsible for 60% of NOx and 14% VOC emissions.

Controls on emissions to air from industrial sources are in place under NSW EPA licensing arrangements for scheduled facilities under the Protection of the Environment Operations Act. The Clean Air Plant and Equipment Regulation provides the regulatory framework for this licensing and it specifies never-to-be exceeded concentration limits for air pollutants. The Clean Air Plant and Equipment Regulation is currently under review and it will be remade and incorporated as an amendment to the Protection of the Environment Operations (Clean Air) Regulation 2002. The DEC anticipates that the proposal will be released for public consultation later in 2004.

In 1999 load based licensing was introduced, which retains licence specific limits but links licence fees to the amount of pollution discharged thus providing a financial incentive for licensees to achieve discharges below the required minimum performance. A recent review of the scheme found that it had not achieved its full potential to reduce air pollution because in some cases air emission fees had been too low to provide an incentive. To address this, air pollution fees increased by 20% from 1 July 2004 for major emitters.

Small industrial, commercial and domestic sources

Trends in population growth and economic development are expected to increase the significance of small commercial and domestic sources of emissions as a proportion of total emissions, particularly VOCs. These industries are generally service oriented and include the following: surface coating, mobile asphalt plants, service stations, printers and dry cleaners all make up the non-scheduled commercial industry groups.

The domestic sector is also a significant contributor to VOC emissions. Household sources include petrol lawnmowers, garden tools, solvents and paints and solid wood heaters.

In combination these “area sources” are responsible for 38% of VOC emissions in the GMR.

a) Cleaner Industries Program

The Cleaner Industries Program is focused on reducing emissions from commercial and other business premises, through partnerships with industries and peak bodies to promote cleaner production to industry members. The Program also involves other Government agencies and local councils, which have a role as industry educators.

Examples of initiatives under the Program with a focus on reducing emissions to air, include:

- Printing industry – production of a guide to reduce use of solvents.
- Furniture industry – environmental information incorporated into industry manual on safety and environment.
- Composites – reducing use of styrene.
- Dry cleaners – reducing emissions of PERC (tetrachloroethylene).

In 2001 the Program was boosted with the allocation of $5 million over 3 years from the waste fund to conduct the Industry Partnership Program. While the Partnership Program has a focus on waste reduction it encompasses measures to reduce emissions to air. The Partnership Program provides matched funding to industry to undertake cleaner production activities and will be structured to cover:

- Small to medium size businesses
- Industry associations
- Clusters of businesses and

- Innovative opportunities.

b) Clean Air Fund

The Clean Air Fund was established with funding of over $5 million from the NSW Environmental Trust. It focuses on reducing air pollution from light industrial, commercial and domestic activities and includes:

- Local Air Improvement Program – the aim of the program is to assist councils in dealing with local sources of air emissions through emission reduction projects. Funding has been made available to Councils for projects that seek to reduce emissions of oxides of nitrogen, volatile organic compounds or fine particles, concentrating on non-scheduled premises. A total of 21 projects have been funded through the program.
- Stage 2 Vapour Recovery Pilot – stage 2 vapour recovery systems are being trialed at council refuelling depots in the Sydney GMR. The purpose of the trial is to assess the cost effectiveness of Stage 2 vapour recovery in terms of reducing evaporative emissions at service stations. Stage 2 vapour recovery systems collect vapours from car petrol tanks during refuelling.
- Investigating measures to encourage the early adoption of less polluting small engines in the State by influencing manufacturers and importers to supply cleaner products and influencing consumers to purchase cleaner small engines. Options to be considered include industry agreements and information based options such as promotion, education and emission labelling.
- The development of an Air Quality Toolkit for council staff to assist them in managing emissions from the activities they regulate.
- Woodsmoke Reduction Program – In addition to the DEC's ongoing campaign “Don’t light tonight unless your heater is right”, which informs people on how to use their wood heaters more efficiently, a Woodsmoke reduction program has been established in regional NSW. The program objective is to improve heater operation and reduce smoke emissions, and it includes a financial incentive to owners in key areas to upgrade from older, more polluting heaters to new, cleaner alternatives. The scheme operated in six council areas in winter 2002 and 744 wood heaters were replaced with cleaner heating alternatives. A further three councils joined the program in 2003 resulting in the replacement of a further 638 wood heaters. 14 councils and one grouping of councils will receive funding to run a woodsmoke reduction program in 2004. These woodsmoke initiatives are supported by the Clean Air Regulation under the Protection of the Environment Operations (POEO) Act which requires that new wood heaters meet the emissions limits in the Australian Standard. Under the POEO Act, councils have the power to take action against people creating excessive smoke from wood heaters and under the States planning legislation, councils have the power to limit or ban the installation of wood heaters.

