

# Queensland air monitoring report 2012

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National Environment Protection (Ambient Air Quality)  
Measure

Air Quality Monitoring, Science Delivery Division

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## Summary

This report fulfils the annual reporting requirements for Queensland under clause 18 of the National Environment Protection (Ambient Air Quality) Measure.

Air monitoring at National Environment Protection (Ambient Air Quality) Measure (AAQ NEPM) monitoring stations in Queensland between January and December 2012 showed no exceedences of the AAQ NEPM air quality standards for carbon monoxide, nitrogen dioxide, ozone and lead at any monitoring site during the year. Exceedences of AAQ NEPM standards and advisory standards occurred for:

- one-hour average sulfur dioxide at the Menzies and The Gap sites in Mount Isa due to industrial emissions
- 24-hour average PM<sub>10</sub> (particles less than 10µm in diameter) at the Mountain Creek and Flinders View sites in South East Queensland, the South Gladstone site, the West Mackay site and The Gap site in Mount Isa due to smoke from bushfires or hazard-reduction burning, or windblown dust
- 24-hour average PM<sub>2.5</sub> (particles less than 2.5µm in diameter) at the South Gladstone site due to bushfire smoke.

The AAQ NEPM goal was met in all regions during 2012 with the exception of:

- one-hour average sulfur dioxide emissions at the Menzies and The Gap sites in Mount Isa due to industrial emissions
- 24-hour average PM<sub>10</sub> emissions at the The Gap site in Mount Isa due to smoke from bushfires or windblown dust.

Compliance with the AAQ NEPM standards and goal could not be demonstrated at some monitoring sites in 2012 because data availability was below the level required to make a valid assessment. The Rocklea site in South East Queensland was damaged by flooding in January 2011 and was offline until May 2012. The Arundel site in South East Queensland closed in February at the end of the campaign monitoring period. Instrument failure was responsible for low data availability for nitrogen dioxide, ozone, sulphur dioxide, PM<sub>10</sub> and PM<sub>2.5</sub> at Springwood and nitrogen dioxide, PM<sub>10</sub> and PM<sub>2.5</sub> at South Gladstone.

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## Introduction

Under clause 18 of the AAQ NEPM, jurisdictions are required to submit an annual report on their compliance with the Measure. The National Environment Protection (Ambient Air Quality) Measure Technical Paper No. 8 “Annual Reports”<sup>1</sup> details the requirements of the annual report.

Queensland’s ambient air monitoring plan<sup>2</sup> outlines the monitoring to be undertaken in Queensland to determine compliance with the Standards and Goal of the AAQ NEPM. It should be noted that this monitoring is only a part of the overall air monitoring network operated by the Department of Science, Information Technology, Innovation and the Arts (DSITIA).

This report documents compliance information for Queensland for 2012 in accordance with Technical Paper No. 8.

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<sup>1</sup> available from <[www.scew.gov.au/archive/air/aaq-nepm.html](http://www.scew.gov.au/archive/air/aaq-nepm.html)>

<sup>2</sup> available from <[www.ehp.qld.gov.au/air/reports/ambient.html](http://www.ehp.qld.gov.au/air/reports/ambient.html)>

## Section A – Monitoring summary

Details of AAQ NEPM monitoring and related activities in Queensland during 2012 follow.

### Current AAQ NEPM monitoring stations

During 2012 monitoring was conducted in five of the ten regions identified in the Queensland monitoring plan – South East Queensland (consisting of four sub-regions), Gladstone, Mackay, Townsville and Mount Isa. Monitoring site locations are shown in Figure 1.

Table 1 contains a descriptive summary of each monitoring site. In line with the descriptions contained in the AAQ NEPM, sites are identified as:

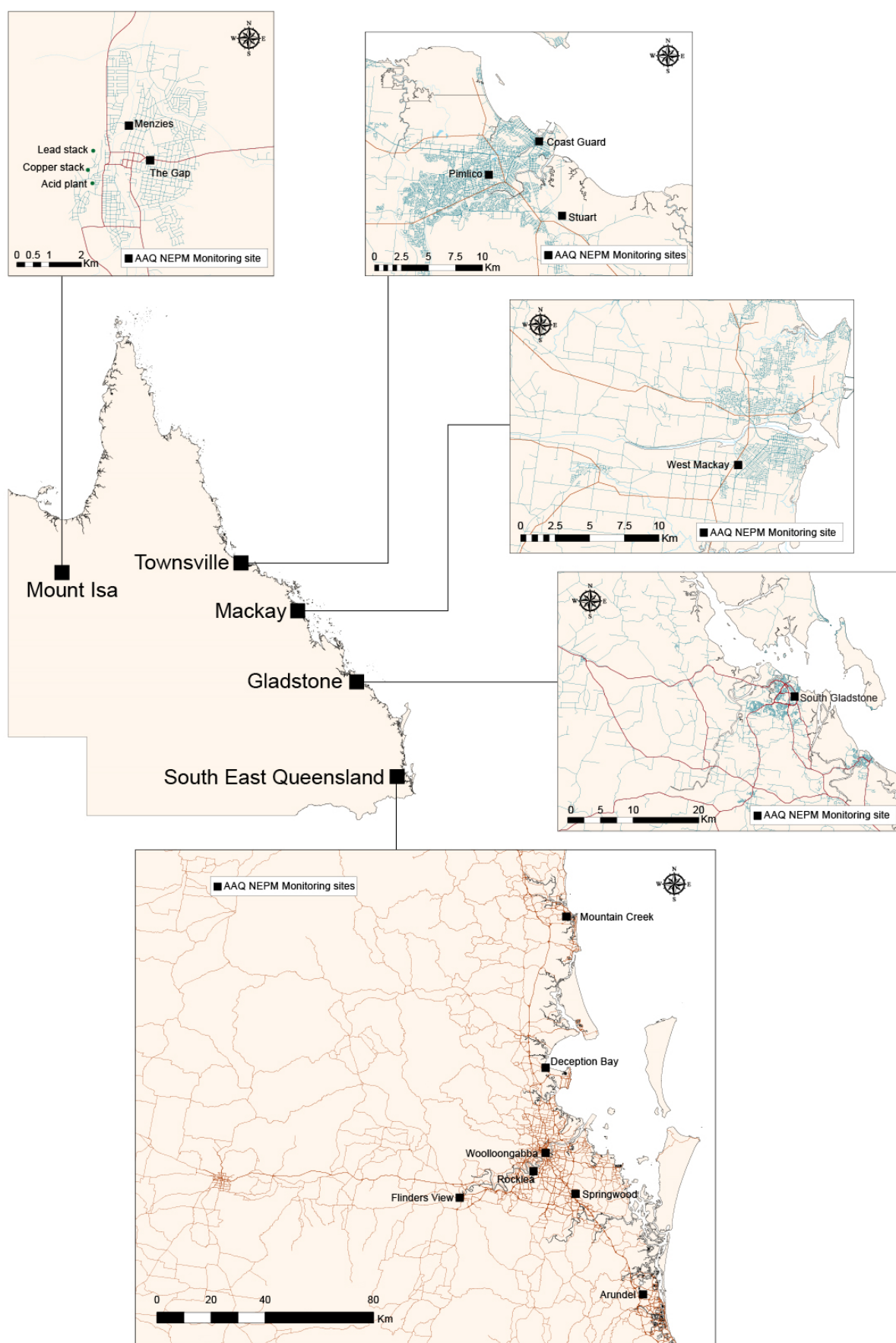
- performance monitoring station (PMS) – nominated location to measure achievement against the goal of the AAQ NEPM
- trend station – nominated location to measure long-term changes in air quality in addition to achievement against the goal of the AAQ NEPM
- campaign station – short-term investigation location (operational for a minimum of one calendar year) to assess the need for ongoing monitoring in the region to measure achievement against the goal of the AAQ NEPM.

Sites are further characterised using the population coverage descriptors contained in the National Environment Protection (Ambient Air Quality) Measure Technical Paper No. 3, “Monitoring Strategy” (available from <[www.scew.gov.au/archive/air/aaq-nepm.html](http://www.scew.gov.au/archive/air/aaq-nepm.html)>):

- generally representative upper bound (GRUB) – indicative of pollutant concentrations in the upper range of levels occurring in populated areas in the region
- population-average – indicative of air quality experienced by most of the population.

The exposed population represented by each monitoring site is described qualitatively by the location category column in Table 1.

Monitoring methods employed by DSITIA comply with the relevant Australian Standard specified in the AAQ NEPM, with the exception of the Springwood site where a differential optical absorption spectroscopy (DOAS) technique is used to measure ozone, nitrogen dioxide and sulfur dioxide levels. At the Rocklea, Arundel and South Gladstone sites, PM<sub>10</sub> monitoring was conducted using TEOM instrumentation fitted with a Filter Dynamic Measurement System (FDMS) to account for possible losses of semi-volatile compounds present in the particles caused by heating of the air stream.



**Figure 1:** 2012 Queensland AAQ NEPM monitoring site locations

**Table 1: 2012 Queensland AAQ NEPM monitoring sites**

Site	Station type	Established	Pollutants measured	Monitoring technique	Location category	Non-conformance with AS3580.1.1 siting criteria	Major pollutant sources
<b>South East Queensland</b>							
<i>North Coast sub-region</i>							
Mountain Creek	PMS – GRUB	July 2001	Ozone Nitrogen dioxide PM <sub>10</sub>	AS3580.6.1–2011 AS3580.5.1–2011 AS3580.9.8–2008	Residential	Nil	Major roads Forestry/ agricultural burning
<i>Brisbane sub-region</i>							
Deception Bay	Trend – GRUB	June 1994	Ozone Nitrogen dioxide	AS3580.6.1–2011 AS3580.5.1–2011	Residential	Trees within 20m west of site	Major roads
Woolloongabba	Trend – Peak	June 1998	Carbon monoxide	AS3580.7.1-2011	Inner city roadside	Building within 20m west of site	Major roads
Rocklea	Trend – GRUB	January 1978 (relocated March 1994 and June 2007)	Ozone Nitrogen dioxide PM <sub>10</sub>  PM <sub>2.5</sub>	AS3580.6.1–2011 AS3580.5.1–2011 FDMS TEOM, based on AS3580.9.8–2008 FDMS TEOM, based on AS3580.9.8–2008	Light industry / residential	Nil	Major roads
Springwood	PMS – Population average	March 1999	Ozone  Nitrogen dioxide  Sulfur dioxide  PM <sub>10</sub> PM <sub>2.5</sub>	Differential Optical Absorption Spectroscopy Differential Optical Absorption Spectroscopy Differential Optical Absorption Spectroscopy AS3580.9.8–2008 TEOM, based on AS3580.9.8–2008	Residential	Nil	Major roads
<i>Gold Coast sub-region</i>							
Arundel	Campaign – Population average	October 2010	Ozone Nitrogen dioxide PM <sub>10</sub>  PM <sub>2.5</sub>	AS3580.6.1–2011 AS3580.5.1–2011 FDMS TEOM, based on AS3580.9.8–2008 FDMS TEOM, based on AS3580.9.8–2008	Residential	Building and trees within 20m of site	Major roads
<i>Ipswich sub-region</i>							
Flinders View	Trend – GRUB	January 1993	Ozone Nitrogen dioxide Sulfur dioxide PM <sub>10</sub>	AS3580.6.1–2011 AS3580.5.1–2011 AS3580.4.1-2008 AS3580.9.8–2008	Industry / residential	Trees within 20m of site	Major roads Industry (power station)
<b>Gladstone</b>							
South Gladstone	Trend – GRUB	July 1992	Nitrogen dioxide Sulfur dioxide PM <sub>10</sub>  PM <sub>2.5</sub>	AS3580.5.1–2011 AS3580.4.1-2008 FDMS TEOM, based on AS3580.9.8–2008 FDMS TEOM, based on AS3580.9.8–2008	Industry / residential	Nil	Major roads Industry (power generation, metals processing)
<b>Mackay</b>							
West Mackay	PMS – GRUB	September 1997 (relocated June 2010)	PM <sub>10</sub>	AS3580.9.8–2008	Residential / rural	Nil	Agricultural burning

**Table 1** (continued): 2012 Queensland AAQ NEPM monitoring sites

Site	Station type	Established	Pollutants measured	Monitoring technique	Location category	Non-conformance with AS3580.1.1 siting criteria	Major pollutant sources
<b>Townsville</b>							
Coast Guard	Campaign – Peak	March 2008	Lead	AS3580.9.3-2003, with analysis by ICP	Industry	Trees within 20m of site	Port operations handling metal concentrates
Pimlico	Campaign – Population average	May 2004	Ozone Nitrogen dioxide Sulfur dioxide PM <sub>10</sub>	AS3580.6.1–2011 AS3580.5.1–2011 AS3580.4.1-2008 AS3580.9.8–2008	Residential	Trees within 20m of site	Major roads Industry (port operations, metals processing)
Stuart	Campaign – GRUB	September 2001	Sulfur dioxide	AS3580.4.1-2008	Industry / rural	Nil	Industry (metals processing)
<b>Mount Isa</b>							
Menzies	Trend – GRUB	January 1983	Sulfur dioxide	AS3580.4.1-2008	Industry / residential	Trees within 20m of site	Industry (metals smelting, sulfuric acid manufacture)
The Gap	PMS – Population average	January 2009	Sulfur dioxide PM <sub>10</sub> Lead	AS3580.4.1-2008 AS3580.9.8–2008 AS3580.9.3-2003, with analysis by ICP	Industry / residential	Building within 20m north-east of site	Industry (metals smelting, sulfuric acid manufacture)

TEOM PM<sub>10</sub> data collected by instruments not fitted with a FDMS in this report have been adjusted using the temperature-dependent factor described in option 2 in the National Environment Protection (Ambient Air Quality) Measure Technical Paper No. 10, “Collection and Reporting of TEOM PM<sub>10</sub> Data”<sup>3</sup>. The resulting adjustments vary linearly from no change at daily average temperatures at or above 15°C to an increase of 40 per cent at a temperature of 5°C.

PM<sub>2.5</sub> data in this report has been obtained TEOM PM<sub>2.5</sub> instruments operating on a continuous basis. The TEOM instrumentation has been operated in accordance with the protocol outlined in the National Environment Protection (Ambient Air Quality) Measure Technical Paper on Monitoring for Particles as PM<sub>2.5</sub>, or was fitted with FDMS units. The reference PM<sub>2.5</sub> sampler (Partisol 2025 sequential air sampler) at the Rocklea monitoring site was not operational during 2012.

## Variations to the approved monitoring plan for Queensland

Monitoring is not required to be undertaken in a region where screening procedures outlined in the National Environment Protection (Ambient Air Quality) Measure Technical Paper No. 4, “Screening Procedures” are satisfied, i.e. pollutant levels are reasonably expected to be consistently lower than the standards in the Measure. Table 2 summarises those regions and pollutants for which screening procedures are satisfied.

On the basis of the results of monitoring conducted in larger population centres and/or the findings of generic modelling studies detailed in Appendix A of Technical Paper No. 4, it has been concluded that campaign monitoring of nitrogen dioxide in Bundaberg, Cairns, Mackay,

<sup>3</sup> available from <[www.scew.gov.au/archive/air/aaq-nepm.html](http://www.scew.gov.au/archive/air/aaq-nepm.html)>

Maryborough/Hervey Bay and Rockhampton, and campaign monitoring of ozone in Bundaberg, Mackay and Maryborough/ Hervey Bay is not required (i.e. performance is “met”).

