

Queensland air monitoring 2017

National Environment Protection
(Ambient Air Quality) Measure

Prepared by: Air Quality Monitoring, Department of Environment and Science

© State of Queensland, 2018.

The Queensland Government supports and encourages the dissemination and exchange of its information. The copyright in this publication is licensed under a Creative Commons Attribution 3.0 Australia (CC BY) licence.



Under this licence you are free, without having to seek our permission, to use this publication in accordance with the licence terms.

You must keep intact the copyright notice and attribute the State of Queensland as the source of the publication.

For more information on this licence, visit <http://creativecommons.org/licenses/by/3.0/au/deed.en>

Disclaimer

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.

If you need to access this document in a language other than English, please call the Translating and Interpreting Service (TIS National) on 131 450 and ask them to telephone Library Services on +61 7 3170 5470.

This publication can be made available in an alternative format (e.g. large print or audiotape) on request for people with vision impairment; phone +61 7 3170 5470 or email <library@ehp.qld.gov.au>.

Citation

DES. 2018. Queensland air monitoring 2017: National Environment Protection (Ambient Air Quality) Measure. Department of Environment and Science, Queensland Government.

June 2018

Contents

Summary.....	1
Introduction	2
Section A – Monitoring summary.....	2
Current AAQ NEPM monitoring stations	2
Variations to the approved monitoring plan for Queensland	7
Section B – Assessment of compliance with standards and goals	7
Carbon monoxide	8
Nitrogen dioxide	9
Ozone	10
Sulfur dioxide	11
PM ₁₀	12
PM _{2.5}	13
Lead	14
Section C – Analysis of monitoring data against standards	15
Exceedance summary	15
Summaries of maximum and second-highest pollutant concentrations	18
Section D – Pollutant distribution and trends.....	21
Carbon monoxide	21
Nitrogen dioxide	23
Ozone	29
Sulfur dioxide	40
PM ₁₀	50
PM _{2.5}	58
Lead	62

List of tables

Table 1. Summary information for 2017 Queensland AAQ NEPM monitoring sites	4
Table 2. Regions that satisfy screening procedures and do not require campaign monitoring	7
Table 3. 2017 CO compliance summary	8
Table 4. 2017 NO ₂ compliance summary	9
Table 5. 2017 O ₃ compliance summary.....	10
Table 6. 2017 SO ₂ compliance summary	11
Table 7. 2017 PM ₁₀ compliance summary.....	12
Table 8. 2017 PM _{2.5} compliance summary	13
Table 9. 2017 lead compliance summary.....	14
Table 10. 2017 SO ₂ exceedances	16
Table 11. 2017 PM ₁₀ exceedances.....	17
Table 12. 2017 PM _{2.5} exceedances	17
Table 13. 2017 summary statistics for daily peak 8-hour average CO concentrations	18
Table 14. 2017 summary statistics for daily peak 1-hour average NO ₂ concentrations.....	18