Conclusions

The data presented in this report demonstrate that NSW achieved compliance with the AAQ NEPM goals for carbon monoxide, nitrogen dioxide, sulfur dioxide and lead. Levels of these pollutants continue to be well below AAQ NEPM standards.

Compliance with AAQ NEPM goals for photochemical smog and fine particles was not demonstrated. Extraordinary natural events such as bushfires and dust storms, influenced by the severe drought experienced throughout NSW during 2003, have contributed to the observed ozone and particle pollution events. However, for ozone in particular, anthropogenic emissions are sufficient to generate exceedences of the AAQ NEPM standards and meeting the AAQ NEPM goal for photochemical oxidants will be a challenge for NSW.

The NSW air quality management plan, *Action for Air,* outlines a broad range of strategies used to manage photochemical smog and brown haze such as integrating air quality goals and urban transport planning; providing more and better transport choices; making cars, trucks and buses cleaner; promoting cleaner homes and business; and managing the impact of open burning.

References

EPA 2000, NSW State of the Environment 2000, NSW Environment Protection Authority, Sydney.

Appendix A: Fine particles as $PM_{2.5}$

In May 2003 NEPC announced a variation to the AAQ NEPM. The purpose of the Variation was to include in the AAQ NEPM, Advisory Reporting Standards (ARS) for particles as $PM_{2.5}$ and protocols for monitoring and reporting $PM_{2.5}$. The standards introduced are 25µg/m^3 for a daily (24-hour) average, and 8µg/m^3 for an annual average.

Below are presented data measuring particles as $PM_{2.5}$ from NSW during 2003. Also included are historical trend data from 1996 onwards (where available).

$PM_{2.5}$ monitoring

The DEC has operated Tapered Element Oscillating Microbalance (TEOM) continuous fine particle monitors sampling $PM_{2.5}$ since 1996. Currently there is no Australian standard method for monitoring $PM_{2.5}$ using TEOM. The ARS allows the use of TEOM monitors for $PM_{2.5}$ measurement, although it is stated that values obtained from this method "cannot be used for comparison with the Advisory Reporting Standards until the outcomes of the $PM_{2.5}$ Equivalence Program have been formally included in the Principal Measure." This report only presents data obtained by TEOM monitors. These data are compared to the ARS purely for interest.

The ARS requires $PM_{2.5}$ monitoring to be conducted at NEPM performance monitoring stations that have been specified for particles as PM_{10}. At present PM_{10} and $PM_{2.5}$ monitoring is performed concurrently at eight of the seventeen stations specified as NEPM monitoring stations for PM_{10} - Chullora, Liverpool, Richmond, Woolooware, Beresfield, Wallsend, Warrawong and Wollongong. PM_{10} and $PM_{2.5}$ monitoring is also performed at the Earlwood and Westmead stations which are not designated as NEPM monitoring stations.

Station siting, exposure and population exposure

Figure A1 shows the location of the $PM_{2.5}$ monitoring stations in the Sydney region, the location of monitoring stations in the lower Hunter and Illawarra regions are given in Figures 2 and 3, respectively, of the main section of this report. *Table A2* gives a brief description of the stations where $PM_{2.5}$ monitoring is conducted.

The Beresfield, Chullora, Richmond, Wallsend, Warrawong and Wollongong stations meet all of the AAQ NEPM siting and exposure criteria. The Earlwood, Liverpool, Westmead and Woolooware stations do not meet these criteria. Particulars of non-compliance with siting criteria for each of these stations are given below in *Table A1*.

Information about the characteristics of individual monitoring stations and exposed population are given in the NSW Monitoring Plan, available on the EPA website www.epa.nsw.gov.au/air/nepm/index.htm.

Table A1: Stations not complying with all siting and exposure criteria

Station	Siting criteria not met	Comments
Earlwood	Clear sky angle <120°. Less than 20m from trees.	Trees have grown since establishment of station.
Liverpool	Clear sky angle <120°.	Trees have grown since establishment of station.
Westmead	Clear sky angle <120°. Less than 20m from trees.	Trees have grown since establishment of station.
Woolooware	Clear sky angle <120°. Less than 20m from trees.	Trees have grown since establishment of station.