**Table 2:** Satisfied screening procedures

Region	CO	NO <sub>2</sub>	Ozone	SO <sub>2</sub>	PM <sub>10</sub>	Lead
South East Queensland	–	–	–	–	–	A
Toowoomba	A	A	A	F	–	F
Maryborough/Hervey Bay	F	E & F	E & F	F	–	F
Bundaberg	F	E & F	E & F	F	–	F
Gladstone	F	–	A	–	–	F
Rockhampton	F	E & F	–	–	–	F
Mackay	F	E & F	E & F	F	–	F
Townsville	F	–	–	–	–	–
Cairns	F	E & F	–	F	–	F
Mount Isa	E	E	E	–	–	–

A = Screening by campaign monitoring at a GRUB monitoring location (with no significant deterioration expected over 5-10 years).  
 E = Screening by use of generic model results based on gross emission estimates, ‘worst case’ meteorology estimates and other conservative assumptions.  
 F = Screening by comparison with an AAQ NEPM compliant region with greater population, emissions and pollution potential. The ‘–’ symbol indicates that monitoring is required to assess compliance.  
 For further information on the screening procedures, refer to National Environment Protection (Ambient Air Quality) Measure Technical Paper No. 4, Screening Procedures (Revision 1, 2007), available from <[www.scew.gov.au/archive/air/aaq-nepm.html](http://www.scew.gov.au/archive/air/aaq-nepm.html)>.

## Section B – Assessment of compliance with standards and goals

This section provides details of the annual compliance assessment for January to December 2012. Compliance criteria are applied on an individual basis at each performance monitoring station operating in the various Queensland regions during the year. South East Queensland performance monitoring stations are further classified under the respective sub-region.

The National Environment Protection (Ambient Air Quality) Measure Technical Paper No. 8 specifies that to make a valid assessment of compliance, a data availability rate of at least 75 per cent in each calendar quarter is required. For this reason, compliance with the standards and goal could not be demonstrated for nitrogen dioxide at the Rocklea, Springwood, Arundel and South Gladstone monitoring sites, ozone at the Rocklea, Springwood and Arundel monitoring sites, sulfur dioxide at the Springwood monitoring site, PM<sub>10</sub> at the Rocklea, Springwood, Arundel and South Gladstone monitoring sites, and PM<sub>2.5</sub> at the Rocklea and Arundel monitoring sites. Low data availability was the result of flood damage to infrastructure (Rocklea), closure of the site (Arundel) or instrument failure (Springwood, Woolloongabba and South Gladstone).

Tables 3 to 9 summarise compliance with the standards and goal for AAQ NEPM pollutants for 2012. Performance is assessed as meeting the standards and goals if the number of exceedences of the standard is no more than the number specified in schedule 2 of the AAQ NEPM and data availability was at least 75 per cent in each quarter of the year, or approved screening procedures are satisfied.

### Carbon monoxide

**Table 3:** 2012 compliance summary for carbon monoxide for Queensland

Region/ performance monitoring station	Data availability rates (% of hours)					Number of exceedences (days)	Performance against the standards and goal
	Q1	Q2	Q3	Q4	Annual		
South East Queensland Brisbane sub-region Woolloongabba	96.9	100	100	99.8	99.2	0	met
AAQ NEPM standard: 9.0 ppm (eight-hour average)							
AAQ NEPM goal: standard exceeded on no more than one day per year							

Regions which do not require monitoring on the basis of screening arguments that pollutant levels are reasonably expected to be consistently below the relevant NEPM standard (i.e. performance is “met”).

- Bundaberg
- Cairns
- Gladstone
- Mackay
- Maryborough/Hervey Bay
- Rockhampton
- Toowoomba
- Townsville



- Mount Isa

Motor vehicles are the major contributor to ambient carbon monoxide levels in urban areas. The use of combustion stoves and wood heaters in winter is minimal in the majority of monitored areas in Queensland. In South East Queensland, carbon monoxide concentrations at the Brisbane CBD performance monitoring station over the period 2000 to 2004, and at the Woolloongabba performance monitoring station over the period 2007 to 2012, were consistently less than 40 per cent of the AAQ NEPM standard (see section D). On this basis, carbon monoxide monitoring in coastal Queensland centres with lower traffic density and warmer winter temperatures than South East Queensland is not required under screening procedure F in Table 1 of the National Environment Protection (Ambient Air Quality) Measure Technical Paper No. 4, "Screening Procedures".

Over the period of campaign monitoring from July 2003 to December 2010, carbon monoxide concentrations at the North Toowoomba site were consistently less than 30 per cent of the AAQ NEPM standard. This satisfies the 60 per cent acceptance limit specified in screening procedure A in Table 1 of the "Screening Procedures" Technical Paper.

Mount Isa satisfies screening criteria for carbon monoxide by generic modelling alone (procedure E in Table 1) and can be considered to comply with the AAQ NEPM eight-hour carbon monoxide standard.

## Nitrogen dioxide

**Table 4:** 2012 compliance summary for nitrogen dioxide in Queensland

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	1-year
<u>South East Queensland</u>									
<i>North Coast sub-region</i>									
Mountain Creek	95.7	94.9	94.6	87.1	93.1	0	0.004	met	met
<i>Brisbane sub-region</i>									
Deception Bay	95.4	88.1	95.4	95.5	93.6	0	0.006	met	met
Rocklea	0.0	52.7	95.4	95.5	61.1	0	i.d.	ND	ND
Springwood	52.5	98.9	71.9	99.5	80.7	0	0.006	ND	ND
<i>Gold Coast sub-region</i>									
Arundel	47.9	0.0	0.0	0.0	11.9	0	i.d.	ND	ND
<i>Ipswich sub-region</i>									
Flinders View	95.6	95.7	95.3	93.8	95.1	0	0.007	met	met
<u>Gladstone</u>									
South Gladstone	73.8	95.7	95.4	95.6	90.2	0	0.007	ND	ND
<u>Townsville</u>									
Pimlico	95.5	93.7	95.4	95.5	95.0	0	0.005	met	met
i.d. = insufficient data to calculate value ND = "not demonstrated" due to insufficient data AAQ NEPM standards: 0.12 ppm (one-hour average); 0.03 ppm (one-year average) AAQ NEPM goal: one-hour standard exceeded on no more than one day per year									

Regions which do not require monitoring on the basis of screening arguments that pollutant levels are reasonably expected to be consistently below the relevant NEPM standard (i.e. performance is "met").

- Bundaberg



- Cairns
- Mackay
- Maryborough/Hervey Bay
- Mount Isa
- Rockhampton
- Toowoomba

Appendix A of the National Environment Protection (Ambient Air Quality) Measure Technical Paper No. 4, "Screening Procedures" states that nitrogen dioxide monitoring is not required in coastal and inland centres with a population below 250 000 on the basis of generic modelling conducted by CSIRO (procedure E in Table 1) coupled with data from a NEPM compliant region with greater population, emissions and pollution potential showing nitrogen dioxide levels are below 40 per cent of the NEPM standards (procedure F in Table 1).

Monitoring at the Pimlico site in Townsville over the period 2004 to 2012 has shown nitrogen dioxide levels to be consistently below 40 per cent of the NEPM standards. The maximum one-hour average nitrogen dioxide concentration during this period was 0.042ppm (35 per cent of the standard). The highest annual average nitrogen dioxide concentration during this period was 0.006ppm (20 per cent of the standard).

On this basis, nitrogen dioxide monitoring in the coastal Queensland centres of Bundaberg, Cairns, Mackay, Maryborough/Hervey Bay and Rockhampton is not required as these centres can be considered to comply with the NEPM 1 hour and annual nitrogen dioxide standards.

Over the period of campaign monitoring from July 2003 to December 2010, nitrogen dioxide concentrations at the North Toowoomba site were consistently less than 50 per cent of the AAQ NEPM standard. This satisfies the 60 per cent acceptance limit specified in screening procedure A in Table 1 of the "Screening Procedures" Technical Paper.

Mount Isa satisfies screening criteria for nitrogen dioxide by generic modelling alone (procedure E in Table 1) and can be considered to comply with the NEPM one-hour and annual nitrogen dioxide standards.

## Ozone

**Table 5:** 2012 compliance summary for ozone in Queensland

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
<u>South East Queensland</u>									
<i>North Coast sub-region</i>									
Mountain Creek	95.7	95.5	93.6	87.1	93.0	0	0	met	met
<i>Brisbane sub-region</i>									
Deception Bay	92.1	95.5	95.5	95.5	94.6	0	0	met	met
Rocklea	0.0	52.8	95.4	90.8	59.9	0	0	ND	ND
Springwood	51.0	97.8	71.6	99.4	80.0	0	0	ND	ND
<i>Gold Coast sub-region</i>									
Arundel	47.9	0.0	0.0	0.0	11.9	0	0	ND	ND
<i>Ipswich sub-region</i>									
Flinders View	95.6	95.7	88.1	83.2	90.6	0	0	met	met
<u>Townsville</u>									
Pimlico	95.5	89.6	95.4	95.5	94.0	0	0	met	met

ND = "not demonstrated" due to insufficient data  
 AAQ NEPM standards: 0.10 ppm (one-hour average); 0.08 ppm (four-hour average)  
 AAQ NEPM goal: standards exceeded on no more than one day per year

Regions which do not require monitoring on the basis of screening arguments that pollutant levels are reasonably expected to be consistently below the relevant NEPM standard (i.e. performance is "met").

- Bundaberg
- Gladstone
- Mackay
- Maryborough/Hervey Bay
- Mount Isa
- Toowoomba

Appendix A of the National Environment Protection (Ambient Air Quality) Measure Technical Paper No. 4, "Screening Procedures" states that ozone monitoring is not required in coastal centres with a population below 62 000 and inland centres with a population below 25 000 on the basis of generic modelling conducted by CSIRO (procedure E in Table 2). On this basis, ozone monitoring is not required in the coastal Queensland centres of Bundaberg, Mackay and Maryborough/Hervey Bay, and the inland centre of Mount Isa, as these centres can be considered to comply with the NEPM one-hour and four-hour ozone standards.

From 2001 to mid-2006, ozone concentrations were monitored at Targinie in the Gladstone region. The Targinie campaign GRUB monitoring station was located 20km north-west of Gladstone and downwind of the major industrial and transport emission sources in the region. Ozone concentrations measured at the Targinie monitoring station over this period were consistently less than 75 per cent of the AAQ NEPM standards. On this basis, ozone levels meet the acceptance limit under screening procedure A in Table 2 of Technical Paper No. 4 and ozone monitoring in Gladstone is not required.

Over the period of campaign monitoring from July 2003 to December 2010, ozone concentrations at the North Toowoomba site were consistently less than 75 per cent of the AAQ NEPM standards.

This satisfies the acceptance limit specified in screening procedure A in Table 2 of Technical Paper No. 4.

Regions for which monitoring has not yet been carried out (i.e. performance is “not demonstrated”).

- Cairns
- Rockhampton

## Sulfur dioxide

**Table 6:** 2012 compliance summary for sulfur dioxide for Queensland

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
<u>South East Queensland</u>											
<i>Brisbane sub-region</i>											
Springwood	52.4	98.2	71.6	99.4	80.4	0	0	0.001	ND	ND	ND
<i>Ipswich sub-region</i>											
Flinders View	95.6	95.7	95.3	94.4	95.2	0	0	0.001	met	met	met
<u>Gladstone</u>											
South Gladstone	95.3	95.7	95.2	95.6	95.4	0	0	0.002	met	met	met
<u>Townsville</u>											
Pimlico	95.4	93.6	95.4	95.5	95.0	0	0	0.001	met	met	met
Stuart	94.9	85.2	85.2	95.7	90.3	0	0	0.001	met	met	met
<u>Mount Isa</u>											
Menzies	94.8	95.6	95.7	95.3	95.4	30	0	0.005	not met	met	met
The Gap	80.2	94.5	88.9	95.2	89.7	19	0	0.004	not met	met	met
i.d. = insufficient data to calculate value ND = “not demonstrated” due to insufficient data AAQ NEPM standards: 0.20 ppm (one-hour average); 0.08 ppm (24-hour average); 0.02 ppm (one-year average) AAQ NEPM goal: one-hour and 24-hour standards exceeded on no more than one day per year											

Regions which do not require monitoring on the basis of screening arguments that pollutant levels are reasonably expected to be consistently below the relevant NEPM standard (i.e. performance is “met”).

- Bundaberg
- Cairns
- Mackay
- Maryborough/Hervey Bay
- Toowoomba

Unless significant industrial point sources of sulfur dioxide exist in a region (e.g. coal-fired power stations or metals smelting), emissions of sulfur dioxide are low. Peak sulfur dioxide concentrations in the Brisbane sub-region of South East Queensland are less than 40 per cent of the AAQ NEPM standard (see section D). On this basis, sulfur dioxide monitoring in other Queensland centres with lower population and no significant sulfur dioxide point sources is not required under screening procedure F in Table 1 of National Environment Protection (Ambient Air Quality) Measure Technical Paper No. 4, “Screening Procedures”.

Regions for which monitoring has not yet been carried out (i.e. performance is “not demonstrated”).

- Rockhampton

**PM<sub>10</sub>****Table 7:** 2012 compliance summary for PM<sub>10</sub> in Queensland

Region/ performance monitoring station	Data availability rates (% of days)					Number of exceedences (days)	Performance against the standards and goal
	Q1	Q2	Q3	Q4	Annual		
<u>South East Queensland</u>							
<i>North Coast sub-region</i>							
Mountain Creek	95.6	96.7	97.8	90.2	95.3	1	met
<i>Brisbane sub-region</i>							
Rocklea	0.0	49.5	95.7	79.3	56.4	0	ND
Springwood	69.2	97.8	94.6	98.9	90.4	0	ND
<i>Gold Coast sub-region</i>							
Arundel	49.5	0.0	0.0	0.0	12.3	0	ND
<i>Ipswich sub-region</i>							
Flinders View	98.9	100.0	94.6	100.0	98.6	2	met
<u>Gladstone</u>							
South Gladstone	72.5	82.4	98.9	100.0	88.8	1	ND
<u>Mackay</u>							
West Mackay	98.9	100.0	98.9	97.8	99.2	1	met
<u>Townsville</u>							
Pimlico	75.8	97.8	97.8	96.7	92.3	0	met
<u>Mount Isa</u>							
The Gap	98.9	97.8	100.0	100.0	99.5	16	not met
ND = "not demonstrated" due to insufficient data AAQ NEPM standard: 50 µg/m <sup>3</sup> (24-hour average) AAQ NEPM goal: standard exceeded on no more than five days per year							

There are no regions which do not require PM<sub>10</sub> monitoring on the basis of screening arguments that pollutant levels are reasonably expected to be consistently below the relevant NEPM standard (i.e. performance is "met").

