NATIONAL ENVIRONMENT PROTECTION (AMBIENT AIR QUALITY) MEASURE

ANNUAL REPORT 2002

(Prepared June 2003)

NEW SOUTH WALES ENVIRONMENT PROTECTION AUTHORITY

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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 2002 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 in all regions where monitoring occurred.

The severe drought conditions experienced across NSW during 2002 adversely impacted on air quality in 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 EPA 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 Act which requires that new wood heaters meet improved standards and provides councils with power to take action against people creating excessive smoke from wood heaters. Councils also have the power to limit or ban the installation of wood heaters in new homes.

Monitoring summary

NSW EPA 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 first two of these are due to be installed during 2003.

The Sydney region

The NSW AAQ NEPM Monitoring Plan provides for monitoring in the Sydney region to be undertaken at six trend stations, four performance stations, and two campaign stations. The Central Coast station is due to be installed by January 2004 and the Macarthur station will be installed in 2003. Liverpool data will be reported at least until the Macarthur station is established. 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	
Lidcombe	T	5	X	X	X	X [7]	X [6]	
Liverpool [3]	C	5	X	X	X	X	X [6]	
Macarthur [4]	P	5	X	X	X	X	X	
Oakdale	P	2	X		X [7]			
Richmond	T	4	X	X	X		X	
Rozelle	T	5	X	X	X [7]	X		X
St Marys	P	1	X					
Woolooware	T	4	X	X	X		X	
CBD [5]	P	2				X		X

(1) P denotes performance; T denotes trend; C denotes campaign.
(2) Scheduled to begin operation in 2004.
(3) Data from the Liverpool station will be reported at least until the Macarthur station is established.
(4) Scheduled to begin operation in 2003.
(5) Peak station.
(6) Instrument to be installed in 2005.
(7) Instrument to be installed in 2003.

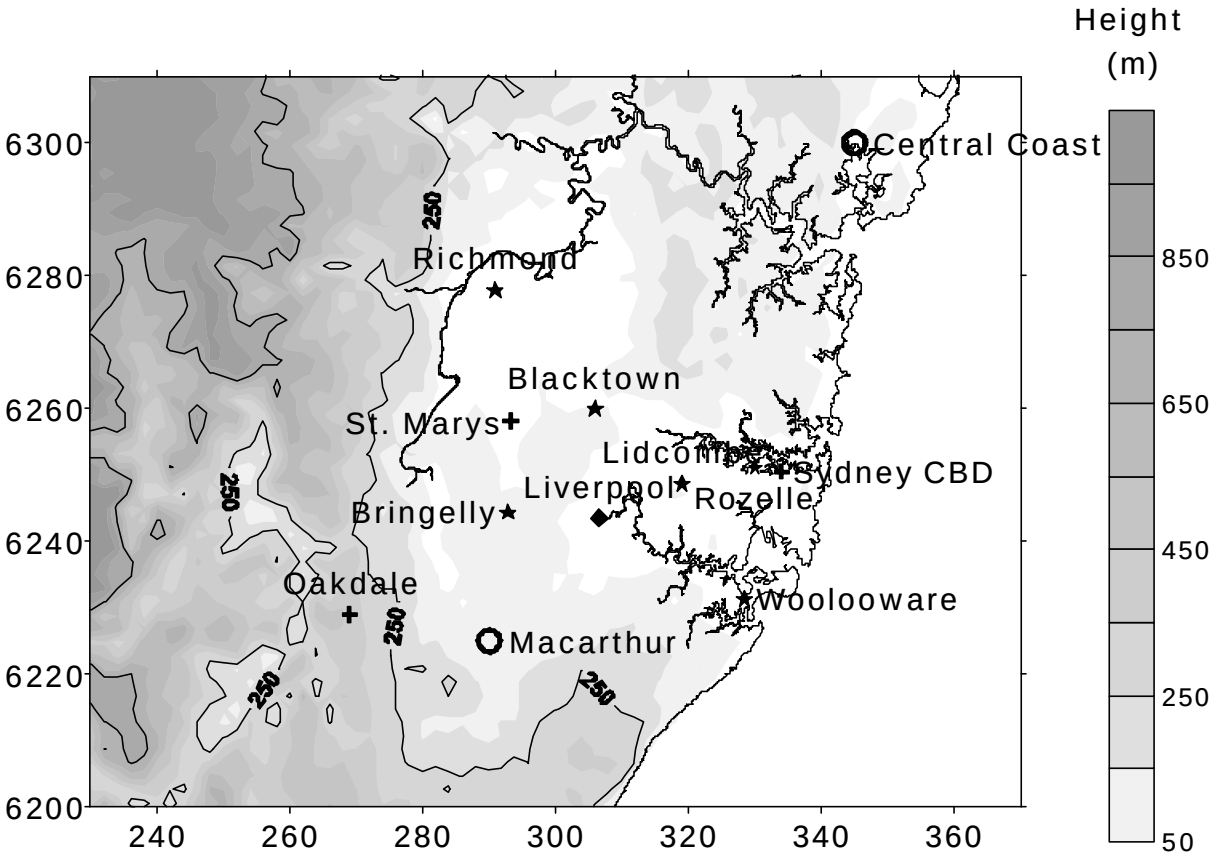

Figure 1: AAQ NEPM Monitoring in the Sydney region (AMG co-ordinates)

★ 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 planned trend station in the Maitland area will not be installed until 2004. 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
Beresfield[3]	C	1			X			
Wallsend[3]	C	4	X	X			X	X

(1) P denotes performance; T denotes trend, C denotes campaign.
(2) Scheduled to begin operation in 2003.
(3) Data from Beresfield and Wallsend will be reported at least until the Maitland station is established.
(4) Instrument to be deployed in 2003.
(5) Instrument to be deployed in 2005.

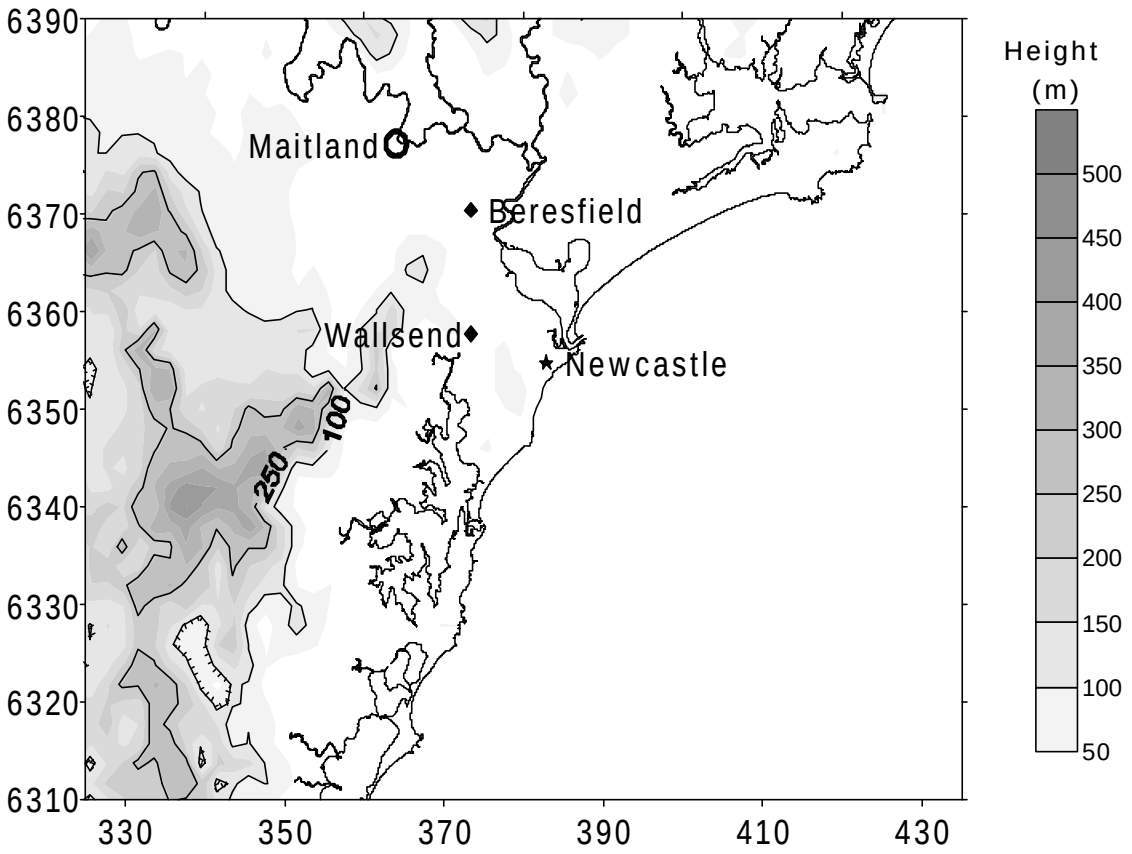

Figure 2: AAQ NEPM Monitoring in the Lower Hunter region (AMG co-ordinates)

★ 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 deployed in 2003.

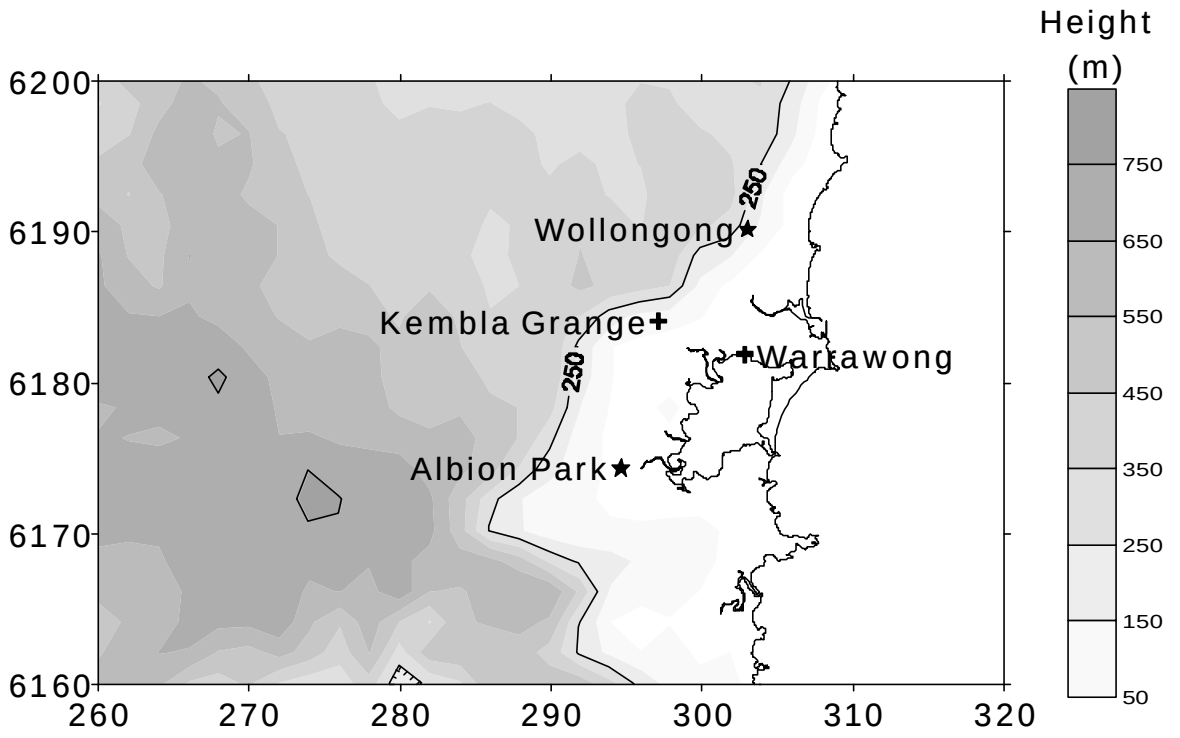

Figure 3: AAQ NEPM Monitoring in the Illawarra region (AMG co-ordinates)

★ 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, NSW EPA has begun campaign monitoring at Albury, Bathurst, Tamworth and Wagga Wagga. On completion of these campaigns the stations will be relocated to Dubbo, Lismore and Orange for further campaign monitoring.