Table 15. 2017 summary statistics for daily peak 1-hour average O ₃ concentrations	18
Table 16. 2017 summary statistics for daily peak 4-hour average O ₃ concentrations	19
Table 17. 2017 summary statistics for daily peak 1-hour average SO ₂ concentrations	19
Table 18. 2017 summary statistics for daily 24-hour average SO ₂ concentrations	20
Table 19. 2017 summary statistics for daily 24-hour average PM ₁₀ concentrations	20
Table 20. 2017 summary statistics for daily 24-hour average PM _{2.5} concentrations.....	21
Table 21. 2017 percentiles of daily peak 8-hour average CO concentrations	21
Table 22. Percentiles of daily peak 8-hour average CO concentrations at Woolloongabba (1998–2017)	22
Table 23. Percentiles of daily peak 8-hour average CO concentrations at North Toowoomba (2003–2010).....	22
Table 24. 2017 percentiles of daily peak 1-hour average NO ₂ concentrations	23
Table 25. Percentiles of daily peak 1-hour average NO ₂ concentrations at Mountain Creek (2002–2017).....	23
Table 26. Percentiles of daily peak 1-hour average NO ₂ concentrations at Deception Bay (1995–2017).....	24
Table 27. Percentiles of daily peak 1-hour average NO ₂ concentrations at Rocklea (1983–2017)	25
Table 28. Percentiles of daily peak 1-hour average NO ₂ concentrations at Flinders View (1995–2017)	26
Table 29. Percentiles of daily peak 1-hour average NO ₂ concentrations at North Toowoomba (2003–2010)	27
Table 30. Percentiles of daily peak 1-hour average NO ₂ concentrations at South Gladstone (1994–2017)	28
Table 31. Percentiles of daily peak 1-hour average NO ₂ concentrations at Pimlico (2004–2016).....	29
Table 32. 2017 percentiles of daily peak 1-hour average O ₃ concentrations.....	29
Table 33. 2017 percentiles of daily peak 4-hour average O ₃ concentrations.....	30
Table 34. Percentiles of daily peak 1-hour average O ₃ concentrations at Mountain Creek (2002–2017)	30
Table 35. Percentiles of daily peak 1-hour average O ₃ concentrations at Deception Bay (1995–2017)	31
Table 36. Percentiles of daily peak 1-hour average O ₃ concentrations at Rocklea (1983–2017).....	32
Table 37. Percentiles of daily peak 1-hour average O ₃ concentrations at Flinders View (1994–2017).....	33
Table 38. Percentiles of daily peak 1-hour average O ₃ concentrations at North Toowoomba (2003–2010).....	34
Table 39. Percentiles of daily peak 1-hour average O ₃ concentrations at Targinie (2001–2006).....	34
Table 40. Percentiles of daily peak 1-hour average O ₃ concentrations at Pimlico (2004–2016)	35
Table 41. Percentiles of daily peak 4-hour average O ₃ concentrations at Mountain Creek (2002–2017)	35
Table 42. Percentiles of daily peak 4-hour average O ₃ concentrations at Deception Bay (1995–2017)	36
Table 43. Percentiles of daily peak 4-hour average O ₃ concentrations at Rocklea (1983–2017).....	37
Table 44. Percentiles of daily peak 4-hour average O ₃ concentrations at Flinders View (1994–2017).....	38
Table 45. Percentiles of daily peak 4-hour average O ₃ concentrations at North Toowoomba (2003–2010).....	39
Table 46. Percentiles of daily peak 4-hour average O ₃ concentrations at Targinie (2001–2006).....	39
Table 47. Percentiles of daily peak 4-hour average O ₃ concentrations at Pimlico (2004–2016)	40
Table 48. 2017 percentiles of daily peak 1-hour average SO ₂ concentrations	40
Table 49. 2017 percentiles of daily 24-hour average SO ₂ concentrations	41
Table 50. Percentiles of daily peak 1-hour average SO ₂ concentrations at Flinders View (1993–2017).....	42
Table 51. Percentiles of daily peak 1-hour average SO ₂ concentrations at South Gladstone (1991–2017)	43
Table 52. Percentiles of daily peak 1-hour average SO ₂ concentrations at Pimlico (2005–2016).....	44
Table 53. Percentiles of daily peak 1-hour average SO ₂ concentrations at Menzies (1983–2017)	45
Table 54. Percentiles of daily 24-hour average SO ₂ concentrations at Flinders View (1993–2017).....	46
Table 55. Percentiles of daily 24-hour average SO ₂ concentrations at South Gladstone (1991–2017)	47

Table 56. Percentiles of daily 24-hour average SO ₂ concentrations at Pimlico (2005–2016).....	48
Table 57. Percentiles of daily 24-hour average SO ₂ concentrations at Menzies (1984–2017).....	49
Table 58. 2017 percentiles of daily 24-hour average PM ₁₀ concentrations.....	50
Table 59. Percentiles of daily 24-hour average PM ₁₀ concentrations at Mountain Creek (2001–2017)	51
Table 60. Percentiles of daily 24-hour average PM ₁₀ concentrations at Rocklea (1996–2017).....	52
Table 61. Percentiles of daily 24-hour average PM ₁₀ concentrations at Flinders View (1998–2017).....	53
Table 62. Percentiles of daily 24-hour average PM ₁₀ concentrations at North Toowoomba (2003–2010).....	54
Table 63. Percentiles of daily 24-hour average PM ₁₀ concentrations at South Gladstone (2000–2017).....	55
Table 64. Percentiles of daily 24-hour average PM ₁₀ concentrations at West Mackay (1998–2017).....	56
Table 65. Percentiles of daily 24-hour average PM ₁₀ concentrations at Pimlico (2004–2016).....	57
Table 66. Percentiles of daily 24-hour average PM ₁₀ concentrations at The Gap (2009–2017).....	57
Table 67. 2017 percentiles of daily 24-hour average PM _{2.5} concentrations.....	58
Table 68. Percentiles of daily 24-hour average PM _{2.5} concentrations at Rocklea (1998–2017).....	59
Table 69. Percentiles of daily 24-hour average PM _{2.5} concentrations at Springwood (1999–2017).....	60
Table 70. Percentiles of daily 24-hour average PM _{2.5} concentrations at North Toowoomba (2003–2007)	61
Table 71. Percentiles of daily 24-hour average PM _{2.5} concentrations at South Gladstone (2008–2017).....	61
Table 72. Annual average lead concentrations at Woolloongabba (1980–2002)	62
Table 73. Annual average lead concentrations at Townsville Coast Guard (2011–2017).....	63
Table 74. Annual average lead concentrations at The Gap (2009–2017)	63

List of figures

Figure 1. 2017 AAQ NEPM monitoring site locations.....	6
--	---

Summary

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

Ambient air quality monitoring at AAQ NEPM sites in Queensland from January to December 2017 showed no exceedances of the AAQ NEPM standards for carbon monoxide, nitrogen dioxide, ozone and lead at any Queensland monitoring station. Exceedances of the AAQ NEPM standards occurred for:

- one-hour average sulfur dioxide concentrations at the Menzies and The Gap monitoring sites in Mount Isa due to industrial emissions;
- 24-hour average PM₁₀ (particles less than 10 micrometres in diameter) concentrations at the air monitoring sites at West Mackay in Mackay and at The Gap in Mount Isa; and
- 24-hour average PM_{2.5} (particles less than 2.5 micrometres in diameter) concentrations at the air monitoring sites at Rocklea in Brisbane and at South Gladstone.

