

Queensland

2006 air monitoring report

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

Disclaimer

While data in this report were collected, processed and compiled with care, the accuracy and reliability of this information is not guaranteed in any way by the Environmental Protection Agency. The data presented are subject to variations due to limitations of equipment and programs used. Neither the Queensland Government nor the Environmental Protection Agency accepts liability or actions taken on the basis of this report.

© State of Queensland. Environmental Protection Agency. 2007.

Copyright protects this publication. Except for purposes permitted by the Copyright Act, reproduction by whatever means is prohibited without the prior written knowledge of The Environmental Protection Agency. Enquiries should be addressed to PO Box 15155 City East, Qld 4002.

Visit us online at: www.epa.qld.gov.au

ISSN 1037-4671

June 2007

Printed on 100% recycled paper.

Queensland

2006 air monitoring report

Contents	1	Table 7. 2006 compliance summary for PM _{2.5} in Queensland.	14
Summary	3	Table 8. 2006 sulfur dioxide exceedences in Queensland.	16
Introduction	3	Table 9. 2006 PM ₁₀ exceedences in Queensland.	17
Section A – Monitoring summary	3	Table 10. 2006 PM _{2.5} exceedences in Queensland.	17
Current AAQ NEPM monitoring stations	3	Table 11. 2006 summary statistics for daily peak 8-hour carbon monoxide in Queensland.	18
Implementation activities	8	Table 12. 2006 summary statistics for daily peak 1-hour nitrogen dioxide in Queensland.	18
Variations to the approved monitoring plan for Queensland	8	Table 13. 2006 summary statistics for daily peak 1-hour ozone in Queensland.	19
Section B – Assessment of compliance with standards and 2008 goal	8	Table 14. 2006 summary statistics for daily peak 4-hour ozone in Queensland.	19
Section C – Assessment of monitoring data against the standards	15	Table 15. 2006 summary statistics for daily peak 1-hour sulfur dioxide in Queensland.	20
Exceedence summary	15	Table 16. 2006 summary statistics for daily peak 24-hour sulfur dioxide in Queensland.	20
2006 maximum, second-highest and sixth-highest concentration summaries	18	Table 17. 2006 summary statistics for 24-hour PM ₁₀ in Queensland.	21
Section D – Data analysis	22	Table 18. 2006 summary statistics for 24-hour PM _{2.5} in Queensland.	21
2006 pollutant distribution information	22	Table 19. Percentiles of daily peak 8-hour carbon monoxide concentrations for 2006.	22
Multi-year statistics for trend stations	26	Table 20. Percentiles of daily peak 1-hour nitrogen dioxide concentrations for 2006.	22
Appendix – Description of 2006 exceedence events	38	Table 21. Percentiles of daily peak 1-hour ozone concentrations for 2006.	23
PM ₁₀ exceedences in Gladstone, Mackay and Townsville on 16-17 November 2006	38	Table 22. Percentiles of daily peak 4-hour ozone concentrations for 2006.	23
PM _{2.5} exceedence at Springwood on 22 November 2006	39	Table 23. Percentiles of daily peak 1-hour sulfur dioxide concentrations for 2006.	24
PM _{2.5} exceedence at Springwood on 29 November 2006	39	Table 24. Percentiles of daily 24-hour sulfur dioxide concentrations for 2006.	24
PM ₁₀ exceedence at Toowoomba on 29 November 2006	40	Table 25. Percentiles of daily 24-hour PM ₁₀ concentrations for 2006.	25
Sulfur dioxide exceedences at Menzies in 2006	40	Table 26. Percentiles of daily 24-hour PM _{2.5} concentrations for 2006.	25
List of tables		Table 27. Daily peak 8-hour carbon monoxide summary 1998 to 2004 for Brisbane CBD.	26
Table 1. 2006 Queensland AAQ NEPM monitoring sites.	5	Table 28. Daily peak 8-hour carbon monoxide summary 1998 to 2006 for Woolloongabba.	26
Table 2. 2006 compliance summary for carbon monoxide in Queensland.	9	Table 29. Daily peak 1-hour nitrogen dioxide summary 1995 to 2006 for Deception Bay.	26
Table 3. 2006 compliance summary for nitrogen dioxide in Queensland.	10	Table 30. Daily peak 1-hour nitrogen dioxide summary 1980 to 2006 for Rocklea.	27
Table 4. 2006 compliance summary for ozone in Queensland.	11	Table 31. Daily peak 1-hour nitrogen dioxide summary 1995 to 2006 for Flinders View.	27
Table 5. 2006 compliance summary for sulfur dioxide in Queensland.	12	Table 32. Daily peak 1-hour nitrogen dioxide summary 1994 to 2006 for South Gladstone.	28
Table 6. 2006 compliance summary for PM ₁₀ in Queensland.	13	Table 33. Daily peak 1-hour ozone summary 1995 to 2006 for Deception Bay.	28
		Table 34. Daily peak 1-hour ozone summary 1980 to 2006 for Rocklea.	29
		Table 35. Daily peak 1-hour ozone summary 1994 to 2006 for Flinders View.	29

Table 36. Daily peak 4-hour ozone summary 1995 to 2006 for Deception Bay.	30
Table 37. Daily peak 4-hour ozone summary 1994 to 2006 for Flinders View.	30
Table 38. Daily peak 4-hour ozone summary 1980 to 2006 for Rocklea.	31
Table 39. Daily peak 1-hour sulfur dioxide summary 1993 to 2006 for Flinders View.	32
Table 40. Daily peak 1-hour sulfur dioxide summary 1991 to 2006 for South Gladstone.	32
Table 41. Daily peak 1-hour sulfur dioxide summary 1983 to 2006 for Menzies.	33
Table 42. Daily 24-hour sulfur dioxide summary 1993 to 2006 for Flinders View.	33
Table 43. Daily 24-hour sulfur dioxide summary 1991 to 2006 for South Gladstone.	34
Table 44. Daily 24-hour sulfur dioxide summary 1984 to 2006 for Menzies.	34
Table 45. Daily 24-hour PM ₁₀ summary 1997 to 2006 for Rocklea.	35
Table 46. Daily 24-hour PM ₁₀ summary 1999 to 2006 for Flinders View.	35
Table 47. Daily 24-hour PM ₁₀ summary 2001 to 2006 for South Gladstone.	35
Table 48. Daily 24-hour PM _{2.5} summary 1998 to 2006 for Rocklea.	36
Table 49. Daily 24-hour PM _{2.5} summary 1999 to 2006 for Springwood.	36
Table 50. Annual lead summary 1980 to 2002 for Woollongabba.	37

List of figures

Figure 1. 2006 Queensland AAQ NEPM monitoring station locations.	4
Figure 2. Particle concentrations at Gladstone, Mackay and Townsville monitoring sites over the period 16-18 November 2006.	38
Figure 3. Particle concentrations at the Springwood site on 22 November 2006.	39
Figure 4. Particle concentrations at the Springwood site on 29 November 2006.	39
Figure 5. Particle concentrations at the North Toowoomba site on 29 November 2006.	40
Figure 6. Relationship between one-hour average wind direction and sulfur dioxide concentrations at the Menzies site during 2006.	40

Summary

Air monitoring at National Environment Protection (Ambient Air Quality) Measure (AAQ NEPM) monitoring stations in Queensland between January and December 2006 indicated that exceedences of the AAQ NEPM standards occurred for:

- 1-hour sulfur dioxide at the Menzies site in Mount Isa due to industrial emissions;
- 24-hour particles with an aerodynamic diameter less than 10µm (PM₁₀) at Toowoomba, Gladstone, Mackay and Townsville due to wind blown dust and smoke from grassfires (Townsville only); and
- 24-hour particles with an aerodynamic diameter less than 2.5µm (PM_{2.5}) due to smoke from bushfires at the Springwood site in south-east Queensland.

The AAQ NEPM 2008 goal was met in all regions during 2006, with the exception of:

- 1-hour sulfur dioxide at the Menzies site in Mount Isa due to industrial emissions.

Compliance with the standards and the 2008 goal could not be demonstrated for nitrogen dioxide at the Springwood monitoring station, ozone at the Springwood and Targinie monitoring stations, sulfur dioxide at the Springwood and Stuart monitoring stations, and PM₁₀ at the Pimlico monitoring site because data availability was below the level required to make a valid assessment.

Introduction

Under clause 18 of the AAQ NEPM, jurisdictions are required to submit an annual report on their compliance with the measure in an approved form by the end of June of the year following the reporting year. The National Environment Protection (Ambient Air Quality) Measure Technical Paper No. 8, "Annual Reports" (available from www.ephc.gov.au) details the format and data requirements of the annual report.

This report documents compliance information for Queensland for 2006 in accordance with the requirements of technical paper No. 8. The report is divided into four sections as follows:

- Section A: Overview of the AAQ NEPM monitoring network and related activities during 2006.
- Section B: Assessment of compliance with the AAQ NEPM Standards and Goals.
- Section C: Assessment of monitoring data against the standards (including details of exceedences and the circumstances which led to these exceedences, and information on the highest values measured for all pollutants and regions).
- Section D: Data analysis (including pollutant distribution summaries and selected multi-year data for trend stations).

Additional information on the circumstances which led to exceedences of standards during 2006 are provided in an appendix.

Section A – Monitoring summary

Queensland's ambient air monitoring plan (available from www.epa.qld.gov.au/environmental_management/air/air_quality_monitoring/national_measures) outlines the monitoring to be undertaken in Queensland to determine compliance with the Standards and 2008 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 EPA. Details of AAQ NEPM monitoring and related activities in Queensland during 2006 follow.

Current AAQ NEPM monitoring stations

During 2006 monitoring was conducted in six of the ten regions identified in the Queensland monitoring plan – south-east Queensland (consisting of four sub-regions), Toowoomba, 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.ephc.gov.au):

- 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.

Exposed population is a qualitative measure of the population density in the vicinity of the monitoring station.