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) Scheduled to be established in January 2004

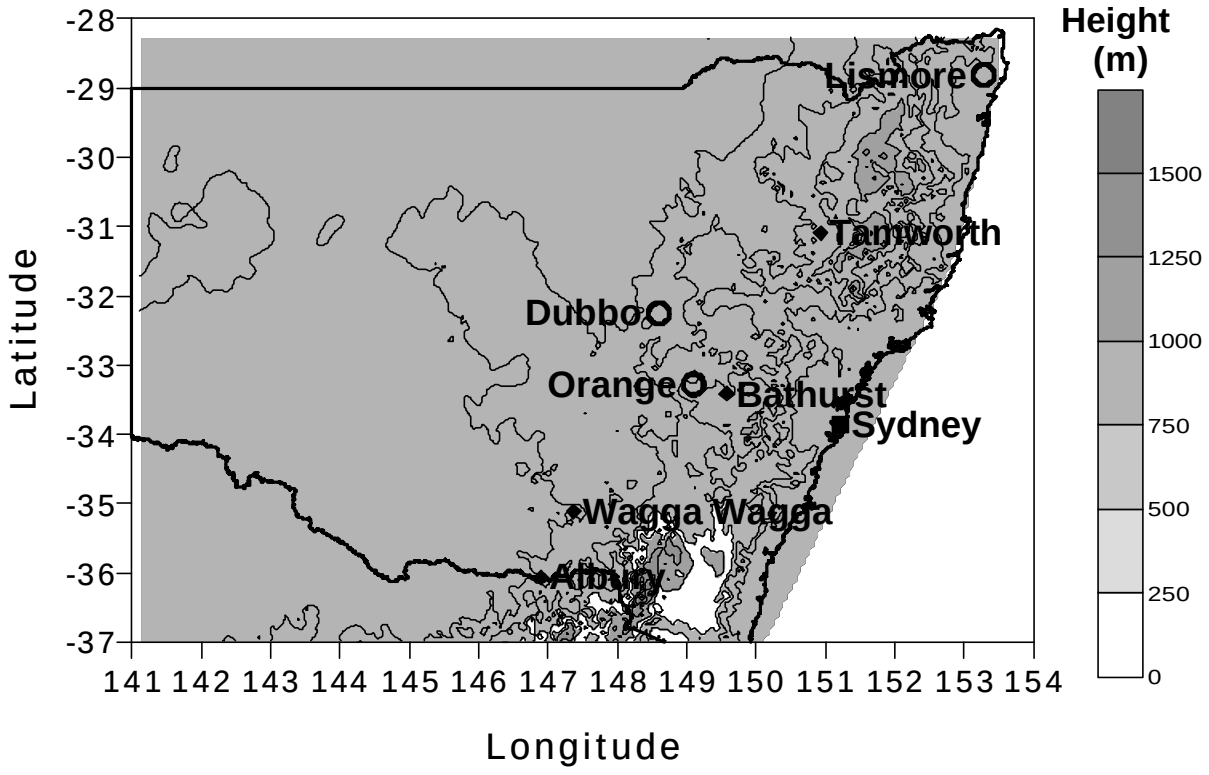

Figure 4: AAQ NEPM Monitoring in rural New South Wales

◆ 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.
Lidcombe	Trend station in a mixed residential and commercial area. Established in 1970.
Macarthur	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 (1)	Trend station representing residential areas of the Central Coast. Scheduled for 2004
Lower Hunter	
Beresfield	Performance station in a semi-rural area used as a proxy for the yet-to-be-established Maitland station.
Maitland (2)	Trend station representing residential area. Scheduled for 2003.
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 (3)	
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	Rural township campaign station scheduled for January 2004.
Orange	Rural township campaign station scheduled for January 2004.
Lismore	Rural township campaign station scheduled for January 2004.

(1) Data reported from Liverpool in the interim.

(2) Data reported from Wallsend in the interim.

(3) Future campaign stations are scheduled on the assumption that initial campaign monitoring will not allow screening.

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 EPA 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 April 2002. The EPA's accreditation was continued and has been extended to include the measurement of PM_{10} by the Tapered Element Oscillating Microbalance (TEOM) method (Australian Standard 3580.9.8), currently used by the EPA for reporting under the AAQ NEPM.

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 of 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, Lidcombe, 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.
Lidcombe	Less than 20m from trees.	Trees have grown since establishment of station. Station relocated in December 2002.
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 EPA 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 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.

Significant amounts of data were lost during 2002 at four stations in the network. The decommissioning of the Lidcombe station in May 2002, and delays in establishing the replacement station at Chullora, has led to data availability from the station of less than thirty-five percent for all measured pollutants. Extensive vandalism at the Albion Park station in late June 2002 meant that the station was offline until mid November. As a result, data availability at this station is less than sixty percent for all measured pollutants. Failure of the ozone monitors at the Oakdale and Bathurst stations has resulted in data availability for ozone of less than twenty and thirty-five percent respectively.

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: 2002 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	91.8	91.8	73.3	75.2	82.9	0	ND
Rozelle	92.5	88.3	70.6	98.7	87.5	0	ND
Lidcombe (2)							
Blacktown	99.5	87.3	91.4	99.9	94.5	0	Met
Liverpool	69.7	79.1	95.9	97.5	85.6	0	ND
Macarthur (1)							
Illawarra							
Wollongong	98.6	97.9	93.8	74.6	91.2	0	ND
Lower Hunter							
Newcastle	99.3	99.5	80.0	99.7	94.6	0	Met

ND Not demonstrated.

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

(2) Instrument to be deployed at new station.

During 2002, the carbon monoxide standard was not exceeded anywhere within NSW where monitoring took place. Compliance with the AAQ NEPM goal was demonstrated in the lower Hunter, and by screening in rural population centres. Compliance was not demonstrated in Sydney and the Illawarra region because the data availability criteria were not met.

Nitrogen dioxide

Table 9: 2002 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	89.7	91.4	90.4	76.8	87.1	0	0.015	Met	Met
Lidcombe	93.1	31.5	00.0	00.0	30.8	0	0.013	ND	ND
Woolooware	89.6	91.7	95.4	94.2	92.8	0	0.010	Met	Met
Blacktown	95.2	93.9	85.7	94.7	92.4	0	0.014	Met	Met
Richmond	91.5	92.5	94.2	93.4	92.9	0	0.007	Met	Met
Liverpool	87.4	95.1	95.5	93.9	93.0	0	0.015	Met	Met
Bringelly	94.8	88.1	95.1	94.4	93.1	0	0.009	Met	Met
Macarthur (1)									
Central Coast (2)									
Illawarra									
Wollongong	94.9	94.9	92.8	94.4	94.2	0	0.011	Met	Met
Albion Park	91.3	88.4	00.0	51.5	57.5	0	0.004	ND	ND
Lower Hunter									
Wallsend	35.4	72.4	87.1	57.5	63.2	0	0.009	ND	ND
Newcastle	95.3	95.2	77.6	76.0	85.9	0	0.009	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 2002, 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 Lidcombe station which was relocated part way through the reporting period and hence did not meet the data availability criteria), and through screening in rural population centres. Compliance was not demonstrated in the Illawarra and lower Hunter because the data availability criteria were not met.

Ozone

Table 10: 2002 compliance summary for O_3 in New South Wales

						AAQ NEPM standard 0.10 ppm (1-hour average) 0.08 ppm (4-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	1-hour	4-hour	1-hour	4-hour
Sydney									
Rozelle	85.0	94.0	79.3	94.1	88.1	0	1	Met	Met
Lidcombe	93.8	31.6	00.0	00.0	31.0	0	1	ND	ND
Woolooware	93.5	90.3	95.4	89.8	92.3	1	**2**	Met	Not met
Blacktown	94.4	94.9	82.8	94.9	91.7	**2**	**6**	Not met	Not met
St Marys	95.4	95.1	95.4	95.3	95.3	1	**7**	Met	Not met
Richmond	95.1	92.4	92.6	89.8	92.5	**2**	**4**	Not met	Not met
Liverpool	90.0	95.5	94.6	94.2	93.6	1	**5**	Met	Not met
Bringelly	88.6	95.3	92.5	95.4	93.0	**2**	**7**	Not met	Not met
Oakdale	00.0	00.0	00.0	73.8	18.6	0	1	ND	ND
Macarthur (1)									
Central Coast (2)									
Illawarra									
Wollongong	93.4	95.1	85.9	88.5	90.7	**2**	**2**	Not met	Not met
Kembla Grange	92.6	88.6	91.7	94.0	91.7	0	1	Met	Met
Albion Park	93.2	86.5	00.0	51.6	57.6	0	1	ND	ND
Lower Hunter									
Wallsend	62.5	91.0	93.9	80.0	81.9	0	0	ND	ND
Newcastle	89.2	95.6	95.4	95.7	94.0	0	0	Met	Met
Maitland (3)									
Regional									
Bathurst	46.1	00.0	12.4	80.4	34.7	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 2002. Sydney and the Illawarra region did not comply with AAQ NEPM goal. Compliance was not demonstrated in the lower Hunter because the data availability criteria were not met at one station. Compliance was demonstrated through screening in rural population centres.

