

Queensland air monitoring report 2011

National Environment Protection (Ambient Air Quality) Measure

Prepared by:

Air Quality Sciences

Science Delivery Division

Department of Science, Information Technology, Innovation and the Arts

© State of Queensland (Department of Science, Information Technology, Innovation and the Arts) 2012

This document has been prepared with all due diligence and care, based on the best available information at the time of publication. The department holds no responsibility for any errors or omissions within this document. Any decisions made by other parties based on this document are solely the responsibility of those parties. Information contained in this document is from a number of sources and, as such, does not necessarily represent government or departmental policy.

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 2011 showed no exceedences of the AAQ NEPM air quality standards for carbon monoxide, nitrogen dioxide and lead at any monitoring site during the year. Exceedences of AAQ NEPM standards and advisory standards occurred for:

- one-hour average ozone at the Flinders View site, and four-hour average ozone at the Deception Bay, Springwood and Flinders View sites in South-East Queensland due to emissions from bushfires; and
- one-hour average sulfur dioxide at the Menzies and The Gap sites in Mount Isa due to industrial emissions; and
- 24-hour average PM₁₀ (particles less than 10µm in diameter) at the Springwood, Arundel 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 windblown dust; and
- 24-hour average PM_{2.5} (particles less than 2.5µm in diameter) at the Springwood and Arundel sites in South-East Queensland, and the South Gladstone site, due to smoke from bushfires or hazard-reduction burning.

The AAQ NEPM goal was met in all regions during 2011, with the exception of:

- four-hour average ozone at the Deception Bay site in South-East Queensland due to emissions from bushfires; and
- one-hour average sulfur dioxide at the Menzies and The Gap sites in Mount Isa due to industrial emissions.

Compliance with the AAQ NEPM standards and goal could not be demonstrated at some monitoring sites in 2011 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 for the remainder of the year while repairs were carried out to station infrastructure. Monitoring at the North Ward site in Townsville ceased in April 2011 at the request of the owner of the property where the monitoring equipment was situated. The Coast Guard site in Townsville was temporarily closed in February 2011 due to cyclone activity and subsequent clean-up. Instrument failure was responsible for low data availability for ozone at the Mountain Creek and Springwood monitoring sites, sulfur dioxide at the Stuart and Menzies monitoring sites, and PM₁₀ at the South Gladstone monitoring site.

Table of contents

Summary.....	3
Introduction	5
Section A – Monitoring summary	5
Current AAQ NEPM monitoring stations	5
Implementation activities	8
Variations to the approved monitoring plan for Queensland	9
Section B – Assessment of compliance with standards and goal	10
Carbon monoxide	10
Nitrogen dioxide	11
Ozone	12
Sulfur dioxide	13
PM ₁₀	14
PM _{2.5}	15
Lead	15
Section C – Analysis of 2011 monitoring data against the standards	16
Exceedence summary	16
Summaries of maximum, second-highest and sixth-highest pollutant concentrations in 2011	20
Section D – Pollutant distributions and trends	24
Carbon monoxide	24
Nitrogen dioxide	25
Ozone	29
Sulfur dioxide	36
PM ₁₀	43
PM _{2.5}	45
Lead	47

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" (available from <www.scew.gov.au/archive/air/aaq-nepm.html>) details the requirements of the annual report.

Queensland's ambient air monitoring plan (available from <www.ehp.qld.gov.au/air/reports/ambient.html>) 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 2011 in accordance with technical paper No. 8.

Section A – Monitoring summary

Details of AAQ NEPM monitoring and related activities in Queensland during 2011 follow.

Current AAQ NEPM monitoring stations

During 2011 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>):

- 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 DERM comply with the relevant Australian Standard specified in the AAQ NEPM, with the exception of the Springwood and Central Gladstone sites 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, PM₁₀ 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: 2011 AAQ NEPM monitoring site locations.

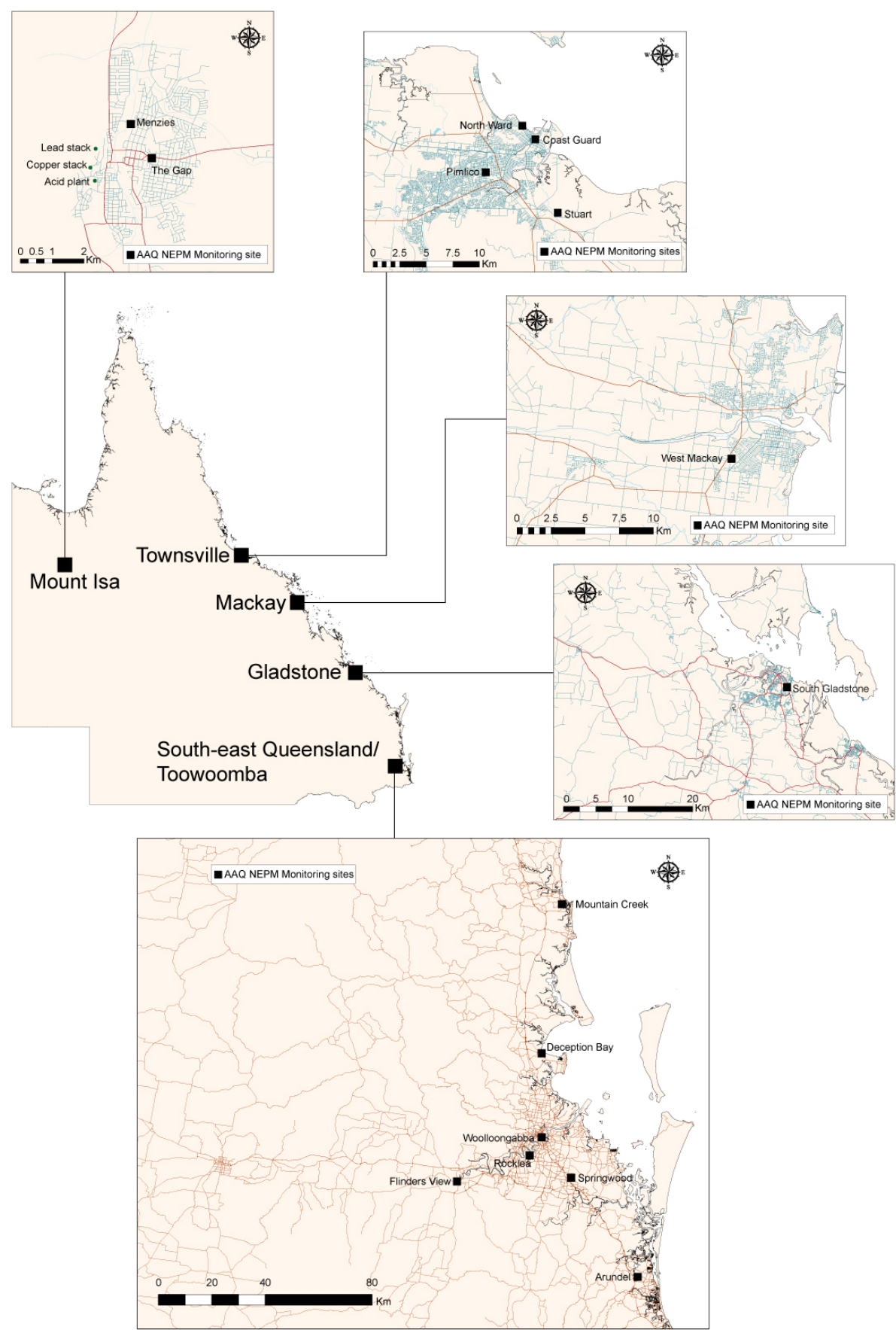


Table 1: 2011 Queensland AAQ NEPM monitoring sites.