Over the period of campaign monitoring from July 2003 to December 2010, all exceedences of the AAQ NEPM 24-hour PM<sub>10</sub> standard at the North Toowoomba monitoring site were found to be associated with bushfire smoke or widespread windblown dust events. There was no evidence that commercial and domestic PM<sub>10</sub> emissions on their own were sufficient to lead to exceedences of the PM<sub>10</sub> standard at the monitoring location.

Regions for which monitoring has not yet been carried out (i.e. performance is "not demonstrated").

- Bundaberg
- Cairns
- Maryborough/Hervey Bay
- Rockhampton

## PM<sub>2.5</sub>

**Table 8:** 2012 compliance summary for PM<sub>2.5</sub> in Queensland

Region/ performance monitoring station	Data availability rates (% of days)					Number of exceedences (days)	Annual mean (µg/m <sup>3</sup> )
	Q1	Q2	Q3	Q4	Annual		
<u>South East Queensland</u>							
<i>Brisbane sub-region</i>							
Rocklea <sup>+</sup>	0.0	49.5	95.7	79.3	56.3	0	i.d.
Springwood <sup>‡</sup>	98.9	100.0	94.6	98.9	98.1	0	4.4
<i>Gold Coast sub-region</i>							
Arundel <sup>+</sup>	49.5	0.0	0.0	0.0	12.3	0	i.d.
<u>Gladstone</u>							
South Gladstone <sup>+</sup>	72.5	82.4	98.9	100.0	88.5	1	5.2

i.d. = insufficient data to calculate value  
<sup>+</sup> Monitoring by TEOM Model 1405 instrumentation fitted with Filter Dynamics Measurement System (FDMS)  
<sup>‡</sup> Monitoring by TEOM Model 1400 instrumentation in accordance with Technical Paper on Monitoring for Particles as PM<sub>2.5</sub>  
 AAQ NEPM advisory standards: 25 µg/m<sup>3</sup> (24-hour average); 8 µg/m<sup>3</sup> (one-year average)

There are no regions which do not require PM<sub>2.5</sub> monitoring on the basis of screening arguments that pollutant levels are reasonably expected to be consistently below the relevant NEPM standard.

Over the period of campaign monitoring from July 2003 to December 2007, all exceedences of the AAQ NEPM 24-hour PM<sub>2.5</sub> advisory standard were associated with bushfire smoke or widespread windblown dust events. There was no evidence that commercial and domestic PM<sub>2.5</sub> emissions on their own were sufficient to cause exceedences of the 24-hour PM<sub>2.5</sub> standard at the monitoring location. PM<sub>2.5</sub> levels complied with the AAQ NEPM annual average advisory standard over the period of monitoring.

Regions for which monitoring has not yet been carried out:

- Bundaberg
- Cairns
- Mackay
- Maryborough/Hervey Bay
- Mount Isa
- Rockhampton
- Townsville

## Lead

**Table 9:** 2012 compliance summary for lead in Queensland

Region/ performance monitoring station	Data availability rates (% of days)					Annual mean ( $\mu\text{g}/\text{m}^3$ )	Performance against the standards and goal
	Q1	Q2	Q3	Q4	Annual		
Townsville Coast Guard	93.8	100.0	100.0	93.3	96.7	0.12	met
Mount Isa The Gap	100.0	81.3	100.0	86.7	91.8	0.10	met
AAQ NEPM standard: $0.5 \mu\text{g}/\text{m}^3$ (one-year average)							

Regions which do not require monitoring on the basis of screening arguments that pollutant levels are reasonably expected to be consistently below the relevant NEPM standard (i.e. performance is “met”).

- Bundaberg
- Cairns
- Gladstone
- Mackay
- Maryborough/Hervey Bay
- Rockhampton
- South East Queensland
- Toowoomba

In the absence of non-vehicle sources of lead (e.g. metals smelting or handling of metal concentrates), no significant sources of lead now exist in most Queensland regions following the phase-out of leaded motor vehicle fuel from March 2001. Annual lead concentrations measured at the South East Queensland performance monitoring station (Woolloongabba) were less than ten per cent of the AAQ NEPM standard for both 2001 ( $0.03 \mu\text{g}/\text{m}^3$ ) and 2002 ( $0.02 \mu\text{g}/\text{m}^3$ ). As outlined in the National Environment Protection (Ambient Air Quality) Measure Technical Paper No. 9, “Lead Monitoring” (available from [www.scew.gov.au/archive/air/aaq-nepm.html](http://www.scew.gov.au/archive/air/aaq-nepm.html)), these measurements demonstrate that compliance with the AAQ NEPM standard and goal has been achieved in South East Queensland, and monitoring of lead ceased from the end of 2002.

With peak lead concentrations in South East Queensland being less than 40 per cent of the AAQ NEPM standard since 1999 (see section D, Table 46), lead monitoring in other Queensland centres with lower population and traffic density (with the exception of Townsville and Mount Isa where additional lead emission sources exist) is not required under screening procedure F in Table 1 of the National Environment Protection (Ambient Air Quality) Measure Technical Paper No. 4, “Screening Procedures”.

## Section C – Analysis of 2012 monitoring data against the standards

Annual summary statistics for the 2012 calendar year are presented in this section. Statistics provided include the listing of exceedences and circumstances which led to these exceedences, and annual maxima, the second highest daily concentration (for carbon monoxide, nitrogen dioxide, ozone and sulfur dioxide where one exceedence day per year is allowed) or sixth highest daily concentration (for PM<sub>10</sub> where five exceedences days per year are allowed), together with the date and site of each occurrence. Details of PM<sub>2.5</sub> measurements obtained using TEOM instrumentation are also provided. The TEOM instruments were operated in accordance with the method outlined in the AAQ NEPM Technical Paper on Monitoring for Particles as PM<sub>2.5</sub>, or were fitted with FDMS units.

Exceedence details are provided in Tables 10 to 12. Summary maxima statistics are provided in Tables 13 to 20. Concentrations exceeding the standard are highlighted in bold in the summary maxima tables.

### Exceedence summary

During 2012, exceedences of AAQ NEPM standards occurred for sulfur dioxide in Mount Isa, and PM<sub>10</sub> in South East Queensland, Gladstone, Mackay and Mount Isa. There were also exceedences of the AAQ NEPM 24-hour advisory reporting standard for PM<sub>2.5</sub> in Gladstone. There were no exceedences of the AAQ NEPM standards for carbon monoxide, nitrogen dioxide, ozone and lead.

There were a number of grass and bushfires in the South East Queensland region during October. The Air NEPM 24-hour PM<sub>10</sub> standard was exceeded at the Flinders View site on 20 and 21 October due to bushfire smoke. Between 16 and 18 December, a large vegetation fire and back burning operations in the Great Sandy National Park north of Noosa resulted in extensive smoke haze across South East Queensland and an exceedence of the Air NEPM 24-hour PM<sub>10</sub> standard at Mountain Creek on 16 December.

In the Gladstone region smoke from a bushfire in the Beecher State Forest, and associated back-burning operations, was responsible for an exceedence of the Air NEPM 24-hour PM<sub>10</sub> standard and the Air NEPM 24-hour PM<sub>2.5</sub> advisory standard at the South Gladstone monitoring site on 26 October. In Mackay, there was an exceedence of the Air NEPM 24-hour PM<sub>10</sub> standard at the West Mackay monitoring site on 23 October, as a result of windblown dust generated by strong winds accompanying the passage of a low pressure trough.

Industrial operations (metals smelting and sulfuric acid manufacture) emit sulfur dioxide into the atmosphere in Mount Isa. Prior to April 2012 smelter operations were only controlled to meet *Mount Isa Mines Agreement Act 1985* (MIM Act) air quality limits. From April 2012 smelter operations have been under a Transitional Environmental Program (TEP) which sets out a staged program of works to achieve compliance with the air quality objectives contained in the Queensland *Environmental Protection (Air) Policy 2008* (equivalent to the Air NEPM standards for sulfur dioxide) by December 2016. As smelter operations were only controlled to meet either MIM Act or TEP limits during 2012, sulfur dioxide levels exceeded the more stringent Air NEPM one-hour standard on occasions.

Mount Isa is situated in an arid area, with very low rainfall between April and October. During this dry season, strong winds associated with the passage of low pressure troughs through the region can result in high levels of windblown dust. Such conditions resulted in exceedences of the Air NEPM 24-hour  $PM_{10}$  standard on 7 September, 10 and 26 October, and 1 and 17 November. All other Air NEPM 24-hour  $PM_{10}$  standard exceedences in Mount Isa in 2012 were the result of fires; smoke from a large grass fire burning in inaccessible land south-east of Mount Isa was responsible for eight  $PM_{10}$  exceedences in September, and smoke from vegetation fires north of Mount Isa was responsible for three  $PM_{10}$  exceedences in November.



**Table 10:** 2012 sulfur dioxide exceedences in Queensland

Region / Performance monitoring station	Standard	Concentration (ppm)	Date	Time	Circumstances
Mount Isa Menzies	1-hour	0.670	Aug 03	15	All exceedences at Mount Isa monitoring sites were due to emissions from industry.
		0.470	Nov 09	05	
		0.449	Nov 06	19	
		0.434	Dec 03	12	
		0.430	Aug 20	13	
		0.415	Sep 16	15	
		0.410	Jun 16	16	
		0.409	Nov 01	18	
		0.397	Feb 07	16	
		0.392	Sep 17	16	
		0.328	Nov 07	14	
		0.319	Sep 17	15	
		0.316	Dec 18	16	
		0.309	Aug 20	14	
		0.299	Feb 21	24	
		0.291	Sep 18	17	
		0.287	Jan 14	17	
		0.287	Nov 25	16	
		0.280	Aug 29	18	
		0.279	Jan 14	16	
		0.278	Dec 03	13	
		0.276	Nov 07	15	
		0.274	Nov 02	20	
		0.271	Nov 26	16	
		0.268	Jun 14	14	
		0.263	Nov 25	15	
		0.262	Dec 18	17	
		0.253	Aug 16	15	
		0.252	Sep 17	13	
		0.250	Oct 28	15	
		0.246	Feb 12	17	
		0.245	Jul 25	17	
		0.244	Jan 14	14	
		0.240	Jan 14	15	
		0.238	Dec 18	11	
		0.236	Sep 16	16	
		0.235	Nov 25	14	
		0.232	Jun 16	17	
		0.226	Jan 03	10	
		0.224	Feb 07	17	
		0.223	Nov 07	17	
		0.217	Sep 16	17	
		0.216	Nov 24	17	
		0.210	Sep 07	14	
		0.206	Sep 25	15	
		0.206	Nov 09	04	
		0.205	Dec 26	17	
		0.203	Dec 10	22	
		0.201	Dec 26	16	
The Gap	1-hour	0.627	Aug 29	18	
		0.479	Dec 01	10	
		0.426	Aug 28	17	
		0.390	Aug 16	15	
		0.365	Nov 26	12	
		0.356	Nov 02	13	
		0.341	Jun 14	12	
		0.332	Aug 20	14	
		0.323	Nov 02	11	
		0.320	Nov 26	10	
		0.310	Jan 06	11	
		0.302	Jun 14	13	

		0.296	Jun 16	14	
		0.289	Dec 20	18	
		0.281	Sep 23	13	
		0.268	Nov 06	08	
		0.249	Oct 10	16	
		0.239	Jan 07	13	
		0.235	Nov 25	11	
		0.227	Dec 28	15	
		0.222	Sep 23	14	
		0.212	Jan 08	11	
		0.207	Nov 25	14	
		0.206	Oct 31	17	
		0.201	Jan 08	10	
AAQ NEPM standards: 0.20 ppm (one-hour average); 0.08 ppm (24-hour average); 0.02 ppm (1-year average)					

**Table 11: 2012 PM<sub>10</sub> exceedences in Queensland**

Table 11: 2012 PM <sub>10</sub> exceedences in Queensland					
Region / Performance monitoring station	Standard	Concentration (µg/m <sup>3</sup> )	Date	Time	Circumstances
<u>South East Queensland</u> Mountain Creek	24-hour	57.1	Dec 16	24	All exceedences at South-East Queensland monitoring sites were the result of bushfire smoke.
Flinders View	24-hour	73.8	Oct 21	24	
		52.0	Oct 20	24	
<u>Gladstone</u> South Gladstone	24-hour	63.0	Oct 26	24	Exceedence was the result of bushfire smoke.
<u>Mackay</u> West Mackay	24-hour	64.9	Oct 23	24	Exceedence was the result of windblown dust generated by strong winds.
<u>Mount Isa</u> The Gap	24-hour	74.5	Sep 27	24	The exceedences in September were due to bushfire smoke, with the exception of the exceedence on 7 September due to windblown dust. All exceedences in October were due to windblown dust. The exceedences on 5, 26, and 27 November were due to bushfire smoke, and the 1 and 17 November exceedences were due to windblown dust.
		64.5	Sep 22	24	
		60.4	Sep 07	24	
		59.3	Oct 10	24	
		58.9	Nov 01	24	
		58.3	Nov 26	24	
		56.7	Sep 19	24	
		56.5	Sep 23	24	
		56.0	Nov 17	24	
		55.6	Sep 20	24	
		54.9	Sep 21	24	
		54.1	Sep 24	24	
		51.8	Nov 27	24	
		51.2	Nov 05	24	
		50.3	Sep 06	24	
		50.1	Oct 26	24	
AAQ NEPM advisory standard: 50 µg/m <sup>3</sup> (24-hour average)					

**Table 12:** 2012 PM<sub>2.5</sub> exceedences in Queensland

Region / Performance monitoring station	Standard	Concentration (µg/m <sup>3</sup> )	Date	Time	Circumstances
<u>Gladstone</u> South Gladstone	24-hour	49.6	Oct 26	24	Exceedence was the result of bushfire smoke.
AAQ NEPM advisory standards: 25 µg/m <sup>3</sup> (24-hour average); 8 µg/m <sup>3</sup> (1-year average)					

## Summaries of maximum, second-highest and sixth-highest pollutant concentrations in 2012

The following tables show the maximum daily concentration recorded during 2012, together with the date and time this occurred, for all pollutants and monitoring sites. The second highest daily concentration is also shown for carbon monoxide, nitrogen dioxide, ozone and sulfur dioxide where one exceedence day per year is allowed. For PM<sub>10</sub>, where five exceedences days per year are allowed, the sixth highest daily concentration is shown.