Figure A1: $PM_{2.5}$ monitoring in the Sydney region (AMG co-ordinates)

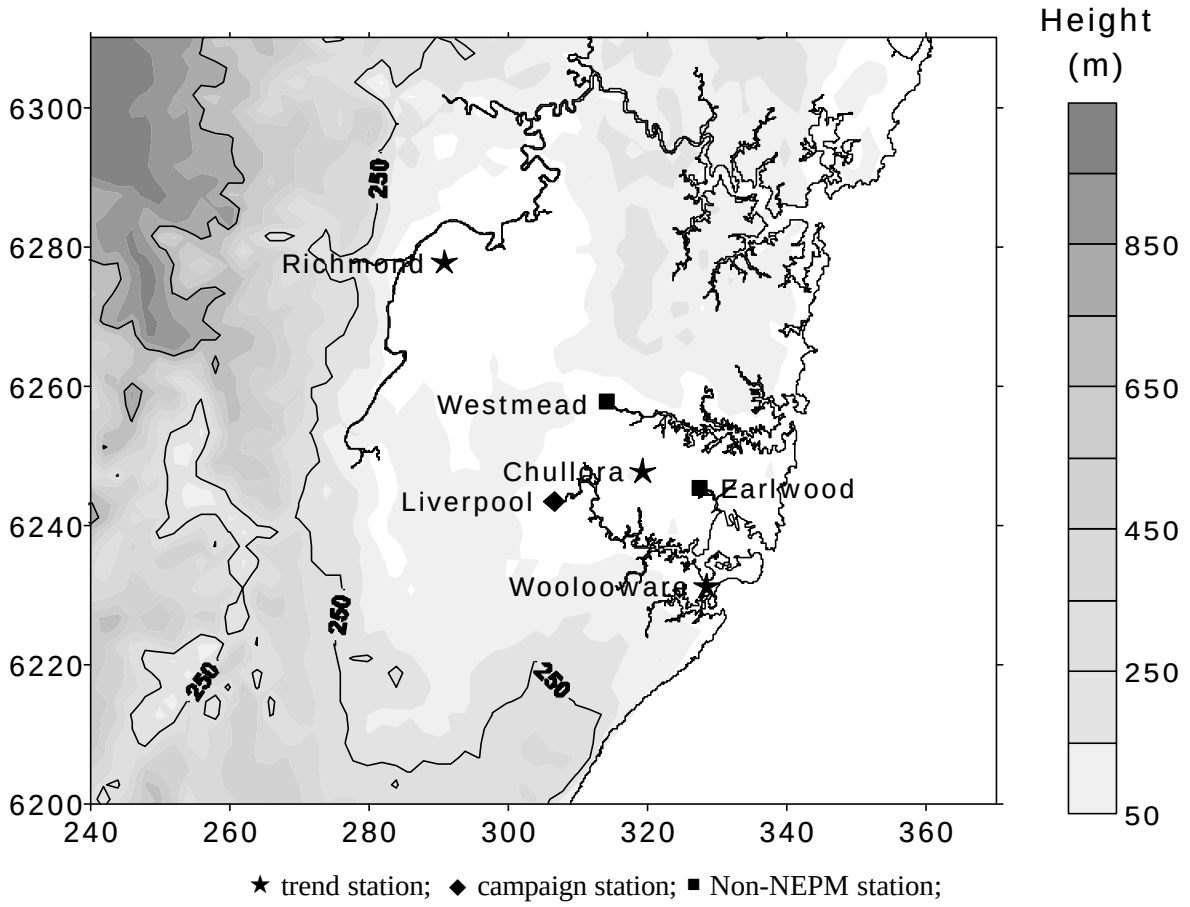

Table A2: Population exposure

Station	Exposed population
Sydney Region	
Chullora	Trend station in a mixed residential and commercial area. Replaced the Lidcombe trend station, which had operated since 1970.
Earlwood	Non NEPM station in a residential area within the Cooks River valley.
Liverpool	Rural area on the SW edge of the Sydney basin - upper bound station for ozone.
Richmond	Trend station representing the residential area in the north of the Hawkesbury basin.
Westmead	Non NEPM area in a mixed residential and commercial area at the head of the Parramatta River Valley.
Woolooware	Trend station in a residential area on the south of Botany Bay and within five kilometres of a major industrial complex. Represents coastal conditions south of the CBD, reporting peak levels when precursors are trapped within coastal circulations.
Lower Hunter	
Beresfield	Performance station in a semi-rural area used as a proxy for the Maitland station.
Wallsend	Performance station in a residential area used as a proxy for the Maitland station.
Illawarra	
Warrawong	Upper bound station in an industrial-residential area.
Wollongong	Trend station in the main population/commercial centre.