Sulfur dioxide

Table 11: 2002 compliance summary for SO_2 in New South Wales

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

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
Sydney											
Lidcombe [5]											
Woolooware	91.6	92.1	95.5	94.6	93.4	0	0	0.001	Met	Met	Met
Blacktown	95.2	94.7	87.9	94.9	93.2	0	0	0.001	Met	Met	Met
Richmond	94.1	93.5	92.3	93.3	93.3	0	0	0.001	Met	Met	Met
Liverpool											
Bringelly	94.7	93.2	95.1	95.3	94.6	0	0	0.000	Met	Met	Met
Macarthur [1]											
Central Coast [2]											
Illawarra											
Wollongong	92.5	86.3	91.8	93.7	91.1	0	0	0.001	Met	Met	Met
Warrawong	95.6	95.5	93.2	91.8	94.0	0	0	0.001	Met	Met	Met
Albion Park	90.7	88.4	00.0	51.6	57.4	0	0	0.001	ND	ND	ND
Lower Hunter											
Wallsend	64.9	88.5	91.7	75.5	80.2	0	0	0.002	ND	ND	ND
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 deployed in 2005.

(5) Instrument to be deployed at new station.

During 2002, 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, and through screening in rural population centres. Compliance was not demonstrated in the Illawarra and lower Hunter regions because the data availability criteria were not met.

Particles as PM_{10}

Table 12: 2002 compliance summary for PM_{10} in New South Wales

AAQ NEPM Standard
50 µg/m^3 (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 [3]							
Lidcombe	94.4	29.7	0	0	30.7	3	ND
Woolooware	98.9	84.6	100	95.7	94.8	**6**	Not met
Blacktown	97.8	90.1	90.2	95.7	93.4	**11**	Not met
St Marys	94.4	89.0	100	75.0	89.6	**13**	Not met
Richmond	90.0	94.5	95.7	96.7	94.2	**17**	Not met
Liverpool	97.8	92.3	78.3	95.7	91.0	**13**	Not met
Bringelly	100	91.2	100	96.7	97.0	**12**	Not met
Oakdale [3]							
Central Coast [1]							
Illawarra							
Wollongong	93.3	98.9	88.0	97.8	94.5	**9**	Not met
Warrawong	97.8	50.5	92.4	97.8	84.7	**11**	Not met
Albion Park	92.2	93.4	0	53.3	59.5	**6**	Not met
Lower Hunter							
Wallsend	68.9	91.2	82.6	81.5	81.1	**9**	Not met
Newcastle [3]							
Maitland [2]							
Regional							
Tamworth	98.9	100	100	97.8	99.2	**9**	Not met
Bathurst	98.9	82.4	95.7	90.2	91.8	**15**	Not met
Wagga Wagga	100	98.9	97.8	100	99.2	**35**	Not met
Albury	90.0	97.8	95.7	63.0	86.6	5	ND
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 Wallsend in the interim.

(3) Instrument to be deployed.

During 2002 the PM_{10} standard was exceeded in all regions where monitoring took place. Sydney, the Illawarra, the lower Hunter, Tamworth, Bathurst and Wagga Wagga did not comply with the AAQ NEPM goal. Compliance was not demonstrated in Albury because the data availability criteria were not met.

Lead

Table 13: 2002 compliance summary for Pb in New South Wales

Region/ Performance monitoring Station	Data availability rates (% of days)					Annual Mean (µg/m^3)	Performance against the standards and goal
	Q1	Q2	Q3	Q4	Annual		
							AAQ NEPM Standard 0.5 µg/m^3 (1-year average)
Sydney							
CBD	93.3	100	93.3	86.7	93.4	0.03	Met
Rozelle	60.0	93.8	93.3	100	86.9	0.02	ND
Illawarra							
Warrawong	100	93.8	80.0	100	93.4	0.02	Met
Lower Hunter							
Wallsend (1) Maitland (2)	0	0	0	86.7	21.3	0.05	ND

ND Not demonstrated.

(1) Commenced monitoring in October 2002

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

The lead standard was not exceeded in any region in 2002 where monitoring took place. Compliance with the AAQ NEPM goal was demonstrated through monitoring in the Illawarra and by screening in rural population centres. Compliance was not demonstrated in Sydney and the lower Hunter because the data availability criteria were not met.

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 that 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 (2002)

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	82.9	275	4.8	24-Jan	4.1	24-May
Rozelle	87.5	304	2.8	16-May	2.1	24-Jun
Lidcombe (2)						
Blacktown	94.5	335	3.0	13-Sep	2.9	13-Jul
Liverpool	85.6	298	3.6	20-Jul	3.3	25-Jun
Macarthur (1)						
Illawarra						
Wollongong	91.2	325	2.3	07-Jun	2.1	03-Aug
Lower Hunter						
Newcastle	94.6	340	3.2	07-Jun	3.2	27-Jul

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

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

(2) Instrument to be deployed at new station.

Carbon monoxide levels are well below the AAQ NEPM standard. The highest recorded value in the state was at the CBD peak monitoring station, and was only 53 per cent of the standard. Levels in all other regions are significantly lower.

Nitrogen dioxide

Table 15: Summary for NO_2 - Daily maximum 1-hour average concentrations (2002)

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	87.1	329	0.086	05-Apr	0.066	08-Nov
Lidcombe	30.8	116	0.052	24-Apr	0.047	11-Apr
Woolooware	92.8	351	0.066	25-Oct	0.057	07-Jun
Blacktown	92.4	350	0.057	04-Oct	0.052	09-Dec
Richmond	92.9	355	0.048	25-Oct	0.045	03-Dec
Liverpool	93.0	352	0.068	30-Oct	0.057	24-Sep
Bringelly	93.1	355	0.052	30-Oct	0.051	29-Oct
Macarthur (1)						
Central Coast (2)						
Illawarra						
Wollongong	94.2	362	0.056	08-Nov	0.055	24-Apr
Albion Park	57.5	218	0.048	08-May	0.042	11-Apr
Lower Hunter						
Wallsend	63.2	235	0.043	07-May	0.039	06-May
Newcastle	85.9	328	0.047	08-Nov	0.045	09-Nov
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 0.09 ppm, 75 per cent of the standard, at the Rozelle station.

Ozone

Table 16: Summary for O_3 - Daily maximum 1-hour average concentrations (2002)

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	88.1	334	0.100	08-Dec	0.093	16-Dec
Lidcombe	31.0	116	0.100	20-Mar	0.078	04-Jan
Woolooware	92.3	351	**0.104**	01-Jan	0.098	08-Nov
Blacktown	91.7	346	**0.130**	16-Dec	**0.113**	03-Dec
St Marys	95.3	365	**0.119**	03-Dec	0.096	16-Dec
Richmond	92.5	353	**0.125**	16-Dec	**0.110**	09-Dec
Liverpool	93.6	354	**0.100**	16-Dec	0.099	11-Jan
Bringelly	93.0	353	**0.118**	16-Dec	**0.109**	22-Jan
Oakdale	18.6	93	0.094	19-Nov	0.088	07-Dec
Macarthur (1)						
Central Coast (2)						
Illawarra						
Wollongong	90.7	345	**0.121**	01-Jan	**0.103**	08-Nov
Kembla Grange	91.7	349	0.099	22-Dec	0.097	01-Jan
Albion Park	57.6	219	0.094	22-Dec	0.093	16-Feb
Lower Hunter						
Wallsend	81.9	306	0.081	10-Nov	0.080	16-Dec
Newcastle	94.0	359	0.083	03-Jan	0.079	10-Nov
Maitland (3)						
Regional						
Bathurst	34.7	125	0.064	20-Dec	0.063	21-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 (2002)

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	92.1	336	**0.087**	16-Dec	0.076	08-Nov
Lidcombe	32.4	116	**0.084**	20-Mar	0.073	07-Mar
Woolooware	96.5	352	**0.088**	01-Jan	**0.084**	08-Nov
Blacktown	95.7	348	**0.107**	16-Dec	**0.095**	03-Dec
St Marys	99.7	364	**0.093**	16-Dec	**0.090**	03-Dec
Richmond	96.3	353	**0.112**	16-Dec	**0.086**	04-Jan
Liverpool	97.7	356	**0.089**	16-Dec	**0.083**	20-Mar
Bringelly	96.8	352	**0.099**	16-Dec	**0.098**	22-Jan
Oakdale	25.7	92	**0.080**	19-Nov	0.079	03-Dec
Macarthur (1)						
Central Coast (2)						
Illawarra						
Wollongong	94.6	345	**0.099**	01-Jan	**0.084**	08-Nov
Kembla Grange	95.8	350	**0.083**	22-Dec	0.078	01-Jan
Albion Park	60.0	219	**0.083**	16-Feb	0.072	04-Jan
Lower Hunter						
Wallsend	85.6	308	0.074	16-Dec	0.071	04-Dec
Newcastle	98.2	359	0.077	03-Jan	0.076	04-Dec
Maitland (3)						
Regional						
Bathurst	36.1	125	0.062	21-Dec	0.057	23-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(#)
1-Jan-2002	Woolooware (1), Wollongong (2)	Bushfires
22-Jan-2002	Bringelly (2)	
8-Nov-2002	Wollongong (1)	
3-Dec-2002	Blacktown (2), St Marys (1)	
9-Dec-2002	Richmond (2)	Bushfires
16-Dec-2002	Liverpool (1), Blacktown (2), Bringelly (2), Richmond (4)	Bushfires

(#) 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(#)
1-Jan-2002	Woolooware (3), Wollongong (5)	Bushfires
4-Jan-2002	Liverpool (1), Bringelly (4), Richmond (3), St Marys (3)	Bushfires
21-Jan-2002	Bringelly (3)	
22-Jan-2002	Blacktown (2), Bringelly (3), St Marys (1)	
16-Feb-2002	Albion Park (1)	
20-Mar-2002	Liverpool (1), Lidcombe (1), Blacktown (2), St Marys (2)	
3-Nov-2002	Liverpool (1), Bringelly (3)	
8-Nov-2002	Woolooware (2), Wollongong (1)	
9-Nov-2002	Blacktown (2)	
19-Nov-2002	Oakdale (1)	
3-Dec-2002	Blacktown (4), Bringelly (3), Richmond (1), St Marys (4)	
7-Dec-2002	Richmond (2), St Marys (2)	
8-Dec-2002	Bringelly (3), St Marys (3)	Bushfires
16-Dec-2002	Rozelle (3), Liverpool (2), Blacktown (5), Bringelly (5), Richmond (5), St Marys (3)	Bushfires
22-Dec-2002	Liverpool (1), Blacktown (1), Kembla Grange (1)	

(#) 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 2000).

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 Wollongong in the Illawarra region. Of the Sydney stations, three (Blacktown, Bringelly, Richmond) had two days that exceeded the standard. The Wollongong station exceeded the standard on two days. The maximum values recorded were 0.13 ppm in Sydney and 0.12 ppm in the Illawarra region.

The 4-hour standard was exceeded at all stations in the Sydney and Illawarra regions. Six stations in Sydney (Blacktown Bringelly, Liverpool, St Marys, Richmond, Woolooware) and one station in the Illawarra (Wollongong) exceeded the standard on two or more days. At two stations in Sydney there were seven days when the standard was exceeded. The maximum values recorded were 0.11 ppm in Sydney and 0.10 ppm in the Illawarra region.