**Table 13:** 2012 summary statistics for daily peak eight hour average carbon monoxide concentrations in Queensland

Region/ performance monitoring station	Number of valid days	Highest (ppm)	Highest (date:hour)	2 <sup>nd</sup> highest (ppm)	2 <sup>nd</sup> highest (date:hour)
<u>South East Queensland</u> Woolloongabba	362	1.8	May 10:01 May 24:01 Jun 06:01		
AAQ NEPM standard: 9.0 ppm (8-hour average) AAQ NEPM goal: standard exceeded on no more than one day per year					

**Table 14:** 2012 summary statistics for daily peak one-hour average nitrogen dioxide concentrations in Queensland

Region/ performance monitoring station	Number of valid days	Highest (ppm)	Highest (date:hour)	2 <sup>nd</sup> highest (ppm)	2 <sup>nd</sup> highest (date:hour)
<u>South East Queensland</u>					
Mountain Creek	354	0.030	Aug 08:20	0.029	Aug 09:19
Deception Bay	358	0.040	May 08:19	0.037	Aug 03:19
Rocklea	234	0.039	Aug 17:10	0.035	May 11:20 Aug 08:19
Springwood	294	0.047	Aug 09:20	0.038	Aug 01:21
Arundel	45	0.015	Feb 06:22 Feb 13:18		
Flinders View	365	0.039	Aug 08:19	0.038	Aug 17:20
<u>Gladstone</u>					
South Gladstone	344	0.042	Aug 27:17	0.041	Oct 11:18
<u>Townsville</u>					
Pimlico	364	0.034	Aug 10:21	0.033	Jun 22:19 Jul 21:21
AAQ NEPM standard: 0.12 ppm (one-hour average) AAQ NEPM goal: standard exceeded on no more than one day per year					

**Table 15:** 2012 summary statistics for daily peak one-hour average ozone concentrations in Queensland

Region/ performance monitoring station	Number of valid days	Highest (ppm)	Highest (date:hour)	2 <sup>nd</sup> highest (ppm)	2 <sup>nd</sup> highest (date:hour)
<u>South East Queensland</u>					
Mountain Creek	354	0.059	Mar 10:17	0.058	Oct 21:13
Deception Bay	362	0.059	Oct 07:13	0.058	Apr 03:14
Rocklea	229	0.081	Oct 06:13	0.073	Dec 18:14
Springwood	290	0.057	Oct 22:13	0.056	Oct 06:13
Arundel	45	0.062	Jan 11:17	0.053	Jan 09:15
Flinders View	345	0.090	Dec 18:15	0.087	Oct 21:13
<u>Townsville</u>					
Pimlico	359	0.051	Dec 17:17	0.048	Dec 07:16
AAQ NEPM standard: 0.10 ppm (one-hour average) AAQ NEPM goal: standard exceeded on no more than one day per year					

**Table 16:** 2012 summary statistics for daily peak four-hour average ozone concentrations in Queensland

Region/ performance monitoring station	Number of valid days	Highest (ppm)	Highest (date:hour)	2 <sup>nd</sup> highest (ppm)	2 <sup>nd</sup> highest (date:hour)
<u>South East Queensland</u> Mountain Creek	355	0.056	Oct 21:14	0.053	Mar 10:18
Deception Bay	362	0.057	Oct 07:16	0.056	Oct 21:13
Rocklea	229	0.066	Oct 06:14	0.064	Dec 18:15
Springwood	289	0.055	Oct 22:15	0.050	Oct 06:14
Arundel	45	0.060	Jan 11:19	0.050	Jan 09:16 Feb 06:15
Flinders View	345	0.080	Oct 21:14 Dec 18:15		
<u>Townsville</u> Pimlico	359	0.045	Dec 07:17 Dec 17:17		
AAQ NEPM standard: 0.08 ppm (four-hour average) AAQ NEPM goal: standard exceeded on no more than one day per year					

**Table 17:** 2012 summary statistics for daily peak one-hour average sulfur dioxide concentrations in Queensland

Region/ performance monitoring station	Number of valid days	Highest (ppm)	Highest (date:hour)	2 <sup>nd</sup> highest (ppm)	2 <sup>nd</sup> highest (date:hour)
<u>South East Queensland</u> Springwood	294	0.013	Jun 22:20 Oct 17:18		
Flinders View	366	0.015	Jan 24:15 Jan 28:12		
<u>Gladstone</u> South Gladstone	364	0.059	Oct 03:14	0.056	Sep 25:09
<u>Townsville</u> Pimlico	364	0.006	Jul 16:23	0.004	Jan 13:02 Feb 11:02 Feb 23:10 Apr 18:02 Jun 30:19 Jul 13:20 Jul 14:20
Stuart	342	0.005	May 21:18	0.004	11 days in total
<u>Mount Isa</u> Menzies	364	<b>0.670</b>	Aug 03:15	<b>0.470</b>	Nov 09:05
The Gap	341	<b>0.627</b>	Aug 29:18	<b>0.479</b>	Dec 01:10
Bold text indicates a value greater than the AAQ NEPM standard. AAQ NEPM standard: 0.20 ppm (one-hour average) AAQ NEPM goal: standard exceeded on no more than one day per year					

**Table 18:** 2012 summary statistics for daily 24-hour average sulfur dioxide concentrations in Queensland

Region/ performance monitoring station	Number of valid days	Highest (ppm)	Highest (date)	2 <sup>nd</sup> highest (ppm)	2 <sup>nd</sup> highest (date)
<u>South East Queensland</u> Springwood	294	0.003	Aug 24	0.002	22 days in total
Flinders View	366	0.004	Jan 28 Feb 25		
<u>Gladstone</u> South Gladstone	364	0.010	Oct 03 Dec 30		
<u>Townsville</u> Pimlico	364	0.003	Feb 11 Feb 23		
Stuart	342	0.004	Jun 30	0.003	Mar 31 Sep 10
<u>Mount Isa</u> Menzies	364	0.063	Sep 17	0.059	Nov 06
The Gap	341	0.075	Nov 02	0.052	Sep 23 Nov 26
AAQ NEPM standard: 0.08 ppm (24-hour average) AAQ NEPM goal: standard exceeded on no more than one day per year					

**Table 19:** 2012 summary statistics for daily 24-hour average PM<sub>10</sub> concentrations in Queensland

Region/ performance monitoring station	Number of valid days	Highest (µg/m <sup>3</sup> )	Highest (date)	6 <sup>th</sup> highest (µg/m <sup>3</sup> )	6 <sup>th</sup> highest (date)
<u>South East Queensland</u> Mountain Creek	348	<b>57.1</b>	Dec 16	31.1	Jan 12 Oct 22
Rocklea	206	41.0	Dec 17	34.1	Oct 27
Springwood	330	39.2	Oct 26	29.8	Nov 02
Arundel	45	25.2	Jan 09	18.7	Feb 10
Flinders View	360	<b>73.8</b>	Oct 21	39.5	Dec 17
<u>Gladstone</u> South Gladstone	324	<b>63.0</b>	Oct 26	29.9	Dec 07
<u>Mackay</u> West Mackay	362	<b>64.9</b>	Oct 23	37.4	Sep 09 Dec 07
<u>Townsville</u> Pimlico	337	30.0	Dec 14	24.4	Oct 13
<u>Mount Isa</u> The Gap	363	<b>74.5</b>	Sep 27	<b>58.3</b>	Nov 26
Bold text indicates a value greater than the AAQ NEPM standard. AAQ NEPM standard: 50 µg/m <sup>3</sup> (24-hour average) AAQ NEPM goal: standard exceeded on no more than five days per year					

**Table 20:** 2012 summary statistics for daily 24-hour average PM<sub>2.5</sub> concentrations in Queensland

Region/ performance monitoring station	Number of valid days	Highest (µg/m <sup>3</sup> )	Highest (date)
<u>South East Queensland</u> Rocklea <sup>+</sup>	206	23.7	Dec 17
Springwood <sup>‡</sup>	359	23.7	Dec 17
Arundel <sup>+</sup>	45	11.0	Jan 09
<u>Gladstone</u> South Gladstone <sup>+</sup>	324	<b>49.6</b>	Oct 26

Bold text indicates a value greater than the AAQ NEPM standard.

<sup>+</sup> Monitoring by TEOM Model 1405 instrumentation fitted with Filter Dynamics Measurement System (FDMS)

<sup>‡</sup> Monitoring by TEOM Model 1400 instrumentation in accordance with Technical Paper on Monitoring for Particles as PM<sub>2.5</sub>

AAQ NEPM advisory standard: 25 µg/m<sup>3</sup> (24-hour average)

## Section D – Pollutant distributions and trends

Results of further analysis of the monitoring data are presented in this section. Percentiles of 2012 daily peak concentrations are presented for each station and standard. In these tables daily peak values are included in the analysis only when at least 75 per cent of the data for the day are valid. Values that exceed the relevant AAQ NEPM standard are shown in bold text. The percentiles for eight-hour carbon monoxide and four-hour ozone are calculated from running hourly values, including those that overlap from one day to the next.

Annual statistics are also presented in tables for each monitoring location identified as a trend station for the pollutant in the Queensland AAQ NEPM monitoring plan. Monitoring sites with less than 75 per cent data over the year are shown in italics. Trend data for lead in South East Queensland is presented, although monitoring ceased in 2002.

### Carbon monoxide

**Table 21:** Percentiles of daily peak eight-hour average carbon monoxide concentrations in Queensland for 2012

Region/ performance monitoring station	Data availability (% of days)	Maximum (ppm)	Percentiles (ppm)					
			99 <sup>th</sup>	98 <sup>th</sup>	95 <sup>th</sup>	90 <sup>th</sup>	75 <sup>th</sup>	50 <sup>th</sup>
<u>South East Queensland</u> Woolloongabba	98.9	1.8	1.7	1.7	1.4	1.1	0.8	0.6

AAQ NEPM standard: 9.0 ppm (eight-hour average)

AAQ NEPM goal: standard exceeded on no more than one day per year

**Table 22:** Percentiles of daily peak eight-hour average carbon monoxide concentrations at Woolloongabba, South East Queensland (1998 to 2012)

Year	Data availability (% of days)	No. of exceedences (days)	Maximum (ppm)	Percentiles (ppm)			
				99 <sup>th</sup>	98 <sup>th</sup>	95 <sup>th</sup>	90 <sup>th</sup>
1998	57.0*	0	5.1	5.0	4.4	4.1	3.4
1999	92.3*	0	5.7	5.3	4.9	4.0	3.2
2000	92.9	0	5.0	4.7	4.2	3.4	2.9
2001	97.0	0	7.0	4.4	4.3	3.9	3.2
2002	97.0	0	4.7	4.7	4.1	3.6	3.0
2003	83.3*	0	5.4	4.4	4.2	3.5	2.7
2004	98.9	0	4.7	4.2	3.8	3.3	2.6
2005	95.1	0	4.0	3.5	3.3	2.6	2.1
2006	95.3	0	4.0	3.7	3.1	2.4	2.1
2007	26.0*	0	1.1	1.1	1.1	1.1	1.0
2008	66.9*	0	2.9	2.7	2.5	2.2	1.8
2009	100.0	0	2.4	2.3	2.1	1.8	1.5
2010	97.0	0	2.7	1.9	1.8	1.3	1.1
2011	99.5	0	1.9	1.7	1.6	1.3	1.0
2012	98.9	0	1.8	1.7	1.7	1.4	1.1

\*Data availability less than 75 per cent for one or more quarters.  
Years shown in italics have less than 75 per cent annual data availability.  
AAQ NEPM standard: 9.0 ppm (eight-hour average)  
AAQ NEPM goal: standard exceeded on no more than one day per year

## Nitrogen dioxide

**Table 23:** Percentiles of daily peak one-hour average nitrogen dioxide concentrations in Queensland for 2012

Region / performance monitoring station	Data availability rates (%)	Maximum (ppm)	Percentiles (ppm)					
			99 <sup>th</sup>	98 <sup>th</sup>	95 <sup>th</sup>	90 <sup>th</sup>	75 <sup>th</sup>	50 <sup>th</sup>
<u>South East Queensland</u>								
Mountain Creek	96.7	0.030	0.028	0.027	0.022	0.021	0.013	0.008
Deception Bay	97.8	0.040	0.034	0.033	0.030	0.027	0.020	0.014
Rocklea	63.9	0.039	0.035	0.032	0.030	0.027	0.022	0.017
Springwood	80.3	0.047	0.036	0.031	0.028	0.026	0.022	0.017
Arundel	12.3	0.015	0.015	0.015	0.015	0.013	0.010	0.008
Flinders View	99.7	0.039	0.037	0.035	0.028	0.025	0.020	0.014
<u>Gladstone</u>								
South Gladstone	94.0	0.042	0.037	0.035	0.032	0.029	0.023	0.018
<u>Townsville</u>								
Pimlico	99.5	0.034	0.031	0.028	0.026	0.022	0.017	0.011

AAQ NEPM standard: 0.12 ppm (one-hour average)  
AAQ NEPM goal: standard exceeded on no more than one day per year



**Table 24:** Percentiles of daily peak one-hour average nitrogen dioxide concentrations at Deception Bay, South East Queensland (1995-2012)

Year	Data availability (% of days)	No. of exceedences (days)	Maximum (ppm)	Annual average (ppm)	Percentiles (ppm)			
					99 <sup>th</sup>	98 <sup>th</sup>	95 <sup>th</sup>	90 <sup>th</sup>
1995	93.4	0	0.058	0.007	0.054	0.046	0.038	0.033
1996	<i>68.6*</i>	<i>0</i>	<i>0.048</i>	<i>0.007</i>	<i>0.043</i>	<i>0.042</i>	<i>0.034</i>	<i>0.030</i>
1997	95.6	0	0.043	0.007	0.038	0.036	0.032	0.028
1998	97.5	0	0.066	0.006	0.050	0.039	0.031	0.026
1999	96.4	0	0.058	0.006	0.039	0.030	0.028	0.024
2000	99.5	0	0.053	0.005	0.038	0.034	0.029	0.025
2001	95.1	0	0.047	0.006	0.040	0.039	0.034	0.030
2002	<i>87.4*</i>	<i>0</i>	<i>0.065</i>	<i>0.006</i>	<i>0.044</i>	<i>0.042</i>	<i>0.036</i>	<i>0.030</i>
2003	94.5	0	0.053	0.006	0.036	0.033	0.030	0.028
2004	97.8	0	0.045	0.006	0.036	0.036	0.030	0.027
2005	95.3	0	0.034	0.006	0.033	0.030	0.028	0.026
2006	99.5	0	0.044	0.008	0.035	0.033	0.028	0.027
2007	<i>94.2*</i>	<i>0</i>	<i>0.063</i>	<i>0.006</i>	<i>0.035</i>	<i>0.033</i>	<i>0.030</i>	<i>0.027</i>
2008	<i>84.7*</i>	<i>0</i>	<i>0.037</i>	<i>0.008</i>	<i>0.034</i>	<i>0.031</i>	<i>0.029</i>	<i>0.027</i>
2009	100.0	0	0.036	0.005	0.030	0.028	0.026	0.024
2010	98.9	0	0.037	0.005	0.033	0.033	0.028	0.024
2011	99.5	0	0.035	0.006	0.033	0.030	0.029	0.027
2012	97.8	0	0.040	0.006	0.034	0.033	0.030	0.027
*Data availability less than 75 per cent for one or more quarters. Years shown in italics have less than 75 per cent annual data availability. AAQ NEPM standards: 0.12 ppm (one-hour average); 0.03 ppm (annual average) AAQ NEPM goal: one-hour standard exceeded on no more than one day per year								

**Table 25:** Percentiles of daily peak one-hour average nitrogen dioxide concentrations at Rocklea, South East Queensland (1980 to 2012)