Compliance with reporting standards

The variation to the AAQ NEPM (2003) states that values obtained using the TEOM method for $PM_{2.5}$ "cannot be used for comparison with the Advisory Reporting Standards until the outcomes of the $PM_{2.5}$ Equivalence Program have been formally included in the Principal Measure."

This report only presents data obtained by TEOM monitors. These data are compared to the ARS for $PM_{2.5}$ purely for interest.

Table A3: Summary of compliance with ARS for $PM_{2.5}$ in New South Wales - 2003

Advisory Reporting Standard
25 µg/m³ (24-hour average)
8 µg/m³ (Annual average)

Region/ Performance monitoring Station	Data availability rates (% of hours)					Number of Exceed-ences (days)	Annual mean (µg/m³)	Performance against the standard	
	Q1	Q2	Q3	Q4	Annual			24-hour	1-year
Sydney									
Chullora	81.1	89.0	41.3	70.7	70.4	6	**11.1**	Not met	Not met
Earlwood	94.4	100.0	100.0	100.0	98.6	9	**10.9**	Not met	Not met
Woolooware	85.6	68.1	66.3	85.9	76.4	5	**9.9**	Not met	Not met
Richmond	91.1	93.4	100.0	100.0	96.2	10	**9.8**	Not met	Not met
Westmead	46.7	90.1	100.0	97.8	83.8	4	**11.2**	Not met	Not met
Liverpool	62.2	97.8	78.3	30.4	67.1	11	**12.8**	Not met	Not met
Illawarra									
Warrawong	100.0	98.9	100.0	96.7	98.9	8	**11.8**	Not met	Not met
Wollongong	98.9	96.7	96.7	100.0	98.1	7	**10.3**	Not met	Not met
Lower Hunter									
Wallsend	87.8	91.2	85.9	89.1	88.5	3	**9.6**	Not met	Not met
Beresfield	96.7	100.0	91.3	80.4	92.1	5	**9.0**	Not met	Not met

Bold font indicates values that exceed the AAQ NEPM advisory reporting standard

All stations above recorded exceedences of the ARS 24-hour and annual standards during 2003. Liverpool recorded eleven days that exceeded the 24-hour standard and also recorded the highest annual average of 12.8µg/m³.

Data analysis

Table A4: Summary for $PM_{2.5}$ - Daily maximum 24-hour average concentrations (2003)

Region/ Performance monitoring Station	Data availability rates (%)	Number of valid days	Maximum values (µg/m³)			
			Highest Value	Highest Date	2nd Highest Value	2nd Highest Date
Sydney						
Chullora	70.4	257	**81.0**	20-Mar	**40.9**	21-Jan
Earlwood	98.6	360	**39.4**	20-Mar	**34.2**	07-Jul
Woolooware	76.4	279	**67.7**	20-Mar	**34.4**	21-Jan
Richmond	96.2	351	**61.9**	26-Jan	**61.7**	21-Jan
Westmead	83.8	306	**67.8**	20-Mar	**39.4**	06-Sep
Liverpool	67.1	245	**50.1**	21-Jan	**45.9**	26-Jan
Illawarra						
Warrawong	98.9	361	**160.3**	20-Mar	**47.2**	21-Jan
Wollongong	98.1	358	**112.5**	20-Mar	**44.9**	21-Jan
Lower Hunter						
Wallsend	88.5	323	**34.1**	27-Jan	**31.9**	31-Jan
Beresfield	92.1	336	**40.9**	30-Jan	**37.9**	27-Jan

AAQ NEPM advisory reporting standard - 25µg/m³ (24-hour average)

Bold font indicates values that exceed the AAQ NEPM advisory reporting standard

Table A5: Days when $PM_{2.5}$ 24-hour AAQ NEPM standard exceeded

Date	Stations where standard exceeded	Comments[#]
18-Jan-2003	Earlwood, Liverpool, Richmond, Warrawong, Wollongong	Bushfires
20-Jan-2003	Richmond	Bushfires
21-Jan-2003	Beresfield, Chullora, Earlwood, Liverpool, Richmond, Warrawong, Wollongong, Woolooware	Bushfires
25-Jan-2003	Richmond	Bushfires
26-Jan-2003	Chullora, Earlwood, Liverpool, Richmond, Warrawong, Wollongong, Woolooware	Bushfires
27-Jan-2003	Beresfield, Chullora, Earlwood, Liverpool, Richmond, Wallsend, Warrawong, Wollongong, Woolooware	Bushfires
30-Jan-2003	Beresfield, Chullora, Earlwood, Liverpool, Richmond, Wallsend, Warrawong, Wollongong, Woolooware	Bushfires
31-Jan-2003	Beresfield, Richmond, Wallsend	Bushfires
20-Mar-2003	Chullora, Earlwood, Richmond, Warrawong, Westmead, Wollongong, Woolooware	Dust storms
7-Jul-2003	Chullora, Earlwood, Liverpool, Westmead	
8-July-2003	Earlwood, Liverpool	
16-July-2003	Liverpool	
17-Aug-2003	Westmead	
4-Sep-2003	Liverpool	
6-Sep-2003	Earlwood, Liverpool, Richmond, Westmead	Hazard reduction burning
10-Sep-2003	Liverpool	
29-Oct-2003	Beresfield	Dust storms
15-Nov-2003	Warrawong	
19-Dec-2003	Warrawong, Wollongong	

