NATIONAL ENVIRONMENT PROTECTION (AMBIENT AIR QUALITY) MEASURE

NEW SOUTH WALES ANNUAL COMPLIANCE REPORT 2011

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Contents

Acronyms, abbreviations and glossary

Following is a list of acronyms, abbreviations and terms used in this report.

AAQ NEPM	Ambient Air Quality – National Environment Protection Measure
ABS	Australian Bureau of Statistics
Ambient air	The external air environment (does not include the air environment inside buildings or structures)
AQMP	Air Quality Monitoring Plan
AS	Australian Standards
BAM	Beta Attenuation Monitor
CO	Carbon monoxide
EPA	Environment Protection Authority
FDMS	Filter Dynamics Measurement System (used with TEOM)
FRM	Federal Reference Method (USEPA)
GRUB	Generally Representative Upper Bound
ICP-AES	Inductively Coupled Plasma-Atomic Emission Spectroscopy
Monitoring station	A facility for measuring the concentration of one or more pollutants in the ambient air in a region or sub-region
NEPC	National Environment Protection Council
NEPM	National Environment Protection Measure
NO_2	Nitrogen dioxide
NO_x	Oxides of nitrogen
O_3	Ozone
OEH	Office of Environment and Heritage (NSW)
Pb	Lead
$PM_{2.5}$	Particulate Matter with aerodynamic diameter of 2.5 microns or less
PM_{10}	Particulate Matter with aerodynamic diameter of 10 microns or less
POEO	Protection of the Environment Operations Act (1997) – key piece of environmental protection legislation in NSW
ppm	Parts per million by volume – parts of pollutant per million parts of air
PRC	Peer Review Committee
RAAS	Reference Ambient Air Sampler
SO_2	Sulfur dioxide
TEOM	Tapered Element Oscillating Microbalance
USEPA	United States Environmental Protection Agency
$\mu g/m^3$	microgram (1 millionth of a gram) per cubic metre referenced to a temperature of 0°C and an absolute pressure of 101.325 kilopascals
VOC	Volatile Organic Compounds – compounds that vaporise, that is become a gas, at normal atmospheric temperatures

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Overview

This report, required under clause 18 of the National Environment Protection (Ambient Air Quality) Measure (AAQ NEPM), presents the results of air quality monitoring in New South Wales for the 2011 calendar year and assesses them against the requirements of the AAQ NEPM. The Office of Environment and Heritage (OEH), the department which undertakes this monitoring for the NSW State Government, also releases these data on its public website (http://www.environment.nsw.gov.au/AQMS/search.htm).

The AAQ NEPM establishes:

- requirements for monitoring air quality,
- air quality standards that are levels of specified pollutants against which air quality can be assessed,
- a goal that the air quality standards are met by 2008 to the extent specified in the NEPM. Recognizing that certain events can impact on air quality, the NEPM specifies a maximum number of days on which it is permissible to exceed the standard.

Monitoring was performed in accordance with New South Wales' monitoring plan, AAQ NEPM Technical Papers and OEH's NATA accreditation.

Ambient Air Quality monitoring at the AAQ NEPM monitoring stations in NSW during 2011 showed no exceedences of the AAQ NEPM standards for carbon monoxide (CO), nitrogen dioxide (NO_2) and sulfur dioxide (SO_2) (monitoring for lead ceased in 2004 due to extremely low ambient concentrations).

Exceedences of the AAQ NEPM standards and goals in the AAQ NEPM monitoring network (a sub-set of OEH's total ambient air quality monitoring network) occurred for:

- 1-hour ozone in Sydney on four calendar days;
- 4-hour ozone in Sydney on seven calendar days;
- 24-hour particles (as PM_{10}) throughout the network for a total of 9 calendar days, with five of the nine exceedences due to local construction next to the Chullora monitoring site.

For fine particles (as $PM_{2.5}$) in 2011 (using the non-adjusted continuous TEOM data), concentrations in excess of the $PM_{2.5}$ advisory 24-hour reporting standard were recorded on two days at two $PM_{2.5}$ monitoring sites (Liverpool and Richmond). Concentrations in excess of the 1-year $PM_{2.5}$ advisory reporting standard were not recorded at any of the monitoring sites.

In 2011, NSW again felt the influence of La Nina event and although drier than 2010, was otherwise the wettest year since 1998. The 2 year period 2010-2011 was the 4th wettest on record for NSW.

Despite a dry start to 2011, Sydney also had the wettest year since 2007. These weather conditions helped to keep the number of exceedences of the PM_{10} particle standard as well as the 1 and 4 hour ozone standards recorded at monitoring sites in NSW to a low level.

Section A – Monitoring summary

Current AAQ NEPM Monitoring network

The NSW Ambient Air Quality NEPM Monitoring Plan (*http://www.environment.nsw.gov.au/air/nepm/index.htm*) details the monitoring that NSW performs to assess compliance with the Ambient Air Quality NEPM. The majority of monitoring occurs in the high population regions of Sydney, Newcastle and Wollongong. These regions contain over 60% of the NSW population. Campaign monitoring is also performed at a number of rural population centers.

The AAQ NEPM monitoring network is only part of an overall 38-station air monitoring network operated by the Office of Environment and Heritage (OEH). The AAQ NEPM network is designed to characterise general air quality and frequently will pick up individual pollutant events. This approach ensures that there is adequate coverage of the populated areas and of the broad differences in pollutant distribution within a region. The choice of stations in each region was made to optimise both population coverage and representation of the occurrences of higher pollutant concentrations.

NSW characterises the air quality to which the general population is exposed in a region by monitoring all air pollutants of interest at a network of trend stations. These stations capture the majority of pollution events that occur from time to time, but are supplemented by additional permanent upper bound stations at which selected pollutants only will be monitored to ensure that all major pollutant events are captured and reported.

Campaign monitoring is being undertaken in regional centres. Initial monitoring is occurring at Albury, Wagga Wagga, Bathurst and Tamworth. Data from these stations will be used to validate and review the screening measures applied to the urban centres outside the Sydney-Wollongong-Newcastle regions.

In total, the AAQ NEPM network in NSW currently monitors pollutants at 20 stations – the majority of pollutants at eight trend stations (T), selected individual pollutants at four additional permanent upper bound stations or performance stations (P), and selected pollutants on a campaign basis at a further eight stations (C) in Sydney, the lower Hunter and provincial cities (see Table 1 and Figures 1 and 2 for further details).

In addition NSW also maintains a number of air quality monitoring stations that are not designated for NEPM reporting. Some stations that are designated NEPM stations for particular pollutants are not designated for other pollutants. For instance St Marys is designated as a NEPM station for ozone however nitrogen dioxide and PM_{10} are also measured at this station. Data from stations that are not designated as NEPM stations for a particular pollutant are not presented in this report.

New sites and site closures

The site at Wagga Wagga had to be closed in October 2011 due to the redevelopment of the site and was replaced by a new site near the racecourse in Beckwith Street, Wagga Wagga North.

Although not part of the AAQ NEPM network, the remaining 12 stations in the Industry-funded Upper Hunter Air Quality Monitoring Network were established at Singleton North West, Muswellbrook North West, Camberwell, Wybong, Merriwa, Maison Dieu, Aberdeen, Bulga, Mount Thorley, Singleton South, Jerrys Plains and Warkworth during 2011. This completes the construction of this network in the Upper Hunter. Data from this network are currently published separately and are thus not included in this report.

Table 1: NSW Ambient Air Quality NEPM monitoring network

Station	Station type [1]	Year established	Number of parameters	Ozone	Nitrogen dioxide	PM_{10}	$PM_{2.5}$	Carbon monoxide	Sulfur dioxide
Sydney									
Blacktown [6]	T	1992 – 2004	5	X	X	X		X	X
Bringelly	T	1992	4	X	X	X			X
Central Coast [2]	C	To be established	4	X	X	X			X
Chullora [3] [8]	T	2003	6	X	X	X	X	X	X
Earlwood	C	1998	1				X		
Liverpool	C	1990	5	X	X	X	X	X	
Macarthur	T	2003	5	X	X	X		X	X
Oakdale	P	1996	2	X		X			
Prospect [6]	T	2007	5	X	X	X		X	X
Richmond [8]	T	1992	5	X	X	X	X		X
Rozelle	T	1978	4	X	X	X		X	
St Marys	P	1992	1	X					
Lower Hunter									
Newcastle	T	1992	5	X	X	X		X	X
Maitland [9]	T	To be established	4	X	X	X			X
Beresfield [4]	C	1993	2			X	X		
Wallsend [4]	C	1992	4	X	X		X		X
Illawarra									
Albion Park	P	1978 – 2005	4	X	X	X			X
Albion Park South	P	2005	4	X	X	X			X
Kembla Grange	P	1994	2	X		X			
Warrawong	P	1993 - 2006	1						X
Wollongong	T	1993	6	X	X	X	X	X	X
Regional NSW									
Albury	C	2000	1			X			
Bathurst [7]	C	2000	2	X		X			
Dubbo [5]	C	Dependent on campaign monitoring results	1			X			
Lismore [5]	C		1			X			
Orange [5]	C		1			X			
Tamworth	C	2000	1			X			
Wagga Wagga	C	2001-2011	1			X			
Wagga Wagga North	C	2011	1			X			

1 P denotes performance; T denotes trend; C denotes campaign

2 New station expected to be opened in September 2012

3 Replaced the Lidcombe trend station

4 Data from Beresfield and Wallsend will be reported at least until the Maitland station is established

5 Monitoring subject to results from initial campaign monitoring

6 Prospect station replaces Blacktown station from 2007

7 Bathurst ozone analyzer removed in August 2007 due to the completion of the campaign

8 Both FRM and TEOM $PM_{2.5}$ monitoring was conducted at this site

9 Under development

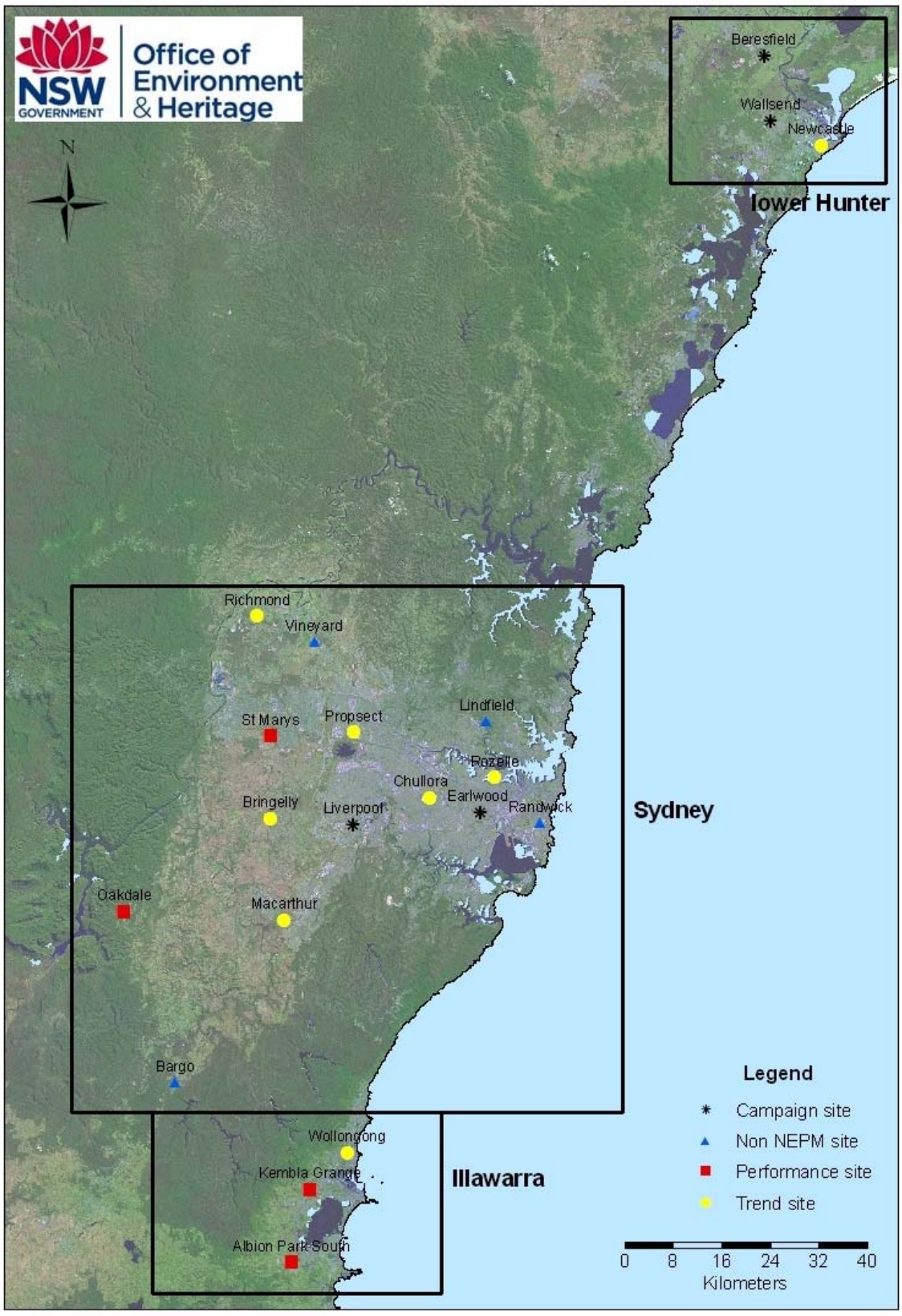

Figure 1 **Ambient Air Quality Monitoring in the Sydney, Illawarra and lower Hunter regions**

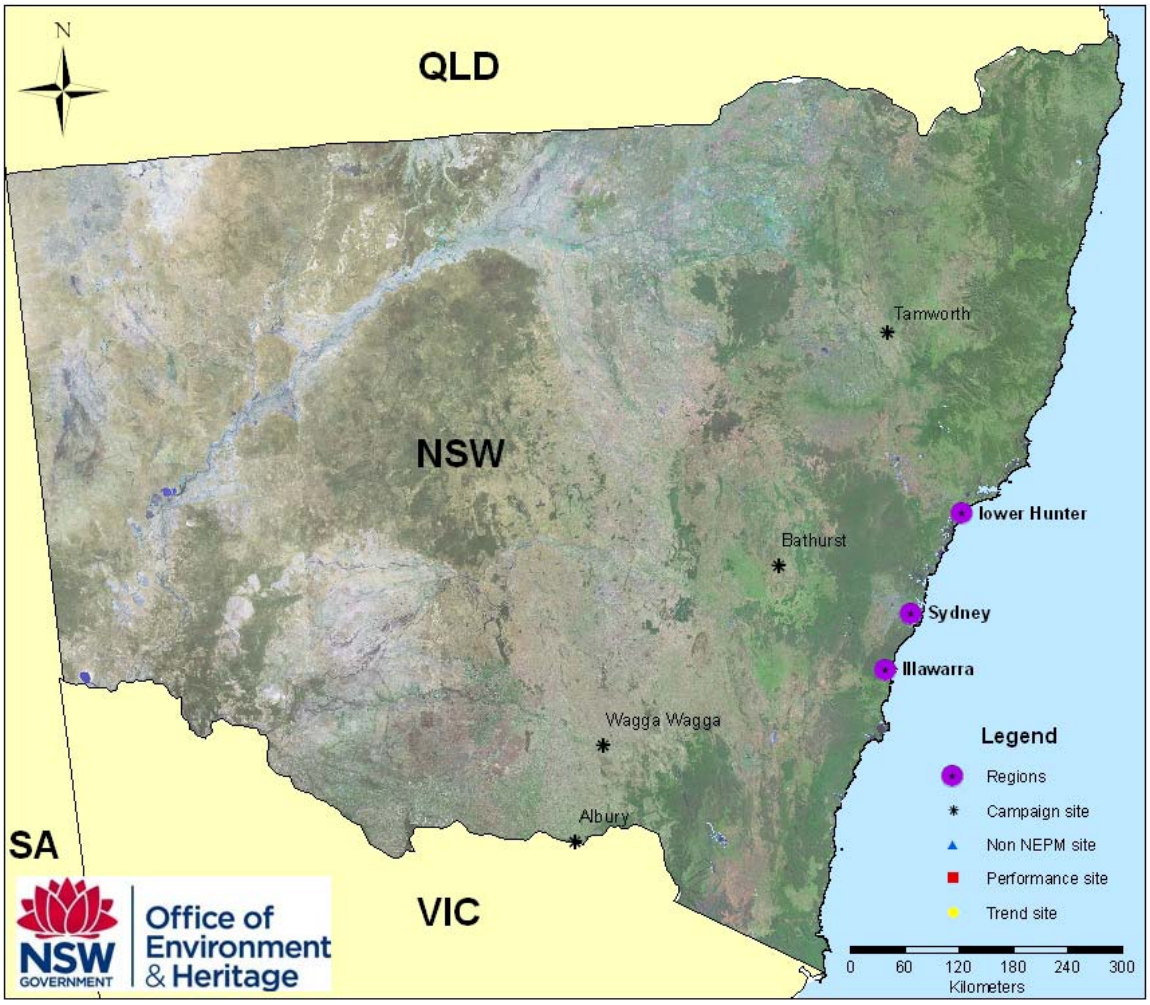

Figure 2 Ambient Air Quality Monitoring in regional New South Wales

Station siting and exposure

All stations within the network meet all of the Ambient Air Quality NEPM siting and exposure criteria with the exceptions of Earlwood, Liverpool, Rozelle, and Tamworth, (see Table 2 for further details).

Table 2: Stations not complying with all siting and exposure criteria

Station	Siting criteria not met	Comments
Earlwood	Clear sky angle <120°. Less than 20m from trees.	Trees have grown since establishment of station.
Liverpool	Clear sky angle <120°.	Trees have grown since establishment of station.
Rozelle	Clear sky angle <120°. Less than 20m from trees.	Trees have grown since establishment of station.
Tamworth	Less than 20m from trees.	Best location in urban area specifically targeted for monitoring.

Monitoring methods

The NSW network is comprised of instruments that are in accordance with the relevant Australian standard (See Table 3 for further details). 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 for temperature.

Table 3: Instruments used in NSW for NEPM monitoring

Pollutant	Standard	Title	Method used
Carbon monoxide	AS3580.7.1-2011	Ambient Air - Determination of Carbon Monoxide - Direct Reading Instrument Method	Gas Filter Correlation /Infra-Red
Nitrogen dioxide	AS3580.5.1-2011	Ambient Air - Determination of Oxides of Nitrogen - Chemiluminescence Method	Gas Phase Chemi-luminescence
Photochemical oxidant (ozone)	AS3580.6.1-2011	Ambient Air - Determination of Ozone - Direct Reading Instrument Method	Non Dispersive Ultra-violet
Sulfur dioxide	AS3580.4.1-2008	Ambient Air - Determination of Sulfur Dioxide - Direct Reading Instrument Method	Pulsed Fluorescence
Lead [+]	AS2800 - 1985	Ambient Air - Determination of Particulate Lead-High Volume Sampler - Gravimetric Method	Atomic Absorption
Particles as PM_{10}	AS 3580.9.8-2008	Determination of Suspended particulate matter - PM_{10} continuous direct mass method using a tapered element oscillating microbalance analyser.	Tapered Element Oscillating Microbalance (TEOM)
Particles as $PM_{2.5}$	AS3580.9.8 - 2008*	Technical Paper on Monitoring for Particles as $PM_{2.5}$	Tapered Element Oscillating Microbalance (TEOM)
			Partisol[#]
			Reference Ambient Air Samplers (RAAS)[#]

* Modified for use in the $PM_{2.5}$ Equivalence Program according to the NEPM Technical Paper

[+] No longer measured in New South Wales

[#] Both the Partisol and RAAS instruments are considered Federal Reference Methods (FRM)

NATA accreditation

As required under Clause 12 of the Ambient Air Quality NEPM, the OEH is accredited by the National Association of Testing Authorities (NATA) for the measurement of all Ambient Air Quality NEPM parameters. The biennial reassessment of the Air Quality Monitoring Laboratory and associated monitoring stations by NATA was completed in late 2011 and accreditation has been continued.

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 AAQ 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 OEH website (*http://www.environment.nsw.gov.au/air/nepm/index.htm*)

Section B – Assessment of compliance with standards and goals

Air quality is assessed against the Ambient Air Quality (AAQ) NEPM standards and goals as specified in Schedule 2 of the NEPM and reproduced below in Table 4.

The **Standards** against which air quality is assessed are concentrations in parts per million (ppm) or micrograms per cubic metre ($\mu g/m^3$) – (see column 3 of Table 4.)

The **Goal** of the AAQ NEPM is to achieve the Standards as assessed in accordance with the monitoring protocol within 10 years of commencement (i.e. 2008) to the extent specified in Schedule 2 of the NEPM. The extent is expressed as a maximum allowable number of exceedences for each standard (see column 4 in Table 4). These are set to account for unusual meteorological conditions and, in the case of particles, natural events such as dust storms and bushfires, that can't be controlled through normal air quality management programs.

The AAQ NEPM also specifies advisory reporting standards for $PM_{2.5}$ (see Table 4). The goal for $PM_{2.5}$ is to collect sufficient data to facilitate a review of the $PM_{2.5}$ standards.

Table 4: NEPM Standards and Goals

Pollutant	Averaging period	AAQ NEPM Standard maximum concentration	AAQ NEPM Goal. maximum number of allowable exceedences
Carbon monoxide	8 hour rolling average	9.0 ppm	1 day a year
Nitrogen dioxide	1 hour average	0.12 ppm	1 day a year
	1 year average	0.03 ppm	None
Photochemical oxidants – as ozone	1 hour average	0.10 ppm	1 day a year
	4 hour rolling average	0.08 ppm	1 day a year
Sulfur dioxide	1 hour average	0.20 ppm	1 day a year
	1 day average	0.08 ppm	1 day a year
	1 year average	0.02 ppm	None
Particles as PM_{10}	1 day average	50 $\mu g/m^3$	5 days a year
Lead	1 day average	0.50 $\mu g/m^3$	None
Particles as $PM_{2.5}$ [#]	1 day average	25 $\mu g/m^3$	Gather sufficient data nationally to facilitate a review of Advisory Reporting Standard.
	1 year average	8 $\mu g/m^3$	

[#] - Reporting standard only.

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

A station's performance is assessed as **complying with the NEPM (i.e. 'MET')** if the number of exceedences is no more than the number specified in Schedule 2 of the AAQ NEPM and data availability was at least 75% in each quarter of 2010. A region demonstrates compliance with the NEPM when either all stations in the region demonstrate compliance, or when the region meets approved *pollutant screening criteria*.

A station's performance is assessed as **not complying with the NEPM (i.e.'NOT MET')** if there is more than the number of exceedences specified in Schedule 2 of the AAQ NEPM, even if the data availability rates are less than the 75% required.

A station's performance is assessed as **'NOT DEMONSTRATED' (ND)** if it records no exceedences, or exceedences on a number of days less than that allowed, but has data availability rates less than 75% in any quarter. This may be due to instrument failures, temporary closures for upgrading or closures to allow relocation of the station.

These categories (i.e. MET, NOT MET and ND) are used in the tables on the following pages.

Calculation and reporting methods used comply with the requirements detailed in the NEPC Peer Review Committee Technical paper No 8: Annual Reports (NEPC 2002). Previous reports included daily average calculations for PM_{10}, $PM_{2.5}$ and sulfur dioxide using hours 0 to 23 – daily averages are now calculated using hours 1 to 24 as detailed in the NEPM Technical Paper No.5, "Data Collection and Handling". There are also some minor differences in the data included in this year's report when compared to previous year's reports due to the way the NSW OEH's new air quality database performs its internal calculations, especially in relation to percentiles.

PM_{10} TEOM data indicate data which has undergone an internal correction factor for USEPA equivalency but without subsequent treatment or temperature adjustment.

$PM_{2.5}$ TEOM data indicate data which has not undergone an internal correction for USEPA PM_{10} equivalency or any subsequent treatment or adjustment for temperature.

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

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

Data loss

There was only one occurrence in 2011 where the data availability rate was lower then that prescribed for the Ambient Air Quality NEPM goals. This was for PM_{10} at Liverpool, where a flow problem was experienced with the continuous TEOM instrument resulting in the invalidation of some data in the second and third quarters of 2011.

Carbon monoxide

Table 5: 2011 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							
Chullora	92.3	93.4	94.9	94.3	93.7	0	Met
Liverpool	92.7	95.0	91.6	94.9	93.6	0	Met
Macarthur	85.9	94.6	88.0	95.4	91.0	0	Met
Prospect	84.3	92.6	95.2	95.4	91.9	0	Met
Rozelle	89.9	95.0	92.0	94.4	92.8	0	Met
Illawarra							
Wollongong	95.0	93.2	95.5	89.1	93.2	0	Met
lower Hunter							
Newcastle	90.5	91.1	89.7	91.7	90.7	0	Met

ND Not demonstrated.