The conditions associated with bushfires during January and December 2002 gave rise to a number of ozone events. If these bushfire days are excluded, then the 1-hour standard was exceeded in the Sydney region on two days, one day in the southwest of the region and one day in the northwest, and in the Illawarra region on one day. The 4-hour standard was exceeded in the Sydney region on nine days, six days in the southwest of the region, six days in the northwest, and two days in the east. Similarly in the Illawarra region the 4-hour standard was exceeded on two days.

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 (2002)

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						
Lidcombe (5)						
Woolooware	93.4	354	0.038	06-Oct	0.030	03-Dec
Blacktown	93.2	352	0.021	19-Nov	0.014	20-Jan
Richmond	93.3	356	0.028	03-Dec	0.011	15-Sep
Liverpool (4)						
Bringelly	94.6	362	0.010	15-Sep	0.010	22-Jan
Macarthur (1)						
Central Coast (2)						
Illawarra						
Wollongong	91.1	348	0.039	16-Nov	0.037	19-Oct
Warrawong	94.0	360	0.046	11-Mar	0.046	18-Jan
Albion Park	57.4	219	0.029	13-Apr	0.028	25-Apr
Lower Hunter						
Wallsend	80.2	300	0.045	13-May	0.038	29-Jul
Newcastle (4)						
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 deployed.
(5) Instrument to be deployed at new station.

Table 21: Summary for SO_2 - Daily maximum 24-hour average concentrations (2002)

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						
Lidcombe (5)						
Woolooware	97.0	354	0.007	03-Dec	0.005	06-Oct
Blacktown	96.4	352	0.004	13-Apr	0.004	13-Jul
Richmond	97.5	356	0.004	03-Dec	0.004	21-Dec
Liverpool (4)						
Bringelly	99.2	362	0.002	20-Jan	0.002	22-Jan
Macarthur (1)						
Central Coast (2)						
Illawarra						
Wollongong	95.3	348	0.008	17-Feb	0.007	09-Dec
Warrawong	98.6	360	0.009	16-Feb	0.007	03-Apr
Albion Park	60.0	219	0.009	03-Dec	0.009	25-Nov
Lower Hunter						
Wallsend	82.2	300	0.012	18-Jun	0.008	12-Jun
Newcastle (4)						
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 deployed.
(5) Instrument to be deployed at new station.

SO_2 levels are significantly below the 1-hour, 24-hour and annual AAQ NEPM standards. The highest recorded values were 0.05 and 0.01 ppm for 1-hour and 24-hour standards respectively.

Particles as PM_{10}

Table 22: Summary for PM_{10} - 24-hour average concentrations (2002)

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 [3]						
Lidcombe	30.7	112	**86.4**	02-Jan	36.5	08-Jan
Woolooware	94.8	346	**109.5**	05-Dec	**53.3**	04-Dec
Blacktown	93.4	341	**122.0**	05-Dec	**78.0**	04-Jan
St Marys	89.6	327	**113.3**	27-Nov	**69.3**	05-Jan
Richmond	94.2	344	**126.4**	04-Jan	**94.8**	07-Dec
Liverpool	91.0	332	**127.6**	05-Dec	**72.4**	03-Nov
Bringelly	97.0	354	**120.2**	27-Nov	**73.0**	03-Nov
Oakdale [3]						
Central Coast [1]						
Illawarra						
Wollongong	94.5	345	**76.7**	05-Dec	**56.6**	25-Nov
Warrawong	84.7	309	**72.6**	04-Jan	**63.2**	23-Oct
Albion Park	59.5	217	**88.3**	13-Nov	**51.7**	25-Nov
Lower Hunter						
Wallsend	81.1	296	**157.4**	05-Dec	**58.8**	13-Nov
Newcastle [3]						
Maitland [2]						
Regional						
Tamworth	99.2	362	**189.8**	23-Oct	**64.3**	07-Dec
Bathurst	91.8	335	**258.2**	13-Nov	**71.8**	08-Dec
Wagga Wagga	99.2	362	**178.2**	29-Nov	**109.5**	04-Dec
Albury	86.6	316	**81.3**	24-Nov	45.9	11-Jan
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 Wallsend in the interim.

(3) Instrument to be deployed.

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

Date	Stations where standard exceeded	Comments(#)
1-Jan-2002	Liverpool, Lidcombe, Bringelly, Woolooware	Bushfires
2-Jan-2002	Liverpool, Lidcombe, Bringelly, Woolooware	Bushfires
3-Jan-2002	Blacktown, Bringelly, Wallsend	Bushfires
4-Jan-2002	Liverpool, Lidcombe, Bringelly, Woolooware, Blacktown, Richmond, Wollongong, Warrawong	Bushfires
5-Jan-2002	Liverpool, Blacktown, Bringelly, Wallsend, Richmond, St Marys	Bushfires
6-Jan-2002	Wagga Wagga	
7-Jan-2002	Wagga Wagga	
10-Jan-2002	Wagga Wagga	
11-Jan-2002	Wagga Wagga	
21-Jan-2002	Wagga Wagga	
18-Mar-2002	Wagga Wagga	
19-Mar-2002	Wagga Wagga	
9-Apr-2002	Wagga Wagga	
24-Apr-2002	Wagga Wagga	
2-May-2002	Wagga Wagga	
7-May-2002	Wagga Wagga	
9-May-2002	Wagga Wagga	
8-Jun-2002	Wagga Wagga, Albury, Bathurst	
9-Jun-2002	Wallsend	
24-Jul-2002	Liverpool	
25-Sep-2002	Wagga Wagga	
4-Oct-2002	Wollongong, Warrawong	
8-Oct-2002	Liverpool, Wollongong, Warrawong, Bathurst	
16-Oct-2002	Wagga Wagga	
18-Oct-2002	Richmond	
19-Oct-2002	Richmond, St Marys	
23-Oct-2002	Bringelly, Richmond, St Marys, Warrawong, Bathurst, Wagga Wagga, Tamworth	Dust storms
24-Oct-2002	Tamworth	
25-Oct-2002	Blacktown, Woolooware, Warrawong	Bushfires
26-Oct-2002	Bathurst	Bushfires
30-Oct-2002	Wollongong, Warrawong, Wagga Wagga	
31-Oct-2002	Richmond, St Marys	
3-Nov-2002	Liverpool, Blacktown, Bringelly, Richmond, St Marys, Wallsend, Bathurst	Dust storms
8-Nov-2002	Warrawong, Bathurst	
9-Nov-2002	Richmond, St Marys, Wallsend	
12-Nov-2002	Wagga Wagga, Albury	Dust storms
13-Nov-2002	Liverpool, Blacktown, Bringelly, Richmond, St Marys, Wollongong, Warrawong, Albion Park, Wallsend, Wagga Wagga, Bathurst	Dust storms
14-Nov-2002	St Marys	
15-Nov-2002	Wagga Wagga	
18-Nov-2002	Wagga Wagga	
19-Nov-2002	Wagga Wagga, Bathurst	
20-Nov-2002	Bathurst	
24-Nov-2002	Wagga Wagga	
25-Nov-2002	Richmond, Wollongong, Albion Park, Wagga Wagga	
26-Nov-2002	Blacktown, Richmond, Wollongong, Warrawong, Albion Park, Wagga Wagga, Bathurst	Bushfires
27-Nov-2002	Liverpool, Blacktown, Bringelly, Richmond, St Marys, Albion Park, Bathurst	Bushfires
28-Nov-2002	Tamworth	
29-Nov-2002	Wagga Wagga	
30-Nov-2002	Tamworth	

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

Table 23 (continued)

Date	Stations where standard exceeded	Comments(#)
3-Dec-2002	Wagga Wagga	
4-Dec-2002	Liverpool, Blacktown, Bringelly, Wooloowa re, Richmond, St Marys, Wagga Wagga, Bathurst	Bushfires
5-Dec-2002	Liverpool, Blacktown, Bringelly, Wooloowa re, Richmond, St Marys, Wollongong, Warrawong, Albion Park, Wallsend, Wagga Wagga, Bathurst, Tamworth	Bushfires
6-Dec-2002	Richmond, Wallsend, Tamworth	Bushfires
7-Dec-2002	Richmond, Tamworth	Bushfires
8-Dec-2002	Liverpool, Blacktown, Bringelly, Wooloowa re, Richmond, St Marys, Wollongong, Warrawong, Albion Park, Wallsend, Wagga Wagga, Bathurst	Bushfires
9-Dec-2002	Liverpool, Richmond, St Marys, Tamworth	Bushfires
18-Dec-2002	Wagga Wagga	
21-Dec-2002	Wagga Wagga	
22-Dec-2002	Wagga Wagga	
23-Dec-2002	Wagga Wagga	
24-Dec-2002	Wagga Wagga	
31-Dec-2002	Wagga Wagga, Albury	

(#) 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 2002. Bushfires during January, November and December, and dust storms during October and November, had significant impact on particle levels throughout NSW. All regions recorded exceedences of the AAQ NEPM standard, and all of these, with the exception of Albury, recorded exceedences on more than the five days allowed. Wagga Wagga recorded exceedences on thirty-five days during 2002.

While in the absence of these extreme events levels of particles are generally below the AAQ NEPM standard, the EPA 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 EPA 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.

These woodsmoke initiatives are supported by the Clean Air Regulation under the Protection of the Environment Operations Act which requires that new wood heaters meet improved standards and provides councils with power to take action against people creating excessive smoke from wood heaters. Councils also have the power to limit or ban the installation of wood heaters in new homes.

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 which ban backyard burning and require approval for other burning in the open. In addition, on specific days when elevated levels of particles are expected, the EPA has the power to ban burning in the open. However, the EPA consults with NSW Rural Fire service to ensure that urgent hazard reduction burns are exempted from such bans.

Lead

Lead levels throughout NSW are significantly below the AAQ NEPM standard. The highest annual average recorded was 0.03 µg/m^3 at the CBD peak monitoring station, which is only 6 per cent of the standard. The annual average of 0.05 µg/m^3 recorded at Wallsend may be biased with only 21 per cent data availability for the year, in any case this higher value still only represents 10 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 twenty-five percent or greater.

Carbon Monoxide

Statistical summary

Table 24: Statistical summary for CO - Daily maximum rolling 8-hour average concentrations (2002)

Region/ Performance monitoring Station	Data availability rates (%)	Maximum conc. (ppm)	Percentiles (ppm)						
			99th	98th	95th	90th	75th	50th	25th
Sydney									
CBD	82.9	4.8	3.9	3.8	3.6	3.4	3.0	2.5	2.1
Rozelle	87.5	2.8	1.7	1.6	1.3	1.1	0.7	0.5	0.3
Lidcombe (2)									
Blacktown	94.5	3.0	2.4	2.0	1.8	1.3	0.6	0.3	0.1
Liverpool	85.6	3.6	3.0	2.9	2.4	1.9	1.2	0.7	0.5
Macarthur (1)									
Illawarra									
Wollongong	91.2	2.3	1.9	1.7	1.5	1.2	0.9	0.5	0.3
Lower Hunter									
Newcastle	94.6	3.2	2.1	1.9	1.4	1.0	0.6	0.4	0.3

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

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

(2) Instrument to be deployed at new station.