The severe drought conditions across NSW were a major influence on particle levels across the state during 2003. Bushfires during January and February, and dust storms during March and October, had significant impact on particle levels throughout NSW. All regions recorded exceedences of the AAQ NEPM ARS.

Extreme levels of particles recorded throughout Sydney and the Illawarra on the 19th-20th March were associated with a severe, widespread dust storm event. The peak daily average $PM_{2.5}$ associated with this event was 160.3 µg/m^3 recorded at Warrawong on the 20th March. This represents levels of fine particles that are greater than six times the ARS.

If extreme events such as bushfires and dust storms are excluded from the analysis only two regions recorded days above the standard, Sydney (6 days) and the Illawarra (2 days). Excluding extreme events the highest recorded daily average was 45.8 µg/m^3 at Liverpool on the 8th July.

Table A6: Statistical summary for $PM_{2.5}$ - Daily 24-hour average concentrations (2003)

Region/ Performance monitoring Station	Data availability rates (%)	Maximum conc. (µg/m^3)	Percentiles (µg/m^3)						
			99th	98th	95th	90th	75th	50th	25th
Sydney									
Chullora	70.4	**81.0**	**32.3**	**25.3**	18.3	16.5	13.0	9.7	7.3
Earlwood	98.6	**39.4**	**30.5**	**26.5**	19.6	17.3	12.7	9.6	7.4
Woolooware	76.4	**67.7**	**28.3**	19.8	17.7	15.8	12.2	9.4	7.4
Richmond	96.2	**61.9**	**38.3**	**27.8**	18.6	14.9	11.0	8.1	6.3
Westmead	83.8	**67.8**	**25.8**	23.5	20.5	17.4	12.9	10.3	7.7
Liverpool	67.1	**50.1**	**36.6**	**30.2**	24.3	20.4	16.3	11.9	8.9
Illawarra									
Warrawong	98.9	**160.3**	**27.2**	24.9	20.6	17.6	13.8	10.3	7.9
Wollongong	98.1	**112.5**	**32.4**	23.6	18.0	15.7	11.7	9.2	7.0
Lower Hunter									
Wallsend	88.5	**34.1**	24.2	20.8	16.1	14.7	11.6	8.7	6.9
Beresfield	92.1	**40.9**	**27.4**	22.2	16.4	14.0	10.7	8.0	5.9

AAQ NEPM advisory reporting standard - 25µg/m^3 (24-hour average)

Bold font indicates values that exceed the AAQ NEPM advisory reporting standard

Trend data

Annual averages and annual maximum 24-hour averages for all stations are given below.

Table A7: Maximum 24-hour average concentrations for $PM_{2.5}$ ($\mu g/m^3$)

Region/ Performance monitoring Station	1996	1997	1998	1999	2000	2001	2002	2003
Sydney								
Chullora								**81.0**
Earlwood	22.6	**39.3**	**33.4**	**27.6**	**35.4**	**81.7**	**56.1**	**39.4**
Lidcombe	**28.3**	**39.0**	**28.8**	**26.2**	**45.1**	**82.9**	**70.6**	
Woolooware			20.5	23.2	**33.2**	**81.9**	**86.2**	**67.7**
Richmond	17.2	**51.3**	**40.3**	**33.1**	17.0	**101.3**	**98.2**	**61.9**
Westmead			**29.6**	**25.3**	**31.4**	**91.6**	**64.6**	**67.8**
Liverpool			**26.5**	**25.4**	**45.1**	**118.6**	**89.2**	**50.1**
Illawarra								
Warrawong	**31.7**	**37.1**	**27.0**	19.9	**32.6**	23.2	**89.6**	**160.3**
Wollongong			18.8	19.4	**31.1**	**53.4**	**93.8**	**112.5**
Lower Hunter								
Wallsend	14.1	**43.4**	**38.2**	21.9	**61.5**	**56.4**	**59.6**	**34.1**
Beresfield			19.2	21.4	**34.1**	**66.4**	**50.4**	**40.9**