Site	Station type	Established	Pollutants monitored	Monitoring technique	Location category	Non-conformance with AS3580.1.1 siting criteria	Major pollutant sources
South-East Queensland							
<i>North Coast sub-region</i>							
Mountain Creek	PMS – GRUB	July 2001	Ozone Nitrogen dioxide PM ₁₀	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 ₁₀ PM _{2.5} PM _{2.5}	AS3580.6.1–2011 AS3580.5.1–2011 FDMS TEOM, based on AS3580.9.8–2008 AS3580.9.9–2006 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 ₁₀ PM _{2.5}	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 ₁₀ PM _{2.5}	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 ₁₀	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)
Gladstone							
South Gladstone	Trend – GRUB	July 1992	Nitrogen dioxide Sulfur dioxide PM ₁₀ PM _{2.5}	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)
Mackay							
West Mackay	PMS – GRUB	September 1997 (relocated June 2010)	PM ₁₀	AS3580.9.8–2008	Residential / rural	Nil	Agricultural burning

Table 1 (continued): 2011 Queensland AAQ NEPM monitoring sites.

Site	Station type	Established	Pollutants monitored	Monitoring technique	Location category	Non-conformance with AS3580.1.1 siting criteria	Major pollutant sources
Townsville							
North Ward	Campaign – GRUB	May 2008	Lead	AS3580.9.3-2003, with analysis by ICP	Industry / residential	Buildings within 20m of site	Port operations handling metal concentrates
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 ₁₀	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)
Mount Isa							
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 ₁₀ 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 PM₁₀ 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 PM₁₀ Data” (available from <www.scew.gov.au/archive/air/aaq-nepm.html>). The resulting adjustments vary linearly from no change at daily average temperatures at or above 15°C to an increase of 40 percent at a temperature of 5°C.

PM_{2.5} data in this report has been obtained using either reference samplers (Partisol 2025 sequential air samplers) operating on a one in three day basis or TEOM PM_{2.5} 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_{2.5}, or was fitted with FDMS units.

Implementation activities

In 2011 DERM conducted ambient air quality monitoring in five of the ten regions identified in the Queensland monitoring plan.

Campaign monitoring at Toowoomba ceased in December 2010. Monitoring had been conducted at the North Toowoomba site since July 2003, and during this period no exceedences of the AAQ NEPM standards for carbon monoxide, nitrogen dioxide and ozone were measured. Exceedences of the AAQ NEPM 24-hour particle standards were only observed during bushfire smoke or dust storm events.

Lead monitoring at the North Ward site in Townsville ceased in April 2011 following a request from the property owner for the Department to remove the monitoring equipment. With the closure of the North Ward site, lead measurements obtained at the peak monitoring site at the Townsville Coast Guard have been included in this report. The Coast Guard site was temporarily closed from late January to mid-March 2011 due to cyclonic conditions and subsequent clean-up activities.

The Rocklea monitoring site infrastructure was damaged by severe flooding that occurred in Brisbane in January 2011. The site was offline for the remainder of the year while new infrastructure was manufactured and installed at the site.

Continuous PM_{2.5} monitoring using FDMS TEOM instrumentation was conducted at Arundel in South-East Queensland and South Gladstone for the entire year. Continuous PM_{2.5} monitoring using conventional TEOM instrumentation was conducted at Springwood for the entire year. The PM_{2.5} reference sampler and continuous FDMS TEOM instrument located at the Rocklea site were offline from the time the site was flooded in January 2011.

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, 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 ₂	Ozone	SO ₂	PM ₁₀	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.

Section B – Assessment of compliance with standards and goal

This section provides details of the annual compliance assessment for January to December 2011. 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 percent 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 monitoring sites, ozone at the Mountain Creek, Rocklea and Springwood monitoring sites, sulfur dioxide at the Stuart and Menzies monitoring sites, PM₁₀ at the Rocklea and South Gladstone monitoring sites, PM_{2.5} at the Rocklea monitoring site, and lead at the North Ward and Townsville Coast Guard monitoring sites. Low data availability was the result of flood damage to station infrastructure (Rocklea), closure of the monitoring site during the year (North Ward), temporary site closure during cyclonic conditions (Townsville Coast Guard) or instrument failure (Mountain Creek, Springwood, South Gladstone, Stuart and Menzies).

Tables 3 to 9 summarise compliance of monitoring with the standards and goal for AAQ NEPM pollutants for 2011. 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 percent in each quarter of the year, or approved screening procedures are satisfied.

Carbon monoxide

Table 3: 2011 compliance summary for carbon monoxide 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		
<u>South-East Queensland</u> <i>Brisbane sub-region</i> Woolloongabba	92.4	95.3	93.4	94.2	93.8	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 2011, were consistently less than 40 percent 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 percent of the AAQ NEPM standard. This satisfies the 60 percent 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: 2011 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	87.6	95.4	95.7	95.5	93.6	0	0.004	met	met
<i>Brisbane sub-region</i>									
Deception Bay	94.3	95.6	95.5	95.6	95.2	0	0.006	met	met
Rocklea	10.8	0.0	0.0	0.0	2.7	0	i.d.	ND	ND
Springwood	96.9	94.9	99.7	99.3	97.7	0	0.007	met	met
<i>Gold Coast sub-region</i>									
Arundel	95.5	95.4	95.7	95.6	95.5	0	0.006	met	met
<i>Ipswich sub-region</i>									
Flinders View	93.5	95.4	95.7	95.3	95.0	0	0.008	met	met
<u>Gladstone</u>									
South Gladstone	94.4	95.0	87.7	95.4	93.1	0	0.006	met	met
<u>Townsville</u>									
Pimlico	94.3	95.4	94.2	95.4	94.8	0	0.006	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 percent of the NEPM standards (procedure F in Table 1).

Monitoring at the Pimlico site in Townsville over the period 2004 to 2011 has shown nitrogen dioxide levels to be consistently below 40 percent of the NEPM standards. The maximum one-hour average nitrogen dioxide concentration during this period was 0.042ppm (35 percent of the standard). The highest annual average nitrogen dioxide concentration during this period was 0.006ppm (20 percent 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 percent of the AAQ NEPM standard. This satisfies the 60 percent 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: 2011 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	87.6	95.4	36.3	95.5	78.6	0	0	ND	ND
<i>Brisbane sub-region</i>									
Deception Bay	94.3	94.5	95.4	95.5	94.9	0	2	met	not met
Rocklea	10.8	0.0	0.0	0.0	2.7	0	0	ND	ND
Springwood	66.5	83.6	99.2	97.0	86.7	0	1	ND	ND
<i>Gold Coast sub-region</i>									
Arundel	95.2	95.4	95.7	95.6	95.5	0	0	met	met
<i>Ipswich sub-region</i>									
Flinders View	86.4	95.4	95.7	91.4	92.2	1	1	met	met
<u>Townsville</u>									
Pimlico	94.3	95.4	93.1	80.9	90.9	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 percent 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 percent 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: 2011 compliance summary for sulfur 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	24-hour		1-hour	24-hour	1-year
<u>South-East Queensland</u> <i>Brisbane sub-region</i> Springwood	90.6	91.1	99.5	95.5	94.2	0	0	0.001	met	met	met
<i>Ipswich sub-region</i> Flinders View	80.0	95.3	95.7	95.3	91.6	0	0	0.001	met	met	met
<u>Gladstone</u> South Gladstone	93.8	93.2	95.6	93.5	94.0	0	0	0.003	met	met	met
<u>Townsville</u> Pimlico	75.9	95.4	94.2	95.4	90.3	0	0	0.001	met	met	met
Stuart	79.5	91.7	36.5	48.3	63.8	0	0	i.d.	ND	ND	ND
<u>Mount Isa</u> Menzies	61.3	95.0	95.8	74.4	81.7	22	0	0.006	not met	ND	ND
The Gap	93.6	94.0	92.6	95.5	93.9	19	0	0.005	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 percent 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