Figure 1: 2006 AAQ NEPM monitoring station locations

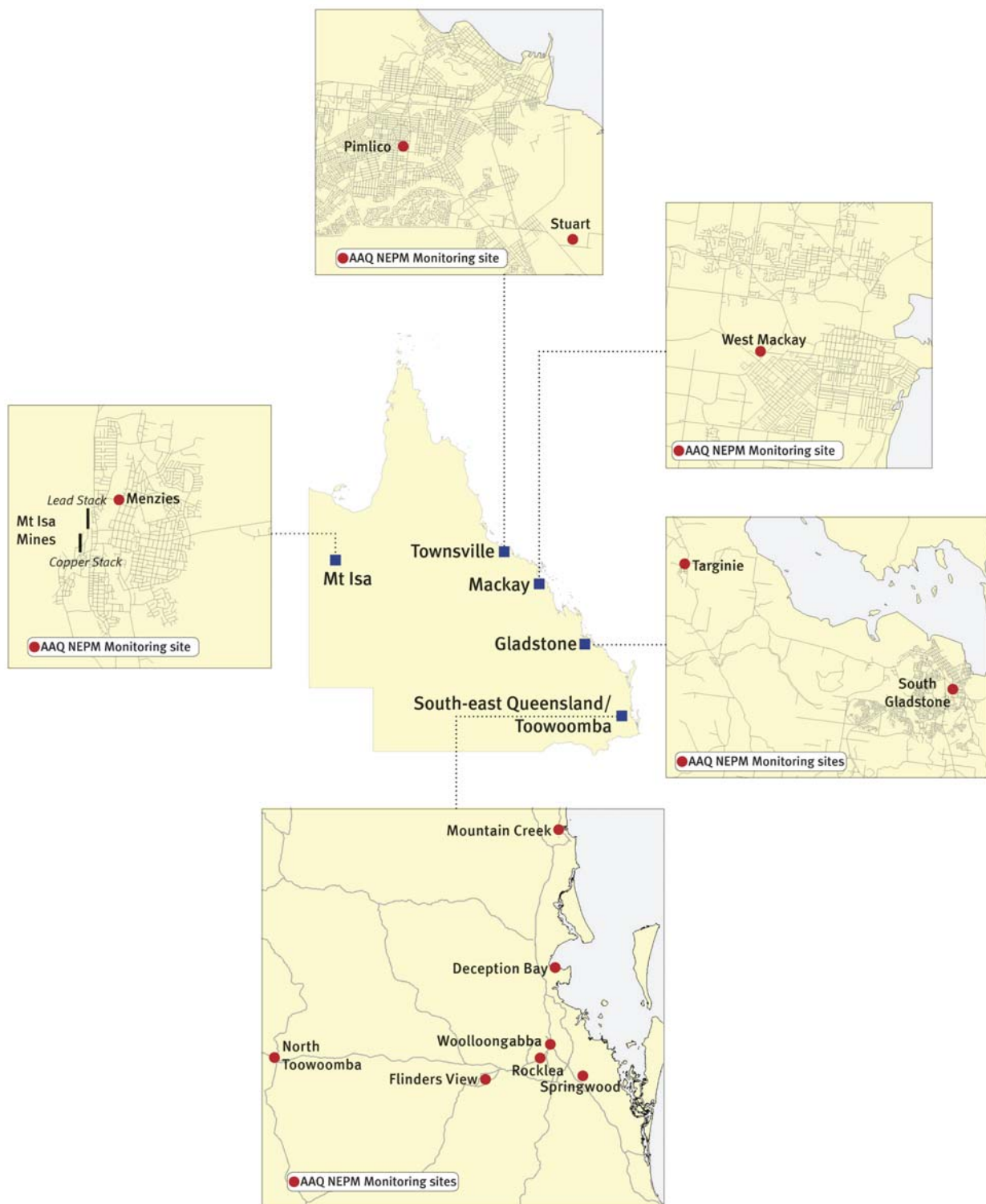


Table 1: 2006 Queensland AAQ NEPM monitoring sites

Site	Station type	Established	Pollutants monitored	Monitoring techniques	Exposed population	Non-conformance with AS2922 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	AS3580.6.1-1990 AS3580.5.1-1993 AS3580.9.8-2001	Medium	Nil	Major roads Forestry/agricultural burning
Brisbane sub-region							
Deception Bay	Trend - GRUB	June 1994	Ozone Nitrogen dioxide	AS3580.6.1-1990 AS3580.5.1-1993	Medium	Trees within 20m west of site	Major roads
Woolloongabba	Trend – Peak	June 1998	Carbon monoxide	AS3580.7.1-1992	High	Nil	Major roads
Rocklea	Trend - GRUB	April 1994	Ozone Nitrogen dioxide PM ₁₀ PM _{2.5} PM _{2.5}	AS3580.6.1-1990 AS3580.5.1-1993 AS3580.9.8-2001 Reference method (Partisol sequential air sampler) TEOM, based on AS3580.9.8-2001	High	Nil	Major roads

Table 1: 2006 Queensland AAQ NEPM monitoring sites (continued)

Site	Station type	Established	Pollutants monitored	Monitoring techniques	Exposed population	Non-conformance with AS2922 siting criteria	Major pollutant sources
South-east Queensland <i>Brisbane sub-region (continued)</i>							
Springwood	PMS - population average	March 1999	Ozone Nitrogen dioxide Sulfur dioxide PM ₁₀ PM _{2.5} PM _{2.5}	Differential Optical Absorption Spectroscopy Differential Optical Absorption Spectroscopy Differential Optical Absorption Spectroscopy AS3580.9.8-2001 Reference method (Partisol sequential air sampler) TEOM, based on AS3580.9.8-2001	High	Nil	Major roads
<i>Ipswich sub-region</i>							
Flinders View	Trend - GRUB	January 1993	Ozone Nitrogen dioxide Sulfur dioxide PM ₁₀	AS3580.6.1-1990 AS3580.5.1-1993 AS3580.4.1-1990 AS3580.9.8-2001	Medium	Trees within 20m of site (kept pruned below inlet height)	Major roads Industry (power generation)
Toowoomba							
North Toowoomba	Campaign - GRUB	July 2003	Carbon monoxide Ozone Nitrogen dioxide PM ₁₀ PM _{2.5}	AS3580.7.1-1992 AS3580.6.1-1990 AS3580.5.1-1993 AS3580.9.8-2001 TEOM, based on AS3580.9.8-2001	High	Nil	Major roads Solid fuel heaters

Table 1: 2006 Queensland AAQ NEPM monitoring sites (continued)

Site	Station type	Established	Pollutants monitored	Monitoring techniques	Exposed population	Non-conformance with AS2922 siting criteria	Major pollutant sources
Gladstone							
South Gladstone	Trend - GRUB	July 1992	Nitrogen dioxide Sulfur dioxide PM ₁₀	AS3580.5.1-1993 AS3580.4.1-1990 AS3580.9.8-2001	Medium	Trees within 20m to north-west of site	Major roads Industry (power generation, metals processing)
Targinie	Campaign - GRUB	December 2000	Ozone	Differential Optical Absorption Spectroscopy	Low	Trees within 20m of DOAS light path	Industry (cement manufacture, metals processing, power generation)
Mackay							
West Mackay	PMS - GRUB	September 1997	PM ₁₀	AS3580.9.8-2001	Medium	Nil	Agricultural burning
Townsville							
Pimlico	Campaign – population average	May 2004	Ozone Nitrogen dioxide Sulfur dioxide PM ₁₀	AS3580.6.1-1990 AS3580.5.1-1993 AS3580.4.1-1990 AS3580.9.8-2001	High	Nil	Major roads Industry (metals processing, port operations)
Stuart	Campaign - GRUB	September 2001	Sulfur dioxide	AS3580.4.1-1990	Low	Nil	Industry (metals processing)
Mount Isa							
Menzies	Trend - GRUB	January 1983	Sulfur dioxide	AS3580.4.1-1990	Low	Tress within 20m of site (kept pruned below inlet height)	Industry (metals smelting, sulfuric acid manufacture)

Implementation activities

In 2006 the EPA continued to monitor ambient air quality in the same six regions as in 2005. PM_{2.5} monitoring using reference samplers on a one in three day basis has continued at the Rocklea and Springwood sites in south-east Queensland as required under the AAQ NEPM PM_{2.5} Equivalence Program.

Variations to the approved monitoring plan for Queensland

Delays in establishing monitoring in other centres, commitments under the AAQ NEPM PM_{2.5} Equivalency Program and other resource constraints have meant that it has not been possible to begin monitoring in Cairns, Mackay, Rockhampton and Bundaberg according to the timeframes set out in the monitoring plan for Queensland.

The need for campaign monitoring of ozone and nitrogen dioxide in Cairns, Mackay, Rockhampton and Bundaberg will be assessed based on the results of campaign monitoring in Townsville and the outcome of modelling studies commissioned by the AAQ NEPM Peer Review Committee.

Section B – Assessment of compliance with standards and 2008 goal

This section provides details of the annual compliance assessment for January to December 2006.

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 2008 goal could not be demonstrated for nitrogen dioxide at the Springwood monitoring station, ozone at the Springwood and Targinie monitoring stations, sulfur dioxide at the Springwood and Stuart monitoring stations, and PM₁₀ at the Pimlico monitoring station.

Tables 2 to 7 summarise compliance of monitoring with the standards and 2008 goal for AAQ NEPM pollutants for 2006. 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. Regions where monitoring has not been conducted can also be considered to meet the standards and goals on the basis that screening shows pollutant levels are reasonably expected to be consistently below the relevant standard (National Environment Protection (Ambient Air Quality) Measure Technical Paper No. 4, "Screening Procedures" (available from www.ephc.gov.au)).

TEOM PM₁₀ data quoted 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.ephc.gov.au). The resulting adjustments vary linearly from no change at daily average temperatures at or above 15deg to an increase of 40 percent at a temperature of 5deg.

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} instrumentation operating continuously. 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}.

Carbon monoxide

Table 2: 2006 compliance summary for carbon monoxide in Queensland

AAQ NEPM Standard
9.0 ppm (8-hour average)

Region/ Performance monitoring station	Data availability rates (% of hours)					Number of exceedences (days)	Performance against the standards and goal
	Q1	Q2	Q3	Q4	Annual		
<u>South-east Queensland</u> <i>Brisbane sub-region</i> Woolloongabba	80.1	89.3	95.2	94.8	89.9	0	met
<u>Toowoomba</u> North Toowoomba	95.2	88.4	82.3	95.0	90.2	0	met

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
- Townsville
- Mount Isa

Motor vehicles are the major contributor to ambient carbon monoxide levels in urban areas where the use of combustion stoves and wood heaters in winter is minimal. Carbon monoxide concentrations at the Brisbane CBD performance monitoring station in south-east Queensland over the period 2000 to 2004 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”.