Bold font indicates values that exceed the AAQ NEPM standard

During 2011 no exceedences of the carbon monoxide standard were recorded in NSW. Compliance with the Ambient Air Quality NEPM goal was demonstrated at all sites in the Sydney, Illawarra and lower Hunter regions.

Nitrogen dioxide

Table 6: 2011 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									
Bringelly	80.1	87.4	91.8	89.9	87.4	0	0.005	Met	Met
Chullora	93.2	93.3	94.2	92.0	93.2	0	0.013	Met	Met
Liverpool	89.2	92.4	92.8	93.7	92.0	0	0.010	Met	Met
Macarthur	91.1	94.2	92.5	93.6	92.9	0	0.008	Met	Met
Prospect	94.1	93.6	95.4	95.3	94.6	0	0.010	Met	Met
Richmond	95.0	94.6	92.6	95.6	94.4	0	0.005	Met	Met
Rozelle	89.1	89.4	90.7	94.4	90.9	0	0.011	Met	Met
Illawarra									
Albion Park Sth	90.9	88.3	88.9	88.3	89.1	0	0.002	Met	Met
Wollongong	88.3	90.4	95.5	89.1	90.8	0	0.008	Met	Met
lower Hunter									
Newcastle	90.5	91.0	89.5	91.7	90.7	0	0.007	Met	Met
Wallsend	87.4	85.0	94.7	95.6	90.7	0	0.008	Met	Met

ND Not demonstrated.

Bold font indicates values that exceed the AAQ NEPM standard

No exceedences of the nitrogen dioxide 1-hour and annual standards were recorded in NSW during 2011. Compliance with the Ambient Air Quality NEPM goal was met at all sites in Sydney, Illawarra and lower Hunter regions.

Ozone

Table 7: 2011 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									
Bringelly	85.6	80.8	92.9	94.4	88.5	**2**	**2**	Not Met	Not Met
Chullora	93.2	93.4	95.0	95.0	94.2	1	1	Met	Met
Liverpool	92.7	94.9	93.8	94.9	94.1	1	1	Met	Met
Macarthur	91.8	94.6	93.5	94.3	93.6	**2**	**2**	Not Met	Not Met
Oakdale	95.5	93.9	95.2	95.5	95.0	**3**	**3**	Not Met	Not Met
Prospect	95.1	94.8	95.4	95.4	95.2	1	**3**	Met	Not Met
Richmond	95.2	92.7	93.6	95.6	94.3	1	1	Met	Met
Rozelle	89.9	95.0	93.0	95.2	93.3	0	0	Met	Met
St Marys	95.5	95.1	93.3	95.4	94.8	**3**	**3**	Not Met	Not Met
Illawarra									
Albion Park Sth	91.0	88.8	89.3	89.1	89.6	1	**3**	Met	Not Met
Kembla Grange	93.4	94.6	93.9	95.7	94.4	1	**2**	Met	Not Met
Wollongong	95.0	93.0	95.5	88.9	93.1	0	0	Met	Met
lower Hunter								Met	Met
Newcastle	90.5	90.9	89.7	91.7	90.7	0	0	Met	Met
Wallsend	92.8	92.9	94.7	95.4	94.0	0	0	Met	Met

ND Not demonstrated.

Bold font indicates values that exceed the AAQ NEPM standard

Both the 1-hour and 4-hour standards for ozone were exceeded in the Sydney and Illawarra regions during 2011. The Sydney and Illawarra regions did not comply with the Ambient Air Quality NEPM goal, while compliance was demonstrated in the lower Hunter region.

Sulfur dioxide

Table 8: 2011 compliance summary for SO_2 in New South Wales

Region/ Performance monitoring Station	Data availability rates (% of hours)					Number of exceedences (days)		Annual Mean (ppm)	Performance against the standards and goal		
	Q1	Q2	Q3	Q4	Annual	1-hour	24-hour		1-hour	24-hour	1-year
								AAQ NEPM standards	**0.20 ppm (1-hour average)**	**0.08 ppm (24-hour average)**	**0.02 ppm (1-year average)**
Sydney											
Bringelly	87.3	81.7	91.9	94.6	88.9	0	0	0.000	Met	Met	Met
Chullora	91.2	93.1	94.0	92.4	92.7	0	0	0.001	Met	Met	Met
Macarthur	84.4	94.2	93.5	95.4	91.9	0	0	0.000	Met	Met	Met
Prospect	94.0	90.5	95.4	95.4	93.8	0	0	0.001	Met	Met	Met
Richmond	95.2	94.6	92.6	95.6	94.5	0	0	0.000	Met	Met	Met
Illawarra											
Albion Park Sth	80.3	88.6	90.3	90.2	87.4	0	0	0.001	Met	Met	Met
Wollongong	94.9	92	95.5	89.1	92.9	0	0	0.001	Met	Met	Met
lower Hunter											
Newcastle	90.5	90.9	89.7	91.7	90.7	0	0	0.002	Met	Met	Met
Wallsend	92.7	91.9	94.7	95.7	93.7	0	0	0.001	Met	Met	Met

ND Not demonstrated.

Bold font indicates values that exceed the AAQ NEPM standard

The 1-hour, 24-hour and annual standards for sulfur dioxide were not exceeded in NSW during 2011. Compliance with the Ambient Air Quality NEPM goal was met throughout the Sydney, lower Hunter and Illawarra regions.

Particles as PM_{10}

Table 9: 2011 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							
Bringelly	100.0	100.0	98.9	96.7	98.9	2	Met
Chullora	98.9	100.0	97.8	100.0	99.2	**7**	Not Met
Liverpool	91.1	19.8	72.8	92.4	69.0	1	Met
Macarthur	98.9	100.0	94.6	100.0	98.4	0	Met
Oakdale	100.0	100.0	100.0	97.8	99.5	1	Met
Prospect	100.0	96.7	97.8	98.9	98.4	0	Met
Richmond	98.9	98.9	97.8	100.0	98.9	0	Met
Rozelle	95.6	100.0	97.8	100.0	98.4	0	Met
Illawarra							
Albion Park Sth	100.0	100.0	97.8	97.8	98.9	1	Met
Kembla Grange	98.9	98.9	100.0	97.8	98.9	1	Met
Wollongong	95.6	100.0	100.0	91.3	96.7	0	Met
lower Hunter							
Beresfield	98.9	98.9	98.9	83.7	95.1	0	Met
Newcastle	98.9	100.0	100.0	98.9	99.5	0	Met
Regional							
Albury	82.2	100.0	80.4	100.0	90.7	0	Met
Bathurst	98.9	100.0	100.0	90.2	97.3	0	Met
Tamworth	98.9	97.8	97.8	92.4	96.7	1	Met
Wagga Wagga/ Wagga Wagga Nth*	96.7	100.0	89.1	98.9*	96.3	0	Met

ND Not demonstrated.

* Wagga Wagga Nth site was commissioned in October 2011

Bold font indicates values that exceed the AAQ NEPM standard

The PM_{10} standard and goal was exceeded at Chullora in the Sydney region during 2011; all other regions in NSW complied with the Ambient Air Quality NEPM. Performance against the standards and goals was not demonstrated at Liverpool due to a flow problem with the instrument.

Particles as $PM_{2.5}$

Table 10: Summary of $PM_{2.5}$ concentrations in NSW (2011) – continuous TEOM method

Advisory Reporting Standard
25 μg/m^3 (24-hour average)
8 μg/m^3 (Annual average)

Region/ Performance monitoring station	Data availability rates (% of hours) Q1	Q2	Q3	Q4	Annual	Days above ARS	Annual mean (μg/m^3)
Sydney							
Chullora	98.0	99.1	98.2	99.0	98.6	0	5.9
Earlwood	93.4	97.2	95.4	99.1	96.3	0	5.4
Liverpool	97.3	98.6	98.6	97.6	98.0	2	5.9
Richmond	98.0	97.1	97.6	97.5	97.5	2	4.7
Illawarra							
Wollongong	96.1	97.6	98.7	92.0	96.1	0	4.6
lower Hunter							
Beresfield	96.7	98.7	99.2	98.9	98.4	0	5.5
Wallsend	98.3	98.4	97.9	99.3	98.5	0	4.8

Bold font indicates values in excess of the AAQ NEPM advisory reporting standard

* Please note that all $PM_{2.5}$ TEOM data uses USEPA factors of A=1.00 and B=0

In 2011, the Sydney, lower Hunter and Illawarra regions all complied with the advisory reporting standard with an annual average below 8.0 μg/m^3.

Table 11: Summary of $PM_{2.5}$ concentrations in NSW (2011) – FRM method

Advisory Reporting Standard
25 μg/m^3 (24-hour average)
8 μg/m^3 (Annual average)

Region/ Performance monitoring station	Data availability rates * (no of valid samples) Q1	Q2	Q3	Q4	Annual	Days above ARS	Annual mean (μg/m^3)
Sydney							
Chullora	75.4	78.6	72.1	85.2	77.9	0	6.2

* Please note that the data availability rates are based on a one day in three sampling regime.

** Please note that sampling at the Richmond site ceased at the end of 2007

Lead

Changes to fuel formulation have brought marked reductions in the levels of lead in the atmosphere. Annual averages throughout New South Wales are now typically less than 0.03µg/m^3 with many 24-hour average samples below the minimum detection limit for lead of 0.007µg/m^3 using ICP-AES (Inductively Coupled Plasma-Atomic Emission Spectroscopy) analysis. Since 2002 the highest annual average recorded in New South Wales was 0.09µg/m^3 at Wallsend during 2003, only 18% of the standard.

With a complete ban on lead in petrol now in force, the primary source of lead in air at the regional scale has been eliminated.

The Office of Environment and Heritage began phasing out ambient lead monitoring for the AAQ NEPM during 2004. All lead monitoring ceased from 1st January 2005.

A report summarising the case for a cessation of lead monitoring was approved by NEPC.

Section C – Analysis of air quality

Data availability rate

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

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

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

Carbon monoxide

Table 11: Summary for CO - Daily maximum rolling 8-hour average concentrations (2011)

Region/ Performance monitoring Station	Data availability rates (%)	Number of valid days	Maximum values (ppm)			
			Highest Value	Highest Date	2nd Highest Value	2nd Highest Date
Sydney						
Chullora	98.3	354	1.5	17/05/2011 02:00	1.5	30/07/2011 05:00
Liverpool	97.9	352	2.4	04/08/2011 02:00	2.3	03/08/2011 02:00
Macarthur	95.3	342	1.1	21/05/2011 09:00	0.8	29/08/2011 02:00
Prospect	95.6	342	1.7	17/05/2011 02:00	1.7	30/07/2011 03:00
Rozelle	96.6	344	1.4	25/06/2011 02:00	1.4	17/05/2011 04:00
Illawarra						
Wollongong	97.2	352	1.2	02/01/2011 19:00	1.2	22/05/2011 02:00
lower Hunter						
Newcastle	98.8	358	1.5	26/06/2011 03:00	1.4	25/06/2011 03:00

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

Bold font indicates values that exceed the AAQ NEPM standard

Carbon monoxide levels are well below the Ambient Air Quality NEPM standard. The highest recorded value in the state was 2.4ppm (Liverpool). This is only 27 per cent of the standard. Levels in all regions are significantly lower than the NEPM standard.

Nitrogen dioxide

Table 12: Summary for NO_2 - Daily maximum 1-hour average concentrations (2011)

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						
Bringelly	87.4	337	0.029	05/09/2011 19:00	0.028	02/08/2011 18:00
Chullora	93.2	354	0.051	02/08/2011 21:00	0.047	03/08/2011 19:00
Liverpool	92.0	353	0.046	21/10/2011 21:00	0.040	22/09/2011 22:00
Macarthur	92.9	356	0.045	22/09/2011 21:00	0.042	20/05/2011 18:00
Prospect	94.6	361	0.039	21/09/2011 22:00	0.039	18/05/2011 23:00
Richmond	94.4	359	0.029	05/08/2011 19:00	0.027	21/09/2011 23:00
Rozelle	90.9	343	0.050	21/05/2011 17:00	0.046	03/08/2011 12:00
Illawarra						
Albion Park Sth	89.1	351	0.040	04/08/2011 18:00	0.033	21/10/2011 17:00
Wollongong	90.8	341	0.043	22/09/2011 21:00	0.041	20/05/2011 17:00
lower Hunter						
Newcastle	90.7	361	0.038	14/11/2011 21:00	0.037	26/08/2011 22:00
Wallsend	90.7	350	0.037	04/08/2011 19:00	0.033	05/08/2011 19:00

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

Bold font indicates values that exceed the AAQ NEPM standard

Within NSW levels of nitrogen dioxide are well below the NEPM standard. The highest recorded 1-hour average value in the state was 0.051ppm (43 per cent of the standard) at the Chullora station. The highest annual average of 0.013ppm (43 percent of the standard) was recorded at Chullora.

Ozone

Table 13: Summary for O_3 - Daily maximum 1-hour average concentrations (2011)

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						
Bringelly	88.5	344	**0.125**	26/01/2011 16:00	**0.107**	31/01/2011 17:00
Chullora	94.2	359	**0.114**	31/01/2011 14:00	0.081	09/11/2011 15:00
Liverpool	94.1	360	**0.103**	31/01/2011 16:00	0.087	26/01/2011 15:00
Macarthur	93.6	357	**0.131**	26/01/2011 17:00	**0.122**	31/01/2011 17:00
Oakdale	95.0	362	**0.126**	26/01/2011 19:00	**0.106**	02/02/2011 16:00
Prospect	95.2	363	**0.126**	26/01/2011 15:00	0.098	31/01/2011 17:00
Richmond	94.3	358	**0.116**	31/01/2011 18:00	0.088	27/01/2011 17:00
Rozelle	93.3	353	0.093	01/02/2011 12:00	0.077	31/01/2011 11:00
St Marys	94.8	362	**0.136**	26/01/2011 16:00	**0.107**	27/01/2011 16:00
Illawarra						
Albion Park Sth	89.6	355	**0.118**	31/01/2011 14:00	0.099	01/02/2011 14:00
Kembla Grange	94.4	358	**0.121**	31/01/2011 14:00	0.093	09/11/2011 16:00
Wollongong	93.1	354	0.084	09/11/2011 15:00	0.081	01/02/2011 14:00
lower Hunter						
Newcastle	90.7	361	0.066	14/11/2011 14:00	0.058	09/11/2011 14:00
Wallsend	94.0	364	0.071	31/01/2011 12:00	0.061	14/11/2011 15:00

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

Bold font indicates values that exceed the AAQ NEPM standard

Table 14: Summary for O_3 - Daily maximum rolling 4-hour average concentrations (2011)

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						
Bringelly	88.5	341	**0.118**	26/01/2011 18:00	0.086	31/01/2011 18:00
Chullora	97.1	358	**0.096**	31/01/2011 15:00	0.075	09/11/2011 16:00
Liverpool	97.3	360	**0.095**	31/01/2011 16:00	0.079	26/01/2011 17:00
Macarthur	96.4	356	**0.122**	26/01/2011 18:00	**0.086**	31/01/2011 19:00
Oakdale	99.2	362	**0.098**	26/01/2011 20:00	**0.093**	02/02/2011 16:00
Prospect	99.3	363	**0.114**	26/01/2011 16:00	**0.083**	31/01/2011 18:00
Richmond	98.5	358	**0.088**	31/01/2011 19:00	0.071	27/01/2011 17:00
Rozelle	97.1	353	0.080	01/02/2011 14:00	0.071	09/11/2011 16:00
St Marys	98.8	362	**0.121**	26/01/2011 18:00	**0.092**	02/02/2011 15:00
Illawarra						
Albion Park Sth	85.7	353	**0.099**	31/01/2011 15:00	**0.085**	01/02/2011 16:00
Kembla Grange	98.4	358	**0.105**	31/01/2011 15:00	**0.085**	09/11/2011 17:00
Wollongong	96.9	353	0.078	09/11/2011 17:00	0.071	01/02/2011 16:00
lower Hunter						
Newcastle	86.8	357	0.063	14/11/2011 16:00	0.056	20/11/2011 15:00
Wallsend	95.8	363	0.059	14/11/2011 16:00	0.056	31/01/2011 14:00

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

Bold font indicates values that exceed the AAQ NEPM standard

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 annual variability of 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 Ambient Air Quality NEPM standards (EPA 2003).

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

The 1-hour standard was exceeded at all Sydney monitoring stations except Rozelle. Oakdale and St Marys recorded the highest number of exceedences with three days where hourly averages were greater than the standard. The maximum 1-hour average during the year was 0.136 ppm recorded at St Marys on the 26th January.

January and February in Sydney gave sunny conditions and low rainfall, with a record-breaking heatwave experienced during the first week of February. In fact, between January 31 and February 6th, Sydney experienced 7 consecutive days above 30°C, resulting in conditions conducive to photochemical smog formation.

Table 15: Days when O_3 1-hour Ambient Air Quality NEPM standard exceeded

Date	Stations where standard exceeded (and hour number/s where concentration exceeding standard)	Comments(#)
26 Jan 2011	Bringelly (15-18), Macarthur (15-18), Oakdale (18-19), Prospect (12-16), St Marys (16-18)	High temperatures
27 Jan 2011	St Marys (16)	High temperatures
31 Jan 2011	Bringelly (17), Chullora (14), Liverpool (16), Macarthur (17), Oakdale (19), Richmond (18), Albion Park Sth (14-15), Kembla Grange (14-15)	High temperatures
2 Feb 2011	Oakdale (16), St Marys (14)	High temperatures

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

Table 16: Days when O_3 4-hour Ambient Air Quality NEPM standard exceeded

Date	Stations where standard exceeded (and the hour number/s where concentration exceeding standard)	Comments(#)
25 Jan 2011	Prospect (16-17)	High temperatures
26 Jan 2011	Bringelly (15-20), Macarthur (14-20), Oakdale (19-21), St Marys (15-20)	High temperatures
27 Jan 2011	St Marys (16)	High temperatures
31 Jan 2011	Bringelly (18-19), Chullora (14-17), Liverpool (15-18), Macarthur (18-20), Oakdale (19-21), Prospect (14, 17-19), Richmond (18-20), Albion Park Sth (14-17), Kembla Grange (14-17)	High temperatures
1 Feb 2011	Albion Park Sth (16-17)	High temperatures
2 Feb 2011	Oakdale (15-18), St Marys (14-16)	High temperatures
9 Nov 2011	Albion Park Sth (17), Kembla Grange (17-18)	

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

The 4-hour standard was exceeded at all stations in the Sydney region except Rozelle. Oakdale, Prospect and Albion Park South recorded a maximum of three exceedence days. The maximum value recorded in Sydney was 0.122ppm at Macarthur on the 26th January.

Sulfur dioxide

Table 17: Summary for SO_2 - Daily maximum 1-hour average concentrations (2011)

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						
Bringelly	88.9	346	0.011	21/05/2011 13:00	0.011	06/10/2011 15:00
Chullora	92.7	353	0.026	04/07/2011 06:00	0.024	22/01/2011 08:00
Macarthur	91.9	351	0.014	06/10/2011 16:00	0.010	25/12/2011 09:00
Prospect	93.8	357	0.014	22/05/2011 15:00	0.013	20/11/2011 05:00
Richmond	94.5	359	0.010	09/03/2011 20:00	0.009	25/02/2011 19:00
Illawarra						
Albion Park Sth	87.4	346	0.035	30/01/2011 19:00	0.025	06/09/2011 15:00
Wollongong	92.9	353	0.018	27/01/2011 19:00	0.018	18/03/2011 14:00
lower Hunter						
Newcastle	90.7	361	0.033	14/11/2011 08:00	0.032	24/01/2011 08:00
Wallsend	93.7	363	0.044	17/07/2011 12:00	0.038	21/03/2011 09:00

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

Bold font indicates values that exceed the AAQ NEPM standard

Table 18: Summary for SO_2 - Maximum 24-hour average concentrations (2011)

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						
Bringelly	94.8	346	0.002	10/05/2011 24:00	0.002	21/05/2011 24:00
Chullora	96.7	353	0.005	22/09/2011 24:00	0.005	03/07/2011 24:00
Macarthur	96.2	351	0.002	17/01/2011 24:00	0.002	23/10/2011 24:00
Prospect	97.8	357	0.003	26/01/2011 24:00	0.003	05/09/2011 24:00
Richmond	98.4	359	0.003	25/02/2011 24:00	0.002	09/03/2011 24:00
Illawarra						
Albion Park Sth	94.8	346	0.010	01/01/2011 24:00	0.008	30/01/2011 24:00
Wollongong	96.7	353	0.009	02/01/2011 24:00	0.005	25/10/2011 24:00
lower Hunter						
Newcastle	98.9	361	0.009	24/06/2011 24:00	0.008	20/04/2011 24:00
Wallsend	99.5	363	0.007	10/05/2011 24:00	0.007	21/05/2011 24:00

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

Bold font indicates values that exceed the AAQ NEPM standard

SO_2 levels are significantly below the 1-hour, 24-hour and annual NEPM standards. Wallsend recorded the highest 1-hour value with 0.044 ppm (22 percent of the standard). The highest 24-hour average was recorded at Albion Park, 0.010 ppm (13 percent of the standard). The highest annual average of 0.002 ppm, which is just 10 percent of the standard, was measured at Newcastle.

Particles as PM_{10}

Table 19: Summary for PM_{10} – Maximum 24-hour average concentrations (2011)

Region/ Performance monitoring Station	Data availability rates (%)	Number of valid days	Maximum values (µg/m^3)			
			Highest Value	Highest Date	6th Highest Value	6th Highest Date
Sydney						
Bringelly	98.9	361	**86.0**	15/11/2011	38.0	21/05/2011
Chullora	99.2	362	**65.2**	01/03/2011	**52.4**	05/02/2011
Liverpool	69.0	252	**68.8**	15/11/2011	36.9	26/08/2011
Macarthur	98.4	359	38.1	23/09/2011	28.7	26/01/2011
Oakdale	99.5	363	**54.7**	15/11/2011	27.0	23/09/2011
Prospect	98.4	359	41.5	20/09/2011	32.0	02/02/2011
Richmond	98.9	361	46.2	22/10/2011	30.5	21/05/2011
Rozelle	98.4	359	39.4	23/09/2011	32.7	01/02/2011
Illawarra						
Albion Park Sth	98.9	361	**51.0**	01/02/2011	33.4	30/01/2011
Kembla Grange	98.9	361	**55.5**	01/02/2011	41.2	30/11/2011
Wollongong	96.7	353	48.5	01/02/2011	38.2	14/01/2011
lower Hunter						
Beresfield	95.1	347	42.8	25/01/2011	37.2	16/09/2011
Newcastle	99.5	363	49.2	25/01/2011	39.6	26/01/2011
Regional						
Albury	90.7	331	28.0	09/04/2011	23.7	21/05/2011
Bathurst	97.3	355	24.3	23/09/2011	21.3	23/10/2011
Tamworth	96.7	353	**50.9**	20/09/2011	28.4	24/09/2011
Wagga Wagga/ Wagga Wagga Nth*	96.3	352	39.2	24/10/2011	32.4	01/02/2011

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

* Wagga Wagga Nth site was commissioned in October 2011

Bold font indicates values that exceed the AAQ NEPM standard

In Sydney, exceedences of the standard were observed on nine days throughout the year. The highest concentration recorded was at Bringelly on the 15th November 2011 with a concentration of 86.0µg/m^3. Five of the PM_{10} exceedences measured in the Sydney region can be attributed to localised construction work being undertaken next to the Chullora monitoring site.

The Ambient Air Quality NEPM standard was exceeded on one day in the Illawarra region, the 1st February 2011, at both the Albion Park South and Kembla Grange sites.

In the lower Hunter region the standard was not exceeded in 2011. In regional centres, the standard was exceeded on one day, the 20th September 2011, at the Tamworth site.

Table 20: Days when PM_{10} 24-hour Ambient Air Quality NEPM standard exceeded

Date	Stations where standard exceeded	Comments(#)
1 Feb 2011	Albion Park South, Chullora, Kembla Grange	
5 Feb 2011	Chullora	Local construction
1 Mar 2011	Chullora	Local construction
10 Mar 2011	Chullora	Hazard reduction burn
5 Jul 2011	Chullora	Local construction
3 Aug 2011	Chullora	Local construction
17 Sep 2011	Bringelly	
20 Sep 2011	Chullora, Tamworth	Local construction & high winds
15 Nov 2011	Bringelly, Liverpool, Oakdale	Hazard reduction burn

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

The Office of Environment and Heritage continues to work towards reducing emissions of anthropogenically-produced particles. The NSW Government has outlined its commitments to improving air quality in NSW under Goal 22 in its forward plan for NSW - *NSW 2021*.