PM₁₀

Table 7: 2011 compliance summary for PM₁₀ 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	91.1	98.9	97.8	100.0	97.0	0	met
<i>Brisbane sub-region</i>							
Rocklea	11.1	0.0	0.0	0.0	2.7	0	ND
Springwood	88.9	96.7	98.9	98.9	95.9	2	met
<i>Gold Coast sub-region</i>							
Arundel	93.3	98.9	100.0	96.7	97.3	1	met
<i>Ipswich sub-region</i>							
Flinders View	96.7	100.0	100.0	100.0	99.2	2	met
<u>Gladstone</u>							
South Gladstone	100.0	63.7	43.5	100.0	76.7	3	ND
<u>Mackay</u>							
West Mackay	93.3	90.1	90.2	97.8	92.9	1	met
<u>Townsville</u>							
Pimlico	85.6	95.6	97.8	95.7	93.7	1	met
<u>Mount Isa</u>							
The Gap	67.8	97.8	95.7	88.0	87.4	13	not met
ND = “not demonstrated” due to insufficient data AAQ NEPM standard: 50 µg/m ³ (24-hour average) AAQ NEPM goal: standard exceeded on no more than five days per year							

There are no regions which do not require PM₁₀ 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 PM₁₀ 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 PM₁₀ emissions on their own were sufficient to lead to exceedences of the PM₁₀ 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_{2.5}

Table 8: 2011 compliance summary for PM_{2.5} in Queensland

Region / Performance monitoring station	Data availability rates (% of days)					Number of exceedences (days)	Annual mean (µg/m ³)
	Q1	Q2	Q3	Q4	Annual		
<u>South-East Queensland</u> <i>Brisbane sub-region</i>							
Rocklea [†]	6.7	0.0	0.0	0.0	2.7	0	i.d.
Rocklea [‡]	11.1	0.0	0.0	0.0	1.7	0	i.d.
Springwood [‡]	85.6	91.2	94.6	100.0	92.9	3	4.6
<i>Gold Coast sub-region</i>							
Arundel	93.3	98.9	100.0	96.7	97.3	2	5.9
<u>Gladstone</u> South Gladstone	100.0	63.7	97.8	100.0	90.4	9	7.5

[†] Monitoring by reference method (1 in 3 days)
[‡] Monitoring by TEOM Model 1405 instrumentation fitted with Filter Dynamics Measurement System (FDMS)
[‡] Monitoring by TEOM Model 1400 instrumentation in accordance with Technical Paper on Monitoring for Particles as PM_{2.5}
 AAQ NEPM advisory standards: 25 µg/m³ (24-hour average); 8 µg/m³ (one-year average)

There are no regions which do not require PM_{2.5} 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_{2.5} advisory standard were associated with bushfire smoke or widespread windblown dust events. There was no evidence that commercial and domestic PM_{2.5} emissions on their own were sufficient to cause exceedences of the 24-hour PM_{2.5} standard at the monitoring location. PM_{2.5} 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: 2011 compliance summary for lead in Queensland

Region / Performance monitoring station	Data availability rates (% of days)					Annual mean (µg/m ³)	Performance against the standards and goal
	Q1	Q2	Q3	Q4	Annual		
<u>Townsville</u> North Ward Coast Guard	53.3 46.7	33.3 100.0	0.0 100.0	0.0 93.3	21.7 85.0	i.d. 0.14	ND ND
<u>Mount Isa</u> The Gap	93.3	100.0	100.0	93.3	96.7	0.14	met

i.d. = insufficient data to calculate value
 ND = "not demonstrated" due to insufficient data
 AAQ NEPM standard: 0.5 µg/m³ (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 percent 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), 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 percent 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 2011 monitoring data against the standards

Annual summary statistics for the 2011 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_{10} where five exceedences days per year are allowed), together with the date and site of each occurrence. Details of $\text{PM}_{2.5}$ measurements obtained using both reference samplers and 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 $\text{PM}_{2.5}$, or were fitted with FDMS units.

Exceedence details are provided in Tables 10 to 13. Summary maxima statistics are provided in Tables 14 to 21. Concentrations exceeding the standard are highlighted in bold in the summary maxima tables.

Exceedence summary

During 2011, exceedences of AAQ NEPM standards occurred for ozone in South-East Queensland, sulfur dioxide in Mount Isa, and PM_{10} in South-East Queensland, Gladstone, Mackay, Townsville and Mount Isa. There was also exceedences of the AAQ NEPM 24-hour advisory reporting standard for $\text{PM}_{2.5}$ in South-East Queensland and Gladstone. There were no exceedences of the AAQ NEPM standards for carbon monoxide, nitrogen dioxide and lead.

There were a large number of grass and bushfires in the South-East Queensland region from 16 to 20 September 2011, with larger fires occurring in the Brisbane Valley, Boonah area, Springfield Lakes and south of Caloundra. Meteorological conditions at the time led to accumulation of the smoke from these fires and were also conducive to ozone formation, leading to elevated levels of ozone and particles throughout South-East Queensland during this period. All 2011 exceedences of ozone, PM_{10} and $\text{PM}_{2.5}$ standards at South-East Queensland monitoring sites occurred during this period.

There were a number of vegetation fires in the Gladstone region between August and October 2011, including grass fires, bushfires, hazard-reduction burns and grazing pasture improvement burns. Large grass fires or bushfires occurred at Burua, Mount Larcom, O'Connell, Targinie and Calliope. Smoke emissions from these fires resulted in elevated particle concentrations throughout the Gladstone region on 3 August and from 12 September to 6 October, with the highest levels measured between 12 and 19 September and 1 and 3 October. All 2011 exceedences of PM₁₀ and PM_{2.5} standards at the South Gladstone monitoring site were the result of smoke impacts from these fires.

The AAQ NEPM 24-hour PM₁₀ standard was exceeded at the West Mackay monitoring site on 3 October 2011. On this day there were bushfires reported north-west of Mackay which contributed to PM₁₀ levels in the region. However, highest PM₁₀ concentrations at the West Mackay site on this day were measured during easterly winds, suggesting that windblown dust from localised activities was the main factor leading to this exceedence. A specific source of the dust could not be identified.

Smoke from a large bushfire and backburning operations between North Shore and Bushland Beach, north-west of Townsville, was responsible for an exceedence of the AAQ NEPM 24-hour PM₁₀ standard on 16 October 2011.