Trend analysis

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

Region/ Performance monitoring Station	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Sydney										
CBD	**11.8**	**11.2**	**9.4**	**9.1**				8.0	5.1	4.8
Rozelle	3.6	4.9	6.1	5.7	6.5	5.9	4.0	4.5	3.2	2.8
Blacktown	4.0	6.7	4.9	4.2	4.5	4.7	3.5	3.1	2.6	3.0
Liverpool		5.9	5.7	4.3	5.9	5.4	4.0	4.8	3.5	3.6
Illawarra										
Wollongong	4.3	3.0	4.9	3.2	3.5	2.2	2.4	2.4	4.2	2.3
Lower Hunter										
Newcastle	5.1	5.3	4.4	4.8		4.3	3.3	3.1	4.0	3.2

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 - Annual 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
1993	27.8	0	4.0	2.8	2.8	2.5	2.1	1.5	1.0	0.7
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

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

Table 27: Statistical summary for CO - Annual 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
1993	87.4	**30**	**11.8**	**10.4**	**9.8**	**9.4**	**9.0**	8.2	6.9	5.6
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									
1998	0									
1999	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

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 - Annual 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
1993	0									
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

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

Table 29: Statistical summary for CO - Annual 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
1993	91.5	0	3.6	2.7	2.1	1.8	1.2	0.4	0.2	0.1
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

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

Table 30: Statistical summary for CO - Annual 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
1993	95.6	0	5.1	4.4	4.1	3.3	2.4	1.3	0.8	0.5
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

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

Table 31: Statistical summary for CO - Annual 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
1993	82.8	0	4.3	4.1	3.7	3.0	2.6	1.8	1.0	0.6
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

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 (2002)

Region/ Performance monitoring Station	Data availability rates (%)	Maximum conc. (ppm)	Percentiles (ppm)						
			99th	98th	95th	90th	75th	50th	25th
Sydney									
Rozelle	87.1	0.086	0.058	0.053	0.045	0.041	0.035	0.027	0.019
Lidcombe	30.8	0.052	0.044	0.000	0.000	0.000	0.000	0.000	0.000
Woolooware	92.8	0.066	0.051	0.047	0.039	0.035	0.028	0.021	0.012
Blacktown	92.4	0.057	0.050	0.046	0.043	0.037	0.032	0.026	0.020
Richmond	92.9	0.048	0.037	0.032	0.029	0.027	0.023	0.018	0.012
Liverpool	93.0	0.068	0.051	0.047	0.045	0.040	0.033	0.028	0.022
Bringelly	93.1	0.052	0.041	0.038	0.033	0.029	0.022	0.017	0.012
Macarthur (1)									
Central Coast (2)									
Illawarra									
Wollongong	94.2	0.056	0.048	0.044	0.039	0.036	0.029	0.023	0.016
Albion Park	57.5	0.048	0.035	0.034	0.029	0.024	0.015	0.008	0.005
Lower Hunter									
Wallsend	63.2	0.043	0.038	0.034	0.029	0.027	0.024	0.018	0.014
Newcastle	85.9	0.047	0.040	0.037	0.034	0.031	0.025	0.019	0.012
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	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Sydney										
Rozelle	**0.181**	0.084	0.089	0.075	0.082	0.081	0.062	0.070	0.066	0.086
Lidcombe	0.109	0.076	0.099	0.070	0.080	**0.126**	0.073	0.070	0.071	0.052
Woolooware	0.090	0.069	0.075	0.063	0.090	0.067	0.060	0.060	0.060	0.066
Blacktown	0.104	0.081	0.063	0.059	0.096	0.060	0.058	0.070	0.058	0.057
Richmond	0.087	0.051	0.045	0.040	0.064	0.053	0.044	0.037	0.038	0.048
Liverpool	**0.123**	0.093	0.088	0.054	0.060	0.063	0.054	0.079	0.067	0.068
Bringelly	0.046	0.058	0.052	**0.133**	0.060	0.050	0.045	0.045	0.048	0.052
Illawarra										
Wollongong	0.090	0.074	0.066	0.081	0.064	0.058	0.062	0.065	0.056	0.056
Albion Park	0.054	0.070	0.060	0.067	0.044	0.081	0.049	0.055	0.051	0.048
Lower Hunter										
Wallsend	0.067	0.048	0.057	0.044	0.058	0.035	0.034	0.054	0.044	0.043
Newcastle	0.076	0.070	0.049	0.044	0.048	0.039	0.049	0.044	0.040	0.047

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	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Sydney										
Rozelle	0.019	0.017	0.018	0.019	0.020	0.016	0.015	0.014	0.014	0.015
Lidcombe	0.019	0.015	0.017	0.015	0.015	0.016	0.016	0.015	0.016	0.013
Woolooware	0.012	0.010	0.011	0.010	0.011	0.010	0.010	0.010	0.009	0.010
Blacktown	0.017	0.015	0.016	0.014	0.015	0.015	0.014	0.013	0.013	0.014
Richmond	0.008	0.008	0.007	0.008	0.008	0.007	0.007	0.006	0.007	0.007
Liverpool	0.015	0.016	0.015	0.012	0.014	0.014	0.014	0.014	0.014	0.015
Bringelly	0.006	0.008	0.008	0.007	0.007	0.006	0.007	0.007	0.006	0.009
Illawarra										
Wollongong	0.011	0.012	0.011	0.011	0.011	0.010	0.011	0.010	0.010	0.011
Albion Park	0.007	0.006	0.006	0.005	0.004	0.004	0.004	0.005	0.004	0.004
Lower Hunter										
Wallsend	0.009	0.009	0.010	0.009	0.006	0.008	0.009	0.008	0.009	0.009
Newcastle	0.010	0.011	0.011	0.010	0.009	0.008	0.009	0.009	0.009	0.009

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
1993	91.4	0	0.104	0.075	0.070	0.063	0.055	0.042	0.030	0.023
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

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
1993	68.0	0	0.046	0.036	0.032	0.028	0.024	0.020	0.014	0.011
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

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

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
1993	86.8	0	0.109	0.091	0.083	0.068	0.059	0.046	0.032	0.023
1994	72.2	0	0.076	0.054	0.053	0.047	0.044	0.036	0.028	0.021
1995	80.3	0	0.099	0.069	0.062	0.052	0.046	0.037	0.030	0.022
1996	64.1	0	0.070	0.049	0.047	0.042	0.038	0.031	0.026	0.022
1997	83.1	0	0.080	0.060	0.055	0.048	0.042	0.034	0.027	0.021
1998	69.4	1	**0.126**	0.052	0.050	0.046	0.040	0.031	0.026	0.021
1999	88.9	0	0.073	0.051	0.047	0.043	0.039	0.035	0.028	0.021
2000	91.7	0	0.070	0.055	0.051	0.042	0.036	0.030	0.025	0.021
2001	93.8	0	0.071	0.055	0.050	0.042	0.038	0.033	0.028	0.022
2002	30.8	0	0.052	0.044	0.040	0.036	0.032	0.027	0.022	0.018

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

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
1993	95.8	1	**0.123**	0.064	0.061	0.051	0.045	0.034	0.026	0.020
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

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
1993	88.2	0	0.087	0.036	0.033	0.030	0.028	0.023	0.018	0.014
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

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
1993	93.6	**2**	**0.181**	0.087	0.079	0.071	0.064	0.048	0.032	0.025
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

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
1993	44.1	0	0.090	0.076	0.063	0.046	0.041	0.031	0.024	0.017
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

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
1993	82.2	0	0.054	0.049	0.046	0.040	0.033	0.022	0.015	0.010
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

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
1993	80.1	0	0.090	0.058	0.053	0.047	0.039	0.031	0.024	0.018
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

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
1993	96.9	0	0.076	0.052	0.048	0.041	0.036	0.030	0.023	0.015
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

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
1993	79.6	0	0.067	0.046	0.039	0.036	0.031	0.025	0.018	0.013
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

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 (2002)

Region/ Performance monitoring Station	Data availability rates (%)	Maximum conc. (ppm)	Percentiles (ppm)						
			99th	98th	95th	90th	75th	50th	25th
Sydney									
Rozelle	88.1	0.100	0.073	0.066	0.053	0.043	0.035	0.028	0.023
Lidcombe	31.0	0.100	0.078	0.074	0.061	0.046	0.037	0.029	0.021
Woolooware	92.3	**0.104**	0.074	0.070	0.052	0.041	0.033	0.027	0.023
Blacktown	91.7	**0.130**	0.093	0.083	0.068	0.059	0.043	0.033	0.026
St Marys	95.3	**0.119**	0.091	0.082	0.067	0.059	0.046	0.034	0.028
Richmond	92.5	**0.125**	0.094	0.084	0.070	0.063	0.045	0.034	0.029
Liverpool	93.6	**0.100**	0.087	0.084	0.064	0.054	0.039	0.030	0.025
Bringelly	93.0	**0.118**	0.098	0.090	0.074	0.064	0.045	0.034	0.028
Oakdale	18.6	0.094	0.088	0.088	0.082	0.075	0.060	0.044	0.033
Macarthur (1)									
Central Coast (2)									
Illawarra									
Wollongong	90.7	**0.121**	0.084	0.081	0.062	0.048	0.036	0.030	0.024
Kembla Grange	91.7	0.099	0.084	0.079	0.053	0.044	0.036	0.031	0.026
Albion Park	57.6	0.094	0.077	0.068	0.048	0.043	0.033	0.027	0.024
Lower Hunter									
Wallsend	81.9	0.081	0.074	0.069	0.056	0.049	0.038	0.031	0.025
Newcastle	94.0	0.083	0.077	0.061	0.054	0.046	0.037	0.030	0.025
Maitland (3)									
Regional									
Bathurst	34.7	0.064	0.063	0.062	0.057	0.052	0.044	0.038	0.032

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 (2002)