Particles as $PM_{2.5}$

Table 21: Summary for $PM_{2.5}$ – Maximum 24-hour average concentrations (2011) – continuous TEOM method

Region/ Performance monitoring Station	Data availability rates (%)	Number of valid days	Maximum values (ppm)			
			Highest Value	Highest Date	2nd Highest Value	2nd Highest Date
Sydney						
Chullora	98.9	361	23.9	21/05/2011	19.5	20/05/2011
Earlwood	96.2	351	23.6	21/05/2011	20.2	20/05/2011
Liverpool	99.2	362	**38.0**	15/11/2011	**28.9**	21/05/2011
Richmond	97.8	357	**42.9**	15/04/2011	**31.7**	22/10/2011
Illawarra						
Wollongong	96.4	352	17.7	19/11/2011	14.3	31/01/2011
lower Hunter						
Beresfield	99.2	362	18.8	25/01/2011	17.0	23/09/2011
Wallsend	100.0	365	16.2	22/09/2011	15.8	25/01/2011

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

Bold font indicates values in excess of the AAQ NEPM advisory reporting standard

* Please note that all $PM_{2.5}$ TEOM data use USEPA factors of A=0 and B=1.00

Table 21A: Summary for $PM_{2.5}$– Maximum 24-hour average concentrations (2011) – FRM method

Region/ Performance monitoring Station	Data availability rates * (%)	Number of valid days	Maximum values (ppm)			
			Highest Value	Highest Date	2nd Highest Value	2nd Highest Date
Sydney						
Chullora	77.9	95	16.7	20/4/2011	16.3	23/9/2011

* data availability rates are based on a one day in three sampling regime.

** Please note that sampling at the Richmond site ceased at the end of 2007

Table 22: Days above the $PM_{2.5}$ 24-hour Ambient Air Quality NEPM advisory reporting standard

Date	Stations where advisory reporting standard exceeded	Comments(#)
15 Apr 2011	Richmond	Hazard reduction burn
21 May 2011	Liverpool	
22 Oct 2011	Richmond	
15 Nov 2011	Liverpool	Hazard reduction burn

Liverpool and Chullora recorded the highest annual 24hr $PM_{2.5}$ average of 5.9µg/m^3. All regions and sites in NSW recorded concentrations below the AAQ NEPM 24-hour average advisory reporting standard for $PM_{2.5}$ except Liverpool and Richmond, with the highest 24-hour average of 42.9µg/m^3 measured at Richmond on the 15th April 2011 during a hazard reduction burn.

Assessment of progress towards achieving the goal

The NSW Government has outlined its commitments to improving air quality in NSW under Goal 22 in its forward plan for NSW - *NSW 2021*. The NSW Office of Environment and Heritage (OEH) implements air quality management policies, programs, and strategies to protect and improve ambient air quality and public health. The NSW Environment Protection Authority (EPA) licenses scheduled industry activities, implements environmental regulatory requirements and conducts compliance and enforcement programs. OEH and the EPA work together to reduce impacts of emissions of anthropogenically produced pollution, particularly particles and ozone. The Ambient Air Quality NEPM goal is a driver for these strategies and a benchmark against which progress in managing air quality can be assessed.

Expansion of NSW Air Monitoring Network

In 2011, thirteen new industry funded air quality monitoring stations became operational in the Upper Hunter. A fourteenth site became operational in early 2012 completing the Upper Hunter monitoring network expansion. A separate publicly accessible Upper Hunter web page combining pollution readings and wind speed and direction data was also established.

Air Quality Management in the Sydney Greater Metropolitan Region and Regional NSW

OEH and the EPA deliver a number of policies, programs and strategies that target the pollutants of most concern in NSW – ground level ozone (and its precursors) in the greater metropolitan region in summer and particles in the greater metropolitan region and in some regional centres year round. These efforts are designed to reduce air emissions from industry, motor vehicles, commercial and domestic sources. Industry emissions of oxides of nitrogen and sulfur dioxide are also a focus for action in some regional locations.

The following outlines the key mechanisms for managing ozone and particles.

Motor Vehicle and Motor Vehicle Fuels

As motor vehicles are one of the main sources of air pollution in Sydney (producing approximately 62% of anthropogenic NOx emissions and approximately 24% of anthropogenic Volatile Organic Compounds (VOC)), OEH has implemented a range of policies to address vehicle emissions.

Stage 1 vapour recovery (VR1) captures VOC emissions from underground petrol storage tanks as they are filled by road tankers. Regulatory changes made in 2009 extended VR1 to all parts of Sydney, Illawarra, Lower Hunter and Central Coast areas. The requirements commenced in July 2010 for new and modified service stations and will apply to all but the smallest existing service stations from 2014.

Stage 2 vapour recovery (VR2) captures VOC emissions from vehicle petrol tanks during refuelling at petrol bowsers. VR2 commenced on a staged basis, starting in July 2010 for new and modified service stations.VR2 equipment is required to be installed at the largest service stations in Sydney, Newcastle, Wollongong and the Central Coast by 2014, and at all but the smallest existing service stations in Sydney by 2017.

Once fully implemented, these vapour recovery initiatives are expected to reduce VOC emissions in the Greater Metropolitan region by approximately 5000 tonnes per year.

The Summer Low Volatility Petrol Program limits summer petrol volatility in NSW to 62 kiloPascals (kPa) – a measure of vapour pressure – as a key means of managing ozone formation in the Sydney region over the summer period from 15 November to 15 March each year. Petrol refiners, importers and blenders must test and report to OEH on batch volatility. The petrol volatility limits reduce VOC emissions in the Sydney region by approximately 4,500 tonnes each summer.

The Clean Machine Pilot Program reduces diesel exhaust emissions through greater uptake and use of cleaner 'non-road' diesel engines, such as cranes, forklifts, generators, and heavy earth moving equipment such as excavators and bulldozers. The Program establishes industry partnerships to foster changed procurement practices, adopt improved worksite practices and promote the retrofitting of old high use machines with diesel particulate filters. OEH offers a subsidy to assist the retrofit of diesel plant and equipment engines. At the end of 2011, 15 organisations, including a number of local councils and private businesses, were partners to the program and more than 50 non-road diesel machines had been retrofitted.

Commercial and domestic emissions

A number of NSW programs focus on the domestic and commercial sectors as these are significant contributors to air pollution in NSW.

Woodsmoke reduction

As part of its ongoing work to help reduce woodsmoke, in 2011 OEH undertook consultation with Local Government on control options for installation/operation of wood heaters. All local councils in NSW were surveyed to assess the effectiveness of current wood smoke control measures and seek their ideas about new measures to improve the existing framework. In December 2011 OEH also released an economic study of potential options to reduce wood smoke impacts in NSW. The objective of the study was to determine whether various wood smoke control measures could supplement or effectively replace existing strategies to reduce particle and volatile organic compound emissions associated with the operation of domestic solid fuel heaters. The study can be found at *Economic Appraisal of Woodsmoke Control Options*.

This research complements previous strategies and programs that have been part of OEH's Woodsmoke Reduction Program, which includes audits of woodheaters sold at retailers to assess compliance with the relevant Australian Standard (AS/NZS4013:1999), rebate programs for replacement of woodheaters with gas or electric heaters and education campaigns for local council officers.

Aerosols and solvents

In 2011 OEH prepared a study to gather information on the aerosol and solvent market in Australia, prepare VOC emission inventories for these sources and review overseas approaches to their management. OEH commenced consultation with key stakeholders on the findings of the study in November 2011.

Local Government training

In 2011, OEH commissioned the Clean Air Society of Australia and New Zealand (CASANZ) to hold training workshops for council officers who manage issues such as woodsmoke, odour and building site dust. These were based on OEH's web-based Local Government Air Quality Toolkit.

National Plan for Clean Air

Under the auspices of the Council of Australian Governments (COAG) Standing Committee on Environment and Water, OEH is chairing a high-level group overseeing the development of The National Plan for Clean Air. The National Plan takes a staged and prioritised approach to management of air pollutants at the national level.

As part of the Plan, NSW is also leading development of an exposure reduction framework for particle pollution.

Industry emissions

The *Protection of the Environment Operations Act 1997* and the *Protection of the Environment Operations (Clean Air) Regulation 2010* provide the framework for managing air pollution from major industry.

Particle emissions from coal mines

In 2011 OEH released a study report *NSW Coal Mining Benchmarking Study - International Best Practice Measures to Prevent and/or Minimise Emissions of Particulate Matter from Coal Mining.* The recommendations from the study of best practice coal mining are being implemented by the EPA. From August to December 2011, sixty coal mines in NSW were required through Pollution Reduction Programs (PRPs) attached to their Environment Protection Licences, to undertake site specific Best Management Practice reviews and determine the best approach to improving air quality at individual mines. The EPA also conducts a program of inspections for dust emissions at open cut coal mine operations and has produced a handbook to guide heavy machinery operators in coal mines on acceptable dust levels.

Coal dust emissions from rail:

In 2011, as a condition of its Environment Protection Licence and the next step in a pollution reduction program started in 2008, the Australian Rail Track Corporation undertook monitoring of particles levels along the Hunter to Newcastle coal rail freight corridor. This was done to determine whether coal trains operating in the Hunter Valley are a source of fine particulates. The monitoring project extended to February 2012.

Regional emissions

Regional particle emissions are a significant contributor to exceedences of the Air NEPM particle goal. There are a number of potential contributors to rural air pollution in NSW including dust storms, agricultural burning, woodsmoke, bushfires and hazard reduction burning. OEH and the EPA are working with stakeholders to provide the community with more information about possible sources of particle pollution and how to manage pollution impacts.

Section D – Data analysis

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

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

Carbon monoxide

Statistical summary

Table 23: Statistical summary for CO - Daily maximum rolling 8-hour average concentrations (2011)

Region/ Performance monitoring Station	Data availability rates (%)	Maximum conc. (ppm)	Percentiles (ppm)						
			99th	98th	95th	90th	75th	50th	25th
Sydney									
Chullora	98.3	1.5	1.4	1.3	1.2	1.0	0.6	0.4	0.3
Liverpool	97.9	2.4	2.1	1.8	1.5	1.2	0.7	0.5	0.4
Macarthur	95.3	1.1	0.8	0.7	0.6	0.5	0.4	0.3	0.3
Prospect	95.6	1.7	1.5	1.4	1.1	1.0	0.6	0.4	0.3
Rozelle	96.6	1.4	1.2	1.1	0.9	0.8	0.5	0.4	0.3
Illawarra									
Wollongong	97.2	1.2	1.1	1.0	0.9	0.7	0.6	0.4	0.3
lower Hunter									
Newcastle	98.8	1.5	1.2	1.0	0.7	0.5	0.3	0.1	0.1

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

Trend analysis

Table 24: Daily maximum rolling 8-hour average concentrations for CO (ppm)

Region/ Performance monitoring Station	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Sydney										
Blacktown/Prospect*	3.0	2.5	1.6			2.0*	1.5*	2.3*	1.9*	1.7*
Chullora			3.4	2.8	2.3	1.8	1.6	2.6	2.3	1.5
Liverpool	3.6	5.5	3.0	2.8	2.1	2.0	2.4	2.2	2.1	2.4
Macarthur				1.0	1.8	1.8	0.9	0.8	0.9	1.1
Rozelle	2.8	2.2	2.2	2.1	2.0	1.8	1.5	2.3	1.8	1.4
Illawarra										
Wollongong	2.3	2.1	2.1	2.5	1.5	1.5	1.3	1.3	1.5	1.2
lower Hunter										
Newcastle	3.2	2.8	2.4	1.9	2.2	1.7	2.0	1.9	1.4	1.5

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

Bold font indicates values that exceed the AAQ NEPM standard

Table 25: Statistical summary for CO - Daily maximum rolling 8-hour average concentrations
Station: Blacktown[(1)]/Prospect[(2)]

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
2002[(1)]	94.5	0	3.0	2.8	2.5	2.0	1.6	0.8	0.3	0.1
2003[(1)]	93.6	0	2.5	2.2	1.9	1.3	0.9	0.4	0.1	0.0
2004[(1)]	40.9	0	1.6	1.5	1.4	1.2	0.9	0.4	0.1	0.0
2005[#]										
2006[#]										
2007[(2)]	78.5	0	2.0	1.7	1.5	1.3	1.1	0.6	0.3	0.2
2008[(2)]	91.7	0	1.5	1.3	1.2	1.0	0.9	0.6	0.3	0.1
2009[(2)]	97.5	0	2.3	2.1	1.8	1.3	1.1	0.7	0.5	0.3
2010[(2)]	95.8	0	1.9	1.7	1.4	1.2	1.0	0.7	0.5	0.4
2011[(2)]	95.6	0	1.7	1.5	1.4	1.1	1.0	0.6	0.4	0.3

Station closed pending relocation.

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

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
2004	84.8	0	3.4	2.2	1.9	1.7	1.3	0.8	0.5	0.3
2005	97.0	0	2.8	1.9	1.7	1.5	1.2	0.7	0.4	0.3
2006	94.7	0	2.3	1.6	1.4	1.2	1.0	0.7	0.4	0.3
2007	90.7	0	1.8	1.6	1.4	1.2	1.0	0.5	0.3	0.2
2008	92.9	0	1.6	1.3	1.2	1.0	0.8	0.5	0.3	0.2
2009	96.1	0	2.6	2.2	1.6	1.3	1.0	0.7	0.4	0.3
2010	98.0	0	2.3	1.8	1.5	1.2	0.9	0.7	0.5	0.4
2011	98.3	0	1.5	1.4	1.3	1.2	1.0	0.6	0.4	0.3

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

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
2002	85.6	0	3.6	3.2	3.0	2.5	2.0	1.2	0.7	0.5
2003	93.4	0	5.5	3.3	3.0	2.3	1.7	1.0	0.6	0.4
2004	88.9	0	3.0	2.9	2.6	2.1	1.7	0.9	0.6	0.4
2005	91.9	0	2.8	2.4	2.3	1.9	1.6	0.9	0.5	0.3
2006	96.4	0	2.1	1.8	1.7	1.5	1.3	0.9	0.5	0.3
2007	94.7	0	2.0	1.9	1.7	1.3	1.1	0.7	0.4	0.2
2008	88.0	0	2.4	2.1	1.8	1.6	1.3	0.7	0.4	0.2
2009	92.4	0	2.2	1.9	1.7	1.5	1.2	0.8	0.5	0.3
2010	98.6	0	2.1	1.9	1.7	1.4	1.1	0.7	0.5	0.4
2011	97.9	0	2.4	2.1	1.8	1.5	1.2	0.7	0.5	0.4

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

Bold font indicates values that exceed the AAQ NEPM standard

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

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
2005	55.2	0	1.0	0.9	0.8	0.7	0.5	0.4	0.3	0.2
2006	98.2	0	1.8	1.6	1.5	0.6	0.4	0.3	0.2	0.2
2007	94.0	0	1.8	1.7	1.1	0.6	0.5	0.4	0.3	0.2
2008	97.3	0	0.9	0.6	0.6	0.5	0.4	0.3	0.2	0.1
2009	95.1	0	0.8	0.8	0.7	0.6	0.6	0.4	0.4	0.2
2010	96.1	0	0.9	0.8	0.8	0.6	0.5	0.4	0.4	0.3
2011	95.3	0	1.1	0.8	0.7	0.6	0.5	0.4	0.3	0.3

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

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
2002	87.5	0	2.8	2.0	1.7	1.5	1.2	0.8	0.5	0.3
2003	93.1	0	2.2	1.8	1.5	1.3	1.0	0.7	0.4	0.3
2004	94.0	0	2.2	1.9	1.7	1.4	1.1	0.7	0.4	0.3
2005	97.3	0	2.1	1.8	1.6	1.3	1.0	0.6	0.4	0.2
2006	96.6	0	2.0	1.6	1.4	1.2	0.9	0.6	0.4	0.3
2007	96.1	0	1.8	1.7	1.3	0.9	0.8	0.5	0.3	0.2
2008	94.4	0	1.5	1.3	1.2	1.1	0.9	0.5	0.3	0.2
2009	95.6	0	2.3	1.5	1.4	1.2	1.0	0.7	0.5	0.4
2010	93.6	0	1.8	1.5	1.4	1.1	0.9	0.7	0.5	0.4
2011	96.6	0	1.4	1.2	1.1	0.9	0.8	0.5	0.4	0.3

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

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
2002	91.2	0	2.3	2.1	1.8	1.5	1.2	0.9	0.5	0.3
2003	96.4	0	2.1	1.9	1.5	1.3	1.0	0.7	0.5	0.3
2004	97.3	0	2.1	1.6	1.5	1.2	1.0	0.7	0.5	0.3
2005	96.8	0	2.5	1.8	1.5	1.2	1.1	0.7	0.5	0.3
2006	98.6	0	1.5	1.3	1.2	1.0	0.9	0.6	0.4	0.3
2007	90.7	0	1.5	1.3	1.1	1.0	0.8	0.6	0.4	0.2
2008	94.0	0	1.3	0.9	0.9	0.8	0.7	0.5	0.3	0.2
2009	82.1	0	1.3	1.1	1.1	1.0	0.8	0.5	0.4	0.2
2010	98.4	0	1.5	1.2	1.1	0.9	0.8	0.6	0.5	0.4
2011	97.2	0	1.2	1.1	1.0	0.9	0.7	0.6	0.4	0.3

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

Bold font indicates values that exceed the AAQ NEPM standard

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

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
2002	94.6	0	3.2	2.8	2.0	1.4	1.1	0.6	0.4	0.3
2003	93.0	0	2.8	2.5	2.0	1.6	1.1	0.6	0.3	0.2
2004	97.0	0	2.4	2.0	1.7	1.3	1.1	0.6	0.4	0.2
2005	95.8	0	1.9	1.7	1.6	1.3	0.9	0.4	0.3	0.2
2006	94.7	0	2.2	1.6	1.5	1.0	0.8	0.4	0.3	0.2
2007	43.4	0	1.7	1.6	1.5	1.1	0.8	0.5	0.2	0.1
2008	96.1	0	2.0	1.5	1.4	1.2	1.0	0.6	0.4	0.3
2009	84.3	0	1.9	1.6	1.4	1.1	0.9	0.6	0.4	0.3
2010	87.5	0	1.4	1.2	1.1	0.9	0.6	0.4	0.3	0.2
2011	98.8	0	1.5	1.2	1.0	0.7	0.5	0.3	0.1	0.1

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

Bold font indicates values that exceed the AAQ NEPM standard

Nitrogen dioxide

Statistical summary

Table 32: Statistical summary for NO_2 - Daily maximum 1-hour average concentrations (2011)

Region/ Performance monitoring Station	Data availability rates (%)	Maximum conc. (ppm)	Percentiles (ppm)						
			99th	98th	95th	90th	75th	50th	25th
Sydney									
Bringelly	87.4	0.029	0.024	0.023	0.019	0.017	0.013	0.010	0.007
Chullora	93.2	0.051	0.046	0.043	0.037	0.034	0.029	0.024	0.018
Liverpool	92.0	0.046	0.039	0.038	0.032	0.030	0.025	0.020	0.015
Macarthur	92.9	0.045	0.039	0.037	0.033	0.029	0.024	0.019	0.014
Prospect	94.6	0.039	0.038	0.035	0.032	0.029	0.025	0.020	0.015
Richmond	94.4	0.029	0.026	0.024	0.021	0.019	0.015	0.011	0.008
Rozelle	90.9	0.050	0.043	0.041	0.035	0.031	0.028	0.022	0.014
Illawarra									
Albion Park Sth	89.1	0.040	0.030	0.027	0.021	0.016	0.012	0.007	0.003
Wollongong	90.8	0.043	0.039	0.037	0.031	0.029	0.024	0.019	0.013
lower Hunter									
Newcastle	90.7	0.038	0.034	0.033	0.029	0.027	0.023	0.017	0.010
Wallsend	90.7	0.037	0.032	0.029	0.027	0.026	0.021	0.016	0.011

AAQ NEPM Standard - 0.12 ppm (1-hour average

Bold font indicates values that exceed the AAQ NEPM standard

Trend analysis

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

Region/ Performance monitoring Station	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Sydney										
Blacktown/Prospect*	0.057	0.055	0.048			0.049*	0.048*	0.051*	0.043*	0.039*
Bringelly	0.052	0.043	0.041	0.045	0.040	0.044	0.033	0.034	0.037	0.029
Lidcombe/Chullora*	0.052	0.066*	0.056*	0.064*	0.066*	0.049*	0.044*	0.052*	0.057*	0.051*
Liverpool	0.068	0.064	0.060	0.063	0.053	0.053	0.046	0.053	0.053	0.046
Macarthur			0.052	0.081	0.066	0.047	0.044	0.048	0.042	0.045
Richmond	0.048	0.036	0.037	0.036	0.043	0.029	0.027	0.030	0.033	0.029
Rozelle	0.066	0.052	0.064	0.052	0.057	0.050	0.040	0.049	0.049	0.050
Illawarra										
Albion Park/Albion Park Sth*	0.048	0.048	0.044	0.044*	0.051*	0.045*	0.029*	0.052*	0.041*	0.040*
Wollongong	0.056	0.049	0.044	0.058	0.050	0.043	0.046	0.048	0.052	0.043
lower Hunter										
Newcastle	0.047	0.039	0.044	0.041	0.042	0.032	0.033	0.043	0.038	0.038
Wallsend	0.043	0.050	0.041	0.038	0.037	0.035	0.031	0.040	0.038	0.037

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	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Sydney										
Blacktown/Prospect*	0.014	0.013	0.013			0.012*	0.010*	0.011*	0.012*	0.010*
Bringelly	0.009	0.007	0.006	0.006	0.006	0.006	0.005	0.004	0.005	0.005
Lidcombe/Chullora*	0.013	0.016*	0.016*	0.014*	0.014*	0.013*	0.013*	0.013*	0.013*	0.013*
Liverpool	0.015	0.013	0.013	0.013	0.013	0.012	0.011	0.010	0.011	0.010
Macarthur			0.009	0.012	0.011	0.011	0.010	0.009	0.009	0.008
Richmond	0.007	0.007	0.007	0.006	0.006	0.006	0.005	0.005	0.005	0.005
Rozelle	0.015	0.014	0.014	0.013	0.013	0.012	0.011	0.011	0.011	0.011
Illawarra										
Albion Park/Albion Park Sth*	0.004	0.005	0.004	0.004	0.005*	0.004*	0.004*	0.003*	0.003*	0.002*
Wollongong	0.011	0.01	0.009	0.009	0.009	0.009	0.009	0.01	0.009	0.008
lower Hunter										
Newcastle	0.009	0.008	0.009	0.009	0.008	0.007	0.007	0.008	0.008	0.007
Wallsend	0.009	0.008	0.008	0.008	0.009	0.008	0.007	0.008	0.009	0.008

AAQ NEPM Standard - 0.03 ppm (Annual average)

Bold font indicates values that exceed the AAQ NEPM standard

Table 35: Statistical summary for NO_2 - Annual daily maximum 1-hour average concentrations
Station: Blacktown[(1)]/Prospect[(2)]

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
2002[(1)]	92.4	0	0.057	0.051	0.047	0.043	0.037	0.032	0.025	0.020
2003[(1)]	89.8	0	0.055	0.049	0.047	0.038	0.035	0.030	0.025	0.020
2004[(1)]	39.3	0	0.048	0.045	0.043	0.038	0.035	0.030	0.024	0.019
2005[#]										
2006[#]										
2007[(2)]	64.7	0	0.049	0.044	0.042	0.037	0.034	0.029	0.025	0.020
2008[(2)]	59.5	0	0.048	0.037	0.036	0.034	0.031	0.026	0.019	0.015
2009[(2)]	84.6	0	0.051	0.040	0.039	0.035	0.032	0.027	0.022	0.017
2010[(2)]	82.0	0	0.043	0.039	0.038	0.033	0.031	0.027	0.023	0.017
2011[(2)]	94.6	0	0.039	0.038	0.035	0.032	0.029	0.025	0.020	0.015

Station closed pending relocation.