Industrial operations (metals smelting and sulfuric acid manufacture) emit sulfur dioxide into the atmosphere in Mount Isa. Under the *Mount Isa Mines Agreement Act 1985*, smelter operations must be managed to maintain ambient sulfur dioxide concentrations in Mount Isa below the levels specified in the Act. As smelter operations were only controlled to meet *Mount Isa Mines Agreement Act 1985* air quality limits during 2011, sulfur dioxide levels exceeded the more stringent Air NEPM one-hour standard on occasions. Following the enactment of amendments to the *Environmental Protection Act 1994* in May 2008 to ensure that the same environmental standards apply to all mining operations in Queensland, the Department of Environment and Heritage Protection has been working with the operator of the Mount Isa smelters to develop a transitional program to achieve compliance with AAQ NEPM air quality standards in the Mount Isa community by 2016.

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 in Mount Isa. In 2011 such conditions were responsible for 12 days when the AAQ NEPM 24-hour PM₁₀ standard was exceeded at The Gap monitoring site in Mount Isa. A further exceedence on 17 November 2011 was the result of smoke from bushfires in the region. Bushfire smoke may have also contributed to some of the PM₁₀ exceedences during October 2011.

Table 10: 2011 ozone exceedences in Queensland

Region / Performance monitoring station	Standard	Concentration (ppm)	Date	Time	Circumstances
South-East Queensland					
Deception Bay	4-hour	0.086	Sep 19	16	All exceedences at South-East Queensland monitoring sites were the result of a combination of pre-cursor emissions from urban sources and bushfires during conducive meteorological conditions.
		0.082	Sep 18	16	
Springwood	4-hour	0.084	Sep 18	18	
Flinders View	1-hour	0.103	Sep 19	15	
	4-hour	0.088	Sep 19	16	
AAQ NEPM standards: 0.10 ppm (one-hour average); 0.08 ppm (four-hour average)					

Table 11: 2011 sulfur dioxide exceedences in Queensland

Region / Performance monitoring station	Standard	Concentration (ppm)	Date	Time	Circumstances		
Mount Isa Menzies	1-hour	0.502	Aug 13	15	All exceedences at Mount Isa monitoring sites were due to emissions from industry.		
		0.476	Sep 30	14			
		0.426	Nov 14	11			
		0.422	Nov 03	17			
		0.353	Nov 21	03			
		0.348	Dec 15	19			
		0.344	Sep 23	17			
		0.337	Nov 17	16			
		0.334	Jan 01	13			
		0.322	Apr 15	15			
		0.322	Dec 05	18			
		0.298	Sep 25	18			
		0.277	Apr 15	16			
		0.271	Dec 15	18			
		0.257	Oct 24	14			
		0.255	Nov 21	08			
		0.254	Aug 13	14			
		0.240	Nov 15	24			
		0.236	Jun 21	16			
		0.234	Jan 01	12			
		0.233	Sep 26	17			
		0.233	Nov 23	12			
		0.218	Nov 20	07			
		0.214	Dec 28	09			
		0.213	Oct 31	22			
		0.211	Dec 06	13			
		0.209	Aug 27	14			
		The Gap	1-hour	0.580		Oct 09	11
				0.560		Oct 12	17
				0.539		Nov 19	10
0.524	Sep 30			14			
0.488	Mar 20			10			
0.450	Sep 18			14			
0.379	Oct 12			16			
0.373	Mar 20			16			
0.347	Dec 27			11			
0.331	Oct 24			11			
0.321	Sep 08			16			
0.301	Jan 09			13			
0.297	Jan 09			12			
0.272	Sep 23			16			
0.270	Oct 12			15			
0.255	Oct 29			10			
0.249	Nov 03			17			
0.240	Nov 10			03			
0.237	Sep 26			17			
0.234	Jan 26			09			
0.227	Oct 29			09			
0.223	Dec 21			09			
0.213	Jan 06			14			
0.208	Nov 14			05			
0.204	Sep 26			18			
AAQ NEPM standards: 0.20 ppm (one-hour average); 0.08 ppm (24-hour average); 0.02 ppm (1-year average)							

Table 12: 2011 PM₁₀ exceedences in Queensland

Region / Performance monitoring station	Standard	Concentration (ppm)	Date	Time	Circumstances
<u>South-East Queensland</u> Springwood	24-hour	62.1 60.9	Sep 19 Sep 18	24 24	All exceedences at South-East Queensland monitoring sites were the result of bushfire smoke.
Arundel	24-hour	56.6	Sep 18	24	
Flinders View	24-hour	67.0 52.3	Sep 19 Sep 18	24 24	
<u>Gladstone</u> South Gladstone	24-hour	136.7 70.9 62.0	Oct 02 Oct 03 Oct 01	24 24 24	All exceedences were the result of bushfire smoke.
<u>Mackay</u> West Mackay	24-hour	65.8	Oct 03	24	Windblown dust from localised source and bushfire smoke
<u>Townsville</u> Pimlico	24-hour	64.9	Oct 16	24	Bushfire smoke
<u>Mount Isa</u> The Gap	24-hour	124.0 93.9 91.2 80.1 73.6 71.5 63.3 61.9 61.1 60.3 58.2 51.2 50.4	Nov 17 Dec 01 Sep 29 Aug 10 Oct 10 Oct 29 Oct 05 Sep 28 Oct 31 Sep 27 Sep 30 Oct 18 Oct 30	24 24 24 24 24 24 24 24 24 24 24 24 24	The exceedence on 17 November 2011 was due to bushfire smoke. The remaining exceedences were due to windblown dust generated by strong winds associated with the passage of low pressure troughs (with a smaller contribution from bushfire smoke for some exceedences during October 2011).
AAQ NEPM advisory standard: 50 µg/m ³ (24-hour average)					

Table 13: 2011 PM_{2.5} exceedences in Queensland

Region / Performance monitoring station	Standard	Concentration (ppm)	Date	Time	Circumstances
South-East Queensland Springwood	24-hour	51.2 47.1 29.3	Sep 18 Sep 19 Sep 17	24 24 24	All exceedences at South-East Queensland monitoring sites were the result of bushfire smoke.
Arundel	24-hour	48.6 25.1	Sep 18 Sep 19	24 24	
Gladstone South Gladstone	24-hour	126.7 73.7 62.2 47.1 36.4 33.6 33.5 31.4 28.2	Oct 02 Sep 17 Oct 03 Sep 18 Sep 12 Oct 01 Sep 13 Sep 19 Aug 03	24 24 24 24 24 24 24 24 24	
AAQ NEPM advisory standards: 25 µg/m ³ (24-hour average); 8 µg/m ³ (1-year average)					

Summaries of maximum, second-highest and sixth-highest pollutant concentrations in 2011

The following tables show the maximum daily concentration recorded during 2011, 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 PM₁₀, where five exceedences days per year are allowed, the sixth highest daily concentration is shown.