Carbon monoxide compliance in Mount Isa can be inferred on the basis of campaign monitoring conducted in Toowoomba, an inland Queensland centre with greater population, lower winter temperatures and higher solid fuel heater use. The maximum 8-hour average carbon monoxide concentration measured in Toowoomba from July 2003 to December 2006 was 3.4ppm, which is less than 40 percent of the AAQ NEPM standard. Using screening procedure F in table 1 of the National Environment Protection (Ambient Air Quality) Measure Technical Paper No. 4, “Screening Procedures”, it can be concluded that carbon monoxide levels in Mount Isa will be consistently below the AAQ NEPM standard.

Nitrogen dioxide

Table 3: 2006 compliance summary for nitrogen dioxide in Queensland

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

Region/ Performance monitoring station	Data availability rates (% of hours)					Number of 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	95.2	95.0	95.2	95.7	95.2	0	0.005	met	met
<i>Brisbane sub-region</i> Deception Bay	91.5	94.5	94.9	95.4	94.1	0	0.008	met	met
Rocklea	90.8	95.1	95.0	83.3	91.1	0	0.011	met	met
Springwood	34.4	94.9	99.4	99.7	82.3	0	0.009	ND	ND
<i>Ipswich sub-region</i> Flinders View	94.6	95.3	94.7	94.9	94.9	0	0.012	met	met
<u>Toowoomba</u> North Toowoomba	94.1	86.1	80.3	92.2	88.1	0	0.005	met	met
<u>Gladstone</u> South Gladstone	93.2	94.8	95.1	93.4	94.1	0	0.003	met	met
<u>Townsville</u> Pimlico	88.8	94.7	95.4	95.7	93.7	0	0.006	met	met

ND = "not demonstrated" due to insufficient data

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

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

Ozone

Table 4: 2006 compliance summary for ozone in Queensland

AAQ NEPM Standard
0.10 ppm (1-hour average)
0.08 ppm (4-hour average)

Region/ Performance monitoring station	Data availability rates (% of hours)					Number of exceedences (days)		Performance against the standards and goal	
	Q1	Q2	Q3	Q4	Annual	1-hour	4-hour	1-hour	4-hour
<u>South-east Queensland</u> <i>North Coast sub-region</i> Mountain Creek	95.4	94.9	95.2	95.7	95.3	0	0	met	met
<i>Brisbane sub-region</i> Deception Bay	91.3	94.3	94.9	95.4	94.0	0	0	met	met
Rocklea	90.8	95.3	94.1	87.3	91.8	0	0	met	met
Springwood	35.8	94.0	97.6	99.0	81.8	0	0	ND	ND
<i>Ipswich sub-region</i> Flinders View	94.8	95.3	94.7	95.0	95.0	0	0	met	met
<u>Toowoomba</u> North Toowoomba	95.0	88.1	85.5	94.9	90.8	0	0	met	met
<u>Gladstone</u> Targinie	99.0	36.4	0.0	0.0	33.5	0	0	ND	ND
<u>Townsville</u> Pimlico	88.9	95.4	95.4	95.7	93.9	0	0	met	met

ND = "not demonstrated" due to insufficient data

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

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

Sulfur dioxide

Table 5: 2006 compliance summary for sulfur dioxide in Queensland

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

Region/ Performance monitoring station	Data availability rates (% of hours)					Number of exceedences (days)		Annual mean (ppm)	Performance against the standards and goal		
	Q1	Q2	Q3	Q4	Annual	1h	24h		1h	24h	1y
<u>South-east Queensland</u> <i>Brisbane sub-region</i> Springwood	36.1	94.0	98.6	99.4	82.2	0	0	0.000	ND	ND	ND
<i>Ipswich sub-region</i> Flinders View	94.9	95.1	94.6	94.9	94.9	0	0	0.001	met	met	met
<u>Gladstone</u> South Gladstone	93.1	92.5	95.1	93.4	93.5	0	0	0.003	met	met	met
<u>Townsville</u> Pimlico	88.7	92.9	95.4	95.7	93.2	0	0	0.000	met	met	met
Stuart	14.3	71.4	95.7	95.6	69.6	0	0	0.000	ND	ND	ND
<u>Mount Isa</u> Menzies	87.5	90.5	91.6	94.7	91.1	42	0	0.005	not met	met	met

ND = "not demonstrated" due to insufficient data

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

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

- Rockhampton

Unless significant industrial point sources of sulfur dioxide exist in a region (e.g. coal-fired power stations and 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".

Particles as PM₁₀

Table 6: 2006 compliance summary for PM₁₀ in Queensland

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

Region/ Performance monitoring station	Data availability rates (% of days)					Number of exceedences (days)	Performance against the standards and goal
	Q1	Q2	Q3	Q4	Annual		
<u>South-east Queensland</u> <i>North Coast sub-region</i> Mountain Creek	97.8	98.9	100.0	98.9	98.9	0	met
<i>Brisbane sub-region</i> Rocklea	94.4	98.9	100.0	91.3	96.2	0	met
Springwood	82.2	94.5	100.0	100.0	94.2	0	met
<i>Ipswich sub-region</i> Flinders View	100.0	100.0	100.0	100.0	100.0	0	met
<u>Toowoomba</u> North Toowoomba	96.7	91.2	88.0	95.7	92.9	1	met
<u>Gladstone</u> South Gladstone	97.8	97.8	100.0	97.8	98.4	1	met
<u>Mackay</u> West Mackay	90.0	98.9	98.9	94.6	95.6	1	met
<u>Townsville</u> Pimlico	71.1	93.4	96.7	96.7	89.6	2	ND

ND = "not demonstrated" due to insufficient data

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

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

Particles as PM_{2.5}

Table 7: 2006 compliance summary for PM_{2.5} in Queensland

AAQ NEPM Advisory Standard
 25 µg/m³ (24-hour average)
 8 µg/m³ (1-year average)

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 [†]	27.8	31.9	16.3	28.3	26.0	0	5.4
Rocklea [‡]	94.4	100.0	100.0	90.2	96.2	0	4.2
Springwood [†]	28.9	30.8	27.2	30.4	29.3	1	5.3
Springwood [‡]	83.3	94.5	100.0	100.0	94.5	1	4.9
<u>Toowoomba</u>							
North Toowoomba [‡]	95.6	91.2	87.0	98.9	93.2	0	4.1

[†]Monitoring by reference method (1 in 3 days)

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

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

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

Lead

No lead monitoring was conducted in Queensland in 2006. In the absence of non-vehicle sources of lead (e.g. metals smelting), 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 10 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.ephc.gov.au), these measurements demonstrate that compliance with the AAQ NEPM standard and 2008 goal has been achieved in south-east Queensland, and monitoring of lead ceased from the end of 2002.

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
- Townsville

Peak lead concentrations in south-east Queensland have been less than 40 percent of the AAQ NEPM standard since 1999 (see section D, table 46). On this basis, lead monitoring in other Queensland centres with lower population and traffic density (with the exception of 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".

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

- Mount Isa

Section C – Assessment of monitoring data against the standards

Information provided in this section allows qualitative and quantitative assessment and comparison of monitoring data against the standards for 2006. Statistics provided include the listing of exceedences and circumstances which led to these exceedences, and annual maxima, the second highest (for carbon monoxide, nitrogen dioxide, ozone and sulfur dioxide) and sixth highest (for PM_{10}) daily concentrations, 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 $\text{PM}_{2.5}$.

Exceedence details are provided in tables 8 to 10. Summary maxima statistics are provided in tables 11 to 18.

Exceedence summary

During 2006, exceedences of AAQ NEPM standards occurred for sulfur dioxide and PM_{10} . The AAQ NEPM 24-hour $\text{PM}_{2.5}$ advisory reporting standard was exceeded. There were no exceedences of the AAQ NEPM standards for ozone, carbon monoxide and nitrogen dioxide. Lead monitoring was not conducted in 2006, as compliance with the standard and 2008 goal was demonstrated in 2002 for all regions with the exception of Mount Isa where monitoring is yet to commence.

Additional information on the circumstances which led to exceedences of standards during 2006 is provided in an appendix.

Table 8: 2006 sulfur dioxide exceedences in Queensland

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

Region/ Performance monitoring station	Standard	Concentration (ppm)	Date	Time	Circumstances
Mount Isa Menzies	1-hour	0.567	Aug26	17	Industry emissions
		0.516	Jul28	15	Industry emissions
		0.430	Feb07	11	Industry emissions
		0.398	Dec29	18	Industry emissions
		0.386	Dec01	18	Industry emissions
		0.362	Sep04	17	Industry emissions
		0.356	Nov07	14	Industry emissions
		0.347	Feb06	16	Industry emissions
		0.340	Dec06	18	Industry emissions
		0.339	Aug25	17	Industry emissions
		0.338	Jul23	17	Industry emissions
		0.328	Aug24	17	Industry emissions
		0.298	Dec18	9	Industry emissions
		0.295	Jul28	16	Industry emissions
		0.279	Jul23	18	Industry emissions
		0.273	Dec25	18	Industry emissions
		0.265	Dec01	20	Industry emissions
		0.264	Feb09	17	Industry emissions
		0.254	Dec31	13	Industry emissions
		0.250	Nov08	15	Industry emissions
		0.246	Jul01	16	Industry emissions
		0.242	Jul27	15	Industry emissions
		0.241	Nov13	15	Industry emissions
		0.238	Nov13	18	Industry emissions
		0.235	Nov07	13	Industry emissions
		0.234	Nov08	16	Industry emissions
			Dec01	12	Industry emissions
		0.233	Sep04	18	Industry emissions
		0.230	Mar04	15	Industry emissions
		0.227	Nov07	18	Industry emissions
		0.226	Feb06	15	Industry emissions
		0.222	Feb07	12	Industry emissions
			Nov07	17	Industry emissions
		0.221	Jul27	17	Industry emissions
		0.219	Feb10	10	Industry emissions
		0.218	Jan22	13	Industry emissions
		0.217	Nov06	17	Industry emissions
		0.211	Nov06	15	Industry emissions
		0.210	Feb10	11	Industry emissions
		0.209	Nov14	16	Industry emissions
		0.204	Dec25	17	Industry emissions
		0.202	Dec04	18	Industry emissions