AAQ NEPM advisory reporting standard - 25mg/m^3 (24-hour average)

Bold font indicates values that exceed the AAQ NEPM advisory reporting standard

Table A8: Annual average concentrations for $PM_{2.5}$ ($\mu g/m^3$)

Region/ Performance monitoring Station	1996	1997	1998	1999	2000	2001	2002	2003
Sydney								
Chullora								**11.1**
Earlwood	**9.2**	**10.2**	**10.3**	**10.2**	**10.3**	**11.5**	**12.8**	**10.9**
Lidcombe	**13.5**	**10.4**	**9.2**	**10.0**	**9.9**	**11.0**	**11.0**	
Woolooware			7.9	**8.1**	**9.5**	**11.0**	**11.5**	**9.9**
Richmond	6.9	7.9	6.4	6.5	7.0	**10.1**	**10.7**	**9.8**
Westmead			**10.3**	**9.9**	**9.9**	**12.1**	**13.0**	**11.2**
Liverpool			**10.1**	**9.6**	**10.4**	**11.6**	**15.0**	**12.8**
Illawarra								
Warrawong	7.6	**8.7**	**8.8**	**8.3**	**9.1**	**9.5**	**12.4**	**11.8**
Wollongong			7.7	8.0	**8.3**	**9.3**	**11.4**	**10.3**
Lower Hunter								
Wallsend	7.3	**9.6**	**8.5**	**8.0**	**8.4**	**10.1**	**11.2**	**9.6**
Beresfield			**8.2**	**8.8**	**8.8**	**12.3**	**13.4**	**9.0**

AAQ NEPM advisory reporting standard - 8mg/m^3 (annual average)

Bold font indicates values that exceed the AAQ NEPM advisory reporting standard

Statistical trends

Table A9: Statistical summary for $PM_{2.5}$ - 24-hour average concentrations

Station: Earlwood

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (µg/m³)	Percentiles (µg/m³)						
				99th	98th	95th	90th	75th	50th	25th
1996	10.4	0	22.6	16.0	13.2	12.8	12.4	9.3	7.8	6.6
1997	98.1	12	**39.3**	**30.4**	**27.4**	22.1	16.5	12.1	8.8	6.5
1998	95.6	7	**33.4**	**25.8**	24.4	19.0	16.9	12.7	9.0	6.9
1999	93.4	4	**27.6**	**25.2**	21.1	18.4	16.2	12.7	9.1	6.9
2000	84.7	3	**35.4**	21.6	19.9	18.2	16.8	12.1	9.3	7.2
2001	93.7	8	**81.7**	**50.2**	**25.1**	20.6	18.1	13.1	9.7	7.6
2002	98.9	15	**56.1**	**51.1**	**29.3**	23.6	20.7	15.2	10.9	8.1
2003	98.6	9	**39.4**	**30.5**	**26.5**	19.6	17.3	12.7	9.6	7.4

AAQ NEPM advisory reporting standard - 25µg/m³ (24-hour average)

Bold font indicates values that exceed the AAQ NEPM advisory reporting standard

Table A10: Statistical summary for $PM_{2.5}$ - 24-hour average concentrations

Station: Lidcombe (1) / Chullora (2)

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (µg/m³)	Percentiles (µg/m³)						
				99th	98th	95th	90th	75th	50th	25th
1996 (1)	13.7	7	**28.3**	**28.0**	**27.9**	**26.8**	**25.5**	16.5	10.3	8.5
1997 (1)	89.3	7	**39.0**	**28.6**	**25.1**	20.1	16.0	12.3	9.1	7.1
1998 (1)	99.7	1	**28.8**	22.4	20.8	17.0	14.3	11.3	8.4	6.2
1999 (1)	98.1	1	**26.2**	21.5	19.6	16.9	14.5	12.0	9.4	7.0
2000 (1)	92.1	2	**45.1**	18.8	18.5	17.0	14.9	11.3	8.9	7.2
2001 (1)	90.4	4	**82.9**	**28.9**	19.9	18.6	16.1	12.7	9.7	7.8
2002 (1)	32.1	4	**70.6**	**48.6**	**33.0**	19.5	15.7	11.4	8.9	7.4
2003 (2)	70.4	6	**81.0**	**32.3**	**25.3**	18.3	16.5	13.0	9.7	7.3

AAQ NEPM advisory reporting standard - 25µg/m³ (24-hour average)