Region/ Performance monitoring Station	Data availability rates (%)	Maximum conc. (ppm)	Percentiles (ppm)						
			99th	98th	95th	90th	75th	50th	25th
Sydney									
Rozelle	92.1	**0.087**	0.061	0.054	0.047	0.040	0.032	0.026	0.021
Lidcombe	32.4	**0.084**	0.072	0.063	0.052	0.043	0.035	0.027	0.020
Woolooware	96.5	**0.088**	0.068	0.056	0.047	0.038	0.031	0.026	0.022
Blacktown	95.7	**0.107**	**0.083**	0.077	0.061	0.054	0.040	0.031	0.024
St Marys	99.7	**0.093**	**0.084**	0.070	0.060	0.053	0.042	0.032	0.026
Richmond	96.3	**0.112**	**0.080**	0.073	0.062	0.056	0.042	0.032	0.027
Liverpool	97.7	**0.089**	0.078	0.068	0.058	0.048	0.035	0.028	0.023
Bringelly	96.8	**0.099**	**0.088**	0.078	0.066	0.055	0.041	0.033	0.026
Oakdale	25.7	**0.080**	0.078	0.074	0.072	0.065	0.053	0.039	0.032
Macarthur (1)									
Central Coast (2)									
Illawarra									
Wollongong	94.6	**0.099**	0.076	0.068	0.056	0.043	0.034	0.028	0.023
Kembla Grange	95.8	**0.083**	0.071	0.070	0.046	0.040	0.034	0.029	0.024
Albion Park	60.0	**0.083**	0.069	0.065	0.043	0.039	0.031	0.026	0.023
Lower Hunter									
Wallsend	85.6	0.074	0.067	0.065	0.052	0.043	0.035	0.029	0.023
Newcastle	98.2	0.077	0.063	0.054	0.050	0.041	0.034	0.028	0.023
Maitland (3)									
Regional									
Bathurst	36.1	0.062	0.058	0.057	0.054	0.049	0.042	0.037	0.030

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	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Sydney										
Rozelle	**0.117**	0.080	0.078			0.088	0.059	0.080	**0.115**	0.100
Lidcombe	**0.150**	0.077	0.083	0.075	**0.168**	**0.142**	0.092	**0.118**	**0.156**	0.100
Woolooware	**0.155**	**0.114**	0.098	0.069	**0.159**	**0.115**	0.075	0.095	**0.126**	**0.104**
Blacktown	**0.125**	**0.114**	0.059	0.082	**0.149**	**0.109**	0.091	**0.113**	**0.153**	**0.130**
St Marys	**0.125**	**0.127**	0.068	0.087	**0.124**	**0.122**	**0.113**	**0.158**	**0.146**	**0.119**
Richmond	**0.105**	**0.101**	0.076	0.093	**0.120**	**0.113**	**0.127**	0.088	**0.117**	**0.125**
Liverpool	**0.127**	**0.113**	0.079	0.092	**0.151**	**0.130**	**0.102**	**0.133**	**0.141**	**0.100**
Bringelly	0.096	**0.130**	0.081	0.098	**0.135**	**0.113**	**0.114**	**0.130**	**0.175**	**0.118**
Oakdale				**0.111**	**0.152**	**0.109**	**0.107**	**0.126**	**0.135**	0.094
Illawarra										
Wollongong	**0.115**	**0.120**	0.097	0.066	**0.120**	**0.105**	0.087	**0.108**	**0.116**	**0.121**
Kembla Grange		**0.112**	0.089	0.083	**0.124**	**0.137**	**0.101**	**0.117**	**0.119**	0.099
Albion Park	**0.134**	**0.101**	0.080	0.062	**0.144**	**0.140**	0.090	**0.106**	0.088	0.094
Lower Hunter										
Wallsend	0.085	0.083	0.052	0.056	**0.129**	0.095	0.069	0.073	0.078	0.081
Newcastle	**0.101**	0.062	0.069	0.056	**0.141**	0.080	0.066	0.071	0.072	0.083
Regional										
Bathurst									0.063	0.064

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	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Sydney										
Rozelle	**0.085**	0.059	0.069			0.079	0.053	0.073	**0.083**	**0.087**
Lidcombe	**0.132**	0.063	0.062	0.065	**0.121**	**0.119**	0.077	**0.095**	**0.137**	**0.084**
Woolooware	**0.119**	**0.089**	0.073	0.064	**0.131**	**0.094**	0.071	**0.083**	**0.096**	**0.088**
Blacktown	**0.092**	**0.082**	0.052	0.071	**0.100**	**0.097**	0.077	**0.101**	**0.120**	**0.107**
St Marys	**0.103**	**0.096**	0.058	0.080	**0.104**	**0.091**	**0.091**	**0.136**	**0.125**	**0.093**
Richmond	**0.092**	**0.097**	0.061	0.075	**0.103**	**0.097**	**0.098**	0.078	**0.111**	**0.112**
Liverpool	**0.109**	**0.096**	0.067	0.078	**0.116**	**0.108**	**0.084**	**0.107**	**0.120**	**0.089**
Bringelly	0.076	**0.108**	0.066	0.076	**0.102**	**0.089**	**0.092**	**0.115**	**0.128**	**0.099**
Oakdale				**0.088**	**0.133**	**0.092**	**0.090**	**0.098**	**0.105**	**0.080**
Illawarra										
Wollongong	**0.084**	**0.086**	0.070	0.055	**0.113**	**0.082**	0.073	**0.086**	**0.091**	**0.099**
Kembla Grange		**0.089**	0.063	0.062	**0.099**	**0.117**	**0.081**	**0.089**	**0.092**	**0.083**
Albion Park		0.079	0.063	0.053	**0.124**	**0.116**	**0.081**	**0.083**	**0.082**	**0.083**
Lower Hunter										
Wallsend	0.077	0.064	0.048	0.053	**0.105**	**0.084**	0.059	0.070	0.073	0.074
Newcastle	**0.091**	0.051	0.063	0.054	**0.125**	0.068	0.065	0.065	0.069	0.077
Regional										
Bathurst									0.060	0.062

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
1993	88.1	**2**	**0.125**	0.096	0.067	0.050	0.043	0.030	0.021	0.016
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

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
1993	89.8	0	0.096	0.074	0.071	0.059	0.048	0.035	0.027	0.021
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

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

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
1993	82.0	1	**0.150**	0.063	0.051	0.044	0.034	0.024	0.016	0.012
1994	80.3	0	0.077	0.067	0.058	0.048	0.035	0.026	0.018	0.010
1995	91.6	0	0.083	0.058	0.055	0.045	0.036	0.028	0.019	0.014
1996	82.1	0	0.075	0.062	0.057	0.047	0.042	0.031	0.022	0.015
1997	95.1	**2**	**0.168**	0.087	0.083	0.064	0.050	0.034	0.023	0.019
1998	89.5	**5**	**0.142**	**0.106**	0.080	0.070	0.051	0.034	0.025	0.020
1999	89.4	0	0.092	0.076	0.065	0.055	0.043	0.031	0.025	0.020
2000	94.7	1	**0.118**	0.080	0.071	0.058	0.048	0.033	0.026	0.021
2001	94.5	**4**	**0.156**	0.094	0.085	0.066	0.050	0.035	0.025	0.020
2002	31.0	0	0.100	0.078	0.074	0.061	0.046	0.037	0.029	0.021

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

Bold font indicates values that exceed the AAQ NEPM standard

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
1993	85.4	**4**	**0.127**	0.092	0.075	0.055	0.042	0.028	0.016	0.009
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

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
1993	0									
1994	0									
1995	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	89.2	**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

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
1993	92.8	**3**	**0.105**	0.066	0.061	0.052	0.044	0.033	0.025	0.021
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

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
1993	91.8	1	**0.117**	0.056	0.046	0.037	0.031	0.023	0.018	0.013
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									
1997	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

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
1993	73.1	**2**	**0.125**	0.088	0.077	0.059	0.047	0.035	0.025	0.019
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

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
1993	86.4	1	**0.155**	0.074	0.066	0.055	0.044	0.029	0.023	0.018
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

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
1993	91.7	1	**0.101**	0.062	0.051	0.045	0.037	0.028	0.022	0.018
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

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
1993	88.7	0	0.085	0.065	0.054	0.049	0.036	0.028	0.022	0.016
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

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
1993	90.8	**2**	**0.134**	0.067	0.062	0.047	0.038	0.025	0.019	0.015
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

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
1993	0									
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

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
1993	85.7	**2**	**0.115**	0.088	0.072	0.058	0.044	0.029	0.022	0.018
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

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 - Annual 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
1993	85.3	**3**	**0.092**	0.069	0.065	0.044	0.037	0.028	0.020	0.015
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

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 - Annual 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
1993	80.0	0	0.076	0.066	0.061	0.052	0.044	0.033	0.024	0.021
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

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 - Annual daily maximum rolling 4-hour average concentration

Station: Lidcombe

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
1993	65.9	1	**0.132**	0.060	0.050	0.040	0.032	0.022	0.017	0.013
1994	66.8	0	0.063	0.057	0.050	0.040	0.032	0.025	0.017	0.012
1995	92.8	0	0.062	0.051	0.045	0.039	0.033	0.026	0.018	0.012
1996	81.6	0	0.065	0.056	0.050	0.043	0.037	0.028	0.021	0.014
1997	90.2	**4**	**0.121**	0.078	0.070	0.058	0.045	0.032	0.022	0.017
1998	87.8	**5**	**0.119**	**0.082**	0.073	0.056	0.045	0.031	0.023	0.017
1999	91.0	0	0.077	0.065	0.056	0.050	0.039	0.029	0.023	0.018
2000	98.7	**2**	**0.095**	0.074	0.066	0.053	0.043	0.031	0.025	0.019
2001	98.5	**4**	**0.137**	**0.080**	0.076	0.057	0.044	0.032	0.024	0.019
2002	32.4	1	**0.084**	0.072	0.063	0.052	0.043	0.035	0.027	0.020

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

Bold font indicates values that exceed the AAQ NEPM standard

Table 67: Statistical summary for O_3 - Annual 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
1993	64.4	**3**	**0.109**	**0.089**	0.079	0.057	0.041	0.028	0.017	0.012
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

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 - Annual 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
1993	0									
1994	0									
1995	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

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 - Annual 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
1993	91.3	**3**	**0.092**	0.062	0.053	0.044	0.039	0.029	0.023	0.020
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

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 - Annual 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
1993	71.9	1	**0.085**	0.053	0.043	0.034	0.029	0.022	0.018	0.013
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									
1997	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

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 - Annual 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
1993	68.8	**2**	**0.103**	0.075	0.063	0.054	0.042	0.033	0.024	0.019
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

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 - Annual 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
1993	85.2	**2**	**0.119**	0.058	0.055	0.048	0.040	0.028	0.022	0.017
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

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 - Annual 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
1993	91.7	1	**0.091**	0.049	0.044	0.037	0.031	0.025	0.021	0.016
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

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 - Annual 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
1993	79.7	0	0.077	0.054	0.049	0.042	0.033	0.026	0.021	0.015
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

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 - Annual 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
1993	0.0									
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

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 - Annual 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
1993	0									
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

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 - Annual 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
1993	87.0	1	**0.084**	0.067	0.062	0.052	0.038	0.026	0.021	0.017
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

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 (2002)

Region/ Performance monitoring Station	Data availability rates (%)	Maximum conc. (ppm)	Percentiles (ppm)						
			99th	98th	95th	90th	75th	50th	25th
Sydney									
Lidcombe [5]									
Woolooware	93.4	0.038	0.017	0.013	0.010	0.007	0.004	0.002	0.001
Blacktown	93.2	0.021	0.013	0.010	0.008	0.006	0.004	0.003	0.002
Richmond	93.3	0.028	0.009	0.008	0.006	0.004	0.003	0.001	0.001
Liverpool [4]									
Bringelly	94.6	0.010	0.009	0.008	0.006	0.004	0.002	0.001	0.001
Macarthur [1]									
Central Coast [2]									
Illawarra									
Wollongong	91.1	0.039	0.030	0.025	0.019	0.015	0.009	0.005	0.002
Warrawong	94.0	0.046	0.031	0.028	0.023	0.019	0.011	0.004	0.000
Albion Park	57.4	0.029	0.027	0.026	0.022	0.016	0.006	0.001	0.000
Lower Hunter									
Wallsend	80.2	0.045	0.034	0.028	0.024	0.019	0.012	0.007	0.004
Newcastle [4]									
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 deployed.
(5) Instrument to be deployed at new station.