Table 9: 2006 PM₁₀ exceedences in Queensland

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

Region/ Performance monitoring station	Concentration (µg/m ³)	Date	Time	Circumstances
<u>Toowoomba</u> North Toowoomba	55.6	Nov29	24	Wind blown dust
<u>Gladstone</u> South Gladstone	54.6	Nov16	24	Dust storm
<u>Mackay</u> West Mackay	106.0	Nov16	24	Dust storm
<u>Townsville</u> Pimlico	61.5 54.7	Nov17 Nov16	24 24	Dust storm and smoke from bushfires Dust storm

Table 10: 2006 PM_{2.5} exceedences in Queensland

AAQ NEPM standard
25 µg/m³ (24-hour average)
8 µg/m³ (1-year average)

Region/ Performance monitoring station	Concentration (µg/m ³)	Date	Time	Circumstances
<u>South-east Queensland</u> Springwood	26.2 25.5	Nov22 Nov29	24 24	Bushfire smoke Bushfire smoke and wind blown dust

2006 maximum, second-highest and sixth-highest concentration summaries

Table 11: 2006 summary statistics for daily peak 8-hour CO in Queensland

AAQ NEPM standard
9.0 ppm (8-hour average)

Region/ Performance monitoring station	Number of valid days	Highest (ppm)	Highest (date:hour)	2nd highest (ppm)	2nd highest (date:time)
<u>South-east Queensland</u> Woolloongabba	348	4.0	May26:01	3.7	May27:01
<u>Toowoomba</u> North Toowoomba	348	1.9	May06:01	1.8	Jul10:02 Jul11:01 Jul27:01

Table 12: 2006 summary statistics for daily peak 1-hour nitrogen dioxide in Queensland

AAQ NEPM standard
0.12 ppm (1-hour average)

Region/ Performance monitoring station	Number of valid days	Highest (ppm)	Highest (date:hour)	2nd highest (ppm)	2nd highest (date:time)
<u>South-east Queensland</u> Mountain Creek	365	0.035	Aug15:20	0.033	May04:19
Deception Bay	363	0.044	Jul12:19	0.041	May03:20
Rocklea	352	0.046	Jun01:18	0.044	Jul12:20
Springwood	307	0.044	Jun01:23	0.034	May30:22 Aug25:21
Flinders View	365	0.050	May03:20	0.048	May26:19 Jul12:18
<u>Toowoomba</u> North Toowoomba	346	0.042	May05:20	0.039	May04:19
<u>Gladstone</u> South Gladstone	365	0.034	Sep21:11	0.030	May30:19 Aug10:19
<u>Townsville</u> Pimlico	360	0.034	Aug10:20 Nov16:22		

Table 13: 2006 summary statistics for daily peak 1-hour ozone in Queensland

AAQ NEPM standard
0.10 ppm (1-hour average)

Region/ Performance monitoring station	Number of valid days	Highest (ppm)	Highest (date:hour)	2nd highest (ppm)	2nd highest (date:time)
<u>South-east Queensland</u>					
Mountain Creek	365	0.053	Apr01:17	0.052	Aug22:13
Deception Bay	363	0.064	May06:16	0.063	Jul12:16
Rocklea	356	0.079	Nov29:12	0.072	Nov26:13
Springwood	307	0.045	Nov29:11	0.040	Nov05:15
Flinders View	365	0.077	Nov24:13	0.075	Nov26:13 Nov29:14
<u>Toowoomba</u>					
North Toowoomba	351	0.063	Nov24:17	0.061	Nov13:19
<u>Gladstone</u>					
Targinie	124	0.035	Jan09:19 Apr01:14		
<u>Townsville</u>					
Pimlico	360	0.048	Jan09:15	0.045	Nov16:17

Table 14: 2006 summary statistics for daily peak 4-hour ozone in Queensland

AAQ NEPM standard
0.08 ppm (4-hour average)

Region/ Performance monitoring station	Number of valid days	Highest (ppm)	Highest (date:hour)	2nd highest (ppm)	2nd highest (date:time)
<u>South-east Queensland</u>					
Mountain Creek	365	0.048	Apr01:18	0.046	Nov06:13
Deception Bay	363	0.060	May06:17	0.057	Nov05:19
Rocklea	356	0.068	Nov29:13	0.060	Jan03:13
Springwood	307	0.039	Nov29:13	0.038	Nov05:16
Flinders View	365	0.070	Nov29:16	0.066	Feb09:16
<u>Toowoomba</u>					
North Toowoomba	351	0.057	Nov27:17	0.056	Dec03:16
<u>Gladstone</u>					
Targinie	124	0.030	Apr01:16	0.028	Jan09:21
<u>Townsville</u>					
Pimlico	360	0.045	Jan09:17	0.042	Nov16:18

Table 15: 2006 summary statistics for daily peak 1-hour sulfur dioxide in Queensland

AAQ NEPM standard
0.20 ppm (1-hour average)

Region/ Performance monitoring station	Number of valid days	Highest (ppm)	Highest (date:hour)	2nd highest (ppm)	2nd highest (date:time)
<u>South-east Queensland</u>					
Springwood	307	0.019	Jul10:19	0.011	Aug15:10
Flinders View	365	0.040	Jan29:21	0.038	Jul07:12 Sep29:11
<u>Gladstone</u>					
South Gladstone	365	0.093	Sep21:10	0.080	Mar18:14 Dec10:15
<u>Townsville</u>					
Pimlico	360	0.006	Jun18:22	0.005	Jun01:10 Aug14:17 Aug23:10
Stuart	268	0.014	Aug23:10	0.008	May26:20 Oct13:22
<u>Mount Isa</u>					
Menzies	354	0.567	Aug26:17	0.516	Jul28:15

Table 16: 2006 summary statistics for 24-hour sulfur dioxide in Queensland

AAQ NEPM standard
0.08 ppm (24-hour average)

Region/ Performance monitoring station	Number of valid days	Highest (ppm)	Highest (date)	2nd highest (ppm)	2nd highest (date)
<u>South-east Queensland</u>					
Springwood	299	0.002	May24	0.001	51 days in total
Flinders View	364	0.007	Oct17	0.006	Jan29 Feb08 Oct16
<u>Gladstone</u>					
South Gladstone	356	0.019	Oct17	0.016	Mar18
<u>Townsville</u>					
Pimlico	351	0.003	Dec06	0.002	13 days in total
Stuart	264	0.002	Aug23 Dec07		
<u>Mount Isa</u>					
Menzies	342	0.065	Dec01	0.060	Nov07

Table 17: 2006 summary statistics for 24-hour PM₁₀ in Queensland

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

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	361	62.9	Feb03	30.1	Nov16
Rocklea	351	52.6	Feb03	37.8	Feb05
Springwood	344	63.6	Feb03	35.6	Oct06
Flinders View	365	64.3	Feb03	41.1	Feb06
<u>Toowoomba</u>					
North Toowoomba	339	111.7	Feb02	35.3	Feb08
<u>Gladstone</u>					
South Gladstone	359	196.7	Feb03	40.1	Feb07
<u>Mackay</u>					
West Mackay	349	146.0	Feb04	54.2	Dec19
<u>Townsville</u>					
Pimlico	327	141.9	Feb03	34.4	Oct21

Table 18: 2006 summary statistics for 24-hour PM_{2.5} in Queensland

AAQ NEPM advisory reporting standard
25 µg/m³ (24-hour average)
8 µg/m³ (1-year average)

Region/ Performance monitoring station	Number of valid days	Highest (µg/m ³)	Highest (date)
<u>South-east Queensland</u>			
Rocklea [†]	91	9.8	Oct29
Rocklea [‡]	351	14.1	Nov26
Springwood [†]	107	26.2	Nov22
Springwood [‡]	345	25.5	Nov29
<u>Toowoomba</u>			
North Toowoomba [‡]	340	16.0	Nov29

[†]Monitoring by reference method (1 in 3 days)

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

Section D – Data analysis

This section provides pollutant distribution information for 2006 (tables 19 to 26), and multi-year data for nominated trend stations in the Queensland air monitoring plan (tables 27 to 50).

2006 pollutant distribution information

Table 19: Percentiles of daily peak 8-hour carbon monoxide concentrations for 2006

AAQ NEPM standard
9.0 ppm (8-hour average)

	Data availability rates (%)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)	75th percentile (ppm)	50th percentile (ppm)
<u>South-east Queensland</u> Woolloongabba	95.3	4.0	3.7	3.1	2.4	2.1	1.4	0.9
<u>Toowoomba</u> North Toowoomba	95.3	1.9	1.8	1.7	1.3	1.1	0.3	0.0

Table 20: Percentiles of daily peak 1-hour nitrogen dioxide concentrations for 2006

AAQ NEPM standard
0.12 ppm (1-hour average)

	Data availability rates (%)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)	75th percentile (ppm)	50th percentile (ppm)
<u>South-east Queensland</u> Mountain Creek	100.0	0.035	0.032	0.030	0.027	0.024	0.016	0.010
Deception Bay	99.5	0.044	0.035	0.033	0.028	0.027	0.021	0.015
Rocklea	96.4	0.046	0.039	0.035	0.031	0.027	0.022	0.016
Springwood	84.1	0.044	0.034	0.032	0.031	0.027	0.023	0.018
Flinders View	100.0	0.050	0.043	0.041	0.035	0.032	0.025	0.019
<u>Toowoomba</u> North Toowoomba	94.8	0.042	0.037	0.033	0.031	0.027	0.021	0.009
<u>Gladstone</u> South Gladstone	100.0	0.034	0.027	0.027	0.024	0.021	0.016	0.012
<u>Townsville</u> Pimlico	98.6	0.034	0.031	0.029	0.025	0.022	0.016	0.011

Table 21: Percentiles of daily peak 1-hour ozone concentrations for 2006

AAQ NEPM standard
0.10 ppm (1-hour average)