Year	Data availability (% of days)	No. of exceedences (days)	Maximum (ppm)	Annual average (ppm)	Percentiles (ppm)			
					99 <sup>th</sup>	98 <sup>th</sup>	95 <sup>th</sup>	90 <sup>th</sup>
1980	97.3	0	0.070	0.011	0.065	0.058	0.043	0.038
1981	78.9*	0	0.070	0.010	0.060	0.051	0.041	0.037
1982	97.8	0	0.073	0.010	0.058	0.054	0.048	0.040
1983	95.6	0	0.056	0.006	0.050	0.042	0.033	0.030
1984	83.3*	0	0.076	0.007	0.061	0.056	0.048	0.041
1985	91.2	0	0.048	0.008	0.044	0.039	0.035	0.031
1986	83.6*	2	<b>0.160</b>	0.012	0.099	0.069	0.056	0.045
1987	92.1	0	0.089	0.015	0.078	0.067	0.060	0.052
1988	60.1*	0	0.114	<i>i.d.</i>	0.083	0.077	0.066	0.055
1989	84.4*	0	0.073	0.016	0.069	0.061	0.054	0.047
1990	75.3*	0	0.079	0.016	0.070	0.064	0.053	0.046
1991	89.0	0	0.113	0.015	0.085	0.071	0.061	0.052
1992	77.9*	2	<b>0.157</b>	0.013	0.072	0.065	0.052	0.042
1993	89.6	0	0.086	0.013	0.066	0.058	0.047	0.040
1994	91.8	0	0.096	0.012	0.062	0.057	0.051	0.045
1995	79.5*	0	0.066	0.010	0.050	0.048	0.040	0.036
1996	90.4*	0	0.058	0.010	0.055	0.044	0.040	0.036
1997	95.6	0	0.061	0.010	0.043	0.042	0.039	0.033
1998	96.2	0	0.056	0.009	0.046	0.041	0.038	0.033
1999	91.2*	0	0.054	0.009	0.044	0.042	0.034	0.029
2000	96.7	0	0.059	0.009	0.046	0.043	0.037	0.032
2001	98.4	0	0.049	0.009	0.042	0.041	0.035	0.032
2002	98.4	0	0.051	0.009	0.046	0.041	0.037	0.033
2003	97.0	0	0.050	0.009	0.039	0.038	0.033	0.030
2004	95.6	0	0.049	0.009	0.047	0.043	0.037	0.033
2005	98.6	0	0.046	0.009	0.042	0.041	0.036	0.031
2006	96.4	0	0.046	0.011	0.039	0.035	0.031	0.027
2007	100.0	0	0.044	0.008	0.041	0.040	0.035	0.031
2008	79.3*	0	0.047	0.008	0.041	0.034	0.030	0.027
2009	98.4	0	0.039	0.007	0.035	0.034	0.031	0.027
2010	98.4	0	0.039	0.007	0.037	0.033	0.028	0.023
2011	2.7*	0	0.020	<i>i.d.</i>	0.020	0.020	0.020	0.020
2012	63.9*	0	0.039	<i>i.d.</i>	0.035	0.032	0.030	0.027

Bold text indicates a value greater than the AAQ NEPM standard.

\*Data availability less than 75 per cent for one or more quarters.

Years shown in italics have less than 75 per cent annual data availability.

i.d. = insufficient data to calculate value

AAQ NEPM standards: 0.12 ppm (one-hour average); 0.03 ppm (annual average)

AAQ NEPM goal: one-hour standard exceeded on no more than one day per year

**Table 26:** Percentiles of daily peak one-hour average nitrogen dioxide concentrations at Flinders View, South East Queensland (1995 to 2012)

Year	Data availability (% of days)	No. of exceedences (days)	Maximum (ppm)	Annual average (ppm)	Percentiles (ppm)			
					99 <sup>th</sup>	98 <sup>th</sup>	95 <sup>th</sup>	90 <sup>th</sup>
1995	91.2*	0	0.038	0.009	0.037	0.035	0.031	0.028
1996	98.4	0	0.055	0.009	0.050	0.044	0.037	0.033
1997	96.4	0	0.046	0.009	0.042	0.040	0.036	0.030
1998	96.4	0	0.048	0.009	0.041	0.039	0.034	0.030
1999	98.4	0	0.046	0.008	0.039	0.038	0.032	0.029
2000	99.2	0	0.042	0.008	0.040	0.038	0.034	0.031
2001	100.0	0	0.045	0.009	0.037	0.036	0.034	0.031
2002	88.8*	0	0.062	0.010	0.057	0.043	0.036	0.033
2003	94.0	0	0.046	0.009	0.039	0.037	0.033	0.029
2004	100.0	0	0.054	0.009	0.047	0.038	0.034	0.030
2005	100.0	0	0.055	0.008	0.046	0.038	0.032	0.028
2006	100.0	0	0.050	0.012	0.043	0.041	0.035	0.032
2007	96.2	0	0.039	0.008	0.036	0.035	0.031	0.029
2008	96.7	0	0.040	0.010	0.039	0.038	0.031	0.028
2009	99.5	0	0.042	0.008	0.038	0.036	0.034	0.030
2010	99.5	0	0.039	0.008	0.037	0.034	0.028	0.025
2011	99.5	0	0.040	0.008	0.036	0.034	0.031	0.028
2012	99.7	0	0.039	0.007	0.037	0.035	0.028	0.025

\*Data availability less than 75 per cent for one or more quarters.

AAQ NEPM standards: 0.12 ppm (one-hour average); 0.03 ppm (annual average)

AAQ NEPM goal: one-hour standard exceeded on no more than one day per year

**Table 27:** Percentiles of daily peak one-hour average nitrogen dioxide concentrations at South Gladstone (1994 to 2012)

Year	Data availability (% of days)	No. of exceedences (days)	Maximum (ppm)	Annual average (ppm)	Percentiles (ppm)			
					99 <sup>th</sup>	98 <sup>th</sup>	95 <sup>th</sup>	90 <sup>th</sup>
1994	81.6*	0	0.049	0.005	0.047	0.044	0.038	0.028
1995	91.8	0	0.038	0.005	0.030	0.028	0.025	0.022
1996	84.2*	0	0.045	0.006	0.039	0.035	0.032	0.029
1997	65.8*	0	0.031	<i>i.d.</i>	0.030	0.029	0.022	0.017
1998	72.9*	0	0.022	<i>i.d.</i>	0.020	0.018	0.015	0.012
1999	88.8*	0	0.034	0.003	0.029	0.029	0.025	0.021
2000	97.8	0	0.031	0.003	0.025	0.024	0.022	0.019
2001	96.4	0	0.048	0.004	0.033	0.031	0.026	0.023
2002	98.4	0	0.036	0.004	0.031	0.029	0.026	0.021
2003	95.3	0	0.035	0.004	0.030	0.027	0.024	0.022
2004	100.0	0	0.042	0.004	0.030	0.029	0.026	0.023
2005	99.7	0	0.035	0.004	0.030	0.028	0.024	0.022
2006	100.0	0	0.034	0.003	0.027	0.027	0.024	0.021
2007	98.4	0	0.035	0.005	0.030	0.029	0.027	0.024
2008	98.6	0	0.033	0.003	0.030	0.026	0.023	0.020
2009	97.5	0	0.033	0.006	0.029	0.028	0.025	0.022
2010	98.4	0	0.033	0.006	0.031	0.029	0.026	0.023
2011	96.7	0	0.035	0.006	0.034	0.032	0.029	0.026
2012	94.0*	0	0.042	0.007	0.037	0.035	0.032	0.029

\*Data availability less than 75 per cent for one or more quarters.

Years shown in italics have less than 75 per cent annual data availability.

*i.d.* = insufficient data to calculate value.

AAQ NEPM standards: 0.12 ppm (one-hour average); 0.03 ppm (annual average)

AAQ NEPM goal: one-hour standard exceeded on no more than one day per year

## Ozone

**Table 28:** Percentiles of daily one-hour peak average ozone concentrations in Queensland for 2012

Region / Performance monitoring station	Data availability rates (%)	Maximum (ppm)	Percentiles (ppm)					
			99 <sup>th</sup>	98 <sup>th</sup>	95 <sup>th</sup>	90 <sup>th</sup>	75 <sup>th</sup>	50 <sup>th</sup>
<u>South East Queensland</u>								
Mountain Creek	96.7	0.059	0.051	0.047	0.041	0.039	0.034	0.029
Deception Bay	98.9	0.059	0.056	0.053	0.048	0.044	0.037	0.032
Rocklea	62.6	0.081	0.073	0.062	0.058	0.050	0.041	0.034
Springwood	79.2	0.057	0.052	0.049	0.043	0.039	0.033	0.029
Arundel	12.3	0.062	0.062	0.062	0.053	0.043	0.033	0.024
Flinders View	94.3	0.090	0.086	0.067	0.056	0.051	0.041	0.032
<u>Townsville</u>								
Pimlico	98.1	0.051	0.043	0.042	0.040	0.038	0.034	0.028

AAQ NEPM standard: 0.10 ppm (one-hour average)

AAQ NEPM goal: standard exceeded on no more than one day per year

**Table 29:** Percentiles of daily peak four-hour average ozone concentrations in Queensland for 2012

Region / Performance monitoring station	Data availability rates (%)	Maximum (ppm)	Percentiles (ppm)					
			99 <sup>th</sup>	98 <sup>th</sup>	95 <sup>th</sup>	90 <sup>th</sup>	75 <sup>th</sup>	50 <sup>th</sup>
<u>South East Queensland</u>								
Mountain Creek	97.0	0.056	0.046	0.044	0.040	0.037	0.033	0.028
Deception Bay	98.9	0.057	0.051	0.050	0.044	0.041	0.035	0.030
Rocklea	62.6	0.066	0.064	0.054	0.051	0.046	0.039	0.032
Springwood	79.0	0.055	0.047	0.045	0.040	0.036	0.031	0.028
Arundel	12.3	0.060	0.060	0.060	0.050	0.041	0.030	0.023
Flinders View	94.3	0.080	0.079	0.062	0.052	0.046	0.038	0.031
<u>Townsville</u>								
Pimlico	98.1	0.045	0.041	0.041	0.038	0.036	0.033	0.027
AAQ NEPM standard: 0.08 ppm (four-hour average)								
AAQ NEPM goal: standard exceeded on no more than one day per year								

**Table 30:** Percentiles of daily peak one-hour ozone concentrations at Deception Bay, South East Queensland (1995 to 2012)

Year	Data availability (% of days)	No. of exceedences (days)	Maximum (ppm)	Percentiles (ppm)			
				99 <sup>th</sup>	98 <sup>th</sup>	95 <sup>th</sup>	90 <sup>th</sup>
1995	95.9	0	0.083	0.075	0.070	0.052	0.047
1996	95.9	0	0.091	0.073	0.064	0.055	0.048
1997	100.0	0	0.079	0.065	0.057	0.048	0.043
1998	94.2	0	0.069	0.060	0.053	0.048	0.044
1999	99.2	0	0.092	0.062	0.057	0.048	0.043
2000	99.7	0	0.070	0.058	0.054	0.046	0.041
2001	86.6*	0	0.079	0.058	0.054	0.048	0.044
2002	89.6*	0	0.071	0.063	0.061	0.048	0.044
2003	97.0	0	0.095	0.063	0.057	0.047	0.043
2004	96.7	0	0.070	0.058	0.055	0.048	0.045
2005	98.4	0	0.079	0.065	0.056	0.050	0.044
2006	99.5	0	0.064	0.056	0.052	0.047	0.042
2007	99.5	0	0.086	0.056	0.054	0.047	0.042
2008	99.7	0	0.082	0.069	0.064	0.047	0.042
2009	100.0	0	0.069	0.057	0.054	0.048	0.045
2010	98.6	0	0.058	0.050	0.046	0.044	0.039
2011	98.9	0	0.099	0.069	0.059	0.046	0.041
2012	98.9	0	0.059	0.056	0.053	0.048	0.044
*Data availability less than 75 per cent for one or more quarters.							
AAQ NEPM standard: 0.10 ppm (one-hour average)							
AAQ NEPM goal: standard exceeded on no more than one day per year							

**Table 31:** Percentiles of daily peak one-hour average ozone concentrations at Rocklea, South East Queensland (1980 to 2012)

Year	Data availability (% of days)	No. of exceedences (days)	Maximum (ppm)	Percentiles (ppm)			
				99 <sup>th</sup>	98 <sup>th</sup>	95 <sup>th</sup>	90 <sup>th</sup>
1980	97.5	0	0.083	0.078	0.066	0.058	0.050
1981	90.7	0	0.078	0.073	0.062	0.049	0.042
1982	97.8	1	<b>0.102</b>	0.070	0.065	0.057	0.047
1983	97.5	0	0.099	0.071	0.068	0.059	0.041
1984	95.1	1	<b>0.102</b>	0.070	0.064	0.055	0.046
1985	91.0	1	<b>0.105</b>	0.079	0.056	0.047	0.036
1986	84.1*	0	0.074	0.073	0.063	0.057	0.050
1987	<i>72.1*</i>	<i>4</i>	<b>0.125</b>	<b>0.106</b>	<i>0.100</i>	<i>0.078</i>	<i>0.055</i>
1988	<i>67.5*</i>	<i>1</i>	<b>0.101</b>	<i>0.085</i>	<i>0.069</i>	<i>0.047</i>	<i>0.039</i>
1989	82.5*	0	0.071	0.058	0.051	0.042	0.036
1990	76.2*	0	0.061	0.051	0.042	0.036	0.031
1991	91.2	0	0.061	0.053	0.045	0.039	0.031
1992	94.0	0	0.069	0.059	0.049	0.039	0.035
1993	94.8	0	0.096	0.063	0.059	0.054	0.050
1994	95.1	1	<b>0.127</b>	0.083	0.073	0.059	0.050
1995	78.6*	0	0.098	0.086	0.070	0.061	0.053
1996	97.0	2	<b>0.135</b>	0.090	0.085	0.071	0.060
1997	97.0	0	0.093	0.085	0.077	0.065	0.053
1998	95.1	1	<b>0.103</b>	0.080	0.078	0.064	0.053
1999	94.2	1	<b>0.135</b>	0.093	0.066	0.057	0.047
2000	96.2	0	0.088	0.076	0.066	0.057	0.049
2001	99.2	0	0.093	0.072	0.063	0.055	0.047
2002	98.6	2	<b>0.118</b>	0.075	0.073	0.060	0.054
2003	97.8	0	0.065	0.063	0.059	0.052	0.046
2004	95.9	0	0.088	0.080	0.076	0.064	0.055
2005	100.0	0	0.081	0.074	0.070	0.061	0.053
2006	97.5	0	0.079	0.066	0.063	0.055	0.048
2007	95.6	0	0.076	0.070	0.059	0.052	0.049
2008	85.0*	0	0.079	0.067	0.065	0.050	0.043
2009	98.4	0	0.077	0.073	0.067	0.055	0.048
2010	98.4	0	0.085	0.072	0.068	0.048	0.043
2011	<i>2.7*</i>	<i>0</i>	<i>0.036</i>	<i>0.036</i>	<i>0.036</i>	<i>0.036</i>	<i>0.036</i>
2012	<i>62.6*</i>	<i>0</i>	<i>0.081</i>	<i>0.073</i>	<i>0.062</i>	<i>0.058</i>	<i>0.050</i>

Bold text indicates a value greater than the AAQ NEPM standard.

\*Data availability less than 75 per cent for one or more quarters.

Years shown in italics have less than 75 per cent annual data availability.