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

Bold font indicates values that exceed the AAQ NEPM standard

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
2002	93.1	0	0.052	0.041	0.038	0.034	0.029	0.022	0.016	0.012
2003	87.1	0	0.043	0.032	0.029	0.022	0.020	0.017	0.013	0.010
2004	90.8	0	0.041	0.033	0.029	0.025	0.022	0.017	0.013	0.010
2005	91.5	0	0.045	0.033	0.030	0.026	0.022	0.018	0.013	0.009
2006	92.0	0	0.040	0.036	0.032	0.026	0.022	0.018	0.014	0.010
2007	92.2	0	0.044	0.033	0.029	0.024	0.022	0.016	0.012	0.009
2008	86.3	0	0.033	0.027	0.024	0.020	0.018	0.014	0.011	0.007
2009	77.9	0	0.034	0.027	0.025	0.022	0.018	0.013	0.010	0.006
2010	87.4	0	0.037	0.029	0.027	0.022	0.019	0.015	0.011	0.009
2011	87.4	0	0.029	0.024	0.023	0.019	0.017	0.013	0.010	0.007

Table 37: Statistical summary for NO_2 - Annual daily maximum 1-hour average concentrations
Station: Lidcombe(1) / Chullora(2)

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
2002(1)	30.8	0	0.052	0.049	0.042	0.036	0.03	0.027	0.022	0.017
2003(2)	76.0	0	0.066	0.055	0.050	0.043	0.038	0.033	0.027	0.022
2004(2)	84.3	0	0.056	0.052	0.051	0.044	0.041	0.034	0.028	0.023
2005(2)	92.5	0	0.064	0.048	0.044	0.040	0.037	0.030	0.026	0.020
2006(2)	91.7	0	0.066	0.052	0.046	0.041	0.037	0.031	0.025	0.019
2007(2)	90.3	0	0.049	0.047	0.045	0.038	0.035	0.029	0.024	0.017
2008(2)	88.9	0	0.044	0.041	0.040	0.037	0.034	0.029	0.024	0.018
2009(2)	90.5	0	0.052	0.044	0.041	0.036	0.033	0.028	0.023	0.018
2010(2)	86.5	0	0.057	0.042	0.040	0.036	0.032	0.028	0.023	0.017
2011(2)	93.2	0	0.051	0.046	0.043	0.037	0.034	0.029	0.024	0.018

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

Bold font indicates values that exceed the AAQ NEPM standard

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
2002	93.0	0	0.068	0.053	0.048	0.045	0.040	0.033	0.027	0.022
2003	89.2	0	0.064	0.048	0.044	0.039	0.034	0.028	0.024	0.020
2004	93.2	0	0.060	0.050	0.049	0.042	0.036	0.030	0.025	0.020
2005	92.0	0	0.063	0.051	0.045	0.039	0.034	0.029	0.024	0.020
2006	92.7	0	0.053	0.049	0.047	0.041	0.035	0.029	0.024	0.018
2007	90.5	0	0.053	0.046	0.039	0.035	0.032	0.028	0.023	0.017
2008	84.7	0	0.046	0.040	0.037	0.033	0.030	0.027	0.021	0.016
2009	85.3	0	0.053	0.044	0.042	0.034	0.030	0.025	0.020	0.015
2010	92.0	0	0.053	0.044	0.041	0.035	0.030	0.026	0.022	0.017
2011	92.0	0	0.046	0.039	0.038	0.032	0.030	0.025	0.020	0.015

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

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
2004	16.2	0	0.052	0.052	0.051	0.039	0.032	0.024	0.020	0.016
2005	91.9	0	0.081	0.053	0.048	0.042	0.035	0.030	0.024	0.019
2006	93.9	0	0.066	0.049	0.048	0.043	0.036	0.030	0.024	0.018
2007	90.2	0	0.047	0.043	0.041	0.037	0.033	0.028	0.023	0.018
2008	89.0	0	0.044	0.041	0.039	0.035	0.032	0.026	0.021	0.016
2009	91.0	0	0.048	0.044	0.040	0.035	0.031	0.025	0.020	0.016
2010	90.4	0	0.042	0.039	0.036	0.032	0.029	0.025	0.020	0.015
2011	92.9	0	0.045	0.039	0.037	0.033	0.029	0.024	0.019	0.014

Table 40: 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
2002	92.9	0	0.048	0.037	0.033	0.029	0.027	0.022	0.017	0.012
2003	93.0	0	0.036	0.032	0.029	0.026	0.024	0.020	0.016	0.012
2004	88.4	0	0.037	0.035	0.033	0.030	0.026	0.021	0.015	0.011
2005	90.1	0	0.036	0.032	0.030	0.027	0.025	0.020	0.014	0.010
2006	91.4	0	0.043	0.036	0.033	0.027	0.024	0.020	0.015	0.011
2007	89.1	0	0.029	0.028	0.026	0.023	0.021	0.016	0.012	0.009
2008	86.9	0	0.027	0.024	0.023	0.021	0.019	0.015	0.011	0.008
2009	91.4	0	0.030	0.027	0.026	0.023	0.020	0.016	0.012	0.009
2010	87.9	0	0.033	0.025	0.024	0.021	0.020	0.015	0.012	0.008
2011	94.4	0	0.029	0.026	0.024	0.021	0.019	0.015	0.011	0.008

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

Bold font indicates values that exceed the AAQ NEPM standard

Table 41: 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
2002	87.0	0	0.066	0.058	0.052	0.045	0.041	0.034	0.027	0.019
2003	88.6	0	0.052	0.047	0.047	0.042	0.038	0.032	0.026	0.019
2004	89.2	0	0.064	0.054	0.047	0.043	0.037	0.031	0.025	0.019
2005	91.2	0	0.052	0.047	0.044	0.040	0.035	0.031	0.023	0.017
2006	92.9	0	0.057	0.050	0.044	0.038	0.035	0.030	0.025	0.017
2007	89.2	0	0.050	0.043	0.040	0.038	0.033	0.028	0.023	0.015
2008	79.1	0	0.040	0.037	0.036	0.033	0.031	0.027	0.022	0.015
2009	86.1	0	0.049	0.039	0.036	0.033	0.031	0.026	0.021	0.015
2010	79.6	0	0.049	0.039	0.037	0.034	0.031	0.028	0.022	0.015
2011	90.9	0	0.050	0.043	0.041	0.035	0.031	0.028	0.022	0.014

Table 42: Statistical summary for NO_2 - Annual daily maximum 1-hour average concentrations
Station: Albion Park(1)/Albion Park Sth(2)

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
2002(1)	57.5	0	0.048	0.039	0.034	0.030	0.024	0.015	0.008	0.005
2003(1)	90.0	0	0.048	0.040	0.036	0.030	0.023	0.017	0.011	0.006
2004(1)	91.4	0	0.044	0.036	0.035	0.026	0.021	0.016	0.010	0.006
2005(1)	4.8	0	0.035	0.035	0.035	0.034	0.031	0.011	0.005	0.004
2006(2)	78.9	0	0.051	0.042	0.034	0.027	0.022	0.016	0.011	0.007
2007(2)	93.0	0	0.045	0.034	0.031	0.027	0.021	0.015	0.010	0.006
2008(2)	55.9	0	0.029	0.026	0.025	0.021	0.018	0.014	0.009	0.004
2009(2)	91.3	0	0.052	0.038	0.033	0.024	0.022	0.014	0.009	0.004
2010(2)	87.5	0	0.041	0.030	0.027	0.023	0.019	0.013	0.008	0.004
2011(2)	89.1	0	0.040	0.030	0.027	0.021	0.016	0.012	0.007	0.003

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

Bold font indicates values that exceed the AAQ NEPM standard

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
2002	94.2	0	0.056	0.051	0.046	0.039	0.035	0.029	0.023	0.016
2003	93.3	0	0.049	0.041	0.037	0.035	0.032	0.027	0.021	0.017
2004	92.2	0	0.044	0.041	0.038	0.034	0.030	0.026	0.020	0.015
2005	88.6	0	0.058	0.043	0.039	0.032	0.029	0.025	0.019	0.014
2006	87.8	0	0.050	0.045	0.040	0.035	0.031	0.025	0.020	0.015
2007	89.6	0	0.043	0.038	0.037	0.032	0.029	0.025	0.020	0.014
2008	83.1	0	0.046	0.037	0.036	0.033	0.030	0.026	0.020	0.014
2009	70.1	0	0.048	0.044	0.037	0.034	0.030	0.025	0.019	0.013
2010	87.1	0	0.052	0.042	0.037	0.033	0.028	0.024	0.020	0.015
2011	90.8	0	0.043	0.039	0.037	0.031	0.029	0.024	0.019	0.013

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
2002	85.9	0	0.047	0.040	0.038	0.034	0.031	0.025	0.019	0.011
2003	95.0	0	0.039	0.035	0.034	0.032	0.029	0.025	0.019	0.011
2004	91.0	0	0.044	0.038	0.035	0.032	0.029	0.025	0.020	0.012
2005	89.7	0	0.041	0.035	0.033	0.031	0.029	0.025	0.018	0.011
2006	89.2	0	0.042	0.035	0.033	0.031	0.028	0.024	0.018	0.010
2007	40.6	0	0.032	0.031	0.029	0.026	0.025	0.021	0.015	0.009
2008	82.8	0	0.033	0.030	0.029	0.027	0.026	0.021	0.016	0.010
2009	89.5	0	0.043	0.037	0.032	0.029	0.027	0.022	0.016	0.010
2010	85.9	0	0.038	0.032	0.031	0.029	0.028	0.023	0.017	0.011
2011	90.7	0	0.038	0.034	0.033	0.029	0.027	0.023	0.017	0.010

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

Bold font indicates values that exceed the AAQ NEPM standard

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
2002	63.2	0	0.043	0.039	0.034	0.029	0.028	0.024	0.018	0.014
2003	85.9	0	0.050	0.037	0.035	0.029	0.027	0.021	0.016	0.012
2004	92.2	0	0.041	0.035	0.033	0.029	0.027	0.023	0.017	0.012
2005	93.4	0	0.038	0.033	0.032	0.029	0.028	0.023	0.018	0.012
2006	92.1	0	0.037	0.035	0.034	0.030	0.027	0.023	0.018	0.013
2007	93.9	0	0.035	0.032	0.031	0.029	0.026	0.022	0.016	0.011
2008	87.1	0	0.031	0.029	0.028	0.026	0.023	0.020	0.015	0.010
2009	83.8	0	0.040	0.033	0.031	0.027	0.025	0.021	0.016	0.011
2010	86.1	0	0.038	0.033	0.032	0.028	0.026	0.022	0.017	0.012
2011	90.7	0	0.037	0.032	0.029	0.027	0.026	0.021	0.016	0.011

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

Bold font indicates values that exceed the AAQ NEPM standard

Ozone

Statistical summary

Table 46: Statistical summary for O_3 - Daily maximum 1-hour average concentrations (2011)

Region/ Performance monitoring Station	Data availability rates (%)	Maximum conc. (ppm)	Percentiles (ppm)						
			99th	98th	95th	90th	75th	50th	25th
Sydney									
Bringelly	88.5	**0.125**	0.087	0.080	0.065	0.055	0.038	0.030	0.026
Chullora	94.2	**0.114**	0.073	0.061	0.052	0.043	0.032	0.025	0.021
Liverpool	94.1	**0.103**	0.080	0.071	0.057	0.046	0.032	0.025	0.022
Macarthur	93.6	**0.131**	0.096	0.084	0.067	0.054	0.037	0.030	0.026
Oakdale	95.0	**0.126**	0.084	0.075	0.063	0.051	0.039	0.031	0.027
Prospect	95.2	**0.126**	0.086	0.068	0.057	0.046	0.034	0.028	0.023
Richmond	94.3	**0.116**	0.077	0.067	0.058	0.048	0.037	0.031	0.026
Rozelle	93.3	0.093	0.066	0.053	0.044	0.038	0.031	0.026	0.023
St Marys	94.8	**0.136**	0.094	0.074	0.060	0.051	0.037	0.030	0.026
Illawarra									
Albion Park Sth	89.6	**0.118**	0.071	0.059	0.046	0.038	0.032	0.028	0.024
Kembla Grange	94.4	**0.121**	0.073	0.063	0.052	0.042	0.034	0.030	0.026
Wollongong	93.1	0.084	0.069	0.055	0.048	0.040	0.034	0.028	0.024
lower Hunter									
Newcastle	90.7	0.066	0.057	0.053	0.047	0.041	0.035	0.029	0.024
Wallsend	94.0	0.071	0.056	0.055	0.049	0.040	0.033	0.027	0.022

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

Bold font indicates values that exceed the AAQ NEPM standard

Table 47: Statistical summary for O_3 - Daily maximum rolling 4-hour average concentrations (2011)

Region/ Performance monitoring Station	Data availability rates (%)	Maximum conc. (ppm)	Percentiles (ppm)						
			99th	98th	95th	90th	75th	50th	25th
Sydney									
Bringelly	88.5	**0.118**	0.076	0.070	0.056	0.048	0.035	0.029	0.025
Chullora	97.1	**0.096**	0.067	0.056	0.047	0.038	0.030	0.023	0.020
Liverpool	97.3	**0.095**	0.068	0.060	0.051	0.042	0.030	0.024	0.020
Macarthur	96.4	**0.122**	0.079	0.072	0.062	0.048	0.035	0.029	0.025
Oakdale	99.2	**0.098**	0.074	0.066	0.057	0.047	0.036	0.030	0.026
Prospect	99.3	**0.114**	0.077	0.061	0.051	0.043	0.032	0.026	0.022
Richmond	98.5	**0.088**	0.065	0.059	0.050	0.045	0.034	0.029	0.025
Rozelle	97.1	0.080	0.058	0.049	0.041	0.035	0.029	0.024	0.021
St Marys	98.8	**0.121**	0.080	0.063	0.054	0.047	0.034	0.028	0.024
Illawarra									
Albion Park Sth	85.7	**0.099**	0.061	0.052	0.042	0.034	0.031	0.027	0.023
Kembla Grange	98.4	**0.105**	0.066	0.057	0.048	0.038	0.033	0.029	0.025
Wollongong	96.9	0.078	0.066	0.052	0.043	0.036	0.032	0.027	0.023
lower Hunter									
Newcastle	86.8	0.063	0.051	0.048	0.044	0.038	0.033	0.027	0.023
Wallsend	95.8	0.059	0.053	0.050	0.045	0.037	0.031	0.025	0.021

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

Bold font indicates values that exceed the AAQ NEPM standard

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

Region/ Performance monitoring Station	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Sydney										
Blacktown/ Prospect*	**0.130**	**0.181**	**0.123**			0.089	**0.107**	**0.126**	**0.104**	**0.126**
Bringelly	**0.118**	**0.155**	**0.122**	**0.112**	**0.119**	**0.111**	0.093	**0.120**	**0.104**	**0.125**
Lidcombe/ Chullora*	0.100	**0.084**	**0.105**	0.086	**0.117**	0.088	0.080	**0.154**	0.083	**0.114**
Liverpool	0.100	**0.151**	**0.113**	**0.149**	0.128	**0.116**	0.098	**0.151**	0.091	**0.103**
Macarthur			0.099	**0.142**	0.128	**0.121**	0.085	**0.116**	**0.119**	**0.131**
Oakdale	0.094	**0.102**	**0.124**	**0.130**	0.109	**0.142**	0.093	**0.128**	0.099	**0.126**
Richmond	**0.125**	**0.148**	0.096	**0.125**	0.108	**0.134**	0.078	**0.102**	0.089	**0.116**
Rozelle	0.100	**0.083**	0.094	0.081	0.093	0.088	0.056	0.083	0.073	0.093
St Marys	**0.118**	0.093	**0.142**	**0.113**	**0.124**	**0.123**	0.096	**0.132**	0.095	**0.136**
Illawarra										
Albion Park/ Albion Park Sth*	0.094	**0.130**	**0.112**	0.067	0.096	0.092	0.062	**0.102**	0.093	**0.118**
Kembla Grange	0.099	**0.113**	**0.120**	0.091	0.093	0.093	0.072	**0.103**	0.081	**0.121**
Wollongong	**0.121**	0.097	**0.103**	**0.102**	0.096	0.077	0.067	0.083	0.082	0.084
lower Hunter										
Newcastle	0.083	0.079	**0.112**	0.078	0.068	0.053	0.064	0.073	0.086	0.066
Wallsend	0.081	0.077	**0.103**	0.094	0.086	0.070	0.057	0.086	0.067	0.071
Regional										
Bathurst	0.064	0.056	0.092	0.056	0.075	0.068				

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	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Sydney										
Blacktown/ Prospect*	**0.107**	**0.157**	**0.107**			**0.085**	**0.096**	**0.100**	**0.097**	**0.114**
Bringelly	**0.099**	**0.133**	**0.110**	**0.102**	**0.110**	**0.095**	0.078	**0.108**	**0.089**	**0.118**
Lidcombe/ Chullora*	**0.084**	0.077	**0.086**	0.080	**0.104**	0.074	0.074	**0.112**	0.072	**0.096**
Liverpool	**0.089**	**0.132**	**0.092**	**0.121**	**0.124**	**0.094**	**0.089**	**0.103**	**0.081**	**0.095**
Macarthur			**0.084**	**0.126**	**0.117**	**0.101**	0.070	**0.097**	**0.103**	**0.122**
Oakdale	0.080	**0.089**	**0.099**	**0.106**	**0.085**	**0.116**	0.075	**0.108**	**0.088**	**0.098**
Richmond	**0.112**	**0.138**	**0.088**	**0.100**	**0.095**	**0.121**	0.067	**0.090**	**0.082**	**0.088**
Rozelle	**0.087**	0.070	**0.087**	0.065	**0.082**	0.075	0.048	0.073	0.067	0.080
St Marys	**0.093**	**0.091**	**0.128**	**0.091**	**0.109**	**0.105**	**0.082**	**0.106**	**0.083**	**0.121**
Illawarra										
Albion Park/ Albion Park Sth*	**0.083**	**0.111**	**0.092**	0.063	0.077	0.080	0.055	**0.083**	0.073	**0.099**
Kembla Grange	**0.083**	**0.107**	**0.100**	**0.084**	**0.081**	**0.082**	0.066	**0.090**	0.078	**0.105**
Wollongong	**0.099**	0.080	**0.090**	**0.099**	**0.086**	0.073	0.063	0.074	0.073	0.078
lower Hunter										
Newcastle	0.077	0.061	0.073	0.070	0.064	0.047	0.058	0.067	0.076	0.063
Wallsend	0.074	0.059	0.078	0.074	0.066	0.068	0.054	0.076	0.063	0.059
Regional										
Bathurst	0.062	0.053	0.067	0.054	0.071	0.066				

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[(1)]/Prospect[(2)]

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
2002[(1)]	91.7	**2**	**0.130**	0.097	0.085	0.068	0.059	0.043	0.033	0.026
2003[(1)]	90.3	**3**	**0.181**	0.089	0.080	0.061	0.051	0.037	0.029	0.024
2004[(1)]	39.5	**2**	**0.123**	**0.103**	0.091	0.084	0.068	0.050	0.036	0.028
2005[#]										
2006[#]										
2007[(2)]	73.3	0	0.089	0.069	0.066	0.061	0.052	0.039	0.030	0.024
2008[(2)]	89.5	1	**0.107**	0.084	0.063	0.052	0.045	0.035	0.027	0.023
2009[(2)]	93.3	**3**	**0.126**	0.099	0.086	0.070	0.061	0.041	0.032	0.026
2010[(2)]	88.7	**2**	**0.104**	0.082	0.072	0.062	0.050	0.038	0.030	0.023
2011[(2)]	95.2	1	**0.126**	0.086	0.068	0.057	0.046	0.034	0.028	0.023

Station closed pending relocation.

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
2002	93.0	**2**	**0.118**	0.098	0.091	0.074	0.064	0.045	0.034	0.028
2003	91.3	**3**	**0.155**	0.099	0.078	0.066	0.056	0.041	0.032	0.028
2004	91.1	**6**	**0.122**	**0.105**	0.095	0.074	0.060	0.044	0.033	0.029
2005	88.4	**3**	**0.112**	0.091	0.081	0.066	0.057	0.043	0.034	0.029
2006	92.1	**6**	**0.119**	**0.107**	0.095	0.071	0.057	0.044	0.033	0.027
2007	92.1	**4**	**0.111**	**0.103**	0.079	0.069	0.058	0.044	0.033	0.028
2008	89.8	0	0.093	0.083	0.071	0.055	0.051	0.039	0.030	0.026
2009	90.8	**4**	**0.120**	**0.102**	0.089	0.072	0.062	0.041	0.030	0.026
2010	89.2	**2**	**0.104**	0.081	0.075	0.061	0.052	0.040	0.031	0.026
2011	88.5	**2**	**0.125**	0.087	0.080	0.065	0.055	0.038	0.030	0.026

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

Bold font indicates values that exceed the AAQ NEPM standard

Table 52: Statistical summary for O_3 - Annual daily maximum 1-hour average concentrations
Station: Lidcombe[(1)] / Chullora[(2)]

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
2002[(1)]	31.0	0	0.100	0.088	0.077	0.063	0.050	0.038	0.029	0.021
2003[(2)]	80.6	0	0.084	0.067	0.064	0.046	0.040	0.034	0.028	0.023
2004[(2)]	87.2	1	**0.105**	0.091	0.075	0.063	0.051	0.038	0.030	0.026
2005[(2)]	92.0	0	0.086	0.078	0.067	0.058	0.048	0.037	0.030	0.025
2006[(2)]	94.3	1	**0.117**	0.078	0.073	0.058	0.049	0.036	0.030	0.024
2007[(2)]	93.0	0	0.088	0.069	0.064	0.054	0.044	0.036	0.029	0.024
2008[(2)]	93.9	0	0.080	0.064	0.057	0.049	0.042	0.032	0.027	0.022
2009[(2)]	92.7	**2**	**0.154**	0.089	0.077	0.061	0.050	0.035	0.027	0.023
2010[(2)]	93.1	0	0.083	0.067	0.062	0.050	0.043	0.031	0.026	0.023
2011[(2)]	94.2	1	**0.114**	0.073	0.061	0.052	0.043	0.032	0.025	0.021

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
2002	93.6	0	0.100	0.091	0.085	0.066	0.054	0.040	0.030	0.024
2003	93.3	**4**	**0.151**	**0.105**	0.074	0.055	0.047	0.035	0.029	0.024
2004	84.0	**3**	**0.113**	0.100	0.086	0.069	0.054	0.040	0.030	0.025
2005	88.0	1	**0.149**	0.085	0.077	0.059	0.052	0.040	0.032	0.026
2006	91.4	**4**	**0.128**	**0.105**	0.090	0.069	0.054	0.040	0.030	0.025
2007	90.3	**2**	**0.116**	0.086	0.078	0.062	0.052	0.039	0.029	0.024
2008	87.1	0	0.098	0.074	0.065	0.057	0.046	0.035	0.028	0.023
2009	88.9	**2**	**0.151**	0.092	0.088	0.068	0.052	0.038	0.029	0.024
2010	94.2	0	0.091	0.078	0.069	0.057	0.047	0.035	0.028	0.023
2011	94.1	1	**0.103**	0.080	0.071	0.057	0.046	0.032	0.025	0.022

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: Macarthur

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
2004	16.2	0	0.099	0.099	0.091	0.076	0.062	0.055	0.039	0.028
2005	94.7	**6**	**0.142**	**0.106**	0.091	0.073	0.061	0.044	0.033	0.029
2006	94.3	**8**	**0.128**	**0.116**	**0.103**	0.074	0.059	0.044	0.032	0.027
2007	90.6	**3**	**0.121**	0.098	0.089	0.071	0.059	0.042	0.032	0.026
2008	93.6	0	0.085	0.081	0.072	0.059	0.052	0.037	0.031	0.027
2009	92.3	**7**	**0.116**	**0.108**	**0.102**	0.078	0.062	0.043	0.032	0.028
2010	93.9	1	**0.119**	0.090	0.083	0.065	0.054	0.040	0.032	0.028
2011	93.6	**2**	**0.131**	0.096	0.084	0.067	0.054	0.037	0.030	0.026

Table 55: 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
2002	18.6	0	0.094	0.094	0.089	0.083	0.077	0.062	0.047	0.037
2003	91.1	1	**0.102**	0.083	0.075	0.066	0.055	0.042	0.033	0.029
2004	77.3	**7**	**0.124**	**0.106**	0.103	0.074	0.065	0.047	0.035	0.030
2005	91.9	**4**	**0.130**	**0.105**	0.085	0.071	0.058	0.043	0.034	0.030
2006	87.9	1	**0.109**	0.089	0.083	0.070	0.060	0.048	0.035	0.030
2007	87.6	**4**	**0.142**	**0.104**	0.092	0.071	0.060	0.044	0.034	0.030
2008	92.5	0	0.093	0.070	0.065	0.058	0.050	0.039	0.032	0.027
2009	85.9	**6**	**0.128**	**0.106**	0.093	0.078	0.058	0.042	0.032	0.029
2010	94.2	0	0.099	0.090	0.080	0.066	0.055	0.039	0.033	0.029
2011	95.0	**3**	**0.126**	0.084	0.075	0.063	0.051	0.039	0.031	0.027