	Data availability rates (%)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)	75th percentile (ppm)	50th percentile (ppm)
<u>South-east Queensland</u>								
Mountain Creek	100.0	0.053	0.047	0.043	0.038	0.035	0.031	0.027
Deception Bay	99.5	0.064	0.056	0.052	0.047	0.042	0.037	0.032
Rocklea	97.5	0.079	0.066	0.063	0.055	0.048	0.041	0.033
Springwood	84.1	0.045	0.040	0.037	0.034	0.031	0.025	0.022
Flinders View	100.0	0.077	0.069	0.065	0.057	0.050	0.041	0.033
<u>Toowoomba</u>								
North Toowoomba	96.2	0.063	0.059	0.058	0.052	0.046	0.039	0.033
<u>Gladstone</u>								
Targinie	34.0	0.035	0.035	0.035	0.028	0.025	0.022	0.018
<u>Townsville</u>								
Pimlico	98.6	0.048	0.042	0.040	0.037	0.035	0.031	0.027

Table 22: Percentiles of daily peak 4-hour ozone concentrations for 2006

AAQ NEPM standard
0.08 ppm (4-hour average)

	Data availability rates (%)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)	75th percentile (ppm)	50th percentile (ppm)
<u>South-east Queensland</u>								
Mountain Creek	100.0	0.048	0.041	0.039	0.035	0.033	0.027	0.025
Deception Bay	99.5	0.060	0.055	0.048	0.044	0.039	0.035	0.031
Rocklea	97.5	0.068	0.056	0.055	0.049	0.043	0.038	0.031
Springwood	84.1	0.039	0.034	0.033	0.030	0.028	0.024	0.021
Flinders View	100.0	0.070	0.059	0.056	0.050	0.044	0.038	0.031
<u>Toowoomba</u>								
North Toowoomba	96.2	0.057	0.055	0.053	0.047	0.042	0.037	0.031
<u>Gladstone</u>								
Targinie	34.0	0.030	0.030	0.028	0.023	0.020	0.018	0.015
<u>Townsville</u>								
Pimlico	98.6	0.045	0.039	0.038	0.035	0.034	0.030	0.025

Table 23: Percentiles of daily peak 1-hour sulfur dioxide concentrations for 2006

AAQ NEPM standard
0.20 ppm (1-hour average)

	Data availability rates (%)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)	75th percentile (ppm)	50th percentile (ppm)
<u>South-east Queensland</u> Springwood Flinders View	84.1 100.0	0.019 0.040	0.010 0.037	0.007 0.027	0.005 0.023	0.003 0.018	0.002 0.011	0.001 0.004
<u>Gladstone</u> South Gladstone	100.0	0.093	0.071	0.064	0.049	0.034	0.018	0.010
<u>Townsville</u> Pimlico Stuart	98.6 73.4	0.006 0.014	0.005 0.008	0.004 0.006	0.003 0.004	0.002 0.003	0.002 0.002	0.001 0.001
<u>Mount Isa</u> Menzies	97.0	0.567	0.398	0.356	0.246	0.176	0.013	0.002

Table 24: Percentiles of daily 24-hour sulfur dioxide concentrations for 2006

AAQ NEPM standard
0.08 ppm (24-hour average)

	Data availability rates (%)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)	75th percentile (ppm)	50th percentile (ppm)
<u>South-east Queensland</u> Springwood Flinders View	81.9 99.7	0.002 0.007	0.001 0.006	0.001 0.004	0.001 0.004	0.001 0.003	0.000 0.002	0.000 0.001
<u>Gladstone</u> South Gladstone	97.5	0.019	0.014	0.011	0.008	0.006	0.004	0.002
<u>Townsville</u> Pimlico Stuart	96.2 72.3	0.003 0.002	0.002 0.001	0.002 0.001	0.002 0.001	0.001 0.001	0.001 0.001	0.000 0.000
<u>Mount Isa</u> Menzies	93.7	0.065	0.054	0.045	0.032	0.018	0.003	0.001

Table 25: Percentiles of daily 24-hour PM₁₀ concentrations for 2006

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

	Data availability rates (%)	Max conc. (µg/m ³)	99th percentile (µg/m ³)	98th percentile (µg/m ³)	95th percentile (µg/m ³)	90th percentile (µg/m ³)	75th percentile (µg/m ³)	50th percentile (µg/m ³)
<u>South-east Queensland</u>								
Mountain Creek	98.9	39.8	33.3	28.4	23.9	20.9	17.1	13.8
Rocklea	96.2	45.5	32.6	31.1	27.0	23.8	19.3	15.6
Springwood	94.2	35.1	34.1	28.4	26.2	22.4	17.8	14.1
Flinders View	100.0	35.7	29.5	28.6	26.0	22.5	18.2	14.3
<u>Toowoomba</u>								
North Toowoomba	92.9	55.6	39.3	33.2	30.0	25.9	20.0	15.3
<u>Gladstone</u>								
South Gladstone	98.4	54.6	37.5	34.3	28.6	23.7	19.8	15.4
<u>Mackay</u>								
West Mackay	95.6	106.0	41.5	36.2	31.7	28.4	23.2	19.2
<u>Townsville</u>								
Pimlico	89.6	61.5	28.3	24.0	22.2	20.1	16.9	14.1

Table 26: Percentiles of daily 24-hour PM_{2.5} concentrations for 2006

AAQ NEPM advisory reporting standards
25 µg/m³ (24-hour average)
8 µg/m³ (1-year average)

	Data availability rates (%)	Max conc. (µg/m ³)	99th percentile (µg/m ³)	98th percentile (µg/m ³)	95th percentile (µg/m ³)	90th percentile (µg/m ³)	75th percentile (µg/m ³)	50th percentile (µg/m ³)
<u>South-east Queensland</u>								
Rocklea [†]	26.0	9.8	9.8	9.7	9.3	8.2	6.5	5.2
Rocklea [‡]	96.2	14.1	13.0	10.6	8.4	7.0	5.4	3.8
Springwood [†]	29.3	26.2	26.2	15.6	10.6	8.2	6.3	4.6
Springwood [‡]	94.5	25.5	21.4	15.3	9.5	8.0	6.0	4.1
<u>Toowoomba</u>								
North Toowoomba [‡]	93.2	16.0	15.3	12.0	9.6	7.9	5.2	3.5

[†]Monitoring by reference method (1 in 3 days)

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

Multi-year statistics for trend stations

Table 27: Daily peak 8-hour carbon monoxide summary 1998 to 2004

Trend station/region: Brisbane CBD, south-east Queensland

AAQ NEPM standard
9.0 ppm (8-hour average)

Year	Data availability (%)	No. of exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
1998	73.7*	0	3.4	3.3	2.7	2.6	2.3
1999	80.0*	0	5.8	3.6	3.5	2.9	2.7
2000	78.1*	0	2.7	2.6	2.4	2.2	1.8
2001	95.9	0	3.3	2.4	2.2	1.9	1.6
2002	72.9*	0	2.5	2.3	2.1	1.6	1.5
2003	97.0	0	2.7	2.2	1.9	1.5	1.2
2004	81.7*	0	3.3	3.1	2.3	1.7	1.2

*Data availability less than 75 percent for one or more quarters. Years shown in italics have less than 75 percent annual data availability.

Table 28: Daily peak 8-hour carbon monoxide summary 1998 to 2006

Trend station/region: Woolloongabba, south-east Queensland

AAQ NEPM standard
9.0 ppm (8-hour average)

Year	Data availability (%)	No. of exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
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

*Data availability less than 75 percent for one or more quarters. Years shown in italics have less than 75 percent annual data availability.

Table 29: Daily peak 1-hour nitrogen dioxide summary 1995 to 2006

Trend station/region: Deception Bay, south-east Queensland

AAQ NEPM standard
0.12 ppm (1-hour average)

Year	Data availability (%)	No. of exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)	Annual average (ppm)
1995	93.4	0	0.058	0.054	0.046	0.038	0.033	0.007
1996	68.6*	0	0.048	0.043	0.042	0.034	0.030	0.007
1997	95.6	0	0.043	0.038	0.036	0.032	0.028	0.007
1998	97.5	0	0.066	0.050	0.039	0.031	0.026	0.006
1999	96.4	0	0.058	0.039	0.030	0.028	0.024	0.006
2000	99.5	0	0.053	0.038	0.034	0.029	0.025	0.005
2001	95.1	0	0.047	0.040	0.039	0.034	0.030	0.006
2002	87.4*	0	0.065	0.044	0.042	0.036	0.030	0.006
2003	94.5	0	0.053	0.036	0.033	0.030	0.028	0.006
2004	97.8	0	0.045	0.036	0.036	0.030	0.027	0.006
2005	95.3	0	0.034	0.033	0.030	0.028	0.026	0.006
2006	99.5	0	0.044	0.035	0.033	0.028	0.027	0.008

*Data availability less than 75 percent for one or more quarters. Years shown in italics have less than 75 percent annual data availability.

Table 30: Daily peak 1-hour nitrogen dioxide summary 1980 to 2006**Trend station/region:** Rocklea, south-east QueenslandAAQ NEPM standard
0.12 ppm (1-hour average)

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

*Data availability less than 75 percent for one or more quarters. Years shown in italics have less than 75 percent annual data availability.