Table 14: 2011 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)	2nd highest (ppm)	2nd highest (date:hour)
South-East Queensland Woolloongabba	363	1.9	Jun 10:23	1.8	Jun 23:23
AAQ NEPM standard: 9.0 ppm (8-hour average) AAQ NEPM goal: standard exceeded on no more than one day per year					

Table 15: 2011 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)	2nd highest (ppm)	2nd highest (date:hour)
<u>South-East Queensland</u> Mountain Creek	357	0.032	Sep 15:19 Sep 16:20		
Deception Bay	363	0.035	Aug 11:19 Aug 12:20 Oct 09:20		
Rocklea	10	0.020	Jan 06:20	0.014	Jan 07:09
Springwood	361	0.036	Sep 19:09	0.034	Aug 09:19
Arundel	365	0.037	Sep 16:20	0.036	Sep 17:24
Flinders View	363	0.040	Jul 13:18	0.039	Jul 25:19
<u>Gladstone</u> South Gladstone	353	0.035	Aug 10:11 Sep 18:09		
<u>Townsville</u> Pimlico	361	0.042	Aug 10:21	0.039	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 16: 2011 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)	2nd highest (ppm)	2nd highest (date:hour)
<u>South-East Queensland</u> Mountain Creek	299	0.077	Sep 19:14	0.068	Sep 18:13
Deception Bay	361	0.099	Sep 19:14	0.097	Sep 18:13
Rocklea	10	0.036	Jan 05:14	0.028	Jan 06:13
Springwood	315	0.094	Sep 18:17	0.074	Sep 17:16
Arundel	365	0.091	Sep 17:17	0.081	Sep 18:17
Flinders View	350	0.103	Sep 19:15	0.079	Nov 15:15
<u>Townsville</u> Pimlico	345	0.073	Oct 12:13	0.064	Sep 16:14 Oct 16:17
Bold text indicates a value greater than the AAQ NEPM standard. AAQ NEPM standard: 0.10 ppm (one-hour average) AAQ NEPM goal: standard exceeded on no more than one day per year					

Table 17: 2011 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)	2nd highest (ppm)	2nd highest (date:hour)
<u>South-East Queensland</u> Mountain Creek	299	0.068	Sep 19:15	0.067	Sep 18:15
Deception Bay	361	0.086	Sep 19:16	0.082	Sep 18:16
Rocklea	10	0.033	Jan 05:15	0.025	Jan 04:16
Springwood	312	0.084	Sep 18:18	0.061	Sep 17:18
Arundel	365	0.078	Sep 17:19	0.074	Sep 18:18
Flinders View	350	0.088	Sep 19:16	0.071	Nov 15:16
<u>Townsville</u> Pimlico	345	0.066	Oct 12:15	0.062	Oct 16: 17

Bold text indicates a value greater than the AAQ NEPM standard.
 AAQ NEPM standard: 0.08 ppm (four-hour average)
 AAQ NEPM goal: standard exceeded on no more than one day per year

Table 18: 2011 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)	2nd highest (ppm)	2nd highest (date:hour)
<u>South-East Queensland</u> Springwood	340	0.011	Sep 18:23	0.010	Sep 16:20 Sep 17:16 Oct 07:20
Flinders View	349	0.028	Jan 19:10	0.026	Jan 26:11
<u>Gladstone</u> South Gladstone	355	0.091	Aug 10:11	0.051	Jan 13:15 Oct 19:13
<u>Townsville</u> Pimlico	344	0.009	Mar 04:13	0.007	Mar 07:21 Mar 17:20 Mar 21:21 Mar 25:16
Stuart	242	0.004	Jan 31:04	0.003	Jan 24:20 Feb 21:21 Jul 03:21 Nov 15:11
<u>Mount Isa</u> Menzies	307	0.502	Aug 13:15	0.476	Sep 30:14
The Gap	355	0.580	Oct 09:11	0.560	Oct 12:17

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 19: 2011 summary statistics for daily 24-hour average sulfur dioxide concentrations in Queensland

Region / Performance monitoring station	Number of valid days	Highest (ppm)	Highest (date)	2nd highest (ppm)	2nd highest (date)
<u>South-East Queensland</u> Springwood	340	0.005	Sep 17 Sep 18		
Flinders View	349	0.005	Jan 11	0.004	Jan 14 Jan 19
<u>Gladstone</u> South Gladstone	355	0.011	Jan 13 Oct 23 Dec 21 Dec 31		
<u>Townsville</u> Pimlico	344	0.006	Mar 15 Mar 17 Mar 25		
Stuart	242	0.002	Aug 01 Dec 12		
<u>Mount Isa</u> Menzies	307	0.060	Dec 05	0.054	Apr 15
The Gap	355	0.060	Oct 12	0.055	Mar 20
AAQ NEPM standard: 0.08 ppm (24-hour average) AAQ NEPM goal: standard exceeded on no more than one day per year					

Table 20: 2011 summary statistics for daily 24-hour average PM₁₀ concentrations in Queensland

Region / Performance monitoring station	Number of valid days	Highest (µg/m ³)	Highest (date)	6th highest (µg/m ³)	6th highest (date)
<u>South-East Queensland</u> Mountain Creek	354	49.5	Sep 19	28.4	Jan 29
Rocklea	10	20.4	Jan 05	16.4	Jan 03
Springwood	350	61.2	Sep 19	24.4	Sep 20
Arundel	355	56.6	Sep 18	30.3	Jan 12
Flinders View	362	67.0	Sep 19	31.6	Sep 20
<u>Gladstone</u> South Gladstone	280	136.7	Oct 02	33.3	Dec 31
<u>Mackay</u> West Mackay	339	65.8	Oct 03	39.6	Sep 21 Sep 29
<u>Townsville</u> Pimlico	342	64.9	Oct 16	32.3	Oct 03
<u>Mount Isa</u> The Gap	319	124.0	Nov 17	71.5	Oct 29
Bold text indicates a value greater than the AAQ NEPM standard. AAQ NEPM standard: 50 µg/m ³ (24-hour average) AAQ NEPM goal: standard exceeded on no more than five days per year					

Table 21: 2011 summary statistics for daily 24-hour average PM_{2.5} concentrations in Queensland

Region / Performance monitoring station	Number of valid days	Highest (µg/m ³)	Highest (date)
<u>South-East Queensland</u>			
Rocklea [†]	2	6.3	Jan 03
Rocklea ⁺	10	8.8	Jan 02
Springwood [‡]	339	51.2	Sep 18
Arundel ⁺	355	48.6	Sep 18
<u>Gladstone</u>			
South Gladstone ⁺	330	126.7	Oct 02

Bold text indicates a value greater than the AAQ NEPM standard.
[†] Monitoring by reference method (1 in 3 days)
⁺ Monitoring by TEOM Model 1405 instrumentation fitted with Filter Dynamics Measurement System (FDMS)
[‡] Monitoring by TEOM Model 1400 instrumentation in accordance with Technical Paper on Monitoring for Particles as PM_{2.5}
 AAQ NEPM advisory standard: 25 µg/m³ (24-hour average)

Section D – Pollutant distributions and trends

Results of further analysis of the monitoring data are presented in this section. Percentiles of 2011 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 percent of the data for the day are valid. Monitoring sites with less than 75 percent data over the year are shown in italics. 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. Trend data for lead in South-East Queensland is presented, although monitoring ceased in 2002.