Table 56: 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
2002	92.5	**2**	**0.125**	0.097	0.085	0.071	0.063	0.044	0.034	0.029
2003	86.1	**2**	**0.148**	0.086	0.078	0.061	0.053	0.039	0.030	0.026
2004	89.5	0	0.096	0.080	0.076	0.065	0.058	0.045	0.034	0.029
2005	91.8	**2**	**0.125**	0.091	0.083	0.065	0.058	0.045	0.035	0.029
2006	92.8	**2**	**0.108**	0.088	0.077	0.069	0.058	0.045	0.035	0.029
2007	91.1	1	**0.134**	0.086	0.075	0.068	0.058	0.045	0.034	0.029
2008	90.6	0	0.078	0.066	0.061	0.053	0.045	0.036	0.030	0.026
2009	90.1	1	**0.102**	0.086	0.078	0.066	0.058	0.043	0.034	0.029
2010	93.2	0	0.089	0.078	0.071	0.060	0.052	0.040	0.032	0.028
2011	94.3	1	**0.116**	0.077	0.067	0.058	0.048	0.037	0.031	0.026

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: Rozelle

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
2002	88.1	0	0.100	0.076	0.066	0.055	0.044	0.035	0.028	0.023
2003	91.2	0	0.083	0.069	0.059	0.045	0.037	0.031	0.026	0.023
2004	88.9	0	0.094	0.080	0.074	0.056	0.045	0.034	0.027	0.024
2005	88.9	0	0.081	0.069	0.060	0.051	0.044	0.034	0.029	0.024
2006	92.2	0	0.093	0.069	0.063	0.052	0.042	0.032	0.027	0.023
2007	92.0	0	0.088	0.058	0.050	0.046	0.041	0.033	0.027	0.023
2008	92.8	0	0.056	0.050	0.046	0.042	0.038	0.030	0.026	0.022
2009	92.6	0	0.083	0.068	0.060	0.050	0.042	0.032	0.028	0.023
2010	89.1	0	0.073	0.057	0.055	0.047	0.040	0.033	0.029	0.025
2011	93.3	0	0.093	0.066	0.053	0.044	0.038	0.031	0.026	0.023

Table 58: 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
2002	95.3	1	**0.118**	0.093	0.085	0.067	0.059	0.046	0.034	0.028
2003	92.7	0	0.093	0.077	0.068	0.059	0.052	0.037	0.030	0.026
2004	93.3	**3**	**0.142**	0.097	0.085	0.068	0.058	0.044	0.033	0.029
2005	92.1	**2**	**0.113**	0.090	0.078	0.066	0.058	0.042	0.034	0.029
2006	92.6	**3**	**0.124**	0.091	0.078	0.067	0.056	0.043	0.032	0.027
2007	92.2	**3**	**0.123**	0.093	0.077	0.065	0.057	0.044	0.033	0.028
2008	92.7	0	0.096	0.076	0.060	0.053	0.048	0.038	0.031	0.026
2009	93.0	**5**	**0.132**	0.102	0.082	0.073	0.062	0.041	0.032	0.028
2010	93.5	0	0.095	0.083	0.073	0.064	0.053	0.040	0.032	0.027
2011	94.8	**3**	**0.136**	0.094	0.074	0.060	0.051	0.037	0.030	0.026

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

Bold font indicates values that exceed the AAQ NEPM standard

Table 59: Statistical summary for O_3 - Annual daily maximum 1-hour average concentration
Station: Albion Park[(1)]/Albion Park Sth[(2)]

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
2002[(1)]	57.6	0	0.094	0.084	0.072	0.050	0.044	0.033	0.027	0.024
2003[(1)]	92.8	**4**	**0.130**	**0.105**	0.067	0.044	0.040	0.034	0.030	0.027
2004[(1)]	93.5	1	**0.112**	0.083	0.068	0.051	0.044	0.035	0.030	0.027
2005[(1)]	4.8	0	0.067	0.067	0.067	0.066	0.060	0.038	0.030	0.023
2006[(2)]	86.2	0	0.096	0.083	0.075	0.054	0.046	0.036	0.031	0.027
2007[(2)]	91.4	0	0.092	0.071	0.060	0.051	0.042	0.035	0.031	0.028
2008[(2)]	90.5	0	0.062	0.058	0.056	0.047	0.040	0.034	0.030	0.025
2009[(2)]	93.2	1	**0.102**	0.075	0.070	0.053	0.044	0.037	0.034	0.030
2010[(2)]	90.3	0	0.093	0.061	0.059	0.049	0.041	0.031	0.028	0.026
2011[(2)]	89.6	1	**0.118**	0.071	0.059	0.046	0.038	0.032	0.028	0.024

Table 60: 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
2002	91.7	0	0.099	0.084	0.080	0.056	0.044	0.036	0.031	0.026
2003	93.3	**2**	**0.113**	0.095	0.069	0.044	0.038	0.033	0.030	0.025
2004	91.3	**3**	**0.120**	0.093	0.064	0.052	0.043	0.036	0.031	0.027
2005	92.6	0	0.091	0.074	0.066	0.054	0.044	0.036	0.032	0.027
2006	94.6	0	0.093	0.074	0.065	0.052	0.047	0.036	0.030	0.026
2007	94.1	0	0.093	0.076	0.063	0.049	0.043	0.034	0.031	0.027
2008	93.6	0	0.072	0.063	0.055	0.048	0.042	0.032	0.029	0.025
2009	87.5	1	**0.103**	0.083	0.070	0.052	0.044	0.035	0.031	0.027
2010	89.7	0	0.081	0.061	0.056	0.049	0.043	0.033	0.029	0.025
2011	94.4	1	**0.121**	0.073	0.063	0.052	0.042	0.034	0.030	0.026

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 concentrations
Station: Wollongong

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
2002	90.7	**2**	**0.121**	0.085	0.082	0.064	0.048	0.036	0.030	0.024
2003	92.8	0	0.097	0.086	0.072	0.046	0.040	0.033	0.029	0.025
2004	92.5	1	0.103	0.084	0.071	0.056	0.043	0.034	0.029	0.026
2005	92.4	1	0.102	0.074	0.066	0.054	0.046	0.035	0.030	0.025
2006	94.6	0	0.096	0.073	0.064	0.054	0.047	0.036	0.030	0.026
2007	90.2	0	0.077	0.068	0.062	0.051	0.042	0.035	0.029	0.025
2008	94.0	0	0.067	0.062	0.056	0.048	0.043	0.033	0.029	0.025
2009	90.7	0	0.083	0.074	0.056	0.046	0.041	0.034	0.030	0.026
2010	91.8	0	0.082	0.067	0.062	0.052	0.043	0.034	0.029	0.025
2011	93.1	0	0.084	0.069	0.055	0.048	0.040	0.034	0.028	0.024

Table 62: 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
2002	94.0	0	0.083	0.079	0.062	0.054	0.046	0.037	0.030	0.025
2003	92.4	0	0.079	0.065	0.055	0.045	0.039	0.035	0.030	0.025
2004	92.3	1	**0.112**	0.070	0.067	0.052	0.044	0.036	0.030	0.025
2005	92.4	0	0.078	0.061	0.058	0.049	0.042	0.035	0.030	0.026
2006	93.7	0	0.068	0.063	0.060	0.047	0.042	0.035	0.029	0.024
2007	43.9	0	0.053	0.052	0.051	0.047	0.040	0.033	0.027	0.022
2008	89.9	0	0.064	0.054	0.049	0.044	0.039	0.034	0.028	0.024
2009	86.3	0	0.073	0.068	0.062	0.050	0.043	0.037	0.032	0.027
2010	89.1	0	0.086	0.069	0.060	0.049	0.041	0.036	0.031	0.027
2011	90.7	0	0.066	0.057	0.053	0.047	0.041	0.035	0.029	0.024

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

Bold font indicates values that exceed the AAQ NEPM standard

Table 63: 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
2002	81.9	0	0.081	0.075	0.070	0.058	0.049	0.038	0.031	0.025
2003	91.6	0	0.077	0.065	0.061	0.050	0.042	0.034	0.029	0.025
2004	88.2	1	**0.103**	0.075	0.065	0.054	0.048	0.037	0.030	0.026
2005	91.3	0	0.094	0.070	0.065	0.053	0.046	0.037	0.031	0.026
2006	93.2	0	0.086	0.070	0.062	0.051	0.045	0.036	0.029	0.024
2007	92.3	0	0.070	0.063	0.055	0.049	0.045	0.036	0.029	0.025
2008	91.9	0	0.057	0.054	0.052	0.044	0.040	0.033	0.028	0.023
2009	85.7	0	0.086	0.068	0.063	0.054	0.044	0.036	0.030	0.024
2010	88.3	0	0.067	0.065	0.056	0.047	0.040	0.034	0.029	0.024
2011	94.0	0	0.071	0.056	0.055	0.049	0.040	0.033	0.027	0.022

Table 64: Statistical summary for O_3 - Annual daily maximum 1-hour average concentrations
Station: Bathurst

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
2002	34.7	0	0.064	0.063	0.063	0.058	0.052	0.044	0.038	0.031
2003	76.4	0	0.056	0.052	0.051	0.047	0.042	0.036	0.032	0.029
2004	89.9	0	0.092	0.069	0.061	0.054	0.050	0.043	0.034	0.029
2005	90.7	0	0.056	0.054	0.052	0.048	0.044	0.038	0.033	0.030
2006	94.5	0	0.075	0.067	0.060	0.054	0.048	0.041	0.034	0.029
2007	54.3	0	0.068	0.067	0.062	0.054	0.050	0.039	0.032	0.029

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

Bold font indicates values that exceed the AAQ NEPM standard

Table 65: Statistical summary for O_3 - Daily maximum rolling 4-hour average concentration
Station: Blacktown[(1)]/Prospect[(2)]

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
2002[(1)]	95.7	**5**	**0.107**	**0.084**	0.079	0.061	0.054	0.039	0.031	0.023
2003[(1)]	94.3	**3**	**0.157**	0.080	0.069	0.056	0.045	0.035	0.028	0.023
2004[(1)]	41.3	**4**	**0.107**	**0.089**	**0.081**	0.070	0.062	0.044	0.033	0.026
2005[#]										
2006[#]										
2007[(2)]	75.1	1	**0.085**	0.063	0.060	0.055	0.048	0.036	0.028	0.023
2008[(2)]	93.1	1	**0.096**	0.069	0.058	0.047	0.042	0.033	0.026	0.022
2009[(2)]	95.7	**6**	**0.100**	**0.087**	0.074	0.063	0.053	0.039	0.030	0.024
2010[(2)]	85.9	**2**	**0.097**	0.072	0.068	0.056	0.046	0.035	0.028	0.022
2011[(2)]	99.3	**3**	**0.114**	0.077	0.061	0.051	0.043	0.032	0.026	0.022

Station closed pending relocation.

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

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
2002	96.8	**7**	**0.099**	**0.089**	0.082	0.066	0.055	0.041	0.032	0.026
2003	95.3	**5**	**0.133**	**0.083**	0.069	0.059	0.050	0.038	0.031	0.026
2004	95.1	**6**	**0.110**	**0.088**	0.080	0.064	0.053	0.041	0.032	0.028
2005	92.4	**3**	**0.102**	0.079	0.072	0.060	0.050	0.040	0.032	0.027
2006	96.1	**5**	**0.110**	**0.084**	0.077	0.062	0.051	0.041	0.031	0.026
2007	94.8	**4**	**0.095**	**0.083**	0.071	0.058	0.052	0.040	0.031	0.027
2008	93.6	0	0.078	0.071	0.061	0.050	0.046	0.036	0.029	0.025
2009	92.5	**5**	**0.108**	**0.085**	0.078	0.063	0.054	0.039	0.029	0.025
2010	85.2	**3**	**0.089**	0.072	0.066	0.055	0.047	0.037	0.030	0.025
2011	88.5	**2**	**0.118**	0.076	0.070	0.056	0.048	0.035	0.029	0.025

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

Bold font indicates values that exceed the AAQ NEPM standard

Table 67: Statistical summary for O_3 - Daily maximum rolling 4-hour average concentration
Station: Lidcombe[(1)] / Chullora[(2)]

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
2002[(1)]	32.4	1	**0.084**	0.078	0.071	0.055	0.044	0.036	0.026	0.020
2003[(2)]	84.2	0	0.077	0.059	0.055	0.041	0.037	0.032	0.026	0.021
2004[(2)]	91.2	**4**	**0.086**	**0.081**	0.067	0.054	0.045	0.035	0.029	0.024
2005[(2)]	96.2	0	0.080	0.066	0.061	0.052	0.042	0.034	0.028	0.023
2006[(2)]	98.8	**2**	**0.104**	0.071	0.064	0.054	0.044	0.034	0.028	0.022
2007[(2)]	97.1	0	0.074	0.065	0.057	0.051	0.041	0.033	0.027	0.022
2008[(2)]	98.3	0	0.074	0.058	0.050	0.045	0.039	0.030	0.025	0.020
2009[(2)]	96.8	**2**	**0.112**	0.075	0.070	0.056	0.045	0.033	0.026	0.021
2010[(2)]	96.4	0	0.072	0.062	0.058	0.045	0.039	0.029	0.024	0.021
2011[(2)]	97.1	1	**0.096**	0.067	0.056	0.047	0.038	0.030	0.023	0.020

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

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
2002	97.7	**5**	**0.089**	**0.082**	0.073	0.058	0.048	0.036	0.028	0.022
2003	97.1	**3**	**0.132**	0.076	0.063	0.049	0.041	0.033	0.028	0.022
2004	87.6	**4**	**0.092**	**0.082**	0.071	0.062	0.048	0.036	0.029	0.023
2005	92.0	**2**	**0.121**	0.074	0.068	0.053	0.046	0.036	0.030	0.024
2006	95.2	**4**	**0.124**	**0.088**	0.074	0.064	0.049	0.037	0.028	0.023
2007	92.3	**2**	**0.094**	0.074	0.067	0.057	0.046	0.035	0.028	0.022
2008	90.5	1	**0.089**	0.064	0.057	0.050	0.042	0.032	0.026	0.021
2009	92.5	**4**	**0.103**	**0.085**	0.077	0.057	0.046	0.035	0.028	0.022
2010	98.3	1	**0.081**	0.069	0.061	0.052	0.042	0.033	0.026	0.021
2011	97.3	1	**0.095**	0.068	0.060	0.051	0.042	0.030	0.024	0.020

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

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
2004	16.9	1	**0.084**	**0.084**	0.080	0.061	0.055	0.047	0.037	0.027
2005	98.9	**7**	**0.126**	**0.096**	0.080	0.061	0.055	0.040	0.032	0.028
2006	98.5	**8**	**0.117**	**0.094**	**0.085**	0.066	0.054	0.040	0.030	0.025
2007	94.1	**7**	**0.101**	**0.084**	0.079	0.063	0.054	0.039	0.030	0.025
2008	97.9	0	0.070	0.065	0.063	0.054	0.047	0.035	0.030	0.025
2009	96.6	**9**	**0.097**	**0.090**	**0.083**	0.068	0.056	0.040	0.031	0.027
2010	98.0	1	**0.103**	0.075	0.073	0.057	0.049	0.038	0.031	0.027
2011	96.4	**2**	**0.122**	0.079	0.072	0.062	0.048	0.035	0.029	0.025

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

Bold font indicates values that exceed the AAQ NEPM standard

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

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
2002	19.4	0	0.080	0.080	0.079	0.073	0.069	0.055	0.043	0.034
2003	95.0	**3**	**0.089**	0.079	0.067	0.057	0.050	0.039	0.032	0.028
2004	80.6	**6**	**0.099**	**0.090**	**0.084**	0.066	0.057	0.043	0.033	0.030
2005	95.9	**4**	**0.106**	**0.088**	0.074	0.062	0.052	0.040	0.032	0.029
2006	91.6	1	**0.085**	0.078	0.072	0.061	0.053	0.043	0.033	0.029
2007	91.0	**5**	**0.116**	**0.086**	0.077	0.063	0.053	0.042	0.033	0.029
2008	96.8	0	0.075	0.061	0.056	0.052	0.045	0.037	0.031	0.026
2009	89.9	**6**	**0.108**	**0.090**	0.080	0.064	0.053	0.040	0.032	0.029
2010	98.4	**2**	**0.088**	0.075	0.070	0.058	0.049	0.038	0.032	0.028
2011	99.2	**3**	**0.098**	0.074	0.066	0.057	0.047	0.036	0.030	0.026

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

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
2002	96.3	**4**	**0.112**	**0.081**	0.074	0.062	0.056	0.041	0.032	0.027
2003	89.5	**3**	**0.138**	0.078	0.068	0.056	0.048	0.037	0.029	0.025
2004	93.8	1	**0.088**	0.074	0.068	0.057	0.052	0.042	0.032	0.028
2005	96.3	**3**	**0.100**	0.080	0.069	0.060	0.052	0.042	0.033	0.028
2006	97.3	**2**	**0.095**	0.078	0.072	0.061	0.052	0.042	0.034	0.027
2007	94.1	**3**	**0.121**	0.079	0.068	0.059	0.053	0.042	0.032	0.027
2008	94.5	0	0.067	0.060	0.055	0.048	0.041	0.034	0.029	0.024
2009	94.2	**3**	**0.090**	0.079	0.069	0.058	0.051	0.040	0.032	0.027
2010	97.3	1	**0.082**	0.067	0.061	0.054	0.047	0.037	0.031	0.026
2011	98.5	1	**0.088**	0.065	0.059	0.050	0.045	0.034	0.029	0.025

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

Bold font indicates values that exceed the AAQ NEPM standard

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

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
2002	92.1	1	**0.087**	0.061	0.057	0.047	0.040	0.031	0.026	0.021
2003	95.3	0	0.070	0.058	0.052	0.039	0.034	0.029	0.025	0.021
2004	92.9	1	**0.087**	0.071	0.066	0.051	0.041	0.032	0.026	0.022
2005	92.9	0	0.065	0.060	0.055	0.045	0.039	0.032	0.027	0.022
2006	96.6	1	**0.082**	0.063	0.056	0.047	0.037	0.031	0.025	0.021
2007	93.7	0	0.075	0.054	0.046	0.042	0.037	0.031	0.026	0.021
2008	97.0	0	0.048	0.046	0.043	0.038	0.034	0.028	0.025	0.020
2009	94.8	0	0.073	0.059	0.054	0.044	0.037	0.031	0.026	0.022
2010	86.8	0	0.067	0.056	0.051	0.043	0.036	0.031	0.027	0.023
2011	97.1	0	0.080	0.058	0.049	0.041	0.035	0.029	0.024	0.021

Table 73: Statistical summary for O_3 - Daily maximum rolling 4-hour average concentration
Station: St Marys

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
2002	99.7	**7**	**0.093**	**0.085**	0.075	0.060	0.053	0.042	0.032	0.026
2003	96.8	**2**	**0.091**	0.063	0.061	0.052	0.047	0.035	0.029	0.025
2004	97.5	**3**	**0.128**	**0.081**	0.070	0.060	0.052	0.040	0.032	0.027
2005	96.2	**3**	**0.091**	0.078	0.068	0.059	0.050	0.040	0.032	0.027
2006	96.6	**4**	**0.109**	**0.084**	0.067	0.059	0.052	0.041	0.030	0.026
2007	93.1	**4**	**0.105**	**0.088**	0.069	0.058	0.051	0.040	0.031	0.026
2008	97.0	1	**0.082**	0.069	0.056	0.048	0.044	0.036	0.029	0.025
2009	97.2	**5**	**0.106**	**0.087**	0.073	0.063	0.055	0.039	0.031	0.026
2010	97.8	1	**0.083**	0.072	0.066	0.057	0.049	0.038	0.031	0.026
2011	98.8	**3**	**0.121**	0.080	0.063	0.054	0.047	0.034	0.028	0.024

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

Bold font indicates values that exceed the AAQ NEPM standard

Table 74: Statistical summary for O_3 - Daily maximum rolling 4-hour average concentration
Station: Albion Park[(1)]/Albion Park Sth[(2)]

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
2002[(1)]	60.0	1	**0.083**	0.071	0.066	0.046	0.039	0.031	0.026	0.022
2003[(1)]	96.8	**4**	**0.111**	**0.085**	0.061	0.040	0.037	0.033	0.029	0.025
2004[(1)]	97.5	1	**0.092**	0.077	0.057	0.047	0.040	0.033	0.029	0.026
2005[(1)]	5.0	0	0.063	0.063	0.063	0.061	0.054	0.039	0.029	0.022
2006[(2)]	90.0	0	0.077	0.073	0.065	0.048	0.041	0.035	0.030	0.026
2007[(2)]	94.6	0	0.080	0.061	0.057	0.046	0.039	0.033	0.030	0.026
2008[(2)]	94.1	0	0.055	0.053	0.048	0.044	0.038	0.032	0.029	0.024
2009[(2)]	95.4	1	**0.083**	0.066	0.060	0.048	0.041	0.036	0.033	0.028
2010[(2)]	86.2	0	0.073	0.056	0.048	0.044	0.037	0.029	0.027	0.024
2011[(2)]	85.7	**3**	**0.099**	0.061	0.052	0.042	0.034	0.031	0.027	0.023

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

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
2002	95.8	1	**0.083**	0.074	0.070	0.048	0.040	0.034	0.029	0.025
2003	97.4	**3**	**0.107**	0.077	0.060	0.042	0.035	0.032	0.028	0.024
2004	95.4	**3**	**0.100**	0.078	0.055	0.047	0.040	0.034	0.029	0.025
2005	96.7	1	**0.084**	0.063	0.059	0.048	0.041	0.034	0.030	0.026
2006	98.9	1	**0.081**	0.063	0.057	0.046	0.042	0.034	0.029	0.025
2007	97.8	1	**0.082**	0.065	0.059	0.046	0.040	0.033	0.029	0.025
2008	97.5	0	0.066	0.054	0.050	0.043	0.039	0.031	0.028	0.023
2009	90.1	**2**	**0.090**	0.075	0.065	0.046	0.040	0.033	0.029	0.026
2010	86.7	0	0.078	0.055	0.052	0.044	0.038	0.031	0.028	0.024
2011	98.4	**2**	**0.105**	0.066	0.057	0.048	0.038	0.033	0.029	0.025

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

Bold font indicates values that exceed the AAQ NEPM standard

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

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
2002	94.6	**2**	**0.099**	0.077	0.071	0.059	0.044	0.034	0.028	0.023
2003	96.4	0	0.080	0.077	0.062	0.042	0.037	0.031	0.028	0.024
2004	96.3	**2**	**0.090**	0.068	0.061	0.050	0.040	0.032	0.028	0.024
2005	96.2	1	**0.099**	0.064	0.061	0.049	0.041	0.033	0.029	0.024
2006	98.6	1	**0.086**	0.066	0.055	0.048	0.042	0.033	0.028	0.024
2007	93.2	0	0.073	0.064	0.054	0.046	0.039	0.033	0.028	0.023
2008	97.9	0	0.063	0.056	0.051	0.043	0.040	0.031	0.027	0.023
2009	92.9	0	0.074	0.064	0.050	0.043	0.037	0.033	0.029	0.025
2010	94.9	0	0.073	0.061	0.055	0.046	0.039	0.032	0.027	0.024
2011	96.9	0	0.078	0.066	0.052	0.043	0.036	0.032	0.027	0.023

Table 77: Statistical summary for O_3 - Daily maximum rolling 4-hour average concentrations
Station: Newcastle

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
2002	98.2	0	0.077	0.072	0.055	0.050	0.041	0.034	0.028	0.023
2003	96.3	0	0.061	0.055	0.050	0.042	0.038	0.033	0.028	0.024
2004	96.4	0	0.073	0.062	0.059	0.048	0.041	0.034	0.028	0.024
2005	96.5	0	0.070	0.055	0.050	0.044	0.039	0.033	0.028	0.024
2006	97.9	0	0.064	0.057	0.053	0.043	0.038	0.033	0.028	0.022
2007	45.6	0	0.047	0.046	0.046	0.041	0.036	0.031	0.025	0.021
2008	93.8	0	0.058	0.049	0.046	0.040	0.037	0.032	0.027	0.022
2009	88.2	0	0.067	0.062	0.056	0.047	0.042	0.035	0.031	0.025
2010	85.1	0	0.076	0.062	0.054	0.045	0.040	0.034	0.029	0.025
2011	86.8	0	0.063	0.051	0.048	0.044	0.038	0.033	0.027	0.023