AAQ NEPM standard: 0.10 ppm (one-hour average)

AAQ NEPM goal: standard exceeded on no more than one day per year

**Table 32:** Percentiles of daily peak one-hour average ozone concentrations at Flinders View, South East Queensland (1994 to 2012)

Year	Data availability (% of days)	No. of exceedences (days)	Maximum (ppm)	Percentiles (ppm)			
				99 <sup>th</sup>	98 <sup>th</sup>	95 <sup>th</sup>	90 <sup>th</sup>
1994	97.5	0	0.076	0.069	0.062	0.056	0.048
1995	95.1	0	0.079	0.071	0.065	0.056	0.051
1996	98.6	2	<b>0.125</b>	0.082	0.075	0.063	0.055
1997	97.5	2	<b>0.106</b>	0.094	0.078	0.066	0.056
1998	95.1	0	0.100	0.085	0.076	0.066	0.056
1999	98.6	1	<b>0.127</b>	0.082	0.077	0.055	0.048
2000	99.2	1	<b>0.116</b>	0.073	0.070	0.060	0.054
2001	99.5	0	0.079	0.074	0.070	0.059	0.051
2002	95.3	0	0.098	0.080	0.078	0.070	0.062
2003	96.7	0	0.087	0.073	0.068	0.056	0.048
2004	100.0	2	<b>0.114</b>	0.079	0.077	0.066	0.058
2005	100.0	0	0.085	0.075	0.073	0.063	0.056
2006	100.0	0	0.077	0.069	0.065	0.057	0.050
2007	100.0	0	0.069	0.062	0.060	0.055	0.050
2008	99.5	0	0.067	0.062	0.056	0.049	0.045
2009	99.7	0	0.075	0.070	0.064	0.058	0.052
2010	97.5	0	0.089	0.063	0.055	0.048	0.043
2011	95.8	1	<b>0.103</b>	0.071	0.065	0.054	0.048
2012	94.3	0	0.090	0.086	0.067	0.056	0.051
Bold text indicates a value greater than the AAQ NEPM standard. *Data availability less than 75 per cent for one or more quarters. AAQ NEPM standard: 0.10 ppm (one-hour average) AAQ NEPM goal: standard exceeded on no more than one day per year							

**Table 33:** Percentiles of daily peak four-hour average ozone concentrations at Deception Bay, South East Queensland (1995 to 2012)

Year	Data availability (% of days)	No. of exceedences (days)	Maximum (ppm)	Percentiles (ppm)			
				99 <sup>th</sup>	98 <sup>th</sup>	95 <sup>th</sup>	90 <sup>th</sup>
1995	95.9	0	0.077	0.061	0.057	0.047	0.043
1996	95.9	0	0.076	0.065	0.059	0.049	0.045
1997	100.0	0	0.066	0.053	0.050	0.044	0.040
1998	94.2	0	0.059	0.054	0.049	0.043	0.040
1999	99.2	1	<b>0.083</b>	0.055	0.052	0.043	0.039
2000	99.7	0	0.063	0.050	0.049	0.042	0.038
2001	86.6*	0	0.075	0.056	0.050	0.044	0.040
2002	89.6*	0	0.067	0.060	0.053	0.044	0.041
2003	97.0	0	0.076	0.060	0.052	0.044	0.040
2004	96.7	0	0.062	0.053	0.049	0.044	0.042
2005	98.6	0	0.063	0.061	0.049	0.046	0.041
2006	99.5	0	0.060	0.055	0.048	0.044	0.039
2007	99.7	0	0.070	0.052	0.050	0.044	0.040
2008	99.7	0	0.073	0.062	0.054	0.043	0.039
2009	100.0	0	0.061	0.053	0.050	0.045	0.042
2010	98.4	0	0.051	0.046	0.044	0.040	0.037
2011	98.9	2	<b>0.086</b>	0.063	0.051	0.043	0.039
2012	98.9	0	0.057	0.051	0.050	0.044	0.041

Bold text indicates a value greater than the AAQ NEPM standard.  
 \*Data availability less than 75 per cent for one or more quarters.  
 AAQ NEPM standard: 0.08 ppm (four-hour average)  
 AAQ NEPM goal: standard exceeded on no more than one day per year



**Table 34:** Percentiles of daily peak four-hour average ozone concentrations at Rocklea, South East Queensland (1980 to 2012)

Year	Data availability (% of days)	No. of exceedences (days)	Maximum (ppm)	Percentiles (ppm)			
				99 <sup>th</sup>	98 <sup>th</sup>	95 <sup>th</sup>	90 <sup>th</sup>
1980	97.5	0	0.076	0.063	0.059	0.049	0.043
1981	90.7	0	0.069	0.056	0.051	0.043	0.038
1982	97.8	0	0.076	0.058	0.053	0.048	0.040
1983	97.5	0	0.078	0.058	0.054	0.047	0.036
1984	95.1	0	0.080	0.059	0.054	0.047	0.041
1985	91.0	1	<b>0.090</b>	0.069	0.051	0.039	0.031
1986	84.1*	0	0.063	0.059	0.052	0.049	0.041
1987	<i>72.1*</i>	8	<b>0.110</b>	<b>0.094</b>	<b>0.093</b>	0.066	0.049
1988	<i>67.5*</i>	1	<b>0.081</b>	0.065	0.050	0.041	0.035
1989	82.5*	0	0.060	0.048	0.042	0.037	0.032
1990	76.2*	0	0.053	0.042	0.037	0.030	0.028
1991	91.2	0	0.054	0.043	0.039	0.032	0.026
1992	94.0	0	0.058	0.052	0.042	0.034	0.031
1993	94.8	0	0.074	0.054	0.053	0.048	0.043
1994	95.1	1	<b>0.101</b>	0.075	0.063	0.051	0.043
1995	78.6*	0	0.080	0.070	0.058	0.054	0.047
1996	97.0	1	<b>0.111</b>	0.076	0.070	0.061	0.051
1997	97.0	0	0.080	0.069	0.064	0.056	0.045
1998	95.1	1	<b>0.091</b>	0.068	0.064	0.057	0.049
1999	94.2	1	<b>0.102</b>	0.066	0.058	0.049	0.042
2000	96.2	0	0.072	0.063	0.054	0.049	0.044
2001	99.2	0	0.071	0.063	0.056	0.048	0.043
2002	98.6	1	<b>0.105</b>	0.068	0.061	0.054	0.047
2003	97.8	0	0.059	0.053	0.051	0.047	0.042
2004	95.9	0	0.077	0.069	0.064	0.057	0.050
2005	100.0	0	0.067	0.064	0.059	0.052	0.047
2006	97.5	0	0.068	0.056	0.055	0.049	0.043
2007	95.9	0	0.067	0.058	0.053	0.048	0.043
2008	85.0*	0	0.064	0.057	0.053	0.044	0.039
2009	98.4	0	0.068	0.061	0.056	0.050	0.043
2010	98.4	0	0.076	0.063	0.056	0.045	0.040
2011	2.7*	0	0.033	0.033	0.033	0.033	0.033
2012	62.6*	0	0.066	0.064	0.054	0.051	0.046

Bold text indicates a value greater than the AAQ NEPM standard.

\*Data availability less than 75 per cent for one or more quarters.

Years shown in italics have less than 75 per cent annual data availability.

AAQ NEPM standard: 0.08 ppm (four-hour average)

AAQ NEPM goal: standard exceeded on no more than one day per year

**Table 35:** Percentiles of daily peak four-hour average ozone concentrations at Flinders View, South East Queensland (1994 to 2012)

Year	Data availability (% of days)	No. of exceedences (days)	Maximum (ppm)	Percentiles (ppm)			
				99 <sup>th</sup>	98 <sup>th</sup>	95 <sup>th</sup>	90 <sup>th</sup>
1994	97.5	0	0.072	0.058	0.056	0.047	0.043
1995	95.1	0	0.066	0.062	0.060	0.050	0.044
1996	98.6	2	<b>0.091</b>	0.068	0.065	0.058	0.049
1997	97.5	2	<b>0.090</b>	0.073	0.067	0.056	0.049
1998	95.1	0	0.069	0.065	0.064	0.057	0.049
1999	98.6	1	<b>0.101</b>	0.067	0.064	0.049	0.043
2000	99.2	1	<b>0.089</b>	0.064	0.061	0.052	0.048
2001	99.5	0	0.072	0.066	0.058	0.052	0.047
2002	95.3	1	<b>0.083</b>	0.070	0.066	0.061	0.055
2003	96.7	0	0.080	0.067	0.059	0.049	0.044
2004	100.0	1	<b>0.100</b>	0.071	0.067	0.057	0.050
2005	100.0	0	0.067	0.066	0.062	0.057	0.050
2006	100.0	0	0.070	0.059	0.056	0.050	0.044
2007	100.0	0	0.062	0.056	0.054	0.049	0.045
2008	99.5	0	0.058	0.055	0.052	0.045	0.041
2009	99.7	0	0.066	0.062	0.059	0.051	0.046
2010	97.5	0	0.072	0.055	0.050	0.043	0.040
2011	96.2	1	<b>0.088</b>	0.061	0.059	0.049	0.045
2012	94.3	0	0.080	0.079	0.062	0.052	0.046
Bold text indicates a value greater than the AAQ NEPM standard. *Data availability less than 75 per cent for one or more quarters. AAQ NEPM standard: 0.08 ppm (four-hour average) AAQ NEPM goal: standard exceeded on no more than one day per year							

## Sulfur dioxide

**Table 36:** Percentiles of daily peak one-hour average sulfur dioxide concentrations in Queensland for 2012

Region / Performance monitoring station	Data availability rates (%)	Maximum (ppm)	Percentiles (ppm)					
			99 <sup>th</sup>	98 <sup>th</sup>	95 <sup>th</sup>	90 <sup>th</sup>	75 <sup>th</sup>	50 <sup>th</sup>
<u>South East Queensland</u> Springwood	80.3	0.013	0.012	0.009	0.007	0.004	0.002	0.001
Flinders View	100.0	0.015	0.014	0.012	0.009	0.007	0.003	0.002
<u>Gladstone</u> South Gladstone	99.5	0.059	0.050	0.045	0.030	0.024	0.014	0.008
<u>Townsville</u> Pimlico	99.5	0.006	0.004	0.004	0.003	0.003	0.002	0.001
Stuart	93.4	0.005	0.004	0.004	0.003	0.003	0.002	0.002
<u>Mount Isa</u> Menzies	99.5	<b>0.670</b>	<b>0.434</b>	<b>0.410</b>	<b>0.274</b>	0.165	0.037	0.002
The Gap	93.2	<b>0.627</b>	<b>0.426</b>	<b>0.341</b>	<b>0.227</b>	0.145	0.017	0.001
Bold text indicates a value greater than the AAQ NEPM standard. AAQ NEPM standard: 0.20 ppm (one-hour average) AAQ NEPM goal: standard exceeded on no more than one day per year								

**Table 37:** Percentiles of daily 24-hour average sulfur dioxide concentrations in Queensland for 2012

Region / Performance monitoring station	Data availability rates (%)	Maximum (ppm)	Percentiles (ppm)					
			99 <sup>th</sup>	98 <sup>th</sup>	95 <sup>th</sup>	90 <sup>th</sup>	75 <sup>th</sup>	50 <sup>th</sup>
<u>South East Queensland</u> Springwood	80.3	0.003	0.002	0.002	0.002	0.001	0.001	0.001
Flinders View	100.0	0.004	0.003	0.003	0.002	0.002	0.001	0.001
<u>Gladstone</u> South Gladstone	99.5	0.010	0.009	0.008	0.006	0.005	0.003	0.002
<u>Townsville</u> Pimlico	99.5	0.003	0.002	0.002	0.002	0.001	0.001	0.001
Stuart	93.4	0.004	0.003	0.002	0.002	0.002	0.001	0.001
<u>Mount Isa</u> Menzies	99.5	0.063	0.056	0.055	0.031	0.016	0.004	0.001
The Gap	93.2	0.075	0.052	0.042	0.027	0.014	0.002	0.000
AAQ NEPM standard: 0.08 ppm (24-hour average) AAQ NEPM goal: standard exceeded on no more than one day per year								

**Table 38:** Percentiles of daily peak one-hour average sulfur dioxide concentrations at Flinders View, South East Queensland (1993 to 2012)

Year	Data availability (% of days)	No. of exceedences (days)	Maximum (ppm)	Annual average (ppm)	Percentiles (ppm)			
					99 <sup>th</sup>	98 <sup>th</sup>	95 <sup>th</sup>	90 <sup>th</sup>
1993	88.2*	0	0.049	0.002	0.030	0.024	0.018	0.014
1994	98.9	0	0.033	0.003	0.027	0.025	0.021	0.017
1995	59.5*	0	0.041	<i>i.d.</i>	0.029	0.027	0.020	0.014
1996	88.3*	0	0.047	0.002	0.037	0.027	0.023	0.017
1997	97.0	0	0.047	0.002	0.040	0.035	0.023	0.019
1998	95.9	0	0.090	0.002	0.037	0.033	0.024	0.019
1999	96.4	0	0.070	0.002	0.035	0.033	0.028	0.021
2000	89.9	0	0.081	0.002	0.049	0.036	0.027	0.022
2001	99.5	0	0.053	0.001	0.048	0.043	0.029	0.023
2002	97.0	0	0.057	0.001	0.035	0.033	0.025	0.018
2003	96.4	0	0.046	0.001	0.031	0.030	0.023	0.017
2004	99.5	0	0.063	0.001	0.036	0.031	0.021	0.016
2005	100.0	0	0.034	0.001	0.028	0.024	0.020	0.014
2006	100.0	0	0.040	0.001	0.037	0.027	0.023	0.018
2007	100.0	0	0.026	0.001	0.024	0.022	0.018	0.014
2008	100.0	0	0.042	0.001	0.030	0.028	0.019	0.016
2009	99.5	0	0.046	0.001	0.030	0.027	0.018	0.014
2010	99.4	0	0.034	0.001	0.022	0.018	0.015	0.012
2011	95.6	0	0.028	0.001	0.022	0.017	0.014	0.009
2012	100.0	0	0.015	0.001	0.014	0.012	0.009	0.007

\*Data availability less than 75 per cent for one or more quarters.

Years shown in italics have less than 75 per cent annual data availability.

i.d. = insufficient data to calculate value.