Table 31: Daily peak 1-hour nitrogen dioxide summary 1995 to 2006**Trend station/region:** Flinders View, south-east QueenslandAAQ NEPM standard
0.12 ppm (1-hour average)

Year	Data availability (%)	No. of exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)	Annual average (ppm)
1995	91.2*	0	0.038	0.037	0.035	0.031	0.028	0.009
1996	98.4	0	0.055	0.050	0.044	0.037	0.033	0.009
1997	96.4	0	0.046	0.042	0.040	0.036	0.030	0.009
1998	96.4	0	0.048	0.041	0.039	0.034	0.030	0.009
1999	98.4	0	0.046	0.039	0.038	0.032	0.029	0.008
2000	99.2	0	0.042	0.040	0.038	0.034	0.031	0.008
2001	100.0	0	0.045	0.037	0.036	0.034	0.031	0.009
2002	88.8*	0	0.062	0.057	0.043	0.036	0.033	0.010
2003	94.0	0	0.046	0.039	0.037	0.033	0.029	0.009
2004	100.0	0	0.054	0.047	0.038	0.034	0.030	0.009
2005	100.0	0	0.055	0.046	0.038	0.032	0.028	0.008
2006	100.0	0	0.050	0.043	0.041	0.035	0.032	0.012

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

Table 32: Daily peak 1-hour nitrogen dioxide summary 1994 to 2006**Trend station/region:** South Gladstone, GladstoneAAQ NEPM standard
0.12 ppm (1-hour average)

Year	Data availability (%)	No. of exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)	Annual average (ppm)
1994	81.6*	0	0.049	0.047	0.044	0.038	0.028	0.005
1995	91.8	0	0.038	0.030	0.028	0.025	0.022	0.005
1996	84.2*	0	0.045	0.039	0.035	0.032	0.029	0.006
1997	65.8*	0	0.031	0.030	0.029	0.022	0.017	0.003
1998	72.9*	0	0.022	0.020	0.018	0.015	0.012	0.002
1999	88.8*	0	0.034	0.029	0.029	0.025	0.021	0.003
2000	97.8	0	0.031	0.025	0.024	0.022	0.019	0.003
2001	96.4	0	0.048	0.033	0.031	0.026	0.023	0.004
2002	98.4	0	0.036	0.031	0.029	0.026	0.021	0.004
2003	95.3	0	0.035	0.030	0.027	0.024	0.022	0.004
2004	100.0	0	0.042	0.030	0.029	0.026	0.023	0.004
2005	99.7	0	0.035	0.030	0.028	0.024	0.022	0.004
2006	100.0	0	0.034	0.027	0.027	0.024	0.021	0.003

*Data availability less than 75 percent for one or more quarters. Years shown in italics have less than 75 percent annual data availability.

Table 33: Daily peak 1-hour ozone summary 1995 to 2006**Trend station/region:** Deception Bay, south-east QueenslandAAQ NEPM standard
0.10 ppm (1-hour average)

Year	Data availability (%)	No. of exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
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

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

Table 34: Daily peak 1-hour ozone summary 1980 to 2006**Trend station/region:** Rocklea, south-east QueenslandAAQ NEPM standard
0.10 ppm (1-hour average)

Year	Data availability (%)	No. of exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
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	0.100	0.078	0.055
1988	67.5*	1	0.101	0.085	0.069	0.047	0.039
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

*Data availability less than 75 percent for one or more quarters. Years shown in italics have less than 75 percent annual data availability.

Table 35: Daily peak 1-hour ozone summary 1994 to 2006**Trend station/region:** Flinders View, south-east QueenslandAAQ NEPM standard
0.10 ppm (1-hour average)

Year	Data availability (%)	No. of exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
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

Table 36: Daily peak 4-hour ozone summary 1995 to 2006**Trend station/region:** Deception Bay, south-east QueenslandAAQ NEPM standard
0.08 ppm (4-hour average)

Year	Data availability (%)	No. of exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
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

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

Table 37: Daily peak 4-hour ozone summary 1994 to 2006**Trend station/region:** Flinders View, south-east QueenslandAAQ NEPM standard
0.08 ppm (4-hour average)

Year	Data availability (%)	No. of exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
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

Table 38: Daily peak 4-hour ozone summary 1980 to 2006

Trend station/region: Rocklea, south-east Queensland

AAQ NEPM standard
0.08 ppm (4-hour average)

Year	Data availability (%)	No. of exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
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	0.066	0.049
1988	67.5*	1	0.081	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	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

*Data availability less than 75 percent for one or more quarters. Years shown in italics have less than 75 percent annual data availability.

Table 39: Daily peak 1-hour sulfur dioxide summary 1993 to 2006**Trend station/region:** Flinders View, south-east QueenslandAAQ NEPM standard
0.20 ppm (1-hour average)

Year	Data availability (%)	No. of exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)	Annual average (ppm)
1993	88.2*	0	0.049	0.030	0.024	0.018	0.014	0.002
1994	98.9	0	0.033	0.027	0.025	0.021	0.017	0.003
1995	59.5*	0	0.041	0.029	0.027	0.020	0.014	0.002
1996	88.3*	0	0.047	0.037	0.027	0.023	0.017	0.002
1997	97.0	0	0.047	0.040	0.035	0.023	0.019	0.002
1998	95.9	0	0.090	0.037	0.033	0.024	0.019	0.002
1999	96.4	0	0.070	0.035	0.033	0.028	0.021	0.002
2000	89.9	0	0.081	0.049	0.036	0.027	0.022	0.002
2001	99.5	0	0.053	0.048	0.043	0.029	0.023	0.001
2002	97.0	0	0.057	0.035	0.033	0.025	0.018	0.001
2003	96.4	0	0.046	0.031	0.030	0.023	0.017	0.001
2004	99.5	0	0.063	0.036	0.031	0.021	0.016	0.001
2005	100.0	0	0.034	0.028	0.024	0.020	0.014	0.001
2006	100.0	0	0.040	0.037	0.027	0.023	0.018	0.001

*Data availability less than 75 percent for one or more quarters. Years shown in italics have less than 75 percent annual data availability.

Table 40: Daily peak 1-hour sulfur dioxide summary 1991 to 2006**Trend station/region:** South Gladstone, GladstoneAAQ NEPM standard
0.20 ppm (1-hour average)

Year	Data availability (%)	No. of exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)	Annual average (ppm)
1991	92.6	0	0.011	0.011	0.009	0.008	0.006	0.002
1992	94.3	0	0.052	0.039	0.029	0.020	0.015	0.003
1993	98.3	0	0.075	0.059	0.050	0.039	0.032	0.004
1994	97.0	0	0.070	0.042	0.040	0.031	0.024	0.003
1995	96.7	0	0.168	0.083	0.065	0.047	0.035	0.004
1996	99.2	0	0.083	0.053	0.042	0.026	0.018	0.002
1997	98.9	0	0.049	0.029	0.023	0.014	0.010	0.001
1998	97.5	0	0.076	0.050	0.042	0.027	0.020	0.001
1999	94.2	0	0.051	0.042	0.039	0.027	0.022	0.002
2000	84.7*	0	0.092	0.071	0.045	0.034	0.024	0.001
2001	98.1	0	0.068	0.046	0.035	0.023	0.018	0.001
2002	94.5	0	0.123	0.040	0.031	0.025	0.020	0.001
2003	93.2	0	0.112	0.058	0.041	0.025	0.019	0.001
2004	96.4	0	0.064	0.040	0.032	0.022	0.017	0.001
2005	99.7	0	0.084	0.063	0.053	0.032	0.027	0.002
2006	100.0	0	0.093	0.071	0.064	0.049	0.034	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.

Table 41: Daily peak 1-hour sulfur dioxide summary 1983 to 2006**Trend station/region:** Menzies, Mount IsaAAQ NEPM standard
0.20 ppm (1-hour average)

Year	Data availability (%)	No. of exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)	Annual average (ppm)
1983	67.4*	25	0.725	0.515	0.430	0.270	0.200	0.021
1984	93.7	31	1.155	0.555	0.515	0.330	0.185	0.017
1985	97.3	7	1.080	0.325	0.210	0.100	0.055	0.016
1986	88.5	50	1.406	1.255	0.788	0.577	0.296	0.031
1987	98.9	51	1.755	1.016	0.853	0.546	0.324	0.022
1988	91.0*	31	0.798	0.682	0.562	0.342	0.159	0.017
1989	85.2	41	0.957	0.585	0.503	0.348	0.241	0.020
1990	44.7*	6	0.577	0.493	0.222	0.145	0.091	0.030
1991	54.8*	28	0.673	0.638	0.440	0.294	0.215	0.018
1992	88.5*	25	0.540	0.457	0.406	0.286	0.170	0.012
1993	95.6	24	0.718	0.434	0.403	0.282	0.134	0.015
1994	91.5	20	0.688	0.483	0.343	0.250	0.135	0.019
1995	98.9	11	0.443	0.254	0.239	0.184	0.109	0.005
1996	98.6	16	0.598	0.409	0.285	0.198	0.131	0.005
1997	98.9	7	0.300	0.256	0.216	0.128	0.083	0.003
1998	48.8*	16	0.693	0.548	0.368	0.265	0.190	0.005
1999	90.4*	17	0.675	0.366	0.269	0.202	0.141	0.004
2000	96.4	31	0.584	0.373	0.357	0.250	0.191	0.006
2001	98.9	41	0.581	0.438	0.422	0.295	0.222	0.006
2002	91.2	49	1.254	0.551	0.526	0.385	0.272	0.009
2003	98.9	42	0.658	0.503	0.493	0.312	0.217	0.007
2004	97.5	36	0.888	0.665	0.444	0.302	0.207	0.007
2005	93.7*	49	0.964	0.663	0.512	0.395	0.271	0.009
2006	97.0	42	0.567	0.398	0.356	0.246	0.176	0.005

*Data availability less than 75 percent for one or more quarters. Years shown in italics have less than 75 percent annual data availability.

Table 42: Daily 24-hour sulfur dioxide summary 1993 to 2006**Trend station/region:** Flinders View, south-east QueenslandAAQ NEPM standard
0.08 ppm (24-hour average)

Year	Data availability (%)	No. of exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)	Annual average (ppm)
1993	88.2*	0	0.006	0.005	0.005	0.004	0.003	0.002
1994	98.9	0	0.008	0.007	0.006	0.006	0.005	0.003
1995	59.5*	0	0.009	0.008	0.006	0.005	0.004	0.002
1996	88.3*	0	0.010	0.005	0.005	0.004	0.004	0.002
1997	97.0	0	0.009	0.006	0.005	0.004	0.003	0.002
1998	95.9	0	0.011	0.007	0.006	0.004	0.004	0.002
1999	96.4	0	0.009	0.007	0.007	0.005	0.004	0.002
2000	89.9	0	0.013	0.012	0.008	0.006	0.005	0.002
2001	99.5	0	0.014	0.007	0.006	0.004	0.003	0.001
2002	97.0	0	0.006	0.006	0.005	0.003	0.003	0.001
2003	96.4	0	0.006	0.005	0.004	0.003	0.002	0.001
2004	99.5	0	0.007	0.006	0.005	0.003	0.003	0.001
2005	100.0	0	0.006	0.004	0.004	0.002	0.002	0.001
2006	99.7	0	0.007	0.006	0.004	0.004	0.003	0.001

*Data availability less than 75 percent for one or more quarters. Years shown in italics have less than 75 percent annual data availability.