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

Bold font indicates values that exceed the AAQ NEPM standard

Table 78: Statistical summary for O_3 - Daily maximum rolling 4-hour average concentration
Station: Wallsend

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
2002	85.6	0	0.074	0.068	0.065	0.053	0.043	0.035	0.029	0.023
2003	95.7	0	0.059	0.058	0.056	0.044	0.039	0.032	0.028	0.024
2004	92.0	0	0.078	0.065	0.057	0.050	0.044	0.035	0.029	0.024
2005	95.4	0	0.074	0.063	0.058	0.048	0.041	0.034	0.029	0.024
2006	97.3	0	0.066	0.064	0.057	0.046	0.040	0.033	0.027	0.023
2007	95.1	0	0.068	0.057	0.050	0.045	0.041	0.034	0.028	0.023
2008	95.7	0	0.054	0.048	0.045	0.040	0.036	0.031	0.027	0.022
2009	89.2	0	0.076	0.063	0.058	0.046	0.040	0.034	0.028	0.023
2010	88.2	0	0.063	0.056	0.052	0.042	0.037	0.032	0.027	0.023
2011	95.8	0	0.059	0.053	0.050	0.045	0.037	0.031	0.025	0.021

Table 79: Statistical summary for O_3 - Daily maximum rolling 4-hour average concentration
Station: Bathurst

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
2001	52.3	0	0.060	0.051	0.050	0.046	0.042	0.035	0.030	0.025
2002	36.1	0	0.062	0.060	0.057	0.054	0.049	0.043	0.037	0.030
2003	79.6	0	0.053	0.050	0.049	0.045	0.040	0.035	0.031	0.028
2004	93.7	0	0.067	0.058	0.055	0.050	0.048	0.041	0.032	0.027
2005	94.5	0	0.054	0.052	0.050	0.046	0.042	0.036	0.032	0.029
2006	98.5	0	0.071	0.062	0.058	0.051	0.045	0.040	0.033	0.028
2007	56.7	0	0.066	0.062	0.059	0.050	0.048	0.037	0.031	0.028

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 80: Statistical summary for SO_2 - Daily maximum 1-hour average concentrations (2011)

Region/ Performance monitoring Station	Data availability rates (%)	Maximum conc. (ppm)	Percentiles (ppm)						
			99th	98th	95th	90th	75th	50th	25th
Sydney									
Bringelly	88.9	0.011	0.005	0.005	0.003	0.003	0.002	0.001	0.000
Chullora	92.7	0.026	0.016	0.011	0.009	0.006	0.004	0.002	0.001
Macarthur	91.9	0.014	0.009	0.006	0.005	0.003	0.002	0.001	0.000
Prospect	93.8	0.014	0.011	0.008	0.006	0.005	0.003	0.002	0.001
Richmond	94.5	0.010	0.008	0.005	0.004	0.003	0.002	0.001	0.000
Illawarra									
Albion Park Sth	87.4	0.035	0.024	0.022	0.017	0.009	0.004	0.000	0.000
Wollongong	92.9	0.018	0.018	0.017	0.012	0.009	0.005	0.003	0.001
lower Hunter									
Newcastle	90.7	0.033	0.027	0.023	0.017	0.014	0.008	0.005	0.001
Wallsend	93.7	0.044	0.031	0.024	0.018	0.014	0.008	0.004	0.001

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

Table 81: Statistical summary for SO_2 - Daily 24-hour average concentrations (2011)

Region/ Performance monitoring Station	Data availability rates (%)	Maximum conc. (ppm)	Percentiles (ppm)						
			99th	98th	95th	90th	75th	50th	25th
Sydney									
Bringelly	94.8	0.002	0.001	0.001	0.001	0.001	0.000	0.000	0.000
Chullora	96.7	0.005	0.003	0.003	0.002	0.002	0.001	0.001	0.000
Macarthur	96.2	0.002	0.002	0.002	0.001	0.001	0.001	0.000	0.000
Prospect	97.8	0.003	0.003	0.002	0.002	0.001	0.001	0.001	0.000
Richmond	98.4	0.003	0.001	0.001	0.001	0.001	0.000	0.000	0.000
Illawarra									
Albion Park Sth	94.8	0.010	0.007	0.006	0.004	0.002	0.001	0.000	0.000
Wollongong	96.7	0.009	0.004	0.003	0.003	0.002	0.001	0.000	0.000
lower Hunter									
Newcastle	98.9	0.009	0.006	0.005	0.005	0.004	0.002	0.001	0.000
Wallsend	99.5	0.007	0.005	0.005	0.003	0.002	0.001	0.001	0.000

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

Bold font indicates values that exceed the AAQ NEPM standard

Trend analysis

Table 82: Maximum 1-hour average concentrations for SO_2 (ppm)

Region/ Performance monitoring Station	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Sydney										
Blacktown / Prospect*	0.021	0.016	0.016			0.022	0.014	0.017	0.018	0.014
Bringelly	0.010	0.017	0.015	0.009	0.009	0.017	0.019	0.012	0.008	0.011
Chullora				0.015	0.015	0.020	0.021	0.029	0.021	0.026
Macarthur				0.015	0.010	0.015	0.015	0.010	0.010	0.014
Richmond	0.028	0.011	0.021	0.015	0.018	0.024	0.015	0.013	0.009	0.010
Illawarra										
Albion Park / Albion Park Sth*	0.029	0.035	0.034	0.031	0.038	0.038	0.028	0.031	0.032	0.035
Warrawong	0.046	0.063	0.088	0.070	0.022					
Wollongong	0.039	0.031	0.053	0.038	0.035	0.032	0.021	0.020	0.027	0.018
lower Hunter										
Newcastle				0.037	0.034	0.043	0.033	0.039	0.027	0.033
Wallsend	0.045	0.047	0.067	0.048	0.058	0.039	0.044	0.044	0.031	0.044

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

Table 83: Maximum 24-hour average concentrations for SO_2 (ppm)

Region/ Performance monitoring Station	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Sydney										
Blacktown/ Prospect*	0.004	0.004	0.004			0.005	0.004	0.003	0.004	0.003
Bringelly	0.002	0.002	0.002	0.002	0.002	0.003	0.003	0.003	0.002	0.002
Chullora				0.005	0.004	0.004	0.005	0.005	0.004	0.005
Macarthur				0.003	0.003	0.004	0.004	0.004	0.003	0.002
Richmond	0.004	0.003	0.004	0.002	0.003	0.004	0.003	0.004	0.002	0.003
Illawarra										
Albion Park / Albion Park Sth*	0.009	0.009	0.009	0.011	0.010	0.014	0.008	0.012	0.011	0.010
Warrawong	0.009	0.011	0.012	0.009	0.007					
Wollongong	0.008	0.006	0.015	0.006	0.007	0.008	0.007	0.004	0.008	0.009
lower Hunter										
Newcastle				0.008	0.009	0.012	0.008	0.010	0.005	0.009
Wallsend	0.011	0.010	0.014	0.007	0.009	0.007	0.007	0.007	0.007	0.007

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

Bold font indicates values that exceed the AAQ NEPM standard

Table 84: Annual average concentrations for SO_2 (ppm)

Region/ Performance monitoring Station	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Sydney										
Blacktown /Prospect*	0.001	0.001	0.001			0.001	0.000	0.000	0.001	0.001
Bringelly	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Chullora				0.001	0.001	0.001	0.001	0.001	0.001	0.001
Macarthur				0.001	0.001	0.001	0.001	0.001	0.000	0.000
Richmond	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Illawarra										
Albion Park/ Albion Park Sth*	0.001	0.001	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.001
Warrawong	0.001	0.001	0.001	0.001	0.001					
Wollongong	0.001	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.001	0.001
lower Hunter										
Newcastle				0.002	0.001	0.001	0.001	0.001	0.001	0.002
Wallsend	0.002	0.002	0.002	0.001	0.001	0.001	0.002	0.001	0.001	0.001

AAQ NEPM Standard - 0.02 ppm (Annual average)

Table 85: Statistical summary for SO_2 - Annual daily maximum 1-hour average concentrations
Station: Blacktown(1)/Prospect(2)

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
2002(1)	93.2	0	0.021	0.014	0.012	0.008	0.006	0.004	0.003	0.002
2003(1)	91.3	0	0.016	0.012	0.010	0.007	0.006	0.004	0.003	0.002
2004(1)	39.1	0	0.016	0.013	0.012	0.010	0.007	0.006	0.004	0.002
2005(#)										
2006(#)										
2007(2)	67.0	0	0.022	0.016	0.013	0.007	0.006	0.003	0.002	0.001
2008(2)	85.1	0	0.014	0.011	0.010	0.008	0.005	0.003	0.002	0.001
2009(2)	91.3	0	0.017	0.010	0.010	0.008	0.006	0.004	0.002	0.001
2010(2)	88.9	0	0.018	0.013	0.011	0.008	0.006	0.004	0.002	0.001
2011(2)	93.8	0	0.014	0.011	0.008	0.006	0.005	0.003	0.002	0.001

Station closed pending relocation.

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

Bold font indicates values that exceed the AAQ NEPM standard

Table 86: 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
2002	94.6	0	0.010	0.009	0.009	0.006	0.004	0.002	0.001	0.001
2003	93.0	0	0.017	0.007	0.006	0.004	0.003	0.002	0.001	0.001
2004	90.8	0	0.015	0.008	0.007	0.005	0.004	0.002	0.001	0.000
2005	91.3	0	0.009	0.008	0.006	0.004	0.004	0.002	0.001	0.000
2006	91.4	0	0.009	0.006	0.005	0.004	0.003	0.002	0.001	0.001
2007	84.2	0	0.017	0.009	0.007	0.005	0.004	0.002	0.001	0.000
2008	89.2	0	0.019	0.008	0.006	0.005	0.003	0.002	0.001	0.000
2009	84.6	0	0.012	0.008	0.005	0.004	0.003	0.001	0.000	0.000
2010	79.9	0	0.008	0.005	0.005	0.004	0.003	0.002	0.001	0.000
2011	88.9	0	0.011	0.005	0.005	0.003	0.003	0.002	0.001	0.000

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

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
2005	68.8	0	0.015	0.013	0.011	0.009	0.007	0.004	0.002	0.001
2006	93.9	0	0.015	0.013	0.011	0.009	0.007	0.004	0.003	0.002
2007	86.7	0	0.020	0.016	0.012	0.009	0.007	0.003	0.002	0.001
2008	77.5	0	0.021	0.018	0.012	0.007	0.006	0.004	0.002	0.001
2009	89.8	0	0.029	0.015	0.012	0.010	0.008	0.004	0.002	0.001
2010	92.1	0	0.021	0.015	0.014	0.010	0.007	0.004	0.002	0.001
2011	92.7	0	0.026	0.016	0.011	0.009	0.006	0.004	0.002	0.001

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

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
2005	53.1	0	0.015	0.012	0.008	0.006	0.004	0.003	0.002	0.001
2006	93.2	0	0.010	0.008	0.006	0.005	0.004	0.002	0.001	0.001
2007	90.9	0	0.015	0.011	0.010	0.006	0.005	0.003	0.002	0.001
2008	92.1	0	0.015	0.013	0.009	0.006	0.004	0.003	0.001	0.001
2009	91.6	0	0.010	0.009	0.007	0.006	0.004	0.003	0.002	0.001
2010	92.9	0	0.010	0.006	0.006	0.005	0.004	0.002	0.001	0.001
2011	91.9	0	0.014	0.009	0.006	0.005	0.003	0.002	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: Richmond

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
2002	93.3	0	0.028	0.009	0.008	0.006	0.004	0.003	0.001	0.001
2003	93.0	0	0.011	0.010	0.009	0.006	0.004	0.003	0.001	0.001
2004	89.7	0	0.021	0.012	0.009	0.007	0.005	0.002	0.001	0.001
2005	92.8	0	0.015	0.009	0.007	0.006	0.004	0.002	0.001	0.001
2006	92.0	0	0.018	0.011	0.009	0.006	0.004	0.002	0.001	0.001
2007	91.0	0	0.024	0.008	0.007	0.005	0.004	0.002	0.001	0.000
2008	72.0	0	0.015	0.010	0.007	0.005	0.003	0.002	0.001	0.000
2009	89.5	0	0.013	0.010	0.009	0.006	0.004	0.002	0.001	0.000
2010	93.3	0	0.009	0.007	0.006	0.005	0.003	0.002	0.001	0.000
2011	94.5	0	0.010	0.008	0.005	0.004	0.003	0.002	0.001	0.000

Table 90: Statistical summary for SO_2 - Annual daily maximum 1-hour average concentrations
Station: Albion Park[(1)]/Albion Park Sth[(2)]

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
2002[(1)]	57.4	0	0.029	0.028	0.027	0.022	0.016	0.006	0.001	0.000
2003[(1)]	93.7	0	0.035	0.026	0.022	0.016	0.012	0.005	0.001	0.000
2004[(1)]	92.9	0	0.034	0.029	0.027	0.017	0.013	0.005	0.001	0.000
2005[(1)]	4.8	0	0.031	0.031	0.031	0.031	0.030	0.007	0.001	0.000
2006[(2)]	86.7	0	0.038	0.028	0.024	0.019	0.011	0.004	0.001	0.000
2007[(2)]	83.1	0	0.038	0.033	0.031	0.019	0.013	0.006	0.001	0.000
2008[(2)]	93.0	0	0.028	0.026	0.022	0.015	0.011	0.005	0.001	0.000
2009[(2)]	85.4	0	0.031	0.027	0.023	0.018	0.013	0.005	0.001	0.000
2010[(2)]	89.6	0	0.032	0.027	0.023	0.019	0.013	0.005	0.001	0.000
2011[(2)]	87.4	0	0.035	0.024	0.022	0.017	0.009	0.004	0.000	0.000

Table 91: 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
2000	90.8	0	0.110	0.077	0.039	0.028	0.020	0.010	0.003	0.000
2001	93.1	0	0.162	0.074	0.058	0.042	0.027	0.011	0.003	0.000
2002	94.0	0	0.046	0.031	0.029	0.023	0.019	0.011	0.004	0.000
2003	93.7	0	0.063	0.052	0.040	0.022	0.017	0.009	0.002	0.000
2004	91.4	0	0.088	0.039	0.029	0.021	0.013	0.006	0.002	0.000
2005	91.8	0	0.070	0.032	0.025	0.019	0.014	0.008	0.002	0.000
2006	37.9	0	0.022	0.022	0.020	0.015	0.010	0.004	0.001	0.000

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

Bold font indicates values that exceed the AAQ NEPM standard

Table 92: 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
2002	91.1	0	0.039	0.033	0.025	0.019	0.015	0.009	0.005	0.002
2003	93.7	0	0.031	0.025	0.023	0.015	0.013	0.008	0.004	0.002
2004	92.8	0	0.053	0.024	0.018	0.014	0.011	0.006	0.003	0.001
2005	93.0	0	0.038	0.023	0.021	0.015	0.011	0.006	0.003	0.001
2006	94.5	0	0.035	0.020	0.018	0.015	0.012	0.007	0.004	0.001
2007	78.9	0	0.032	0.022	0.020	0.016	0.011	0.007	0.003	0.001
2008	78.2	0	0.021	0.019	0.015	0.012	0.009	0.006	0.002	0.000
2009	75.3	0	0.020	0.016	0.014	0.010	0.007	0.004	0.002	0.000
2010	88.4	0	0.027	0.018	0.015	0.013	0.011	0.006	0.003	0.001
2011	92.9	0	0.018	0.018	0.017	0.012	0.009	0.005	0.003	0.001

Table 93: Statistical summary for SO_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
2005	72.6	0	0.037	0.035	0.029	0.020	0.015	0.008	0.005	0.002
2006	93.3	0	0.034	0.028	0.021	0.017	0.013	0.007	0.004	0.001
2007	44.5	0	0.043	0.032	0.025	0.021	0.014	0.008	0.005	0.003
2008	86.9	0	0.033	0.027	0.024	0.019	0.015	0.010	0.004	0.002
2009	69.7	0	0.039	0.033	0.027	0.021	0.015	0.008	0.005	0.002
2010	84.6	0	0.027	0.022	0.020	0.015	0.012	0.008	0.004	0.002
2011	90.7	0	0.033	0.027	0.023	0.017	0.014	0.008	0.005	0.001

Table 94: 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
2002	80.2	0	0.045	0.036	0.028	0.024	0.019	0.012	0.007	0.003
2003	90.3	0	0.047	0.034	0.029	0.023	0.017	0.011	0.006	0.003
2004	90.1	0	0.067	0.042	0.033	0.022	0.016	0.010	0.005	0.002
2005	93.4	0	0.048	0.033	0.027	0.021	0.016	0.009	0.005	0.002
2006	94.5	0	0.058	0.027	0.025	0.021	0.016	0.011	0.005	0.002
2007	83.9	0	0.039	0.032	0.027	0.022	0.018	0.010	0.005	0.002
2008	91.3	0	0.044	0.032	0.026	0.021	0.018	0.011	0.006	0.002
2009	67.2	0	0.044	0.028	0.025	0.019	0.014	0.009	0.005	0.001
2010	70.3	0	0.031	0.022	0.02	0.017	0.014	0.009	0.004	0.001
2011	93.7	0	0.044	0.031	0.024	0.018	0.014	0.008	0.004	0.001

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

Bold font indicates values that exceed the AAQ NEPM standard

Table 95: Statistical summary for SO_2 - 24-hour average concentrations
Station: Blacktown[(1)]/Prospect[(2)]

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
2002[(1)]	96.4	0	0.004	0.003	0.003	0.002	0.002	0.001	0.001	0.001
2003[(1)]	95.1	0	0.004	0.003	0.003	0.002	0.002	0.001	0.001	0.000
2004[(1)]	40.7	0	0.004	0.004	0.003	0.003	0.002	0.002	0.001	0.001
2005[#]										
2006[#]										
2007[(2)]	67.1	0	0.005	0.003	0.003	0.002	0.002	0.001	0.001	0.000
2008[(2)]	89.9	0	0.004	0.003	0.003	0.002	0.001	0.001	0.000	0.000
2009[(2)]	96.4	0	0.003	0.003	0.002	0.002	0.002	0.001	0.000	0.000
2010[(2)]	96.4	0	0.004	0.003	0.003	0.002	0.002	0.001	0.001	0.000
2011[(2)]	97.8	0	0.003	0.003	0.002	0.002	0.001	0.001	0.001	0.000

Station closed pending relocation.

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

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
2002	99.2	0	0.002	0.002	0.002	0.001	0.001	0.001	0.000	0.000
2003	97.3	0	0.002	0.002	0.002	0.001	0.001	0.000	0.000	0.000
2004	94.8	0	0.002	0.002	0.001	0.001	0.001	0.000	0.000	0.000
2005	95.3	0	0.002	0.002	0.001	0.001	0.001	0.000	0.000	0.000
2006	95.3	0	0.002	0.002	0.001	0.001	0.001	0.000	0.000	0.000
2007	86.8	0	0.003	0.002	0.002	0.002	0.001	0.001	0.000	0.000
2008	92.3	0	0.003	0.002	0.002	0.002	0.001	0.001	0.000	-0.001
2009	87.1	0	0.003	0.002	0.001	0.001	0.001	0.000	0.000	-0.001
2010	85.8	0	0.002	0.002	0.001	0.001	0.001	0.000	0.000	0.000
2011	94.8	0	0.002	0.001	0.001	0.001	0.001	0.000	0.000	0.000

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

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
2005	71.8	0	0.005	0.004	0.003	0.003	0.002	0.001	0.001	0.000
2006	98.4	0	0.004	0.004	0.003	0.003	0.002	0.002	0.001	0.001
2007	89.3	0	0.004	0.004	0.003	0.003	0.002	0.001	0.001	0.000
2008	80.9	0	0.005	0.004	0.003	0.002	0.002	0.001	0.001	0.000
2009	94.5	0	0.005	0.004	0.003	0.003	0.002	0.001	0.001	0.000
2010	95.9	0	0.004	0.004	0.003	0.003	0.002	0.001	0.001	0.000
2011	96.7	0	0.005	0.003	0.003	0.002	0.002	0.001	0.001	0.000

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

Bold font indicates values that exceed the AAQ NEPM standard

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

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
2005	55.3	0	0.003	0.003	0.002	0.002	0.001	0.001	0.000	0.000
2006	97.3	0	0.003	0.003	0.002	0.002	0.001	0.001	0.000	0.000
2007	94.8	0	0.004	0.003	0.003	0.002	0.002	0.001	0.001	0.000
2008	97.0	0	0.004	0.003	0.003	0.002	0.002	0.001	0.000	0.000
2009	95.9	0	0.004	0.003	0.003	0.002	0.002	0.001	0.001	0.000
2010	97.0	0	0.003	0.002	0.002	0.001	0.001	0.001	0.000	0.000
2011	96.2	0	0.002	0.002	0.002	0.001	0.001	0.001	0.000	0.000

Table 99: Statistical summary for SO_2 - 24-hour average concentrations
Station: Richmond

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
2002	97.5	0	0.004	0.002	0.002	0.002	0.001	0.001	0.000	0.000
2003	97.0	0	0.003	0.002	0.002	0.001	0.001	0.001	0.000	0.000
2004	92.9	0	0.004	0.002	0.002	0.002	0.001	0.001	0.000	0.000
2005	96.7	0	0.002	0.002	0.002	0.001	0.001	0.001	0.000	0.000
2006	95.9	0	0.003	0.002	0.002	0.002	0.001	0.001	0.000	0.000
2007	94.5	0	0.004	0.002	0.002	0.001	0.001	0.000	0.000	0.000
2008	74.9	0	0.003	0.002	0.001	0.001	0.001	0.000	0.000	0.000
2009	93.7	0	0.004	0.003	0.002	0.001	0.001	0.000	0.000	0.000
2010	97.5	0	0.002	0.002	0.001	0.001	0.001	0.000	0.000	0.000
2011	98.4	0	0.003	0.001	0.001	0.001	0.001	0.000	0.000	0.000

Table 100: Statistical summary for SO_2 - 24-hour average concentrations
Station: Albion Park(1)/Albion Park Sth(2)

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
2002(1)	60.0	0	0.009	0.009	0.007	0.006	0.004	0.001	0.000	0.000
2003(1)	98.9	0	0.009	0.008	0.006	0.004	0.003	0.001	0.000	0.000
2004(1)	97.0	0	0.009	0.007	0.006	0.004	0.003	0.001	0.000	0.000
2005(1)	4.9	0	0.011	0.011	0.011	0.010	0.007	0.002	0.000	0.000
2006(2)	89.3	0	0.010	0.008	0.007	0.004	0.003	0.001	0.000	0.000
2007(2)	83.8	0	0.014	0.011	0.008	0.004	0.003	0.001	0.000	0.000
2008(2)	97.0	0	0.008	0.006	0.005	0.004	0.003	0.002	0.000	0.000
2009(2)	88.5	0	0.012	0.009	0.008	0.006	0.004	0.002	0.000	0.000
2010(2)	97.8	0	0.011	0.010	0.008	0.006	0.003	0.001	0.000	0.000
2011(2)	94.8	0	0.010	0.007	0.006	0.004	0.002	0.001	0.000	0.000

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

Bold font indicates values that exceed the AAQ NEPM standard

Table 101: Statistical summary for SO_2 - 24-hour average concentrations
Station: Warrawong

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
2000	93.7	0	0.009	0.007	0.006	0.005	0.003	0.002	0.000	0.000
2001	97.3	0	0.013	0.010	0.009	0.007	0.005	0.002	0.000	0.000
2002	98.6	0	0.009	0.006	0.006	0.005	0.004	0.002	0.001	0.000
2003	98.4	0	0.011	0.009	0.007	0.005	0.003	0.002	0.000	0.000
2004	95.4	0	0.012	0.007	0.006	0.004	0.003	0.001	0.000	0.000
2005	96.7	0	0.009	0.006	0.005	0.004	0.003	0.002	0.000	0.000
2006	39.2	0	0.007	0.006	0.005	0.003	0.002	0.001	0.000	0.000

Table 102: Statistical summary for SO_2 - 24-hour average concentrations
Station: Wollongong