Carbon monoxide

Table 22: Percentiles of daily peak eight-hour average carbon monoxide concentrations in Queensland for 2011

Region / Performance monitoring station	Data availability (% of days)	Maximum (ppm)	Percentiles (ppm)					
			99th	98th	95th	90th	75th	50th
<u>South-East Queensland</u>								
Woolloongabba	99.5	1.9	1.7	1.6	1.3	1.0	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 23: Percentiles of daily peak eight-hour average carbon monoxide concentrations at Woolloongabba, South-East Queensland (1998 to 2011)

Year	Data availability (% of days)	No. of exceedences (days)	Maximum (ppm)	Percentiles (ppm)			
				99th	98th	95th	90th
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

*Data availability less than 75 percent for one or more quarters.
Years shown in italics have less than 75 percent 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 24: Percentiles of daily peak one-hour average nitrogen dioxide concentrations in Queensland for 2011

Region / Performance monitoring station	Data availability rates (%)	Maximum (ppm)	Percentiles (ppm)			
			99th	98th	95th	90th
<u>South-East Queensland</u>						
Mountain Creek	97.8	0.032	0.027	0.027	0.023	0.021
Deception Bay	99.5	0.035	0.033	0.030	0.029	0.027
Rocklea	2.7	0.020	0.020	0.020	0.020	0.020
Springwood	98.9	0.036	0.033	0.031	0.029	0.027
Arundel	100.0	0.037	0.031	0.031	0.027	0.025
Flinders View	99.5	0.040	0.036	0.034	0.031	0.028
<u>Gladstone</u>						
South Gladstone	96.7	0.035	0.034	0.032	0.029	0.026
<u>Townsville</u>						
Pimlico	98.9	0.042	0.038	0.036	0.031	0.027
AAQ NEPM standard: 0.12 ppm (one-hour average)						
AAQ NEPM goal: standard exceeded on no more than one day per year						

Table 25: Percentiles of daily peak one-hour average nitrogen dioxide concentrations at Deception Bay, South-East Queensland (1995 to 2011)

Year	Data availability (% of days)	No. of exceedences (days)	Maximum (ppm)	Annual average (ppm)	Percentiles (ppm)			
					99th	98th	95th	90th
1995	93.4	0	0.058	0.007	0.054	0.046	0.038	0.033
1996	68.6*	0	0.048	0.007	0.043	0.042	0.034	0.030
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	87.4*	0	0.065	0.006	0.044	0.042	0.036	0.030
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	94.2*	0	0.063	0.006	0.035	0.033	0.030	0.027
2008	84.7*	0	0.037	0.008	0.034	0.031	0.029	0.027
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

*Data availability less than 75 percent for one or more quarters.

Years shown in italics have less than 75 percent 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 26: Percentiles of daily peak one-hour average nitrogen dioxide concentrations at Rocklea, South-East Queensland (1980 to 2011)

Year	Data availability (% of days)	No. of exceedences (days)	Maximum (ppm)	Annual average (ppm)	Percentiles (ppm)			
					99th	98th	95th	90th
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	0.160	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	<i>60.1*</i>	<i>0</i>	<i>0.114</i>	<i>i.d.</i>	<i>0.083</i>	<i>0.077</i>	<i>0.066</i>	<i>0.055</i>
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	0.157	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

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

*Data availability less than 75 percent for one or more quarters.

Years shown in italics have less than 75 percent 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 27: Percentiles of daily peak one-hour average nitrogen dioxide concentrations at Flinders View, South-East Queensland (1995 to 2011)

Year	Data availability (% of days)	No. of exceedences (days)	Maximum (ppm)	Annual average (ppm)	Percentiles (ppm)			
					99th	98th	95th	90th
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

*Data availability less than 75 percent 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 28: Percentiles of daily peak one-hour average nitrogen dioxide concentrations at South Gladstone (1994 to 2011)

Year	Data availability (% of days)	No. of exceedences (days)	Maximum (ppm)	Annual average (ppm)	Percentiles (ppm)			
					99th	98th	95th	90th
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

*Data availability less than 75 percent for one or more quarters.

Years shown in italics have less than 75 percent 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 29: Percentiles of daily peak one-hour average ozone concentrations in Queensland for 2011

Region / Performance monitoring station	Data availability rates (%)	Maximum (ppm)	Percentiles (ppm)					
			99th	98th	95th	90th	75th	50th
<u>South-East Queensland</u>								
Mountain Creek	81.9	0.077	0.061	0.052	0.043	0.037	0.032	0.028
Deception Bay	98.9	0.099	0.069	0.059	0.046	0.041	0.035	0.030
Rocklea	2.7	0.036	0.036	0.036	0.036	0.036	0.027	0.022
Springwood	86.3	0.094	0.062	0.054	0.043	0.039	0.022	0.027
Arundel	100.0	0.091	0.063	0.062	0.048	0.043	0.035	0.029
Flinders View	95.9	0.103	0.071	0.065	0.054	0.048	0.037	0.030
<u>Townsville</u>								
Pimlico	94.5	0.073	0.064	0.055	0.046	0.040	0.022	0.027

Bold text indicates a value greater than the AAQ NEPM standard

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

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

Table 30: Percentiles of daily peak four-hour average ozone concentrations in Queensland for 2011

Region / Performance monitoring station	Data availability rates (%)	Maximum (ppm)	Percentiles (ppm)					
			99th	98th	95th	90th	75th	50th
South-East Queensland								
Mountain Creek	81.9	0.068	0.058	0.049	0.039	0.035	0.030	0.027
Deception Bay	98.9	0.086	0.063	0.051	0.043	0.039	0.034	0.029
Rocklea	2.7	0.033	0.033	0.033	0.033	0.033	0.024	0.021
Springwood	85.5	0.084	0.057	0.046	0.039	0.036	0.031	0.026
Arundel	100.0	0.078	0.056	0.054	0.045	0.040	0.033	0.028
Flinders View	96.2	0.088	0.061	0.059	0.049	0.045	0.035	0.029
Townsville								
Pimlico	94.5	0.062	0.061	0.049	0.044	0.039	0.034	0.026

Bold text indicates a value greater than the AAQ NEPM standard
 AAQ NEPM standard: 0.08 ppm (four-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 Deception Bay, South-East Queensland (1995 to 2011)

Year	Data availability (% of days)	No. of exceedences (days)	Maximum (ppm)	Percentiles (ppm)			
				99th	98th	95th	90th
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

*Data availability less than 75 percent 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 32: Percentiles of daily peak one-hour average ozone concentrations at Rocklea, South-East Queensland (1980 to 2011)

Year	Data availability (% of days)	No. of exceedences (days)	Maximum (ppm)	Percentiles (ppm)			
				99th	98th	95th	90th
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	0.102	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	0.102	0.070	0.064	0.055	0.046
1985	91.0	1	0.105	0.079	0.056	0.047	0.036
1986	84.1*	0	0.074	0.073	0.063	0.057	0.050
1987	72.1*	4	0.125	0.106	<i>0.100</i>	<i>0.078</i>	<i>0.055</i>
1988	67.5*	1	0.101	<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	0.127	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	0.135	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	0.103	0.080	0.078	0.064	0.053
1999	94.2	1	0.135	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	0.118	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	2.7*	0	<i>0.036</i>	<i>0.036</i>	<i>0.036</i>	<i>0.036</i>	<i>0.036</i>

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

*Data availability less than 75 percent for one or more quarters.