Table 43: Daily 24-hour sulfur dioxide summary 1991 to 2006**Trend station/region:** South Gladstone, GladstoneAAQ NEPM standard
0.08 ppm (24-hour average)

Year	Data availability (%)	No. of exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)	Annual average (ppm)
1991	92.6	0	0.007	0.006	0.006	0.004	0.004	0.002
1992	94.3	0	0.012	0.011	0.010	0.009	0.008	0.003
1993	98.3	0	0.014	0.010	0.010	0.008	0.007	0.004
1994	97.0	0	0.013	0.007	0.007	0.006	0.005	0.003
1995	96.7	0	0.017	0.014	0.012	0.008	0.007	0.004
1996	99.2	0	0.010	0.007	0.006	0.005	0.004	0.002
1997	98.9	0	0.007	0.004	0.003	0.002	0.002	0.001
1998	97.5	0	0.012	0.010	0.007	0.005	0.003	0.001
1999	94.2	0	0.009	0.008	0.006	0.005	0.004	0.002
2000	84.7*	0	0.022	0.008	0.006	0.004	0.003	0.001
2001	98.1	0	0.006	0.005	0.004	0.003	0.002	0.001
2002	94.5	0	0.029	0.029	0.006	0.004	0.003	0.001
2003	93.2	0	0.013	0.011	0.007	0.005	0.003	0.001
2004	96.4	0	0.007	0.006	0.006	0.004	0.003	0.001
2005	98.9	0	0.011	0.009	0.006	0.004	0.004	0.002
2006	97.5	0	0.019	0.014	0.011	0.008	0.006	0.003

*Data availability less than 75 percent for one or more quarters. Years shown in italics have less than 75 percent annual data availability.

Table 44: Daily 24-hour sulfur dioxide summary 1984 to 2006**Trend station/region:** Menzies, Mount IsaAAQ NEPM standard
0.08 ppm (24-hour average)

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

*Data availability less than 75 percent for one or more quarters. Years shown in italics have less than 75 percent annual data availability.

Table 45: Daily 24-hour PM₁₀ summary 1997 to 2006**Trend station/region:** Rocklea, south-east QueenslandAAQ NEPM standard
50 µg/m³ (24-hour average)

Year	Data availability (%)	No. of exceedences (days)	Max conc. (µg/m ³)	99th percentile (µg/m ³)	98th percentile (µg/m ³)	95th percentile (µg/m ³)	90th percentile (µg/m ³)
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

Table 46: Daily 24-hour PM₁₀ summary 1999 to 2006**Trend station/region:** Flinders View, south-east QueenslandAAQ NEPM standard
50 µg/m³ (24-hour average)

Year	Data availability (%)	No. of exceedences (days)	Max conc. (µg/m ³)	99th percentile (µg/m ³)	98th percentile (µg/m ³)	95th percentile (µg/m ³)	90th percentile (µg/m ³)
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

Table 47: Daily 24-hour PM₁₀ summary 2001 to 2006**Trend station/region:** South Gladstone, GladstoneAAQ NEPM standard
50 µg/m³ (24-hour average)

Year	Data availability (%)	No. of exceedences (days)	Max conc. (µg/m ³)	99th percentile (µg/m ³)	98th percentile (µg/m ³)	95th percentile (µg/m ³)	90th percentile (µg/m ³)
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

Table 48: Daily 24-hour PM_{2.5} summary 1998 to 2006**Trend station/region:** Rocklea, south-east Queensland[†]AAQ NEPM advisory standard
25 µg/m³ (24-hour average)

Year	Data availability (%)	No. of exceedences (days)	Max conc. (µg/m ³)	99th percentile (µg/m ³)	98th percentile (µg/m ³)	95th percentile (µg/m ³)	90th percentile (µg/m ³)	Annual average (µg/m ³)
1998	80.8*	0	16.1	11.1	9.2	7.7	6.0	3.5
1999	88.8*	0	14.5	13.3	12.4	10.3	8.3	5.0
2000	95.6	3	37.4	20.2	17.7	13.3	10.9	5.8
2001	98.6	3	95.4	18.4	17.1	12.3	9.2	5.5
2002	96.4	3	45.3	22.0	17.1	12.8	10.9	6.1
2003	98.6	1	33.1	14.7	13.3	10.2	8.1	4.6
2004	94.3	5	29.7	28.7	22.5	17.2	11.3	6.2
2005	90.4*	0	15.3	13.0	10.9	9.2	8.0	4.5
2006	96.2	0	14.1	13.0	10.6	8.4	7.0	4.2

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

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

Table 49: Daily 24-hour PM_{2.5} summary 1999 to 2006**Trend station/region:** Springwood, south-east Queensland[†]AAQ NEPM advisory standard
25 µg/m³ (24-hour average)

Year	Data availability (%)	No. of exceedences (days)	Max conc. (µg/m ³)	99th percentile (µg/m ³)	98th percentile (µg/m ³)	95th percentile (µg/m ³)	90th percentile (µg/m ³)	Annual average (µg/m ³)
1999	82.7*	0	22.3	12.9	11.8	8.7	7.1	4.3
2000	96.7	6	35.4	28.9	23.6	17.3	13.2	6.4
2001	97.0	0	19.4	18.0	16.2	11.8	9.1	5.3
2002	95.9	5	38.9	28.4	20.1	14.9	11.7	6.2
2003	98.4	0	20.5	16.0	15.1	10.7	8.8	5.2
2004	98.4	0	21.7	16.8	15.4	11.6	9.5	5.4
2005	96.4	0	15.2	13.9	12.3	10.2	8.2	4.6
2006	94.5	1	25.5	21.4	15.3	9.5	8.0	4.9

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

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

Table 50: Annual lead summary 1980 to 2002**Trend station/region:** Woolloongabba, south-east QueenslandAAQ NEPM standard
0.5 µg/m³ (annual average)

Year	Data availability (%)	Annual average (µg/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	0.22
1999	98.3	0.19
2000	88.5	0.14
2001	93.4	0.03
2002	96.7	0.02

*Data availability less than 75 percent for one or more quarters. Years shown in italics have less than 75 percent annual data availability.

Appendix – Description of 2006 exceedence events

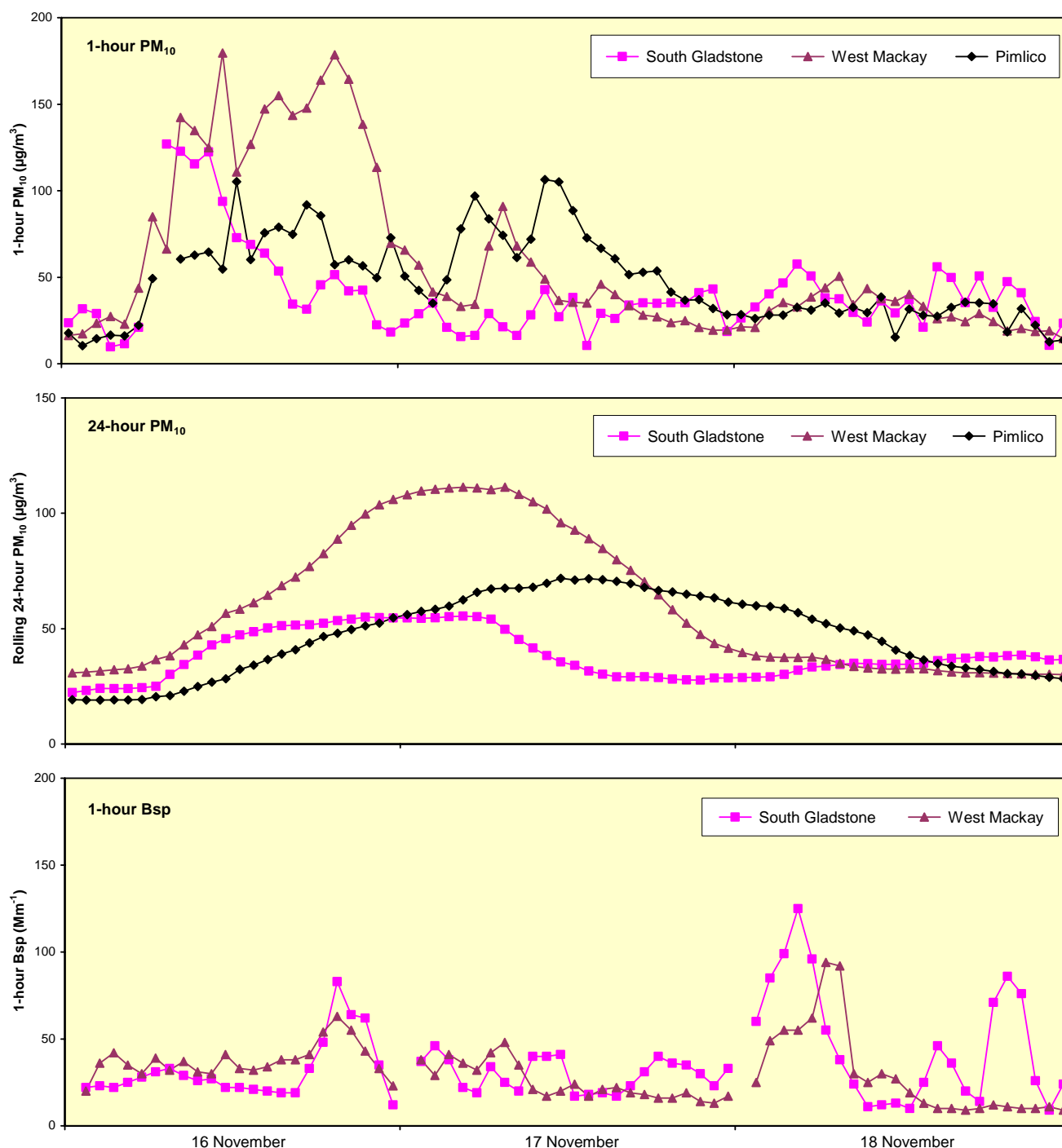
PM₁₀ exceedences in Gladstone, Mackay and Townsville on 16-17 November 2006

On 16 November a large high pressure system over the Southern Ocean directed a deep southerly air stream over south eastern Australia. Strong gusty winds created a widespread dust storm affecting central and northern Queensland. This led to exceedences of the Air NEPM 24-hour PM₁₀ standard at monitoring sites in Gladstone and Mackay on 16 November and in Townsville on both 16 November

and 17 November. Smoke from a number of bushfires reported around Townsville on 16 November – the largest of which burnt out several thousand hectares of grassland around Mount Stuart approximately 7km south of the Pimlico monitoring site – was also a contributing factor to the PM₁₀ exceedences recorded in Townsville.