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
2002	95.3	0	0.008	0.007	0.006	0.004	0.003	0.002	0.001	0.000
2003	98.4	0	0.006	0.005	0.005	0.003	0.003	0.001	0.001	0.000
2004	97.0	0	0.015	0.007	0.005	0.003	0.002	0.001	0.001	0.000
2005	97.5	0	0.006	0.006	0.003	0.003	0.002	0.001	0.001	0.000
2006	98.9	0	0.007	0.005	0.004	0.003	0.002	0.001	0.001	0.000
2007	79.2	0	0.008	0.006	0.005	0.003	0.002	0.002	0.001	0.000
2008	79.8	0	0.007	0.004	0.003	0.003	0.002	0.001	0.000	-0.001
2009	73.4	0	0.004	0.003	0.003	0.002	0.002	0.001	0.000	-0.001
2010	92.9	0	0.008	0.005	0.004	0.002	0.002	0.001	0.000	0.000
2011	96.7	0	0.009	0.004	0.003	0.003	0.002	0.001	0.000	0.000

Table 103: Statistical summary for SO_2 - 24-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
2005	75.3	0	0.008	0.006	0.005	0.004	0.003	0.002	0.001	0.000
2006	97.3	0	0.009	0.005	0.005	0.004	0.003	0.002	0.001	0.000
2007	45.8	0	0.012	0.012	0.007	0.005	0.003	0.002	0.001	0.000
2008	90.2	0	0.008	0.006	0.006	0.004	0.003	0.002	0.001	0.000
2009	73.4	0	0.010	0.008	0.006	0.004	0.004	0.002	0.001	0.000
2010	91.8	0	0.005	0.005	0.004	0.004	0.003	0.002	0.001	0.000
2011	98.9	0	0.009	0.006	0.005	0.005	0.004	0.002	0.001	0.000

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

Bold font indicates values that exceed the AAQ NEPM standard

Table 104: Statistical summary for SO_2 - 24-hour average concentrations
Station: Wallsend

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ppm)	Percentiles (ppm)						
				99th	98th	95th	90th	75th	50th	25th
2002	82.5	0	0.011	0.008	0.007	0.006	0.004	0.003	0.002	0.001
2003	93.7	0	0.010	0.008	0.005	0.004	0.003	0.002	0.001	0.001
2004	92.9	0	0.014	0.008	0.006	0.004	0.003	0.002	0.001	0.001
2005	97.5	0	0.007	0.006	0.005	0.004	0.003	0.002	0.001	0.000
2006	98.9	0	0.009	0.007	0.005	0.004	0.003	0.002	0.001	0.000
2007	83.6	0	0.007	0.006	0.006	0.005	0.004	0.002	0.001	0.000
2008	95.4	0	0.007	0.006	0.006	0.005	0.004	0.002	0.001	0.001
2009	68.2	0	0.007	0.006	0.006	0.004	0.003	0.002	0.001	0.000
2010	74.2	0	0.007	0.005	0.004	0.003	0.003	0.002	0.001	0.000
2011	99.5	0	0.007	0.005	0.005	0.003	0.002	0.001	0.001	0.000

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

Bold font indicates values that exceed the AAQ NEPM standard

Particles as PM_{10}

Statistical summary

Table 105: Statistical summary for PM_{10} - 24-hour average concentrations (2011)

Region/ Performance monitoring Station	Data availability rates (%)	Maximum conc. (ppm)	Percentiles (µg/m^3)						
			99th	98th	95th	90th	75th	50th	25th
Sydney									
Bringelly	98.9	**86.0**	41.5	36.5	30.7	25.0	18.9	14.3	10.6
Chullora	99.2	**65.2**	**55.8**	49.0	38.1	30.7	23.1	18.1	13.6
Liverpool	69.0	**68.8**	46.1	37.5	33.1	27.7	21.7	16.9	13.0
Macarthur	98.4	38.1	31.9	28.5	23.0	20.6	16.0	12.1	8.9
Oakdale	99.5	**54.7**	28.1	24.9	21.3	17.3	13.1	9.6	6.9
Prospect	98.4	41.5	35.9	31.7	27.4	24.1	19.4	15.3	11.0
Richmond	98.9	46.2	32.3	29.7	25.3	21.3	16.0	11.8	8.9
Rozelle	98.4	39.4	34.7	32.3	27.2	24.5	20.5	15.7	12.0
Illawarra									
Albion Park Sth	98.9	**51.0**	34.9	31.6	27.2	23.5	17.0	11.9	8.6
Kembla Grange	98.9	**55.5**	45.9	39.7	33.6	29.1	21.1	15.0	9.9
Wollongong	96.7	48.5	42.4	37.7	32.6	26.3	21.0	15.8	11.4
lower Hunter									
Beresfield	95.1	42.8	39.9	35.8	29.3	25.5	21.3	16.1	12.5
Newcastle	99.5	49.2	42.6	38.7	32.4	29.6	24.0	18.2	13.6
Regional									
Albury	90.7	28.0	25.2	23.7	19.9	17.9	14.5	11.9	9.2
Bathurst	97.3	24.3	23.2	21.1	18.6	17.5	13.8	10.3	7.8
Tamworth	96.7	**50.9**	34.0	27.4	22.4	19.2	15.8	12.3	9.1
Wagga Wagga / Wagga Wagga Nth*	96.3	39.2	33.9	31.5	27.5	24.1	19.1	14.4	10.5

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

* Wagga Wagga Nth site was commissioned in October 2011

Bold font indicates values that exceed the AAQ NEPM standard

The data availability rate at Liverpool was below 75% due to a flow problem with the instrument.

Table 106: Maximum 24-hour average concentrations for PM_{10} (µg/m^3)

Region/ Performance monitoring Station	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Sydney										
Bringelly	**117.7**	**187.8**	44.1			46.3*	41.8*	**1680.3***	40.1*	**86.0**
Chullora	**118.6**	**275.1**	**62.5**	**54.5**	**72.2**	**51.0**	**62.7**	**1683.9**	41.1	**65.2**
Liverpool		**213.7**	**55.8**	**50.7**	**66.1**	**66.5**	44.3	**1474.7**	42.1	**68.8**
Macarthur	**126.3**	**283.3**	**62.1**	**55.5**	**75.2**	**53.1**	**53.8**	**1579.8**	41.1	38.1
Oakdale			**60.6**	**53.2**	**92.3**	**53.1**	**65.5**	**1146.3**	**58.7**	**54.7**
Prospect			41.3	42.3	**56.5**	49.2	**68.2**	**1528.3**	33.3	41.5
Richmond	**127.3**	**196.4**	46.6	47.4	**63.1**	43.0	39.0	**1637.3**	37.0	46.2
Rozelle		38.1	**54.1**	46.8	**50.3**	**54.4**	43.1	**1562.8**	37.6	39.4
Illawarra										
Albion Park Sth					**61.4**	**53.8**	**96.1**	**1359.6**	41.8	**51.0**
Kembla Grange			**58.8**	**60.5**	**86.0**	**59.2**	**100.8**	**1174.0**	47.5	**55.5**
Wollongong	**75.6**	**280.5**	49.0	**56.5**	**63.3**	**58.5**	**78.3**	**1145.4**	49.6	48.5
Lower Hunter										
Beresfield	**165.6**	**87.0**	**53.1**	**53.1**	**51.9**	**64.0**	**59.9**	**1999.0**	50.0	42.8
Newcastle			46.7	48.3	**51.2**	**58.1**	**54.4**	**2426.8**	**57.1**	49.2
Regional										
Albury	**86.2**	**940.2**	**56.0**	**56.9**	**213.0**	**212.8**	**124.8**	**249.7**	**60.8**	28.0
Bathurst	**256.7**	**622.3**	**68.5**	44.9	**59.6**	**162.8**	**63.0**	**2114.4**	43.3	24.3
Tamworth	**197.1**	**241.6**	**56.2**	**88.7**	47.8	48.8	**100.4**	**1791.4**	29.1	**50.9**
Wagga Wagga / Wagga Wagga Nth*	**193.2**	**970.0**	**109.0**	**161.9**	**188.3**	**110.3**	**294.9**	**297.4**	**64.9**	39.2

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

* Wagga Wagga Nth site was commissioned in October 2011

Bold font indicates values that exceed the AAQ NEPM standard

Table 107: Statistical summary for PM_{10} - 24-hour average concentrations
Station: Blacktown[(1)]/Prospect[(2)]

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ug/m3)	Percentiles (µg/m^3)						
				99th	98th	95th	90th	75th	50th	25th
2002[(1)]	93.4	**11**	**117.7**	**89.2**	**66.9**	44.9	33.8	25.2	18.5	14.6
2003[(1)]	94.8	5	**187.8**	**69.4**	43.6	34.8	29.3	21.8	16.9	12.7
2004[(1)]	35.8	0	44.1	43.4	41.9	39.2	33.7	27.4	22.6	18.1
2005[#]										
2006[#]										
2007[(2)]	82.7	0	46.3	43.3	41.6	33.4	28.1	21.9	16.8	12.4
2008[(2)]	88.5	0	41.8	39.6	35.0	32.6	27.5	21.0	16.4	12.8
2009[(2)]	96.4	**11**	**1680.3**	**135.3**	**60.7**	38.9	32.3	24.1	18.2	13.5
2010[(2)]	97.5	0	40.1	31.7	30.1	26.7	22.8	18.7	14.9	11.2
2011[(2)]	98.4	0	41.5	35.9	31.7	27.4	24.1	19.4	15.3	11.0

Station closed pending relocation.

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

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ug/m3)	Percentiles (µg/m^3)						
				99th	98th	95th	90th	75th	50th	25th
2002	97.3	**12**	**118.6**	**76.9**	**66.3**	41.3	34.2	25.3	18.4	13.7
2003	97.0	**6**	**275.1**	**56.0**	44.3	34.1	28.7	21.7	16.6	11.8
2004	93.4	2	**62.5**	46.0	41.6	35.1	30.7	24.8	18.9	13.2
2005	92.1	2	**54.5**	46.5	43.5	35.7	30.8	23.8	18.4	13.7
2006	88.8	3	**72.2**	**52.3**	42.6	33.4	29.3	25.0	19.0	14.5
2007	99.5	1	**51.0**	48.5	42.4	33.5	30.3	23.7	16.6	12.0
2008	97.0	1	**62.7**	35.2	33.0	28.6	24.6	19.3	14.4	10.6
2009	94.8	**6**	**1683.9**	**114.8**	47.4	37.1	31.9	22.8	17.0	12.4
2010	97.3	0	41.1	37.5	33.9	29.1	23.7	18.5	14.4	10.7
2011	98.9	2	**86.0**	41.5	36.5	30.7	25.0	18.9	14.3	10.6

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

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ug/m3)	Percentiles (µg/m^3)						
				99th	98th	95th	90th	75th	50th	25th
2003	85.2	**11**	**213.7**	**61.1**	**57.5**	47.2	36.0	28.8	21.0	16.3
2004	90.7	3	**55.8**	49.8	46.2	39.0	34.2	27.2	21.2	16.1
2005	88.8	1	**50.7**	46.1	43.8	38.3	33.6	27.4	20.4	16.3
2006	97.0	3	**66.1**	49.2	38.6	34.4	31.1	26.4	21.3	16.5
2007	97.5	2	**66.5**	39.4	37.7	34.2	29.2	23.1	18.8	13.4
2008	97.0	0	44.3	38.8	36.5	33.0	30.2	23.7	18.6	13.9
2009	98.4	**9**	**1474.7**	**121.0**	**58.7**	38.1	32.7	25.0	19.9	14.8
2010	98.6	0	42.1	39.1	35.6	30.7	26.6	21.4	16.9	12.9
2011	99.2	**7**	**65.2**	**55.8**	49.0	38.1	30.7	23.1	18.1	13.6

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} - 24-hour average concentrations
Station: Liverpool

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ug/m3)	Percentiles (µg/m^3)						
				99th	98th	95th	90th	75th	50th	25th
2002	91.0	**14**	**126.3**	**83.8**	**72.5**	46.0	37.6	27.3	20.0	15.1
2003	90.1	**6**	**283.3**	**62.5**	45.8	37.4	32.3	25.3	19.4	14.8
2004	91.5	1	**62.1**	46.6	44.7	36.8	32.9	26.3	20.6	14.8
2005	96.4	2	**55.5**	48.1	43.7	38.1	32.5	26.5	20.2	15.1
2006	95.9	3	**75.2**	**50.5**	40.8	35.0	31.6	26.3	20.5	16.0
2007	95.3	1	**53.1**	41.3	39.1	35.9	30.3	23.7	17.6	12.8
2008	92.9	1	**53.8**	36.2	33.6	30.1	26.6	21.7	16.9	12.2
2009	93.7	**8**	**1579.8**	**114.8**	**59.5**	38.8	31.7	25.1	18.4	14.3
2010	97.3	0	41.1	35.3	33.0	29.9	26.2	20.4	16.2	12.0
2011	69.0	1	**68.8**	46.1	37.5	33.1	27.7	21.7	16.9	13.0

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

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ug/m3)	Percentiles (µg/m^3)						
				99th	98th	95th	90th	75th	50th	25th
2004	14.5	1	**60.6**	**60.6**	**53.8**	42.8	38.0	30.9	21.8	15.6
2005	83.6	1	**53.2**	46.6	41.9	35.7	31.3	24.4	18.1	13.7
2006	100.0	4	**92.3**	**53.5**	34.5	31.0	26.2	22.4	15.6	11.5
2007	96.4	1	**53.1**	38.0	36.7	29.8	25.8	20.1	14.7	10.4
2008	99.5	1	**65.5**	33.2	30.7	27.6	23.3	17.5	13.7	9.9
2009	96.7	**7**	**1146.3**	**111.4**	**56.2**	35.5	29.6	21.2	15.5	10.5
2010	99.5	1	**58.7**	35.7	30.9	26.8	21.5	16.7	12.5	9.5
2011	98.4	0	38.1	31.9	28.5	23.0	20.6	16.0	12.1	8.9

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

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ug/m3)	Percentiles (µg/m^3)						
				99th	98th	95th	90th	75th	50th	25th
2004	56.8	0	41.3	36.3	28.7	23.8	19.2	15.7	10.1	6.4
2005	92.9	0	42.3	38.8	32.5	27.7	22.2	16.6	12.4	8.4
2006	96.4	1	**56.5**	35.8	33.9	28.6	23.6	17.8	12.6	8.5
2007	97.3	0	49.2	36.4	32.2	25.4	22.4	16.4	11.2	7.2
2008	96.7	1	**68.2**	33.9	31.0	27.0	21.3	15.5	10.7	7.2
2009	91.2	**6**	**1528.3**	**130.2**	48.4	30.6	25.5	19.5	12.7	7.5
2010	99.5	0	33.3	29.3	27.9	23.3	18.1	13.4	9.2	6.6
2011	99.5	1	**54.7**	28.1	24.9	21.3	17.3	13.1	9.6	6.9

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

Bold font indicates values that exceed the AAQ NEPM standard

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

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ug/m3)	Percentiles (µg/m^3)						
				99th	98th	95th	90th	75th	50th	25th
2002	94.5	**16**	**127.3**	**106.2**	**84.7**	49.4	35.3	24.4	17.2	12.3
2003	96.7	**7**	**196.4**	**76.0**	**52.8**	35.4	28.8	21.1	15.7	11.3
2004	96.2	0	46.6	41.1	38.4	33.7	29.8	22.5	17.4	12.1
2005	97.0	0	47.4	43.8	37.3	30.3	25.8	20.1	15.3	11.5
2006	97.0	2	**63.1**	44.9	38.0	30.8	27.1	21.5	16.0	12.2
2007	98.4	0	43.0	34.4	33.4	28.6	24.3	18.6	13.6	10.0
2008	98.4	0	39.0	30.9	28.1	24.9	20.2	16.0	11.9	8.9
2009	95.9	**6**	**1637.3**	**121.7**	46.1	32.9	28.0	19.4	13.4	9.6
2010	96.2	0	37.0	30.2	26.9	24.6	20.6	15.9	12.0	9.2
2011	98.9	0	46.2	32.3	29.7	25.3	21.3	16.0	11.8	8.9

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

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ug/m3)	Percentiles (µg/m^3)						
				99th	98th	95th	90th	75th	50th	25th
2003	9.9	0	38.1	38.1	38.0	37.2	31.7	22.4	18.7	16.2
2004	92.3	1	**54.1**	43.8	38.8	34.0	30.1	24.6	19.3	14.0
2005	95.1	0	46.8	42.6	39.3	35.2	31.4	24.3	18.8	14.9
2006	94.0	1	**50.3**	45.0	38.8	33.6	29.3	24.7	19.4	15.4
2007	97.5	1	**54.4**	38.2	36.1	30.7	27.1	21.7	17.2	13.2
2008	96.4	0	43.1	34.0	32.6	28.7	26.0	20.6	16.7	12.9
2009	95.3	**8**	**1562.8**	**128.5**	**55.8**	36.1	31.0	24.3	17.8	13.1
2010	98.9	0	37.6	31.1	29.3	26.8	24.3	19.6	15.6	12.1
2011	98.4	0	39.4	34.7	32.3	27.2	24.5	20.5	15.7	12.0

Table 115: Statistical summary for PM_{10} - 24-hour average concentrations
Station: Albion Park Sth

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ug/m3)	Percentiles (µg/m^3)						
				99th	98th	95th	90th	75th	50th	25th
2006	85.8	2	**61.4**	42.3	38.6	35.9	29.4	21.7	15.3	10.5
2007	88.5	1	**53.8**	42.6	37.8	33.4	28.4	20.8	13.6	8.7
2008	97.0	1	**96.1**	40.0	35.3	29.7	25.2	18.2	13.0	9.4
2009	99.5	**9**	**1359.6**	**73.0**	**50.7**	38.0	31.6	22.8	15.4	10.1
2010	96.7	0	41.8	37.2	35.6	29.0	24.7	18.4	11.6	8.6
2011	98.9	1	**51.0**	34.9	31.6	27.2	23.5	17.0	11.9	8.6

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

Bold font indicates values that exceed the AAQ NEPM standard

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

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ug/m3)	Percentiles (µg/m^3)						
				99th	98th	95th	90th	75th	50th	25th
2004	57.4	1	**58.8**	46.8	43.3	37.0	30.3	21.8	14.9	10.5
2005	97.8	4	**60.5**	**50.8**	46.8	39.1	33.6	23.4	17.1	12.2
2006	99.2	**9**	**86.0**	**69.6**	**54.5**	40.4	34.5	26.0	18.7	13.0
2007	99.5	5	**59.2**	**50.5**	46.6	39.0	33.2	24.3	17.7	12.1
2008	98.6	4	**100.8**	**52.8**	42.0	33.3	30.3	23.3	16.7	11.1
2009	99.2	**14**	**1174.0**	**134.4**	**67.0**	42.5	34.0	25.5	18.0	11.5
2010	98.6	0	47.5	42.7	39.5	33.4	28.4	22.7	16.2	11.7
2011	98.9	1	**55.5**	45.9	39.7	33.6	29.1	21.1	15.0	9.9

Table 117: Statistical summary for PM_{10} - 24-hour average concentrations
Station: Wollongong

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ug/m3)	Percentiles (µg/m^3)						
				99th	98th	95th	90th	75th	50th	25th
2002	94.2	**11**	**75.6**	**65.9**	**57.3**	44.6	34.4	25.6	18.3	13.7
2003	98.1	**8**	**280.5**	**61.8**	**51.3**	34.7	29.3	21.4	16.8	12.4
2004	97.0	0	49.0	46.2	42.3	36.7	30.6	23.4	17.4	12.2
2005	97.3	1	**56.5**	45.6	41.9	34.5	29.8	23.6	16.7	12.6
2006	96.4	4	**63.3**	**52.6**	46.7	37.5	32.3	25.1	18.5	13.0
2007	95.3	3	**58.5**	49.3	42.7	37.8	31.8	24.7	18.3	13.1
2008	94.5	1	**78.3**	41.0	36.8	31.2	28.7	21.5	16.3	12.1
2009	95.9	**6**	**1145.4**	**107.0**	49.5	40.3	34.7	24.5	18.8	12.6
2010	95.1	0	49.6	44.2	40.2	31.9	28.3	22.4	15.8	12.1
2011	96.7	0	48.5	42.4	37.7	32.6	26.3	21.0	15.8	11.4

Table 118: Statistical summary for PM_{10} - 24-hour average concentrations
Station: Beresfield

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ug/m3)	Percentiles (µg/m^3)						
				99th	98th	95th	90th	75th	50th	25th
2002	80.5	**25**	**165.6**	**103.4**	**71.2**	**56.7**	47.3	33.2	21.7	16.1
2003	91.2	5	**87.0**	**60.7**	47.5	34.0	29.0	22.7	17.5	13.1
2004	87.2	1	**53.1**	47.2	43.8	39.2	33.1	24.9	19.3	14.0
2005	95.9	1	**53.1**	44.3	41.1	37.0	31.7	25.2	18.6	14.6
2006	96.4	2	**51.9**	44.5	43.2	36.8	34.2	26.7	18.7	14.6
2007	90.1	5	**64.0**	**55.1**	49.3	41.8	32.1	25.2	18.4	13.1
2008	95.4	5	**59.9**	**52.5**	38.3	32.3	27.3	21.5	16.9	13.4
2009	98.6	**15**	**1999.0**	**174.3**	**70.6**	47.7	35.3	26.2	18.4	14.2
2010	97.0	0	50.0	37.7	32.1	28.3	24.7	20.0	15.4	12.3
2011	95.1	0	42.8	39.9	35.8	29.3	25.5	21.3	16.1	12.5

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

Bold font indicates values that exceed the AAQ NEPM standard

Table 119: Statistical summary for PM_{10} - 24-hour average concentrations
Station: Newcastle

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ug/m3)	Percentiles (µg/m^3)						
				99th	98th	95th	90th	75th	50th	25th
2004	19.4	0	46.7	46.6	46.6	39.4	34.1	27.3	21.7	17.0
2005	81.6	0	48.3	41.7	39.3	35.7	31.8	26.4	20.9	16.5
2006	97.3	1	**51.2**	43.2	38.1	34.2	30.8	25.6	20.5	15.8
2007	47.1	3	**58.1**	**56.8**	49.9	39.5	33.6	26.8	21.5	17.2
2008	93.2	2	**54.4**	44.2	39.6	34.4	31.4	24.8	19.1	15.1
2009	93.2	**13**	**2426.8**	**119.5**	**71.2**	44.9	37.0	28.1	22.3	16.5
2010	96.2	1	**57.1**	38.7	34.7	30.3	27.3	23.1	17.9	13.7
2011	99.5	0	49.2	42.6	38.7	32.4	29.6	24.0	18.2	13.6

Table 120: Statistical summary for PM_{10} - 24-hour average concentrations
Station: Albury

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ug/m3)	Percentiles (µg/m^3)						
				99th	98th	95th	90th	75th	50th	25th
2002	82.5	5	**86.2**	**62.5**	45.2	38.9	31.0	22.9	16.0	12.9
2003	80.8	**29**	**940.2**	**272.5**	**201.3**	**95.2**	49.3	23.1	14.2	9.7
2004	77.3	2	**56.0**	45.0	41.0	36.7	32.2	18.6	13.2	9.9
2005	90.1	3	**56.9**	**50.4**	41.0	36.2	30.7	20.4	14.3	10.9
2006	87.9	**14**	**213.0**	**114.8**	**75.8**	48.1	35.4	24.0	17.8	13.3
2007	91.2	**11**	**212.8**	**117.3**	**91.5**	44.9	31.4	22.3	15.2	11.0
2008	96.4	**8**	**124.8**	**67.8**	**53.5**	40.2	29.7	20.7	14.3	9.9
2009	96.7	**15**	**249.7**	**144.0**	**102.0**	39.0	28.5	19.3	14.0	10.1
2010	99.5	2	**60.8**	45.1	31.6	24.1	19.4	14.6	11.2	8.6
2011	90.7	0	28.0	25.2	23.7	19.9	17.9	14.5	11.9	9.2

Table 121: Statistical summary for PM_{10} - 24-hour average concentrations
Station: Bathurst

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ug/m3)	Percentiles (µg/m^3)						
				99th	98th	95th	90th	75th	50th	25th
2002	91.5	**16**	**256.7**	**98.3**	**71.9**	48.9	35.9	25.0	16.7	12.5
2003	90.4	**12**	**622.3**	**122.2**	**74.1**	34.8	27.9	17.2	13.0	8.9
2004	88.5	4	**68.5**	**54.9**	47.0	39.0	33.0	24.4	15.3	9.8
2005	93.2	0	44.9	40.8	36.3	30.4	25.4	18.6	12.9	8.9
2006	98.6	3	**59.6**	46.0	44.3	35.2	28.6	22.3	15.4	11.5
2007	95.1	2	**162.8**	48.6	38.9	32.0	26.6	19.2	13.5	9.2
2008	94.8	1	**63.0**	40.8	35.9	28.8	24.1	16.9	12.3	8.8
2009	97.8	**12**	**2114.4**	**122.4**	**69.8**	36.9	26.8	20.3	13.8	9.0
2010	98.6	0	43.3	32.6	26.7	21.2	18.5	12.5	7.9	5.0
2011	97.3	0	24.3	23.2	21.1	18.6	17.5	13.8	10.3	7.8