Years shown in italics have less than 75 percent 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 33: Percentiles of daily peak one-hour average ozone concentrations at Flinders View, South-East Queensland (1994 to 2011)

Year	Data availability (% of days)	No. of exceedences (days)	Maximum (ppm)	Percentiles (ppm)			
				99th	98th	95th	90th
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	0.125	0.082	0.075	0.063	0.055
1997	97.5	2	0.106	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	0.127	0.082	0.077	0.055	0.048
2000	99.2	1	0.116	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	0.114	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	97.0	1	0.103	0.071	0.065	0.054	0.048

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

*Data availability less than 75 percent 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 34: Percentiles of daily peak four-hour average ozone concentrations at Deception Bay, South-East Queensland (1995 to 2011)

Year	Data availability (% of days)	No. of exceedences (days)	Maximum (ppm)	Percentiles (ppm)			
				99th	98th	95th	90th
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	0.083	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	0.086	0.063	0.051	0.043	0.039

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

*Data availability less than 75 percent 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 35: Percentiles of daily peak four-hour average ozone concentrations at Rocklea, South-East Queensland (1980 to 2011)

Year	Data availability (% of days)	No. of exceedences (days)	Maximum (ppm)	Percentiles (ppm)			
				99th	98th	95th	90th
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	0.090	0.069	0.051	0.039	0.031
1986	84.1*	0	0.063	0.059	0.052	0.049	0.041
1987	72.1*	8	0.110	0.094	0.093	<i>0.066</i>	<i>0.049</i>
1988	67.5*	1	0.081	<i>0.065</i>	<i>0.050</i>	<i>0.041</i>	<i>0.035</i>
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	0.101	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	0.111	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	0.091	0.068	0.064	0.057	0.049
1999	94.2	1	0.102	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	0.105	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	<i>0.033</i>	<i>0.033</i>	<i>0.033</i>	<i>0.033</i>	<i>0.033</i>

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

*Data availability less than 75 percent for one or more quarters.

Years shown in italics have less than 75 percent 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 36: Percentiles of daily peak four-hour average ozone concentrations at Flinders View, South-East Queensland (1994 to 2011)

Year	Data availability (% of days)	No. of exceedences (days)	Maximum (ppm)	Percentiles (ppm)			
				99th	98th	95th	90th
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	0.091	0.068	0.065	0.058	0.049
1997	97.5	2	0.090	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	0.101	0.067	0.064	0.049	0.043
2000	99.2	1	0.089	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	0.083	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	0.100	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	0.088	0.061	0.059	0.049	0.045

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

*Data availability less than 75 percent 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 37: Percentiles of daily peak one-hour average sulfur dioxide concentrations in Queensland for 2011

Region / Performance monitoring station	Data availability rates (%)	Maximum (ppm)	Percentiles (ppm)					
			99th	98th	95th	90th	75th	50th
<u>South-East Queensland</u>								
Springwood	93.2	0.011	0.010	0.008	0.006	0.005	0.003	0.002
Flinders View	95.6	0.028	0.022	0.017	0.014	0.009	0.005	0.002
<u>Gladstone</u>								
South Gladstone	97.2	0.091	0.049	0.045	0.033	0.026	0.016	0.008
<u>Townsville</u>								
Pimlico	94.2	0.009	0.007	0.006	0.005	0.005	0.004	0.002
Stuart	66.3	0.004	0.003	0.002	0.002	0.002	0.001	0.001
<u>Mount Isa</u>								
Menzies	84.1	0.502	0.426	0.348	0.236	0.173	0.040	0.003
The Gap	97.3	0.580	0.524	0.347	0.213	0.146	0.026	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 38: Percentiles of daily 24-hour average sulfur dioxide concentrations in Queensland for 2011

Region / Performance monitoring station	Data availability rates (%)	Maximum (ppm)	Percentiles (ppm)					
			99th	98th	95th	90th	75th	50th
<u>South-East Queensland</u>								
Springwood	93.2	0.005	0.004	0.004	0.003	0.003	0.002	0.001
Flinders View	95.6	0.005	0.004	0.003	0.002	0.002	0.001	0.001
<u>Gladstone</u>								
South Gladstone	97.3	0.011	0.011	0.009	0.008	0.005	0.003	0.002
<u>Townsville</u>								
Pimlico	94.2	0.006	0.006	0.005	0.004	0.003	0.002	0.001
Stuart	66.3	0.002	0.002	0.001	0.001	0.001	0.001	0.000
<u>Mount Isa</u>								
Menzies	84.1	0.060	0.053	0.047	0.029	0.016	0.004	0.001
The Gap	97.3	0.060	0.044	0.042	0.028	0.017	0.003	0.001
AAQ NEPM standard: 0.08 ppm (24-hour average) AAQ NEPM goal: standard exceeded on no more than one day per year								

Table 39: Percentiles of daily peak one-hour average sulfur dioxide concentrations at Flinders View, South-East Queensland (1993 to 2011)

Year	Data availability (% of days)	No. of exceedences (days)	Maximum (ppm)	Annual average (ppm)	Percentiles (ppm)			
					99th	98th	95th	90th
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

*Data availability less than 75 percent for one or more quarters.

Years shown in italics have less than 75 percent 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 40: Percentiles of daily peak one-hour average sulfur dioxide concentrations at South Gladstone (1991 to 2011)

Year	Data availability (% of days)	No. of exceedences (days)	Maximum (ppm)	Annual average (ppm)	Percentiles (ppm)			
					99th	98th	95th	90th
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

*Data availability less than 75 percent 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 41: Percentiles of daily peak one-hour average sulfur dioxide concentrations at Menzies, Mount Isa (1983 to 2011)

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

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

*Data availability less than 75 percent for one or more quarters.

Years shown in italics have less than 75 percent 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 42: Percentiles of daily 24-hour average sulfur dioxide concentrations at Flinders View, South-East Queensland (1993 to 2011)

Year	Data availability (% of days)	No. of exceedences (days)	Maximum (ppm)	Annual average (ppm)	Percentiles (ppm)			
					99th	98th	95th	90th
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

*Data availability less than 75 percent for one or more quarters.

Years shown in italics have less than 75 percent 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 43: Percentiles of daily 24-hour average sulfur dioxide concentrations at South Gladstone (1991 to 2011)

Year	Data availability (% of days)	No. of exceedences (days)	Maximum (ppm)	Annual average (ppm)	Percentiles (ppm)			
					99th	98th	95th	90th
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

*Data availability less than 75 percent 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 44: Percentiles of daily 24-hour average sulfur dioxide concentrations at Menzies, Mount Isa (1984 to 2011)

Year	Data availability (% of days)	No. of exceedences (days)	Maximum (ppm)	Annual average (ppm)	Percentiles (ppm)			
					99th	98th	95th	90th
1984	93.7	3	0.094	0.017	0.087	0.071	0.053	0.033
1985	97.3	1	0.111	0.016	0.050	0.042	0.030	0.024
1986	88.5	11	0.145	0.031	0.123	0.101	0.071	0.052
1987	98.9	12	0.158	0.022	0.110	0.099	0.060	0.044
1988	91.0*	3	0.123	0.017	0.091	0.064	0.041	0.032
1989	85.2	1	0.100	0.020	0.066	0.062	0.048	0.035
1990	<i>44.7*</i>	<i>1</i>	0.088	<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>	<i>3</i>	0.117	<i>i.d.</i>	0.100	<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	0.085	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	0.081	0.009	0.057	0.055	0.043	0.033
2003	98.9	2	0.093	0.007	0.067	0.057	0.036	0.022
2004	97.5	1	0.100	0.007	0.069	0.050	0.034	0.017
2005	91.8*	2	0.091	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	0.199	0.007	0.060	0.046	0.036	0.023
2008	96.2	1	0.089	0.007	0.064	0.056	0.037	0.025
2009	95.1	2	0.088	0.006	0.056	0.051	0.032	0.015
2010	97.0	1	0.094	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

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

*Data availability less than 75 percent for one or more quarters.