The fact that Bsp (nephelometer) measurements in Gladstone and Mackay showed little correlation with the PM₁₀ measurements (figure 2) indicates a high proportion of coarse particles, consistent with wind blown dust particles.

Figure 2: Particle concentrations at Gladstone, Mackay and Townsville monitoring sites over the period 16-18 November 2006.

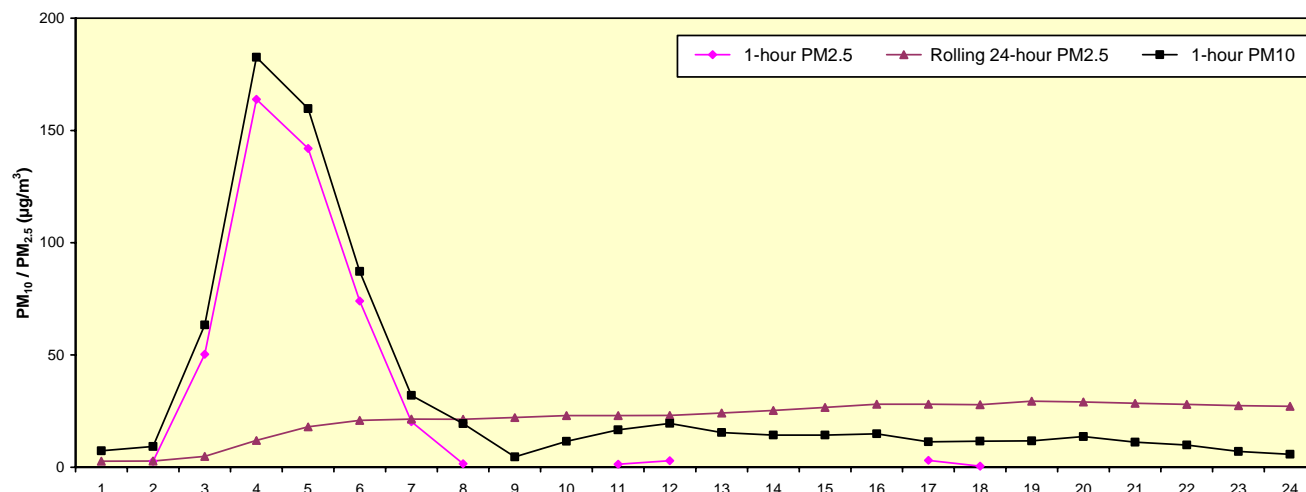


PM_{2.5} exceedence at Springwood on 22 November 2006

A large fire started in a pine plantation near Logan Village on 21 November and eventually burnt out about 770ha before it was extinguished. Southerly winds during the early morning of 22 November carried smoke from this fire over the Springwood monitoring site, leading to an exceedence of the advisory PM_{2.5} 24-hour standard on this day. As figure 3 shows, TEOM PM_{2.5} concentrations were elevated

between 3am and 6am. PM_{2.5} levels fell significantly from 7am when winds shifted to a westerly direction. The close correspondence observed between PM_{2.5} and PM₁₀ measurements confirmed a high proportion of fine particles, consistent with the presence of smoke particles. (The exceedence is based on the reference PM_{2.5} sampler measurement on this day as there was insufficient TEOM PM_{2.5} data available to calculate a valid 24-hour average).

Figure 3: Particle concentrations at the Springwood site on 22 November 2006.

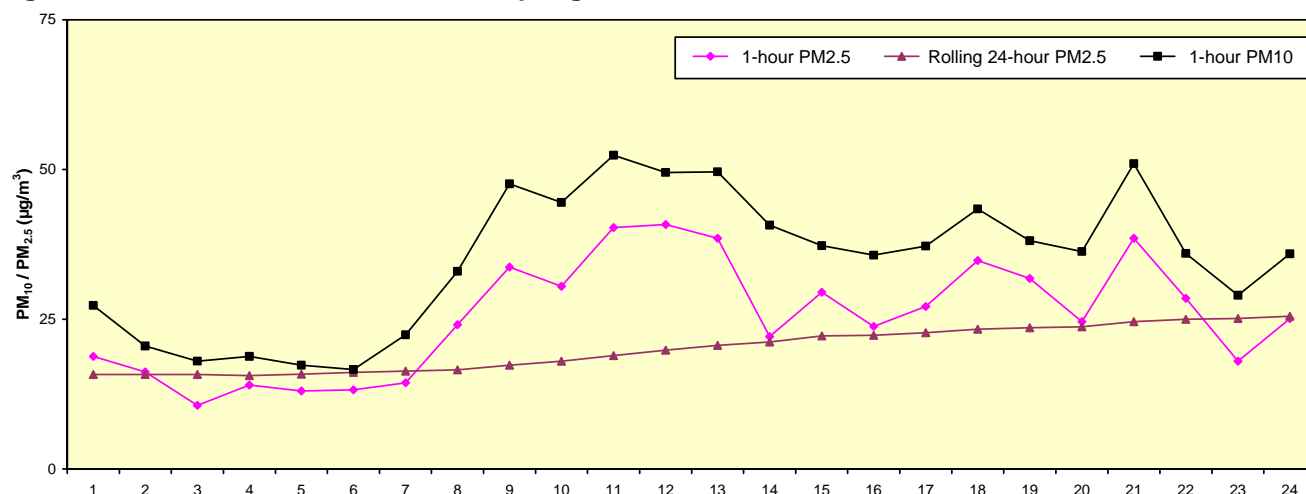


PM_{2.5} exceedence at Springwood on 29 November 2006

On 29 November a fire burnt out around 500ha of bushland at Narangba, north of Brisbane. Smoke from this fire was blown over eastern areas of south-east Queensland by north-westerly winds. In addition, the dry and windy conditions carried dust from inland Queensland over south-east Queensland on this day. These conditions led to an exceedence of the

advisory PM_{2.5} 24-hour standard at the Springwood monitoring site. Figure 4 shows that PM_{2.5} particles comprised a significant fraction of the PM₁₀ mass at Springwood on this day, consistent with the presence of a high proportion of fine smoke particles. However, the PM_{2.5} to PM₁₀ ratio on 29 November was lower than that observed on the morning of 22 November, indicating a contribution from wind blown dust to overall particle levels.

Figure 4: Particle concentrations at the Springwood site on 29 November 2006.



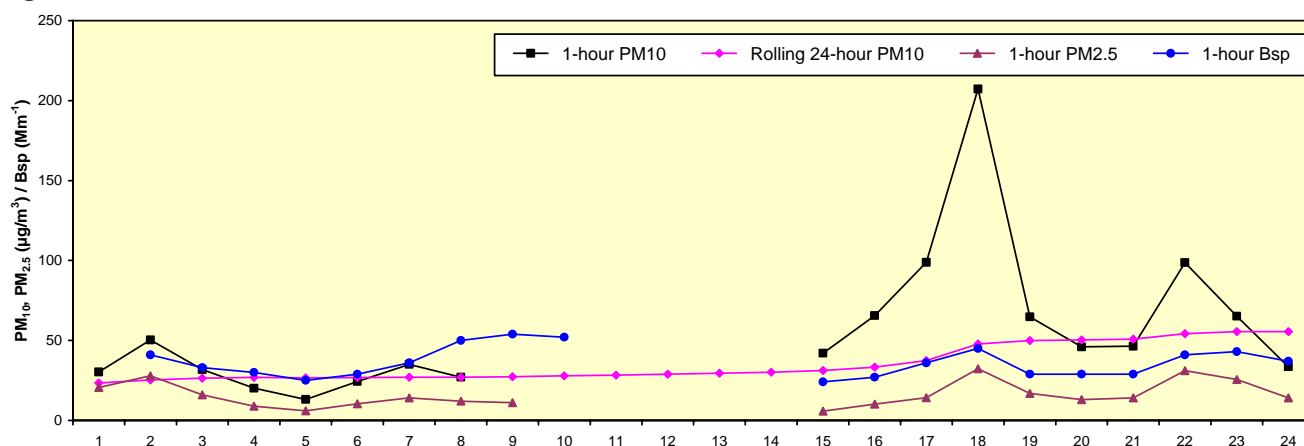
PM₁₀ exceedence at North Toowoomba on 29 November 2006

Dry and windy conditions ahead of an inland trough caused elevated levels of wind blown dust in western Queensland on 29 November. Passage of the trough through the Toowoomba region in the late afternoon was accompanied by high PM₁₀ concentrations (figure

5), leading to an exceedence of the Air NEPM PM₁₀ standard.

Corresponding low PM_{2.5} and Bsp measurements point to coarse wind blown dust particles being responsible for the elevated PM₁₀ measurements at the North Toowoomba site on 29 November.

Figure 5: Particle concentrations at the North Toowoomba site on 29 November 2006.



Sulfur dioxide exceedences at Menzies in 2006

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 (these are currently equivalent to the USEPA three-hour secondary, 24-hour primary and annual average primary sulfur dioxide standards). As smelter operations are only controlled to meet *Mount Isa*

Mines Agreement Act 1985 air quality limits, sulfur dioxide levels can exceed the more stringent Air NEPM one-hour and 24-hour standards on occasions.

The smelter and sulfuric acid manufacturing plant are situated to the south-southwest of the Menzies monitoring site. The relationship between one-hour average wind direction and sulfur dioxide concentrations greater than 0.200ppm (figure 6) demonstrates that exceedences are highly correlated with winds blowing from these plants towards the Menzies site.

Figure 6: Relationship between 1-hour average wind direction and sulfur dioxide concentrations at the Menzies site during 2006.