AAQ NEPM standards: 0.20 ppm (one-hour average); 0.02 ppm (annual average)

AAQ NEPM goal: one-hour standard exceeded on no more than one day per year

**Table 39:** Percentiles of daily peak one-hour average sulfur dioxide concentrations at South Gladstone (1991 to 2012)

Year	Data availability (% of days)	No. of exceedences (days)	Maximum (ppm)	Annual average (ppm)	Percentiles (ppm)			
					99 <sup>th</sup>	98 <sup>th</sup>	95 <sup>th</sup>	90 <sup>th</sup>
1991	92.6	0	0.011	0.002	0.011	0.009	0.008	0.006
1992	94.3	0	0.052	0.003	0.039	0.029	0.020	0.015
1993	98.3	0	0.075	0.004	0.059	0.050	0.039	0.032
1994	97.0	0	0.070	0.003	0.042	0.040	0.031	0.024
1995	96.7	0	0.168	0.004	0.083	0.065	0.047	0.035
1996	99.2	0	0.083	0.002	0.053	0.042	0.026	0.018
1997	98.9	0	0.049	0.001	0.029	0.023	0.014	0.010
1998	97.5	0	0.076	0.001	0.050	0.042	0.027	0.020
1999	94.2	0	0.051	0.002	0.042	0.039	0.027	0.022
2000	84.7*	0	0.092	0.001	0.071	0.045	0.034	0.024
2001	98.1	0	0.068	0.001	0.046	0.035	0.023	0.018
2002	94.5	0	0.123	0.001	0.040	0.031	0.025	0.020
2003	93.2	0	0.112	0.001	0.058	0.041	0.025	0.019
2004	96.4	0	0.064	0.001	0.040	0.032	0.022	0.017
2005	99.7	0	0.084	0.002	0.063	0.053	0.032	0.027
2006	100.0	0	0.093	0.002	0.071	0.064	0.049	0.034
2007	98.4	0	0.075	0.002	0.069	0.061	0.044	0.035
2008	98.6	0	0.140	0.002	0.065	0.056	0.042	0.026
2009	97.5	0	0.053	0.002	0.040	0.035	0.028	0.021
2010	98.4	0	0.052	0.002	0.038	0.035	0.028	0.022
2011	97.3	0	0.091	0.003	0.049	0.045	0.033	0.026
2012	99.5	0	0.059	0.002	0.050	0.045	0.030	0.024

\*Data availability less than 75 per cent for one or more quarters.

AAQ NEPM standards: 0.20 ppm (one-hour average); 0.02 ppm (annual average)

AAQ NEPM goal: one-hour standard exceeded on no more than one day per year

**Table 40:** Percentiles of daily peak one-hour average sulfur dioxide concentrations at Menzies, Mount Isa (1983 to 2012)

Year	Data availability (% of days)	No. of exceedences (days)	Maximum (ppm)	Annual average (ppm)	Percentiles (ppm)			
					99 <sup>th</sup>	98 <sup>th</sup>	95 <sup>th</sup>	90 <sup>th</sup>
1983	67.4*	25	<b>0.725</b>	<i>i.d.</i>	<b>0.515</b>	<b>0.430</b>	<b>0.270</b>	0.200
1984	93.7	31	<b>1.155</b>	0.017	<b>0.555</b>	<b>0.515</b>	<b>0.330</b>	0.185
1985	97.3	7	<b>1.080</b>	0.016	<b>0.325</b>	<b>0.210</b>	0.100	0.055
1986	88.5	50	<b>1.406</b>	<b>0.031</b>	<b>1.255</b>	<b>0.788</b>	<b>0.577</b>	<b>0.296</b>
1987	98.9	51	<b>1.755</b>	<b>0.022</b>	<b>1.016</b>	<b>0.853</b>	<b>0.546</b>	<b>0.324</b>
1988	91.0*	31	<b>0.798</b>	0.017	<b>0.682</b>	<b>0.562</b>	<b>0.342</b>	0.159
1989	85.2	41	<b>0.957</b>	0.020	<b>0.585</b>	<b>0.503</b>	<b>0.348</b>	<b>0.241</b>
1990	44.7*	6	<b>0.577</b>	<i>i.d.</i>	<b>0.493</b>	<b>0.222</b>	0.145	0.091
1991	54.8*	28	<b>0.673</b>	<i>i.d.</i>	<b>0.638</b>	<b>0.440</b>	<b>0.294</b>	<b>0.215</b>
1992	88.5*	25	<b>0.540</b>	0.012	<b>0.457</b>	<b>0.406</b>	<b>0.286</b>	0.170
1993	95.6	24	<b>0.718</b>	0.015	<b>0.434</b>	<b>0.403</b>	<b>0.282</b>	0.134
1994	91.5	20	<b>0.688</b>	0.019	<b>0.483</b>	<b>0.343</b>	<b>0.250</b>	0.135
1995	98.9	11	<b>0.443</b>	0.005	<b>0.254</b>	<b>0.239</b>	0.184	0.109
1996	98.6	16	<b>0.598</b>	0.005	<b>0.409</b>	<b>0.285</b>	0.198	0.131
1997	98.9	7	<b>0.300</b>	0.003	<b>0.256</b>	<b>0.216</b>	0.128	0.083
1998	48.8*	16	<b>0.693</b>	<i>i.d.</i>	<b>0.548</b>	<b>0.368</b>	<b>0.265</b>	0.190
1999	90.4*	17	<b>0.675</b>	0.004	<b>0.366</b>	<b>0.269</b>	<b>0.202</b>	0.141
2000	96.4	31	<b>0.584</b>	0.006	<b>0.373</b>	<b>0.357</b>	<b>0.250</b>	0.191
2001	98.9	41	<b>0.581</b>	0.006	<b>0.438</b>	<b>0.422</b>	<b>0.295</b>	<b>0.222</b>
2002	91.2	49	<b>1.254</b>	0.009	<b>0.551</b>	<b>0.526</b>	<b>0.385</b>	<b>0.272</b>
2003	98.9	42	<b>0.658</b>	0.007	<b>0.503</b>	<b>0.493</b>	<b>0.312</b>	<b>0.217</b>
2004	97.5	36	<b>0.888</b>	0.007	<b>0.665</b>	<b>0.444</b>	<b>0.302</b>	<b>0.207</b>
2005	93.7*	49	<b>0.964</b>	0.009	<b>0.663</b>	<b>0.512</b>	<b>0.395</b>	<b>0.271</b>
2006	97.0	25	<b>0.567</b>	0.005	<b>0.398</b>	<b>0.356</b>	<b>0.246</b>	0.176
2007	96.7	31	<b>0.608</b>	0.007	<b>0.408</b>	<b>0.375</b>	<b>0.282</b>	0.185
2008	97.0	38	<b>0.751</b>	0.007	<b>0.528</b>	<b>0.482</b>	<b>0.289</b>	<b>0.203</b>
2009	96.7	25	<b>1.013</b>	0.006	<b>0.582</b>	<b>0.481</b>	<b>0.286</b>	0.126
2010	97.0	19	<b>0.669</b>	0.005	<b>0.413</b>	<b>0.392</b>	<b>0.248</b>	0.146
2011	84.1*	22	<b>0.502</b>	0.006	<b>0.426</b>	<b>0.348</b>	<b>0.236</b>	0.173
2012	99.5	30	<b>0.670</b>	0.005	<b>0.434</b>	<b>0.410</b>	<b>0.274</b>	0.165

Bold text indicates a value greater than the AAQ NEPM standards.

\*Data availability less than 75 per cent for one or more quarters.

Years shown in italics have less than 75 per cent annual data availability.

i.d. = insufficient data to calculate value.

AAQ NEPM standards: 0.20 ppm (one-hour average); 0.02 ppm (annual average)

AAQ NEPM goal: one-hour standard exceeded on no more than one day per year

**Table 41:** Percentiles of daily 24-hour average sulfur dioxide concentrations at Flinders View, South East Queensland (1993 to 2012)

Year	Data availability (% of days)	No. of exceedences (days)	Maximum (ppm)	Annual average (ppm)	Percentiles (ppm)			
					99 <sup>th</sup>	98 <sup>th</sup>	95 <sup>th</sup>	90 <sup>th</sup>
1993	88.2*	0	0.006	0.002	0.005	0.005	0.004	0.003
1994	98.9	0	0.008	0.003	0.007	0.006	0.006	0.005
1995	59.5*	0	0.009	<i>i.d.</i>	0.008	0.006	0.005	0.004
1996	88.3*	0	0.010	0.002	0.005	0.005	0.004	0.004
1997	97.0	0	0.009	0.002	0.006	0.005	0.004	0.003
1998	95.9	0	0.011	0.002	0.007	0.006	0.004	0.004
1999	96.4	0	0.009	0.002	0.007	0.007	0.005	0.004
2000	89.9	0	0.013	0.002	0.012	0.008	0.006	0.005
2001	99.5	0	0.014	0.001	0.007	0.006	0.004	0.003
2002	97.0	0	0.006	0.001	0.006	0.005	0.003	0.003
2003	96.4	0	0.006	0.001	0.005	0.004	0.003	0.002
2004	99.5	0	0.007	0.001	0.006	0.005	0.003	0.003
2005	100.0	0	0.006	0.001	0.004	0.004	0.002	0.002
2006	99.7	0	0.007	0.001	0.006	0.004	0.004	0.003
2007	99.5	0	0.006	0.001	0.004	0.004	0.003	0.002
2008	98.6	0	0.006	0.001	0.005	0.004	0.003	0.002
2009	97.5	0	0.007	0.001	0.005	0.004	0.003	0.002
2010	99.5	0	0.008	0.001	0.004	0.003	0.003	0.002
2011	95.6	0	0.005	0.001	0.004	0.003	0.002	0.002
2012	100.0	0	0.004	0.001	0.003	0.003	0.002	0.002

\*Data availability less than 75 per cent for one or more quarters.

Years shown in italics have less than 75 per cent annual data availability.

i.d. = insufficient data to calculate value.

AAQ NEPM standards: 0.08 ppm (24-hour average); 0.02 ppm (annual average)

AAQ NEPM goal: 24-hour standard exceeded on no more than one day per year

**Table 42:** Percentiles of daily 24-hour average sulfur dioxide concentrations at South Gladstone (1991 to 2012)

Year	Data availability (% of days)	No. of exceedences (days)	Maximum (ppm)	Annual average (ppm)	Percentiles (ppm)			
					99 <sup>th</sup>	98 <sup>th</sup>	95 <sup>th</sup>	90 <sup>th</sup>
1991	92.6	0	0.007	0.002	0.006	0.006	0.004	0.004
1992	94.3	0	0.012	0.003	0.011	0.010	0.009	0.008
1993	98.3	0	0.014	0.004	0.010	0.010	0.008	0.007
1994	97.0	0	0.013	0.003	0.007	0.007	0.006	0.005
1995	96.7	0	0.017	0.004	0.014	0.012	0.008	0.007
1996	99.2	0	0.010	0.002	0.007	0.006	0.005	0.004
1997	98.9	0	0.007	0.001	0.004	0.003	0.002	0.002
1998	97.5	0	0.012	0.001	0.010	0.007	0.005	0.003
1999	94.2	0	0.009	0.002	0.008	0.006	0.005	0.004
2000	84.7*	0	0.022	0.001	0.008	0.006	0.004	0.003
2001	98.1	0	0.006	0.001	0.005	0.004	0.003	0.002
2002	94.5	0	0.029	0.001	0.029	0.006	0.004	0.003
2003	93.2	0	0.013	0.001	0.011	0.007	0.005	0.003
2004	96.4	0	0.007	0.001	0.006	0.006	0.004	0.003
2005	98.9	0	0.011	0.002	0.009	0.006	0.004	0.004
2006	97.5	0	0.019	0.003	0.014	0.011	0.008	0.006
2007	97.5	0	0.021	0.002	0.012	0.010	0.007	0.005
2008	97.0	0	0.018	0.002	0.010	0.009	0.006	0.005
2009	93.7	0	0.009	0.002	0.008	0.007	0.006	0.004
2010	98.4	0	0.010	0.002	0.009	0.007	0.005	0.004
2011	97.3	0	0.011	0.003	0.011	0.009	0.008	0.005
2012	99.5	0	0.010	0.002	0.009	0.008	0.006	0.005

\*Data availability less than 75 per cent for one or more quarters.  
 AAQ NEPM standards: 0.08 ppm (one-hour average); 0.02 ppm (annual average)  
 AAQ NEPM goal: 24-hour standard exceeded on no more than one day per year



**Table 43:** Percentiles of daily 24-hour average sulfur dioxide concentrations at Menzies, Mount Isa (1984 to 2012)

Year	Data availability (% of days)	No. of exceedences (days)	Maximum (ppm)	Annual average (ppm)	Percentiles (ppm)			
					99 <sup>th</sup>	98 <sup>th</sup>	95 <sup>th</sup>	90 <sup>th</sup>
1984	93.7	3	<b>0.094</b>	0.017	<b>0.087</b>	0.071	0.053	0.033
1985	97.3	1	<b>0.111</b>	0.016	0.050	0.042	0.030	0.024
1986	88.5	11	<b>0.145</b>	<b>0.031</b>	<b>0.123</b>	<b>0.101</b>	0.071	0.052
1987	98.9	12	<b>0.158</b>	<b>0.022</b>	<b>0.110</b>	<b>0.099</b>	0.060	0.044
1988	91.0*	3	<b>0.123</b>	0.017	<b>0.091</b>	0.064	0.041	0.032
1989	85.2	1	<b>0.100</b>	0.020	0.066	0.062	0.048	0.035
1990	<i>44.7*</i>	<i>1</i>	<b><i>0.088</i></b>	<i>i.d.</i>	<i>0.078</i>	<i>0.072</i>	<i>0.052</i>	<i>0.046</i>
1991	<i>54.8*</i>	3	<b><i>0.117</i></b>	<i>i.d.</i>	<b><i>0.100</i></b>	<i>0.073</i>	<i>0.053</i>	<i>0.038</i>
1992	88.5*	0	0.064	0.012	0.056	0.052	0.033	0.025
1993	95.6	0	0.064	0.015	0.052	0.046	0.040	0.027
1994	91.5	2	<b>0.085</b>	0.019	0.059	0.054	0.045	0.040
1995	98.9	0	0.049	0.005	0.036	0.028	0.018	0.012
1996	98.6	0	0.049	0.005	0.043	0.040	0.024	0.015
1997	98.9	0	0.034	0.003	0.028	0.022	0.016	0.010
1998	<i>48.8*</i>	<i>0</i>	<i>0.055</i>	<i>i.d.</i>	<i>0.041</i>	<i>0.037</i>	<i>0.029</i>	<i>0.019</i>
1999	90.4*	0	0.049	0.004	0.036	0.032	0.024	0.015
2000	96.4	0	0.078	0.006	0.070	0.055	0.032	0.019
2001	98.9	0	0.075	0.006	0.052	0.045	0.033	0.021
2002	91.2	1	<b>0.081</b>	0.009	0.057	0.055	0.043	0.033
2003	98.9	2	<b>0.093</b>	0.007	0.067	0.057	0.036	0.022
2004	97.5	1	<b>0.100</b>	0.007	0.069	0.050	0.034	0.017
2005	91.8*	2	<b>0.091</b>	0.009	0.069	0.060	0.044	0.032
2006	93.7	0	0.065	0.005	0.054	0.045	0.032	0.018
2007	94.5	1	<b>0.199</b>	0.007	0.060	0.046	0.036	0.023
2008	96.2	1	<b>0.089</b>	0.007	0.064	0.056	0.037	0.025
2009	95.1	2	<b>0.088</b>	0.006	0.056	0.051	0.032	0.015
2010	97.0	1	<b>0.094</b>	0.005	0.058	0.043	0.028	0.015
2011	84.1*	0	0.060	0.006	0.053	0.047	0.029	0.016
2012	99.5	0	0.063	0.005	0.056	0.055	0.031	0.016

Bold text indicates a value greater than the AAQ NEPM standard.

\*Data availability less than 75 per cent for one or more quarters.

Years shown in italics have less than 75 per cent annual data availability.

i.d. = insufficient data to calculate value.