Table 79: Statistical summary for SO_2 - Daily 24-hour average concentrations (2002)

Region/ Performance monitoring Station	Data availability rates (%)	Maximum conc. (ppm)	Percentiles (ppm)						
			99th	98th	95th	90th	75th	50th	25th
Sydney									
Lidcombe [5]									
Woolooware	97.0	0.007	0.003	0.003	0.002	0.002	0.001	0.000	0.000
Blacktown	96.4	0.004	0.003	0.003	0.002	0.002	0.001	0.001	0.001
Richmond	97.5	0.004	0.002	0.002	0.002	0.001	0.001	0.000	0.000
Liverpool [4]									
Bringelly	99.2	0.002	0.002	0.002	0.001	0.001	0.001	0.000	0.000
Macarthur [1]									
Central Coast [2]									
Illawarra									
Wollongong	95.3	0.008	0.006	0.006	0.004	0.003	0.002	0.001	0.000
Warrawong	98.6	0.009	0.006	0.006	0.005	0.003	0.002	0.001	0.000
Albion Park	60.0	0.009	0.008	0.007	0.006	0.004	0.001	0.000	0.000
Lower Hunter									
Wallsend	82.2	0.012	0.007	0.007	0.005	0.004	0.003	0.002	0.001
Newcastle [4]									
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 deployed.
(5) Instrument to be deployed at new station.

Trend analysis

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

Region/ Performance monitoring Station	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Sydney										
Woolooware	0.058	0.041	0.040	0.034	0.026	0.029	0.030	0.034	0.026	0.038
Blacktown	0.028			0.020	0.018	0.020	0.020	0.015	0.020	0.021
Richmond	0.026	0.012		0.018	0.016	0.012	0.019	0.015	0.012	0.028
Bringelly	0.020			0.009	0.012	0.013	0.012	0.018	0.012	0.010
Illawarra										
Wollongong	**0.287**	0.192	0.031	0.019	0.043	0.033	0.041	0.031	0.030	0.039
Warrawong	0.049	0.162				0.058	0.051	0.110	0.162	0.046
Albion Park	**0.218**	0.091	0.038	0.036	0.034	0.055	0.033	0.042	0.034	0.029
Lower Hunter										
Wallsend	0.069	0.073	0.059	0.080	0.101	0.063	0.074	0.041	0.049	0.045

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	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Sydney										
Woolooware	0.021	0.009	0.006	0.006	0.005	0.004	0.005	0.005	0.006	0.007
Blacktown	0.010			0.007	0.010	0.008	0.003	0.004	0.005	0.004
Richmond	0.015	0.005		0.003	0.003	0.007	0.003	0.004	0.010	0.004
Bringelly	0.006			0.005	0.003	0.003	0.003	0.004	0.003	0.002
Illawarra										
Wollongong	0.031	0.033	0.009	0.007	0.011	0.009	0.006	0.008	0.008	0.008
Warrawong	0.015	0.019				0.011	0.009	0.010	0.013	0.009
Albion Park	0.016	0.021	0.012	0.011	0.011	0.014	0.009	0.014	0.013	0.009
Lower Hunter										
Wallsend	0.015	0.018	0.020	0.022	0.022	0.016	0.014	0.010	0.013	0.012

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

Table 82: Annual average concentrations for SO_2 (ppm)

Region/ Performance monitoring Station	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Sydney										
Woolooware	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Blacktown	0.002			0.001	0.002	0.001	0.001	0.001	0.001	0.001
Richmond	0.003	0.002		0.001	0.001	0.001	0.001	0.000	0.000	0.001
Bringelly	0.001			0.001	0.001	0.001	0.001	0.000	0.000	0.000
Illawarra										
Wollongong	0.005	0.007	0.003	0.002	0.001	0.002	0.001	0.002	0.001	0.001
Warrawong	0.003	0.006				0.001	0.001	0.001	0.002	0.001
Albion Park	0.003	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Lower Hunter										
Wallsend	0.005	0.003	0.002	0.003	0.004	0.003	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
1993	41.3	0	0.028	0.017	0.015	0.013	0.011	0.007	0.004	0.002
1994	0									
1995	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

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
1993	58.3	0	0.020	0.016	0.015	0.010	0.006	0.004	0.003	0.001
1994	0									
1995	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

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
1993	69.0	0	0.026	0.015	0.014	0.012	0.009	0.007	0.004	0.003
1994	5.6	0	0.012	0.011	0.011	0.009	0.007	0.006	0.004	0.003
1995	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

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
1993	28.1	0	0.058	0.033	0.030	0.023	0.016	0.010	0.004	0.001
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

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
1993	54.6	0	0.069	0.061	0.051	0.040	0.035	0.023	0.014	0.008
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

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
1993	82.2	1	**0.218**	0.093	0.058	0.037	0.023	0.006	0.004	0.003
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

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
1993	10.8	0	0.049	0.048	0.047	0.040	0.023	0.013	0.005	0.001
1994	5.6	0	0.162	0.131	0.121	0.096	0.074	0.021	0.011	0.005
1995	0									
1996	0									
1997	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

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
1993	43.0	**3**	**0.287**	0.170	0.146	0.097	0.057	0.016	0.010	0.005
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

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 - Annual daily maximum 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
1993	38.9	0	0.010	0.009	0.008	0.006	0.005	0.002	0.001	0.000
1994	0									
1995	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

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

Table 92: Statistical summary for SO_2 - Annual daily maximum 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
1993	50.4	0	0.006	0.004	0.003	0.003	0.002	0.002	0.001	0.000
1994	0									
1995	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

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

Table 93: Statistical summary for SO_2 - Annual daily maximum 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
1993	69.6	0	0.015	0.012	0.011	0.009	0.007	0.004	0.002	0.002
1994	5.8	0	0.005	0.004	0.004	0.004	0.004	0.003	0.002	0.001
1995	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

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

Table 94: Statistical summary for SO_2 - Annual daily maximum 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
1993	24.7	0	0.021	0.012	0.007	0.004	0.003	0.002	0.001	0.000
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

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

Table 95: Statistical summary for SO_2 - Annual daily maximum 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
1993	55.9	0	0.015	0.014	0.013	0.011	0.010	0.007	0.005	0.003
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

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

Table 96: Statistical summary for SO_2 - Annual daily maximum 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
1993	82.2	0	0.016	0.009	0.008	0.006	0.005	0.003	0.003	0.001
1994	72.9	0	0.021	0.011	0.009	0.007	0.005	0.002	0.001	0.000
1995	74.9	0	0.012	0.009	0.009	0.005	0.004	0.002	0.001	0.000
1996	78.6	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

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

Table 97: Statistical summary for SO_2 - Annual daily maximum 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
1993	9.0	0	0.015	0.010	0.008	0.007	0.005	0.004	0.002	0.001
1994	4.9	0	0.019	0.015	0.014	0.011	0.010	0.008	0.003	0.002
1995	0									
1996	0									
1997	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

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

Table 98: Statistical summary for SO_2 - Annual daily maximum 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
1993	38.4	0	0.031	0.023	0.017	0.010	0.009	0.006	0.004	0.002
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

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 (2002)

Region/ Performance monitoring Station	Data availability rates (%)	Maximum conc. (µg/m^3)	Percentiles (µg/m^3)						
			99th	98th	95th	90th	75th	50th	25th
Sydney									
Rozelle [3]									
Lidcombe	30.7	**86.4**	**62.3**	47.2	35.5	29.7	20.8	16.0	13.9
Woolooware	94.8	**109.5**	**61.7**	46.9	36.7	30.8	23.7	17.8	13.7
Blacktown	93.4	**122.0**	**82.4**	**64.5**	42.9	33.6	25.2	18.4	14.6
St Marys	89.6	**113.3**	**74.4**	**66.4**	42.2	34.0	23.3	17.0	12.7
Richmond	94.2	**126.4**	**102.8**	**84.2**	49.1	34.9	24.5	17.1	12.2
Liverpool	91.0	**127.6**	**76.0**	**68.5**	46.1	37.3	27.2	20.2	15.1
Bringelly	97.0	**120.2**	**73.6**	**64.4**	40.1	34.5	25.4	18.4	13.6
Oakdale [3]									
Central Coast [1]									
Illawarra									
Wollongong	94.5	**76.7**	**61.9**	**53.1**	43.8	34.1	25.6	18.5	13.7
Warrawong	84.7	**72.6**	**64.4**	**54.9**	45.0	38.4	30.1	22.3	16.4
Albion Park	59.5	**88.3**	**65.1**	**53.1**	40.2	34.6	26.1	16.4	10.9
Lower Hunter									
Wallsend	81.1	**157.4**	**62.7**	**51.7**	45.2	34.2	23.8	17.5	13.6
Newcastle [3]									
Maitland [2]									
Regional									
Tamworth	99.2	**189.8**	**66.2**	**51.2**	40.9	33.6	23.4	17.4	13.1
Bathurst	91.8	**258.2**	**83.6**	**68.8**	45.7	35.2	25.0	16.6	12.5
Wagga Wagga	99.2	**178.2**	**121.6**	**94.9**	**60.6**	49.3	33.3	24.6	16.9
Albury	86.6	**81.3**	**56.8**	**44.4**	38.0	31.2	22.9	16.1	12.9
Orange [1]									
Dubbo [1]									
Lismore [1]									

AAQ NEPM Standard – 50 µg/m^3 (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 Wallsend in the interim.

(3) Instrument to be deployed.