Years shown in italics have less than 75 percent 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

PM₁₀**Table 45:** Percentiles of daily 24-hour average PM₁₀ concentrations in Queensland for 2011

Region / Performance monitoring station	Data availability rates (%)	Maximum (µg/m ³)	Percentiles (µg/m ³)					
			99th	98th	95th	90th	75th	50th
<u>South-East Queensland</u>								
Mountain Creek	97.0	49.5	29.5	28.3	21.7	19.3	15.7	12.6
Rocklea	2.7	20.4	20.4	20.4	20.4	20.4	17.7	17.3
Springwood	95.9	61.2	26.4	23.6	20.6	17.9	15.3	12.6
Arundel	97.3	56.6	31.8	28.1	24.8	21.1	16.1	12.6
Flinders View	99.2	67.0	33.2	29.9	22.3	20.2	16.8	13.6
<u>Gladstone</u>								
South Gladstone	76.7	136.7	62.0	33.3	27.7	23.2	17.4	11.6
<u>Mackay</u>								
West Mackay	92.9	65.8	41.8	39.4	36.2	30.2	23.4	19.0
<u>Townsville</u>								
Pimlico	93.7	64.9	33.9	31.8	27.7	22.3	18.1	15.2
<u>Mount Isa</u>								
The Gap	87.4	124.0	91.2	71.5	42.6	32.4	20.7	13.8
Bold text indicates a value greater than the AAQ NEPM standard. AAQ NEPM standard: 50 µg/m ³ (24-hour average) AAQ NEPM goal: standard exceeded on no more than five days per year								

Table 46: Percentiles of daily 24-hour average PM₁₀ concentrations at Rocklea, South-East Queensland (1997 to 2011)

Year	Data availability (% of days)	No. of exceedences (days)	Maximum (µg/m ³)	Percentiles (µg/m ³)			
				99th	98th	95th	90th
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	56.7	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	69.5	35.2	34.2	27.2	24.4
2002	99.2	8	177.2	95.3	60.1	35.0	30.9
2003	98.1	2	119.9	41.7	33.6	28.2	24.2
2004	92.6	2	52.4	44.5	39.9	33.5	28.8
2005	89.9	2	52.6	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	53.4	41.4	38.9	32.1	26.7
2008	94.8	1	86.8	44.2	37.8	30.0	25.8
2009	97.3	9	1033.4	124.7	75.9	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

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

*Data availability less than 75 percent for one or more quarters.

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

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

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

Table 47: Percentiles of daily 24-hour average PM₁₀ concentrations at Flinders View, South-East Queensland (1999 to 2011)

Year	Data availability (% of days)	No. of exceedences (days)	Maximum (µg/m ³)	Percentiles (µg/m ³)			
				99th	98th	95th	90th
1999	95.3	0	44.2	28.4	25.5	20.3	17.9
2000	97.3	1	61.1	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	197.2	103.3	60.8	35.9	31.8
2003	94.8	1	119.1	35.1	30.5	26.0	23.0
2004	99.2	3	64.1	40.8	38.5	32.9	28.9
2005	97.0	3	64.3	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	68.5	45.6	38.8	26.6	22.0
2009	98.6	8	1001.8	111.3	72.4	32.2	27.9
2010	99.2	0	33.9	25.7	24.3	21.1	18.5
2011	99.2	2	67.0	33.2	29.9	22.3	20.2

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

*Data availability less than 75 percent for one or more quarters.

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

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

Table 48: Percentiles of daily 24-hour average PM₁₀ concentrations at South Gladstone (2001 to 2011)

Year	Data availability (% of days)	No. of exceedences (days)	Maximum (µg/m ³)	Percentiles (µg/m ³)			
				99th	98th	95th	90th
2001	95.6	4	66.6	51.6	36.0	30.3	25.9
2002	98.1	5	197.0	83.0	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	196.7	53.8	37.1	26.6	23.0
2006	98.4	1	54.6	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	65.6	43.7	36.7	28.8	24.9
2009	83.0*	7	252.3	114.5	69.0	38.8	30.8
2010	78.4*	0	35.6	32.9	31.9	26.7	23.6
2011	76.7*	3	136.7	62.0	33.3	27.7	23.2

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

*Data availability less than 75 percent for one or more quarters.

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

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

PM_{2.5}

Table 49: Percentiles of daily 24-hour average PM_{2.5} concentrations in Queensland for 2011

Region / Performance monitoring station	Data availability rates (%)	Maximum (µg/m ³)	Percentiles (µg/m ³)					
			99th	98th	95th	90th	75th	50th
<u>South-East Queensland</u>								
Rocklea ⁺	2.7	8.8	8.8	8.8	8.8	8.8	8.4	7.2
Springwood [‡]	92.9	51.2	29.3	11.5	8.7	6.8	5.4	4.0
Arundel ⁺	97.3	48.6	15.4	13.0	10.3	8.5	7.0	5.4
<u>Gladstone</u>								
South Gladstone ⁺	90.4	126.7	62.2	33.5	16.4	12.0	7.6	5.3

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

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

[‡] Monitoring by TEOM Model 1400 instrumentation in accordance with Technical Paper on Monitoring for Particles as PM_{2.5}

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

Table 50: Percentiles of daily 24-hour average PM_{2.5} concentrations at Rocklea, South-East Queensland (1998 to 2011)

Year	Data availability (% of days)	No. of exceedences (days)	Maximum (µg/m ³)	Annual average (µg/m ³)	Percentiles (µg/m ³)			
					99th	98th	95th	90th
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	37.4	5.8	20.2	17.7	13.3	10.9
2001	98.6	3	95.4	5.5	18.4	17.1	12.3	9.2
2002	96.4	3	45.3	6.1	22.0	17.1	12.8	10.9
2003	87.7*	1	34.7	5.1	23.3	13.9	10.6	8.6
2004	93.7	5	32.9	6.5	28.7	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	163.6	10.9	34.3	25.7	21.5	18.0
2010	96.7	0	23.2	8.2	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

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

*Data availability less than 75 percent for one or more quarters.

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

i.d. = insufficient data to calculate value.

AAQ NEPM advisory standards: 25 µg/m³ (24-hour average); 8 µg/m³ (annual average)

Table 51: Percentiles of daily 24-hour average PM_{2.5} concentrations at Springwood, South-East Queensland (1999 to 2011)

Year	Data availability (% of days)	No. of exceedences (days)	Maximum (µg/m ³)	Annual average (µg/m ³)	Percentiles (µg/m ³)			
					99th	98th	95th	90th
1999	82.7*	0	22.3	4.3	12.9	11.8	8.7	7.1
2000	96.7	6	35.4	6.4	28.9	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	38.9	6.2	28.4	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	25.5	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	150.6	5.5	25.3	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	51.2	4.6	29.3	11.5	8.7	6.8

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

*Data availability less than 75 percent for one or more quarters.

AAQ NEPM advisory standards: 25 µg/m³ (24-hour average); 8 µg/m³ (annual average)

Lead

Table 52: 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	2.21
1981	85.2*	2.69
1982	96.7	2.34
1983	96.7	2.21
1984	93.4	2.56
1985	86.9*	2.40
1986	100.0	1.90
1987	96.7	1.91
1988	98.4	2.13
1989	98.4	1.64
1990	98.4	1.47
1991	100.0	0.97
1992	90.2	0.63
1993	93.4	0.57
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 percent for one or more quarters.

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

i.d. = insufficient data to calculate value.

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