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

Bold font indicates values that exceed the AAQ NEPM standard

Table 122: Statistical summary for PM_{10} - 24-hour average concentrations
Station: Tamworth

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ug/m3)	Percentiles (µg/m^3)						
				99th	98th	95th	90th	75th	50th	25th
2002	99.2	**7**	**197.1**	**70.1**	**51.5**	41.3	33.7	23.2	17.5	13.0
2003	92.9	**7**	**241.6**	**70.7**	**51.4**	34.7	25.8	19.7	15.1	11.4
2004	79.2	2	**56.2**	47.0	40.4	34.8	31.0	24.8	19.4	15.4
2005	68.2	2	**88.7**	42.9	33.7	29.8	27.4	20.6	14.8	10.6
2006	79.2	0	47.8	39.0	36.7	29.3	26.7	21.3	15.0	11.0
2007	73.7	0	48.8	42.3	34.5	30.3	26.2	19.4	14.7	10.1
2008	85.8	3	**100.4**	**52.0**	40.7	30.5	23.8	18.7	14.0	10.5
2009	96.7	**17**	**1791.4**	**235.9**	**120.7**	47.0	33.8	22.8	15.7	11.4
2010	98.4	0	29.1	26.5	24.6	21.8	18.4	14.7	11.2	8.3
2011	96.7	1	**50.9**	34.0	27.4	22.4	19.2	15.8	12.3	9.1

Table 123: Statistical summary for PM_{10} - 24-hour average concentrations
Station: Wagga Wagga / Wagga Wagga Nth*

Year	Data availability rates (%)	Number of Exceedences (days)	Maximum value (ug/m3)	Percentiles (µg/m^3)						
				99th	98th	95th	90th	75th	50th	25th
2002	99.2	**34**	**193.2**	**123.3**	**101.9**	**60.7**	48.7	33.6	24.6	17.1
2003	87.4	**21**	**970.0**	**133.9**	**101.9**	**56.7**	44.6	28.9	19.3	12.8
2004	91.0	**28**	**109.0**	**70.5**	**68.5**	**61.3**	47.0	33.2	21.5	13.8
2005	90.7	**27**	**161.9**	**80.9**	**72.4**	**59.5**	46.4	30.4	19.8	14.1
2006	95.6	**37**	**188.3**	**110.0**	**86.8**	**61.1**	**50.7**	36.2	24.9	16.9
2007	97.5	**34**	**110.3**	**82.0**	**75.2**	**61.0**	47.5	33.0	21.7	14.8
2008	93.7	**23**	**294.9**	**70.6**	**62.6**	**53.2**	45.1	28.4	21.0	14.5
2009	82.5	**21**	**297.4**	**214.4**	**112.3**	**55.9**	46.2	30.6	19.8	12.4
2010	97.0	**6**	**64.9**	**52.1**	48.5	38.7	29.0	21.5	15.4	10.0
2011*	96.3	0	39.2	33.9	31.5	27.5	24.1	19.1	14.4	10.5

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

* Wagga Wagga Nth site was commissioned in October 2011

Bold font indicates values that exceed the AAQ NEPM standard

Particles as $PM_{2.5}$

Note on continuous TEOM $PM_{2.5}$ data after 2010

The current approved compliance method for monitoring $PM_{2.5}$ is a non-continuous (batch), 1-day-in-3 technique that requires pre and post laboratory weighing. This introduces a significant time delay in acquiring data so jurisdictions use other continuous techniques (e.g. TEOM monitors) to provide the near real-time reporting of air quality via the web expected by the community. However, the $PM_{2.5}$ AAQ NEPM variation requires us to report all $PM_{2.5}$ data (by the compliance method and continuous) and historically, our $PM_{2.5}$ data collected by the continuous TEOM method have been reported with the internal USEPA PM_{10} equivalency factors of A = 3 and B = 1.03 (where y = A + Bx) included in the calculation.

Prior to the report of 2010, assessments of continuous TEOM $PM_{2.5}$ data in the main body of the report used data with these PM_{10} equivalency factors applied (Table 21, Tables 124 to 134). Removing the PM_{10} equivalency factor brings NSW in line with other Australian jurisdictions and more approximates that data from the reference method specified in the $PM_{2.5}$ AAQ NEPM variation.

Statistical summary

Table 124: Statistical summary for $PM_{2.5}$ - Daily 24-hour average concentrations (2011) – continuous TEOM method

Region/ Performance monitoring Station	Data availability rates (%)	Maximum conc. (µg/m^3)	Percentiles (µg/m^3)						
			99th	98th	95th	90th	75th	50th	25th
Sydney									
Chullora	98.9	23.9	18.6	16.2	12.3	10.8	7.6	5.2	3.4
Earlwood	96.2	23.6	18.4	15.8	12.7	10.5	6.9	4.5	2.8
Liverpool	99.2	**38.0**	20.7	16.2	14.0	10.9	7.4	4.9	3.1
Richmond	97.8	**42.9**	22.7	15.7	10.6	8.6	6.2	3.7	2.2
Illawarra									
Wollongong	96.4	17.7	16.0	14.1	11.2	8.8	6.4	3.8	2.4
lower Hunter									
Beresfield	99.2	18.8	15.0	13.5	11.0	9.7	7.0	4.9	3.2
Wallsend	100.0	16.2	13.9	12.3	10.9	8.8	6.2	4.2	2.7

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

Bold font indicates values in excess of the AAQ NEPM advisory reporting standard

* Please note that all $PM_{2.5}$ TEOM data-uses USEPA factors of A=0 and B=1.00

Trend data

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

Table 125: Maximum 24-hour average concentrations for $PM_{2.5}$ (µg/m^3) – continuous TEOM method

Region/ Performance monitoring Station	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Sydney										
Chullora		**81.2**	23.5	**25.4**	**32.8**	20.5	19.5	**183.2**	24.2	23.9
Earlwood	**50.5**	**35.3**	20.1	**26.8**	**29.0**	19.8	18.3	**186.7**	22.5	23.6
Liverpool	**78.7**	**45.9**	**38.9**	**30.8**	**48.1**	23.0	**32.1**	**268.2**	21.8	**38.0**
Richmond	**95.4**	**57.2**	23.3	22.7	**31.6**	21.1	17.7	**192.3**	20.8	**42.9**
Illawarra										
Warrawong	**83.5**	**152.6**	23.6	24.0	15.0					
Wollongong	**86.2**	**106.0**	22.6	22.0	**26.6**	22.5	14.7	**241.0**	23.5	17.7
lower Hunter										
Beresfield	**47.0**	**42.8**	**27.8**	19.5	24.9	23.0	16.9	**230.9**	**25.9**	18.8
Wallsend	**55.6**	**30.2**	23.5	18.0	**25.6**	18.2	22.7	**415.6**	18.8	16.2

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

Bold font indicates values in excess of the AAQ NEPM advisory reporting standard

* Please note that all $PM_{2.5}$ TEOM data-uses USEPA factors of A=0 and B=1.00

$PM_{2.5}$ 24 hour average

$PM_{2.5}$ TEOM 24 hour daily averages provided in NEPM reports from 2009 onwards will differ from those reported previously as the US EPA PM_{10} equivalence factors have been removed from all TEOM $PM_{2.5}$ data values; in reports prior to 2009 these factors were left in.

Table 126: Annual average concentrations for $PM_{2.5}$ (µg/m^3) - continuous TEOM method

Region/ Performance monitoring Station	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Sydney										
Chullora		**11.0**	**8.6**	7.6	7.2	6.4	5.9	7.1	5.7	5.9
Earlwood	**9.5**	7.8	7.6	7.1	6.9	5.9	5.4	6.8	5.6	5.4
Liverpool	**11.8**	**10.3**	**9.2**	**8.3**	**8.8**	7.2	6.4	**8.2**	6.3	5.9
Richmond	**9.0**	6.8	6.4	5.8	5.9	6.4	7.3	5.8	4.2	4.7
Illawarra										
Warrawong	**9.4**	**8.7**	**8.1**	7.4	6.0					
Wollongong	**8.3**	7.3	6.6	6.3	6.3	5.9	5.2	7.0	5.0	4.6
lower Hunter										
Beresfield	**10.4**	6.1	7.7	6.8	6.8	6.3	5.9	**8.4**	5.9	5.5
Wallsend	**8.1**	6.6	6.7	6.5	6.4	5.8	5.8	8.0	4.6	4.8

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

Bold font indicates values in excess of the AAQ NEPM advisory reporting standard

* Please note that all $PM_{2.5}$ TEOM data-uses USEPA factors of A=0 and B=1.00

Statistical trends

Table 127: Statistical summary for $PM_{2.5}$ - 24-hour average concentrations – continuous TEOM method

Station: Chullora

Year	Data availability rates (%)	Days above advisory reporting standard	Maximum value (µg/m^3)	Percentiles (µg/m^3)						
				99th	98th	95th	90th	75th	50th	25th
2003	70.4	7	**81.2**	**36.5**	**25.3**	19.2	16.8	13.1	9.7	7.6
2004	89.6	0	23.5	20.0	18.5	15.9	14.0	10.9	7.9	5.7
2005	93.2	2	**25.4**	19.5	17.2	15.1	12.9	9.2	6.7	5.0
2006	94.2	2	**32.8**	16.6	14.6	13.1	11.4	8.8	6.4	4.8
2007	65.5	0	20.5	17.4	16.8	13.4	11.9	8.1	5.4	3.7
2008	96.7	0	19.5	16.6	14.4	11.8	9.9	7.6	5.4	3.7
2009	98.6	3	**183.2**	18.9	17.2	14.0	11.1	8.5	5.9	3.9
2010	93.4	0	24.2	17.7	15.2	11.9	9.9	7.3	5.0	3.4
2011	98.9	0	23.9	18.6	16.2	12.3	10.8	7.6	5.2	3.4

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

Bold font indicates values in excess of the AAQ NEPM advisory reporting standard

* Please note that all $PM_{2.5}$ TEOM data-uses USEPA factors of A=0 and B=1.00

Table 128: Statistical summary for $PM_{2.5}$ - 24-hour average concentrations – continuous TEOM method

Station: Earlwood

Year	Data availability rates (%)	Days above advisory reporting standard	Maximum value (µg/m^3)	Percentiles (µg/m^3)						
				99th	98th	95th	90th	75th	50th	25th
2002	98.9	9	**50.5**	**47.1**	**28.6**	19.9	17.3	11.7	7.8	4.9
2003	98.6	5	**35.3**	**30.4**	24.2	16.3	14.3	9.7	6.5	4.5
2004	96.2	0	20.1	19.5	18.0	15.1	13.1	10.1	6.8	4.5
2005	98.9	2	**26.8**	20.1	18.7	14.0	12.2	9.1	6.1	4.4
2006	98.6	2	**29.0**	17.8	15.1	13.1	11.6	8.3	6.4	4.4
2007	96.7	0	19.8	16.8	15.6	12.2	10.5	7.8	5.2	3.3
2008	98.6	0	18.3	15.3	14.7	11.3	9.6	7.2	4.9	3.2
2009	75.6	1	**186.7**	22.5	18.9	13.9	11.3	8.2	5.2	3.4
2010	95.9	0	22.5	16.5	14.2	11.5	9.7	7.3	5.0	3.4
2011	96.2	0	23.6	18.4	15.8	12.7	10.5	6.9	4.5	2.8

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

Bold font indicates values in excess of the AAQ NEPM advisory reporting standard

* Please note that all $PM_{2.5}$ TEOM data-uses USEPA factors of A=0 and B=1.00

Table 129: Statistical summary for $PM_{2.5}$ - 24-hour average concentrations – continuous TEOM method

Station: Liverpool

Year	Data availability rates (%)	Days above advisory reporting standard	Maximum value (µg/m^3)	Percentiles (µg/m^3)						
				99th	98th	95th	90th	75th	50th	25th
2002	96.7	19	**78.7**	**46.8**	**35.0**	**25.9**	22.2	14.6	9.6	6.3
2003	65.8	6	**45.9**	**42.9**	**29.4**	20.7	17.2	13.4	8.8	6.3
2004	85.5	4	**38.9**	**27.3**	23.3	17.2	15.8	11.8	8.5	5.1
2005	91.2	2	**30.8**	24.2	22.0	17.2	15.3	10.9	7.3	4.9
2006	98.6	3	**48.1**	22.2	18.5	15.8	14.1	11.0	8.3	5.9
2007	94.8	0	23.0	19.4	18.3	15.2	12.1	9.2	6.6	4.3
2008	92.6	1	**32.1**	16.6	14.9	12.2	10.6	8.3	5.8	3.9
2009	95.1	3	**268.2**	**25.2**	19.9	15.0	12.9	9.7	6.7	4.2
2010	95.9	0	21.8	17.8	15.5	13.2	10.9	8.1	5.5	3.8
2011	99.2	2	**38.0**	20.7	16.2	14	10.9	7.4	4.9	3.1

Bold font indicates values in excess of the AAQ NEPM advisory reporting standard

* Please note that all $PM_{2.5}$ TEOM data-uses USEPA factors of A=0 and B=1.00

Table 130: Statistical summary for $PM_{2.5}$ - 24-hour average concentrations – continuous TEOM method

Station: Richmond

Year	Data availability rates (%)	Days above advisory reporting standard	Maximum value (µg/m^3)	Percentiles (µg/m^3)						
				99th	98th	95th	90th	75th	50th	25th
2002	64.4	9	**95.4**	**56.0**	**41.6**	22.1	15.1	10.3	6.8	3.8
2003	95.9	6	**57.2**	**39.9**	24.5	15.7	11.7	7.8	5.2	3.4
2004	96.7	0	23.3	20.1	17.7	14.2	11.5	8.5	5.7	3.4
2005	83.8	0	22.7	15.7	14.5	12.4	10.8	7.3	4.9	3.3
2006	84.9	1	**31.6**	17.4	13.1	10.9	9.3	7.4	5.3	3.8
2007	12.9	0	21.1	18.6	16.0	13.6	9.5	7.7	6.0	4.3
2008	98.9	0	17.7	14.6	13.7	12.3	10.5	8.6	6.9	5.6
2009	89.3	3	**192.3**	23.0	16.9	11.5	9.8	6.7	4.4	2.8
2010	97.0	0	20.8	13.7	12.2	9.2	7.9	5.7	3.5	2.1
2011	97.8	2	**42.9**	22.7	15.7	10.6	8.6	6.2	3.7	2.2

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

Bold font indicates values in excess of the AAQ NEPM advisory reporting standard

* Please note that all $PM_{2.5}$ TEOM data-uses USEPA factors of A=0 and B=1.00

Table 131: Statistical summary for $PM_{2.5}$ - 24-hour average concentrations – continuous TEOM method

Station: Warrawong

Year	Data availability rates (%)	Days above advisory reporting standard	Maximum value (µg/m^3)	Percentiles (µg/m^3)						
				99th	98th	95th	90th	75th	50th	25th
2000	97.3	2	**30.8**	17.9	15.8	12.1	9.9	7.3	5.1	3.6
2001	95.1	0	19.8	18.1	17.2	14.5	11.7	8.8	5.7	3.6
2002	96.7	10	**83.5**	**42.4**	**30.3**	21.7	17.4	11.9	7.4	4.9
2003	98.4	4	**152.6**	**26.0**	21.4	17.7	14.4	10.9	7.5	5.0
2004	94.5	0	23.6	21.0	18.6	17.0	14.4	10.8	7.2	4.8
2005	94.5	0	24.0	21.0	18.7	15.7	13.2	9.7	6.5	4.3
2006	40.5	0	15.0	15.0	14.0	12.5	10.8	8.3	5.9	3.3

Bold font indicates values in excess of the AAQ NEPM advisory reporting standard

* Please note that all $PM_{2.5}$ TEOM data-uses USEPA factors of A=0 and B=1.00

Table 132: Statistical summary for $PM_{2.5}$ - 24-hour average concentrations – continuous TEOM method

Station: Wollongong

Year	Data availability rates (%)	Days above advisory reporting standard	Maximum value (µg/m^3)	Percentiles (µg/m^3)						
				99th	98th	95th	90th	75th	50th	25th
2002	95.6	11	**86.2**	**46.4**	**26.1**	21.9	15.0	10.3	6.3	4.0
2003	97.0	5	**106.0**	**30.9**	20.8	15.2	12.6	8.6	6.0	4.2
2004	97.0	0	22.6	19.1	17.6	14.5	12.3	8.9	5.9	3.6
2005	97.8	0	22.0	18.0	16.6	13.0	11.9	8.2	5.5	3.8
2006	100.0	2	**26.6**	17.4	14.4	12.5	11.2	8.4	5.7	3.6
2007	98.4	0	22.5	18.5	16.3	13.7	10.8	7.7	5.2	3.2
2008	94.0	0	14.7	14.2	13.0	10.7	9.3	7.0	4.8	3.0
2009	96.2	3	**241.0**	23.0	19.3	15.0	12.0	8.3	5.6	3.4
2010	92.9	0	23.5	15.0	13.8	11.0	9.2	6.3	4.2	3.0
2011	96.4	0	17.7	16.0	14.1	11.2	8.8	6.4	3.8	2.4

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

Bold font indicates values in excess of the AAQ NEPM advisory reporting standard

* Please note that all $PM_{2.5}$ TEOM data-uses USEPA factors of A=0 and B=1.00

Table 133: Statistical summary for $PM_{2.5}$ - 24-hour average concentrations – continuous TEOM method

Station: Beresfield

Year	Data availability rates (%)	Days above advisory reporting standard	Maximum value (µg/m^3)	Percentiles (µg/m^3)						
				99th	98th	95th	90th	75th	50th	25th
2002	95.1	19	**47.0**	**42.8**	**36.3**	**26.1**	18.7	12.4	8.2	5.5
2003	90.7	3	**42.8**	**26.7**	19.8	14.3	10.7	7.7	5.1	3.1
2004	90.4	1	**27.8**	20.3	19.6	16.5	13.3	9.8	7.1	4.6
2005	93.7	0	19.5	17.8	16.3	14.9	12.2	8.8	5.9	4.1
2006	98.9	0	24.9	17.8	15.5	13.3	11.4	8.5	5.9	4.3
2007	86.0	0	23.0	17.2	15.9	13.6	11.5	8.4	5.5	3.5
2008	92.1	0	16.9	15.1	13.9	11.7	9.7	7.7	5.7	3.6
2009	94.0	5	**230.9**	**34.4**	21.5	16.3	13.6	9.6	6.6	4.7
2010	97.3	1	**25.9**	15.1	13.3	11.7	9.9	7.5	5.3	4.0
2011	99.2	0	18.8	15.0	13.5	11.0	9.7	7.0	4.9	3.2

Bold font indicates values in excess of the AAQ NEPM advisory reporting standard

* Please note that all $PM_{2.5}$ TEOM data-uses USEPA factors of A=0 and B=1.00

Table 134: Statistical summary for $PM_{2.5}$ - 24-hour average concentrations – continuous TEOM method

Station: Wallsend

Year	Data availability rates (%)	Days above advisory reporting standard	Maximum value (µg/m^3)	Percentiles (µg/m^3)						
				99th	98th	95th	90th	75th	50th	25th
2002	85.5	9	**55.6**	**40.5**	**29.4**	19.5	14.2	9.5	6.1	4.2
2003	88.2	2	**30.2**	22.9	18.5	13.4	11.1	8.7	5.5	3.8
2004	87.4	0	23.5	17.4	15.2	12.8	11.0	8.5	5.8	4.2
2005	95.9	0	18.0	16.5	15.3	13.3	11.3	8.3	5.8	4.1
2006	99.2	1	**25.6**	16.6	14.5	12.1	10.5	8.2	5.8	4.1
2007	92.3	0	18.2	15.2	14.9	12.3	10.0	7.5	5.1	3.3
2008	87.7	0	22.7	18.3	14.7	12.0	10.1	7.5	5.1	3.4
2009	90.7	5	**415.6**	**38.4**	20.3	14.3	12.5	8.1	5.4	3.8
2010	92.9	0	18.8	11.9	10.7	8.8	7.4	5.7	4.2	3.0
2011	100.0	0	16.2	13.9	12.3	10.9	8.8	6.2	4.2	2.7

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

Bold font indicates values in excess of the AAQ NEPM advisory reporting standard

* Please note that all $PM_{2.5}$ TEOM data-uses USEPA factors of A=0 and B=1.00

Statistical summary

Table 135: Statistical summary for $PM_{2.5}$ - Daily 24-hour average concentrations (2011) – FRM method

Region/ Performance monitoring Station	Data availability rates (%)	Maximum conc. (µg/m^3)	Percentiles (µg/m^3)						
			99th	98th	95th	90th	75th	50th	25th
Sydney									
Chullora	77.9	16.7	16.3	15.5	13.9	12.5	7.5	5.4	3.8

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

Bold font indicates values in excess of the AAQ NEPM advisory reporting standard

* data availability rates are based on a one day in three sampling regime.

** Please note that sampling at the Richmond site ceased at the end of 2007

Trend data

Annual averages and annual maximum 24-hour averages for all stations are given below. Please note that monitoring as part of this study did not begin until February 2005, and monitoring ceased at Richmond in September 2007 due to technical issues. Please note that the data availability rates are based on a one day in three sampling regime.

Table 136: Maximum 24-hour average concentrations for $PM_{2.5}$ (µg/m^3) – FRM method

Region/ Performance monitoring Station	2005	2006	2007	2008	2009	2010	2011
Sydney							
Chullora	**27.8**	**30.0**	19.2	22.1	**27.5**	**28.2**	16.7
Richmond	**28.8**	**45.8**	18.3				

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

Bold font indicates values in excess of the AAQ NEPM advisory reporting standard

* data availability rates are based on a one day in three sampling regime.

** Please note that monitoring at Richmond ceased in 2007

Table 137: Annual average concentrations for $PM_{2.5}$ (µg/m^3) – FRM method

Region/ Performance monitoring Station	2005	2006	2007	2008	2009	2010	2011
Sydney							
Chullora	7.3	6.8	6.7	6.1	6.7	6.5	6.2
Richmond	6.4	6.5	6.6				

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

Bold font indicates values in excess of the AAQ NEPM advisory reporting standard

* data availability rates are based on a one day in three sampling regime.

** Please note that monitoring at Richmond ceased in 2007

Table 138: Statistical summary for $PM_{2.5}$ - 24-hour average concentrations –FRM method
Station: Chullora

Year	Data availability rates (%)	Days above advisory reporting standard	Maximum value (µg/m^3)	Percentiles (µg/m^3)						
				99th	98th	95th	90th	75th	50th	25th
2005	72.1	1	**27.8**	19.1	17.6	13.0	11.7	9.2	6.7	4.6
2006	84.4	1	**30.0**	20.3	16.6	13.3	11.2	8.3	5.8	4.1
2007	80.3	0	19.2	15.5	14.6	13.8	11.4	8.2	5.8	4.0
2008	88.5	0	22.1	19.2	14.3	11.5	10.5	7.2	5.4	4.0
2009	87.6	2	**27.5**	**26.7**	19.1	13.1	11.3	9.1	5.4	3.8
2010	83.8	1	**28.2**	21.9	16.6	12.8	11.0	7.5	5.8	4.2
2011	77.9	0	16.7	16.3	15.5	13.9	12.5	7.5	5.4	3.8

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

Bold font indicates values in excess of the AAQ NEPM advisory reporting standard

* data availability rates are based on a one day in three sampling regime.

Table 139: Statistical summary for $PM_{2.5}$ - 24-hour average concentrations – FRM method
Station: Richmond

Year	Data availability rates (%)	Days above advisory reporting standard	Maximum value (µg/m^3)	Percentiles (µg/m^3)						
				99th	98th	95th	90th	75th	50th	25th
2005	69.7	2	**28.8**	**27.7**	21.3	13.3	11.5	7.5	5.0	3.3
2006	68.9	1	**45.8**	19.3	13.0	11.3	10.6	8.0	5.8	3.6
2007	49.2	0	18.3	16.8	15.7	15.4	11.8	8.8	5.6	3.6

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

Bold font indicates values in excess of the AAQ NEPM advisory reporting standard

* data availability rates are based on a one day in three sampling regime.

** Please note that sampling at the Richmond site ceased at the end of 2007