AAQ NEPM standards: 0.08 ppm (24-hour average); 0.02 ppm (annual average)

AAQ NEPM goal: 24-hour standard exceeded on no more than one day per year

**PM<sub>10</sub>****Table 44:** Percentiles of daily average PM<sub>10</sub> concentrations in Queensland for 2012

Region / Performance monitoring station	Data availability rates (%)	Maximum (µg/m <sup>3</sup> )	Percentiles (µg/m <sup>3</sup> )					
			99 <sup>th</sup>	98 <sup>th</sup>	95 <sup>th</sup>	90 <sup>th</sup>	75 <sup>th</sup>	50 <sup>th</sup>
<u>South East Queensland</u> Mountain Creek	95.1	<b>57.1</b>	37.8	31.1	24.7	20.9	15.8	12.4
Rocklea	56.3	41.0	37.8	34.7	27.4	22.8	18.6	14.5
Springwood	90.2	39.2	37.0	29.5	23.0	20.6	15.5	12.1
Arundel	12.3	25.2	25.2	25.2	23.0	21.1	16.9	12.4
Flinders View	98.4	<b>73.8</b>	42.7	38.6	28.1	23.2	17.8	14.4
<u>Gladstone</u> South Gladstone	88.5	<b>63.0</b>	33.6	29.9	25.2	22.2	17.3	13.9
<u>Mackay</u> West Mackay	98.9	<b>64.9</b>	40.0	37.4	27.6	24.3	20.6	17.3
<u>Townsville</u> Pimlico	92.1	30.0	26.3	23.6	21.5	18.8	15.7	12.7
<u>Mount Isa</u> The Gap	99.2	<b>74.5</b>	<b>59.3</b>	<b>56.7</b>	49.2	38.8	24.2	15.5
Bold text indicates a value greater than the AAQ NEPM standard. AAQ NEPM standard: 50 µg/m <sup>3</sup> (24-hour average) AAQ NEPM goal: standard exceeded on no more than five days per year								

**Table 45:** Percentiles of daily 24-hour average PM<sub>10</sub> concentrations at Rocklea, South East Queensland (1997 to 2012)

Year	Data availability (% of days)	No. of exceedences (days)	Maximum (µg/m <sup>3</sup> )	Percentiles (µg/m <sup>3</sup> )			
				99 <sup>th</sup>	98 <sup>th</sup>	95 <sup>th</sup>	90 <sup>th</sup>
1997	92.1	0	45.8	42.7	32.1	28.9	26.5
1998	90.1	0	34.7	32.4	29.1	25.7	23.3
1999	96.4	1	<b>56.7</b>	31.6	30.4	25.5	22.3
2000	92.3	0	47.6	40.6	38.1	32.8	27.0
2001	97.3	1	<b>69.5</b>	35.2	34.2	27.2	24.4
2002	99.2	8	<b>177.2</b>	<b>95.3</b>	<b>60.1</b>	35.0	30.9
2003	98.1	2	<b>119.9</b>	41.7	33.6	28.2	24.2
2004	92.6	2	<b>52.4</b>	44.5	39.9	33.5	28.8
2005	89.9	2	<b>52.6</b>	46.1	37.3	27.8	23.8
2006	96.2	0	45.5	32.6	31.1	27.0	23.8
2007	99.2	1	<b>53.4</b>	41.4	38.9	32.1	26.7
2008	94.8	1	<b>86.8</b>	44.2	37.8	30.0	25.8
2009	97.3	9	<b>1033.4</b>	<b>124.7</b>	<b>75.9</b>	40.8	35.2
2010	96.7	0	38.0	30.5	28.7	25.3	22.8
2011	2.7*	0	20.4	20.4	20.4	20.4	20.4
2012	56.3*	0	41.0	37.8	34.7	27.4	22.8

Bold text indicates a value greater than the AAQ NEPM standard.

\*Data availability less than 75 per cent for one or more quarters.

Years shown in italics have less than 75 per cent annual data availability.

AAQ NEPM standard: 50 µg/m<sup>3</sup> (24-hour average)

AAQ NEPM goal: standard exceeded on no more than five days per year

**Table 46:** Percentiles of daily 24-hour average PM<sub>10</sub> concentrations at Flinders View, South East Queensland (1999 to 2012)

Year	Data availability (% of days)	No. of exceedences (days)	Maximum (µg/m <sup>3</sup> )	Percentiles (µg/m <sup>3</sup> )			
				99 <sup>th</sup>	98 <sup>th</sup>	95 <sup>th</sup>	90 <sup>th</sup>
1999	95.3	0	44.2	28.4	25.5	20.3	17.9
2000	97.3	1	<b>61.1</b>	42.3	38.5	32.0	26.4
2001	99.7	0	42.5	37.5	35.0	25.5	22.9
2002	97.3	7	<b>197.2</b>	<b>103.3</b>	<b>60.8</b>	35.9	31.8
2003	94.8	1	<b>119.1</b>	35.1	30.5	26.0	23.0
2004	99.2	3	<b>64.1</b>	40.8	38.5	32.9	28.9
2005	97.0	3	<b>64.3</b>	44.7	40.7	26.8	24.0
2006	100.0	0	35.7	29.5	28.6	26.0	22.5
2007	99.2	0	44.6	39.6	36.7	28.3	23.4
2008	99.2	2	<b>68.5</b>	45.6	38.8	26.6	22.0
2009	98.6	8	<b>1001.8</b>	<b>111.3</b>	<b>72.4</b>	32.2	27.9
2010	99.2	0	33.9	25.7	24.3	21.1	18.5
2011	99.2	2	<b>67.0</b>	33.2	29.9	22.3	20.2
2012	98.4	2	<b>73.8</b>	42.7	38.6	28.1	23.2

Bold text indicates a value greater than the AAQ NEPM standard.  
 \*Data availability less than 75 per cent for one or more quarters.  
 AAQ NEPM standard: 50 µg/m<sup>3</sup> (24-hour average)  
 AAQ NEPM goal: standard exceeded on no more than five days per year

**Table 47:** Percentiles of daily 24-hour average PM<sub>10</sub> concentrations at South Gladstone (2001 to 2012)

Year	Data availability (% of days)	No. of exceedences (days)	Maximum (µg/m <sup>3</sup> )	Percentiles (µg/m <sup>3</sup> )			
				99 <sup>th</sup>	98 <sup>th</sup>	95 <sup>th</sup>	90 <sup>th</sup>
2001	95.6	4	<b>66.6</b>	<b>51.6</b>	36.0	30.3	25.9
2002	98.1	5	<b>197.0</b>	<b>83.0</b>	48.5	33.8	26.3
2003	96.4	0	41.3	35.5	33.1	26.2	23.2
2004	99.7	0	42.7	35.6	30.0	25.6	22.4
2005	97.8	4	<b>196.7</b>	<b>53.8</b>	37.1	26.6	23.0
2006	98.4	1	<b>54.6</b>	37.5	34.3	28.6	23.7
2007	96.7	0	38.8	29.5	28.4	25.4	22.9
2008	95.9	2	<b>65.6</b>	43.7	36.7	28.8	24.9
2009	83.0*	7	<b>252.3</b>	<b>114.5</b>	<b>69.0</b>	38.8	30.8
2010	78.4*	0	35.6	32.9	31.9	26.7	23.6
2011	76.7*	3	<b>136.7</b>	<b>62.0</b>	33.3	27.7	23.2
2012	88.5*	1	<b>63.0</b>	33.6	29.9	25.2	22.2

Bold text indicates a value greater than the AAQ NEPM standard.  
 \*Data availability less than 75 per cent for one or more quarters.  
 AAQ NEPM standard: 50 µg/m<sup>3</sup> (24-hour average)  
 AAQ NEPM goal: standard exceeded on no more than five days per year

## PM<sub>2.5</sub>

**Table 48:** Percentiles of daily 24-hour average PM<sub>2.5</sub> concentrations in Queensland for 2012

Region / Performance monitoring station	Data availability rates (%)	Maximum (µg/m <sup>3</sup> )	Percentiles (µg/m <sup>3</sup> )					
			99 <sup>th</sup>	98 <sup>th</sup>	95 <sup>th</sup>	90 <sup>th</sup>	75 <sup>th</sup>	50 <sup>th</sup>
<u>South East Queensland</u>								
Rocklea <sup>+</sup>	56.3	23.7	22.8	16.7	13.9	11.3	8.6	6.6
Springwood <sup>‡</sup>	98.1	23.7	15.6	13.3	10.2	7.5	5.5	3.7
Arundel <sup>+</sup>	12.3	11.0	11.0	11.0	9.2	5.1	3.9	2.9
<u>Gladstone</u>								
South Gladstone <sup>+</sup>	88.5	<b>49.6</b>	21.4	12.1	9.5	7.5	5.9	4.8

Bold text indicates a value greater than the AAQ NEPM advisory standard.  
<sup>+</sup> Monitoring by TEOM Model 1405 instrumentation fitted with Filter Dynamics Measurement System (FDMS)  
<sup>‡</sup> Monitoring by TEOM Model 1400 instrumentation in accordance with Technical Paper on Monitoring for Particles as PM<sub>2.5</sub>  
 AAQ NEPM advisory standard: 25 µg/m<sup>3</sup> (24-hour average)

**Table 49:** Percentiles of daily 24-hour average PM<sub>2.5</sub> concentrations at Rocklea, South East Queensland (1998 to 2012)

Year	Data availability (% of days)	No. of exceedences (days)	Maximum (µg/m <sup>3</sup> )	Annual average (µg/m <sup>3</sup> )	Percentiles (µg/m <sup>3</sup> )			
					99 <sup>th</sup>	98 <sup>th</sup>	95 <sup>th</sup>	90 <sup>th</sup>
1998	80.8*	0	16.1	3.5	11.1	9.2	7.7	6.0
1999	88.8*	0	14.5	5.0	13.3	12.4	10.3	8.3
2000	95.6	3	<b>37.4</b>	5.8	20.2	17.7	13.3	10.9
2001	98.6	3	<b>95.4</b>	5.5	18.4	17.1	12.3	9.2
2002	96.4	3	<b>45.3</b>	6.1	22.0	17.1	12.8	10.9
2003	87.7*	1	<b>34.7</b>	5.1	23.3	13.9	10.6	8.6
2004	93.7	5	<b>32.9</b>	6.5	<b>28.7</b>	24.4	17.9	11.6
2005	90.1*	0	15.3	4.6	13.0	12.2	9.6	8.1
2006	95.3	0	14.2	4.1	13.7	11.1	8.6	7.1
2007	99.7	0	20.5	4.4	17.6	13.5	10.6	8.5
2008	95.3	0	11.6	3.8	9.8	9.5	7.8	6.9
2009	92.6	7	<b>163.6</b>	<b>10.9</b>	<b>34.3</b>	<b>25.7</b>	21.5	18.0
2010	96.7	0	23.2	<b>8.2</b>	17.4	15.3	13.6	12.0
2011	2.7*	0	8.8	<i>i.d.</i>	8.8	8.8	8.8	8.8
2012	56.3*	0	23.7	<i>i.d.</i>	22.8	16.7	13.9	11.3

Bold text indicates a value greater than the AAQ NEPM advisory standard.

\*Data availability less than 75 per cent for one or more quarters.

Years shown in italics have less than 75 per cent annual data availability.

*i.d.* = insufficient data to calculate value.

Monitoring by TEOM Model 1400 instrumentation in accordance with Technical Paper on Monitoring for Particles as PM<sub>2.5</sub> from 1998 to 2008.

Monitoring by TEOM Model 1405 instrumentation fitted with Filter Dynamics Measurement System (FDMS) since 2009.

AAQ NEPM advisory standards: 25 µg/m<sup>3</sup> (24-hour average); 8 µg/m<sup>3</sup> (annual average)

**Table 50:** Percentiles of daily 24-hour average PM<sub>2.5</sub> concentrations at Springwood, South East Queensland (1999 to 2012)

Year	Data availability (% of days)	No. of exceedences (days)	Maximum (µg/m <sup>3</sup> )	Annual average (µg/m <sup>3</sup> )	Percentiles (µg/m <sup>3</sup> )			
					99 <sup>th</sup>	98 <sup>th</sup>	95 <sup>th</sup>	90 <sup>th</sup>
1999	82.7*	0	22.3	4.3	12.9	11.8	8.7	7.1
2000	96.7	6	<b>35.4</b>	6.4	<b>28.9</b>	23.6	17.3	13.2
2001	97.0	0	19.4	5.3	18.0	16.2	11.8	9.1
2002	95.9	5	<b>38.9</b>	6.2	<b>28.4</b>	20.1	14.9	11.7
2003	96.2	0	20.5	5.5	16.6	15.4	10.9	9.2
2004	98.4	0	21.7	5.5	16.9	15.4	11.7	9.5
2005	96.4	0	15.2	4.7	14.9	13.3	10.3	8.6
2006	94.0	1	<b>25.5</b>	4.8	20.1	15.3	9.3	7.9
2007	98.4	0	17.8	4.3	14.0	12.0	9.4	7.8
2008	96.7	0	10.9	4.1	9.9	8.8	7.9	6.7
2009	91.5	3	<b>150.6</b>	5.5	<b>25.3</b>	18.0	11.4	9.0
2010	83.3	0	19.4	4.4	12.8	10.7	8.4	7.4
2011	92.9	3	<b>51.2</b>	4.6	<b>29.3</b>	11.5	8.7	6.8
2012	98.1	0	23.7	4.4	15.6	13.3	10.2	7.5

Bold text indicates a value greater than the AAQ NEPM advisory standard.

\*Data availability less than 75 per cent for one or more quarters.

Monitoring by TEOM Model 1400 instrumentation in accordance with Technical Paper on Monitoring for Particles as PM<sub>2.5</sub>.

AAQ NEPM advisory standards: 25 µg/m<sup>3</sup> (24-hour average); 8 µg/m<sup>3</sup> (annual average)

## Lead

**Table 51:** Annual average lead concentrations at Woolloongabba, South East Queensland (1980 to 2002)

Year	Data availability (% of days)	Annual average ( $\mu\text{g}/\text{m}^3$ )
1980	91.8	<b>2.21</b>
1981	85.2*	<b>2.69</b>
1982	96.7	<b>2.34</b>
1983	96.7	<b>2.21</b>
1984	93.4	<b>2.56</b>
1985	86.9*	<b>2.40</b>
1986	100.0	<b>1.90</b>
1987	96.7	<b>1.91</b>
1988	98.4	<b>2.13</b>
1989	98.4	<b>1.64</b>
1990	98.4	<b>1.47</b>
1991	100.0	<b>0.97</b>
1992	90.2	<b>0.63</b>
1993	93.4	<b>0.57</b>
1994	96.7	0.48
1995	100.0	0.38
1996	98.4	0.25
1997	100.0	0.27
1998	65.6*	<i>i.d.</i>
1999	98.3	0.19
2000	88.5	0.14
2001	93.4	0.03
2002	96.7	0.02

Bold text indicates a value greater than the AAQ NEPM standard.

\*Data availability less than 75 per cent for one or more quarters.

Years shown in italics have less than 75 per cent annual data availability.

*i.d.* = insufficient data to calculate value.

AAQ NEPM standard:  $0.5 \mu\text{g}/\text{m}^3$  (annual average)