Trend analysis

Table 100: Daily maximum 24-hour average concentrations for PM_{10} ($\mu g/m^3$)

Region/ Performance monitoring Station	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Sydney										
Lidcombe		**57.9**	37.3	46.2	49.8	38.7	37.0	**52.5**	**65.3**	**86.4**
Woolooware		**108.9**	**70.6**	**82.0**	**62.7**	42.3	39.0	46.1	**90.7**	**109.5**
Blacktown	38.1	**130.7**	38.6	39.2	**57.3**	**66.9**	37.5	36.2	**127.1**	**122.0**
St Marys	37.0	**106.4**	**62.9**	37.5	46.0	**56.7**	**53.2**	37.0	**142.3**	**113.3**
Richmond	**51.5**	**123.8**	**53.6**	**85.8**	**71.5**	**55.6**	44.4	43.2	**119.9**	**126.4**
Liverpool	50.0	**117.9**	40.0	37.3	**58.7**	45.7	46.0	**64.1**	**61.4**	**127.6**
Bringelly	42.1	**123.0**	47.0	**92.0**	**68.2**	45.9	33.9	36.5	**99.4**	**120.2**
Illawarra										
Wollongong		**104.1**	**61.0**	**69.6**	**64.8**	**56.9**	40.2	**58.1**	**68.2**	**76.7**
Warrawong		**72.9**	**50.3**	**51.5**	**50.8**	42.4	40.6	41.7	**55.3**	**72.6**
Albion Park						**63.6**	48.7	**62.5**	**58.7**	**88.3**
Lower Hunter										
Wallsend		**68.0**	**67.1**	**71.1**	**74.7**	47.9	38.4	46.7	**75.8**	**157.4**
Regional										
Tamworth								21.1	34.6	**189.8**
Bathurst								35.2	35.6	**258.2**
Wagga Wagga									**69.8**	**178.2**
Albury									28.8	**81.3**

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} - Annual daily maximum 24-hour average concentrations

Station: Blacktown

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (µg/m^3)	Percentiles (µg/m^3)						
				99th	98th	95th	90th	75th	50th	25th
1993	55.9	0	38.1	35.6	32.2	28.1	25.3	18.3	14.4	10.4
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	62.2	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

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

Bold font indicates values that exceed the AAQ NEPM standard

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

Station: Bringelly

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (µg/m^3)	Percentiles (µg/m^3)						
				99th	98th	95th	90th	75th	50th	25th
1993	89.3	0	42.1	35.0	33.0	29.8	24.4	19.6	15.4	11.7
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	86.6	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	1	**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

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

Bold font indicates values that exceed the AAQ NEPM standard

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

Station: Lidcombe

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (µg/m^3)	Percentiles (µg/m^3)						
				99th	98th	95th	90th	75th	50th	25th
1993										
1994	37.8	1	**57.9**	35.6	31.8	28.6	24.7	19.6	8.8	5.3
1995	89.0	0	37.3	35.9	34.2	29.8	25.9	19.8	15.4	11.2
1996	87.4	0	46.2	35.1	31.4	28.7	26.0	20.0	14.9	11.5
1997	81.1	0	49.8	39.8	36.8	31.8	27.5	21.2	15.9	11.9
1998	100	0	38.7	32.5	30.8	28.1	23.2	17.8	13.1	10.0
1999	87.7	0	37.0	31.4	29.6	26.0	23.7	20.0	15.6	11.6
2000	94.3	1	**52.5**	38.5	34.1	29.5	25.4	20.2	16.2	12.4
2001	86.0	1	**65.3**	39.5	34.5	30.1	27.8	23.1	17.9	14.0
2002	30.7	3	**86.4**	**62.3**	47.2	35.5	29.7	20.8	16.0	13.9

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

Bold font indicates values that exceed the AAQ NEPM standard

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

Station: Liverpool

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (µg/m^3)	Percentiles (µg/m^3)						
				99th	98th	95th	90th	75th	50th	25th
1993	47.4	0	50.0	46.4	40.0	34.0	26.9	21.4	16.1	12.3
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	81.1	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

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

Bold font indicates values that exceed the AAQ NEPM standard

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

Station: Richmond

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (µg/m^3)	Percentiles (µg/m^3)						
				99th	98th	95th	90th	75th	50th	25th
1993	35.3	1	**51.5**	37.6	37.2	32.7	27.4	23.3	16.4	11.6
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	76.4	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

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

Bold font indicates values that exceed the AAQ NEPM standard

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

Station: St Marys

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (µg/m^3)	Percentiles (µg/m^3)						
				99th	98th	95th	90th	75th	50th	25th
1993	39.2	0	37.0	32.6	30.1	27.2	22.8	18.3	13.2	9.7
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	72.6	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

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

Bold font indicates values that exceed the AAQ NEPM standard

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

Station: Woolooware

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (µg/m^3)	Percentiles (µg/m^3)						
				99th	98th	95th	90th	75th	50th	25th
1993	17.5	0	49.1	47.1	44.1	26.7	21.9	18.2	14.4	11.4
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	81.6	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

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

Bold font indicates values that exceed the AAQ NEPM standard

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

Station: Albion Park

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (µg/m^3)	Percentiles (µg/m^3)						
				99th	98th	95th	90th	75th	50th	25th
1993	0									
1994	0									
1995	0									
1996	0									
1997	20.0	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

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

Bold font indicates values that exceed the AAQ NEPM standard

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

Station: Warrawong

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (µg/m^3)	Percentiles (µg/m^3)						
				99th	98th	95th	90th	75th	50th	25th
1993	18.9	0	31.6	31.5	29.1	24.4	21.7	18.3	14.2	10.2
1994	93.7	4	**72.9**	47.0	43.0	31.3	26.1	20.1	14.5	10.7
1995	98.4	0	**50.3**	39.2	34.5	28.4	26.2	21.3	15.1	11.3
1996	97.3	0	**51.5**	34.2	31.9	29.0	26.4	20.6	14.8	11.0
1997	80.8	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	0	**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

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

Bold font indicates values that exceed the AAQ NEPM standard

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

Station: Wollongong

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (µg/m^3)	Percentiles (µg/m^3)						
				99th	98th	95th	90th	75th	50th	25th
1993	0									
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	75.1	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

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

Bold font indicates values that exceed the AAQ NEPM standard

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

Station: Wallsend

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (µg/m^3)	Percentiles (µg/m^3)						
				99th	98th	95th	90th	75th	50th	25th
1993	0									
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	67.7	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

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

Bold font indicates values that exceed the AAQ NEPM standard

Lead

Trend analysis

Table 112: Annual average concentration for Pb in New South Wales (µg/m^3)

Region/ Performance monitoring Station	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Sydney										
CBD	0.47	0.31	0.25	0.20				0.07	0.04	0.03
Rozelle	0.31	0.20	0.09	0.09	0.10	0.09	0.07	0.07	0.04	0.02
Illawarra										
Warrawong									0.02	0.02
Lower Hunter										
Wallsend										0.05

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

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 states because of the need to take account of regional climatic and seasonal factors when setting volatility limits. NSW is planning to amend the Protection of the Environment Operations Clean Air (Motor Vehicle and Motor Vehicle Fuels) Regulation, 2002 to limit petrol volatility from the 2003/04 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 introduced a five-point plan to encourage carmakers to sell and consumers to purchase the most environmentally advanced new cars and light trucks. It does this by recognising and rewarding environment-friendly purchases and greening the Government's own fleet. A paper outlining the Cleaner Vehicles Action Plan was released for public comment in May 2003.

The five-point plan includes:

- Clean Car Benchmarks - environmental performance benchmarks for new light vehicles to identify the cleanest cars available.
- Stamp duty as an environmental incentive – new vehicles will be assessed on their environmental performance and will pay stamp duty accordingly.
- Greener NSW Government fleet program – This requires government agencies to establish fleet improvement plans with targets for reductions in fuel consumption and greenhouse gas.
- Voluntary clean fleet program – This Program encourages the adoption of environment friendly practices by large vehicle fleets and includes voluntary maintenance programs, purchasing cleaner vehicles and maintaining and operating fleets in an environmentally-friendly manner.
- Consumer Green Guide - the development of a green vehicle guide for consumers, covering cars and light trucks.

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 will be required to meet Euro 2 emissions standards and from 2005, Euro 3 emission standards. For diesel vehicles, Euro 2 applies from 2002/3 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 2006/2007.

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 vehicles 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 EPA operates an on-road enforcement program to tackle smoky vehicles. In 2001-02 over 2050 penalty infringement notices (PINs) and 2940 warning letters were issued. Diesel vehicles make up a large number of smoky vehicles with 1896 of the PINs in 2001/02 being issued to diesel vehicle owners. The community can also report smoky vehicles, including on the EPA's website. The EPA 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.

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 404 compressed natural gas buses.

Licensed Industry

Industrial emissions are a relatively small proportion of total emissions of VOCs and NOx in the Sydney region, at 18% and 14% respectively. The situation changes somewhat when considering the Greater metropolitan Region (GMR), with industry responsible for 60% of NOx and 14% VOC emissions. (NSW EPA 2002)

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 a revised Regulation is scheduled for implementation from 1 September 2004.

In recent years load based licensing has been 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.

In the two-year period to 2002, licensed industry has committed to invest over $20m to reduce emissions to air.

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 will have a focus on waste reduction this will encompass 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

With funding of close to $5 million from the NSW Environmental Trust, the Clean Air Fund has been established. This focuses on reducing air pollution from light industrial, commercial and domestic activities and includes:

- Local Air Improvement Projects – the Local Air Improvement Projects initiative has been established 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.
- Stage 2 Vapour Recovery Pilot – stage 2 vapour recovery systems are to be 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.
- Promotion of the supply and uptake of cleaner small appliances – this initiative will develop voluntary measures to increase the supply and purchase of low emission small engines in NSW. Options to be considered include industry agreements, information based options such as promotion, education and emission labelling.
- A tune-up program for smaller combustion systems in the west and south west of Sydney
- Woodsmoke Reduction Program – In addition to the EPA ongoing 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. 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 last winter (2002) - Armidale, Orange, Cooma, Tumut, Lithgow and the Blue Mountains and will continue in those again this year. Last year 744 wood heaters were replaced with cleaner heating alternatives. A further three councils – Goulburn, Wagga, Wagga and Wingecarribee have joined the program in 2003. These woodsmoke initiatives are supported by the Clean Air Regulation under the Protection of the Environment Operations Act which requires that new wood heaters meet improved standards and provides councils with power to take action against people creating excessive smoke from wood heaters. Councils also have the power to limit or ban the installation of wood heaters in new homes.

Conclusions

The data presented in this report demonstrate that NSW achieved compliance with the AAQ NEPM goals for all pollutants except ozone and particles. Extraordinary natural events such as bushfires and dust storms, influenced by the severe drought experienced throughout NSW during 2002, have contributed to the ozone and particle pollution events observed during 2002. However, for ozone in particular, anthropogenic emissions are sufficient to generate exceedences of the AAQ NEPM standards.

Levels of carbon monoxide, nitrogen dioxide, sulfur dioxide and lead continue to be well below AAQ NEPM standards.

References

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