Bold font indicates values that exceed the AAQ NEPM advisory reporting standard

Table A11: Statistical summary for $PM_{2.5}$ - 24-hour average concentrations

Station: Liverpool

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (µg/m³)	Percentiles (µg/m³)						
				99th	98th	95th	90th	75th	50th	25th
1996	0.0									
1997	0.0									
1998	85.5	1	**26.5**	22.3	21.2	19.2	17.0	12.8	9.6	6.5
1999	98.6	1	**25.4**	20.1	18.6	17.1	14.8	12.1	9.0	6.8
2000	98.4	5	**45.1**	**25.3**	22.7	17.8	15.5	12.2	9.5	7.5
2001	98.1	6	**118.6**	**53.0**	21.9	19.4	17.1	13.3	10.2	7.6
2002	96.7	40	**89.2**	**44.4**	**39.3**	**29.8**	**25.7**	17.9	12.9	9.4
2003	67.1	11	**50.1**	**36.6**	**30.2**	24.3	20.4	16.3	11.9	8.9

AAQ NEPM advisory reporting standard - 25µg/m³ (24-hour average)

Bold font indicates values that exceed the AAQ NEPM advisory reporting standard

Table A12: Statistical summary for $PM_{2.5}$ - 24-hour average concentrations

Station: Richmond

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (µg/m³)	Percentiles (µg/m³)						
				99th	98th	95th	90th	75th	50th	25th
1996	48.1	0	17.2	15.1	14.0	11.3	10.1	8.1	6.4	4.9
1997	94.8	7	**51.3**	**31.6**	24.9	17.2	12.4	8.9	6.6	4.9
1998	95.9	2	**40.3**	14.6	13.5	11.9	10.3	8.0	5.8	4.2
1999	96.7	1	**33.1**	15.7	12.8	10.9	10.1	8.2	6.1	4.6
2000	96.7	0	17.0	14.2	13.4	12.0	10.6	8.2	6.3	5.1
2001	66.8	4	**101.3**	**66.7**	22.4	16.7	13.7	10.9	8.7	6.4
2002	64.4	12	**98.2**	**56.7**	**45.2**	23.9	19.0	13.6	10.0	6.8
2003	96.2	10	**61.9**	**38.3**	**27.8**	18.6	14.9	11.0	8.1	6.3

AAQ NEPM advisory reporting standard - 25µg/m³ (24-hour average)

Bold font indicates values that exceed the AAQ NEPM advisory reporting standard

Table A13: Statistical summary for $PM_{2.5}$ - 24-hour average concentrations

Station: Westmead

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (µg/m³)	Percentiles (µg/m³)						
				99th	98th	95th	90th	75th	50th	25th
1996	0.0									
1997	0.0									
1998	79.7	1	**29.6**	23.7	21.6	18.5	16.1	12.7	9.5	7.0
1999	89.6	1	**25.3**	19.7	19.0	17.2	14.7	11.7	9.1	7.2
2000	88.3	1	**31.4**	21.4	19.9	17.7	15.2	11.9	9.0	7.2
2001	81.1	5	**91.6**	**25.8**	23.7	20.1	17.9	14.3	10.9	8.5
2002	76.2	10	**64.6**	**38.9**	**30.0**	22.7	20.4	15.4	11.7	8.9
2003	83.8	4	**67.8**	**25.8**	23.5	20.5	17.4	12.9	10.3	7.7

AAQ NEPM advisory reporting standard - 25µg/m³ (24-hour average)

Bold font indicates values that exceed the AAQ NEPM advisory reporting standard

Table A14: Statistical summary for $PM_{2.5}$ - 24-hour average concentrations

Station: Woolooware

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (µg/m³)	Percentiles (µg/m³)						
				99th	98th	95th	90th	75th	50th	25th
1996	0.0									
1997	0.0									
1998	75.6	0	20.5	19.0	17.9	14.6	12.9	9.9	7.2	5.3
1999	98.6	0	23.2	16.5	15.1	13.3	11.7	9.6	7.7	6.0
2000	95.1	3	**33.2**	24.5	18.8	16.6	14.3	11.1	8.6	7.3
2001	97.8	2	**81.9**	22.5	20.7	18.7	16.5	13.1	9.8	7.8
2002	90.1	9	**86.2**	**31.3**	**27.6**	21.4	18.1	13.8	10.0	7.7
2003	76.4	5	**67.7**	**28.3**	19.8	17.7	15.8	12.2	9.4	7.4

AAQ NEPM advisory reporting standard - 25µg/m³ (24-hour average)

Bold font indicates values that exceed the AAQ NEPM advisory reporting standard

Table A15: Statistical summary for $PM_{2.5}$ - 24-hour average concentrations

Station: Warrawong

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (µg/m³)	Percentiles (µg/m³)						
				99th	98th	95th	90th	75th	50th	25th
1996	47.3	1	**31.7**	16.6	15.5	13.4	12.1	9.7	6.9	4.8
1997	99.7	5	**37.1**	**25.0**	21.5	16.9	13.9	10.6	7.6	5.8
1998	97.3	1	**27.0**	20.3	19.2	17.0	13.2	10.5	8.1	6.2
1999	97.5	0	19.9	16.2	15.6	14.0	12.6	9.6	7.8	6.2
2000	97.5	3	**32.6**	20.7	18.7	15.3	13.3	10.5	8.3	6.7
2001	94.2	0	23.2	21.5	20.6	17.6	15.1	12.0	8.9	6.7
2002	96.7	18	**89.6**	**40.3**	**31.4**	24.4	21.1	15.2	10.6	8.0
2003	98.9	8	**160.3**	**27.2**	24.9	20.6	17.6	13.8	10.3	7.9

AAQ NEPM advisory reporting standard - 25µg/m³ (24-hour average)

Bold font indicates values that exceed the AAQ NEPM advisory reporting standard

Table A16: Statistical summary for $PM_{2.5}$ - 24-hour average concentrations

Station: Wollongong

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (µg/m³)	Percentiles (µg/m³)						
				99th	98th	95th	90th	75th	50th	25th
1996	0.0									
1997	0.0									
1998	83.6	0	18.8	16.4	14.8	12.6	11.4	9.1	7.3	5.7
1999	98.6	0	19.4	16.1	14.9	12.5	11.4	9.3	7.5	6.1
2000	100.0	1	**31.1**	18.9	17.2	15.1	12.4	9.6	7.6	6.2
2001	96.7	2	**53.4**	20.6	19.3	17.0	14.8	11.0	8.2	6.4
2002	95.9	18	**93.8**	**40.2**	**30.1**	24.5	18.4	13.5	9.3	7.2
2003	98.1	7	**112.5**	**32.4**	23.6	18.0	15.7	11.7	9.2	7.0

AAQ NEPM advisory reporting standard - 25µg/m³ (24-hour average)

Bold font indicates values that exceed the AAQ NEPM advisory reporting standard

Table A17: Statistical summary for $PM_{2.5}$ - 24-hour average concentrations

Station: Beresfield

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (µg/m³)	Percentiles (µg/m³)						
				99th	98th	95th	90th	75th	50th	25th
1996	0.0									
1997	0.0									
1998	81.9	0	19.2	16.3	15.6	14.1	12.8	10.1	7.8	5.7
1999	95.9	0	21.4	17.6	17.0	15.7	13.9	10.8	8.1	6.2
2000	85.5	2	**34.1**	22.5	19.7	15.4	13.4	10.2	7.8	6.3
2001	69.6	9	**66.4**	**33.1**	**25.5**	21.1	18.9	14.8	11.3	8.3
2002	95.1	26	**50.4**	**45.6**	**39.8**	**29.3**	21.4	15.8	11.3	8.8
2003	92.1	5	**40.9**	**27.4**	22.2	16.4	14.0	10.7	8.0	5.9

AAQ NEPM advisory reporting standard - 25µg/m³ (24-hour average)

Bold font indicates values that exceed the AAQ NEPM advisory reporting standard

Table A18: Statistical summary for $PM_{2.5}$ - 24-hour average concentrations

Station: Wallsend

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (μg/m³)	Percentiles (μg/m³)						
				99th	98th	95th	90th	75th	50th	25th
1996	27.3	0	14.1	13.6	12.9	11.6	11.2	8.7	7.1	5.5
1997	86.8	3	**43.4**	23.3	21.8	17.3	14.0	11.4	8.4	6.7
1998	95.6	1	**38.2**	17.5	16.9	15.4	13.6	10.4	7.9	5.8
1999	88.8	0	21.9	15.1	14.0	12.7	11.6	9.5	7.6	5.9
2000	88.5	1	**61.5**	17.4	15.7	14.5	13.1	9.8	7.3	6.1
2001	94.8	8	**56.4**	**34.2**	**26.4**	18.1	15.5	11.6	8.6	7.1
2002	85.8	13	**59.6**	**37.0**	**31.5**	22.8	17.3	12.9	9.4	7.3
2003	88.5	3	**34.1**	24.2	20.8	16.1	14.7	11.6	8.7	6.9

AAQ NEPM advisory reporting standard - 25μg/m³ (24-hour average)

Bold font indicates values that exceed the AAQ NEPM advisory reporting standard