AAQ NEPM goals were met in all Queensland regions except:

- one-hour average sulfur dioxide concentrations at the Menzies and The Gap monitoring sites in Mount Isa due to industrial emissions.

In the case of the PM₁₀ and PM_{2.5} exceedances, all exceedances were associated with an exceptional event as defined in the AAQ NEPM (e.g. bushfire smoke or dust storm) and, as such, were not considered when determining compliance with the relevant 24-hour goal.

The Woolloongabba monitoring site closed temporarily in June 2016 due to building construction work at the original site location. The monitoring equipment was relocated approximately 100 metres to the north of the original site and monitoring recommenced at the new location in June 2017. A new monitoring site was established at North Ward in Townsville in December 2017 as a replacement for the former Pimlico monitoring site that was decommissioned in February 2016. As a result, compliance with AAQ NEPM standards and goals was not demonstrated for carbon monoxide at Woolloongabba, and nitrogen dioxide, sulfur dioxide, PM₁₀ and PM_{2.5} at North Ward because data availability was below the level required to make a valid assessment.

Introduction

Clause 18 of the National Environment Protection (Ambient Air Quality) Measure (AAQ NEPM)¹ requires all jurisdictions to submit an annual report on their compliance with the Measure. The required content of these reports are specified in the *National Environment Protection (Ambient Air Quality) Measure Technical Paper No. 8, Annual Reports* (AAQ NEPM Technical Paper No. 8)².

The Air Quality Monitoring Unit within the Department of Environment and Science (DES) operates the Queensland ambient air quality monitoring network. This network includes air monitoring to assess compliance with the standards and goals of the AAQ NEPM, as detailed in the *Ambient air quality monitoring plan for Queensland*³, together with additional ambient and investigative air monitoring for other purposes.

This report documents Queensland's compliance with the standards and goals of the AAQ NEPM in accordance with the AAQ NEPM Technical Paper No. 8.

Section A – Monitoring summary

Current AAQ NEPM monitoring stations

DES monitored ambient air quality in five of the ten regions identified in the Queensland monitoring plan in 2017, as follows:

- South East Queensland (made up of three sub-regions: North Coast, Brisbane and Ipswich)
- Gladstone
- Mackay
- Townsville
- Mount Isa.

Table 1 presents summary information for all AAQ NEPM compliance monitoring stations in Queensland in 2017. Each monitoring station is categorised as one of the following:

- performance monitoring station (PMS) – nominated to measure air quality to assess achievement of the AAQ NEPM goal
- trend station – nominated to measure air quality to identify long-term changes and assess achievement of the AAQ NEPM goal
- campaign station – short-term investigation station, operated for at least one calendar year, to assess the need for ongoing monitoring in the region to assess achievement of the AAQ NEPM goal.

The location category in Table 1 provides a qualitative description of the exposed population at each monitoring station.

Table 1 also describes monitoring stations using population coverage descriptors in the *National Environment Protection (Ambient Air Quality) Measure Technical Paper No. 3, Monitoring Strategy*⁴:

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

In some instances data is reported from peak sites where the highest concentrations in the region are expected. This provides an indication of maximum exposure in the region.

DES generally monitors air quality in compliance with the Australian Standards (AS) specified in the AAQ NEPM. Exceptions to these standards during 2017 were:

- differential optical absorption spectroscopy (DOAS) instrumentation operated in accordance with AS 3580.15 was used to measure ozone, nitrogen dioxide and sulfur dioxide at Springwood in South East Queensland;
- tapered element oscillating microbalance (TEOM) instruments fitted with Filter Dynamics Measurement Systems (FDMS) – to account for possible losses of semi-volatile compounds present in particles caused by heating the air stream – operated in accordance with AS 3580.9.13 were used to measure PM₁₀ and PM_{2.5} at Rocklea and Springwood in South East Queensland and at South Gladstone; and

¹ available from www.legislation.gov.au/Details/F2016C00215

² available from www.nepc.gov.au/resource/ephc-archive-ambient-air-quality-nepm

³ available from www.qld.gov.au/environment/pollution/monitoring/air-reports/

⁴ available from www.nepc.gov.au/resource/ephc-archive-ambient-air-quality-nepm

- measurement of PM₁₀ and PM_{2.5} at the North Ward site in Townsville by instrumentation using a backscattering of polychromatic light technique (Teledyne API model T640X monitor).

Monitoring techniques used at each AAQ NEPM compliance monitoring site are listed in Table 1.

PM₁₀ and PM_{2.5} data was collected using TEOM instruments at all sites with the exception of North Ward in Townsville.

PM₁₀ data collected using TEOM units not fitted with FDMS units were adjusted using a 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*⁵. These adjusted PM₁₀ concentrations vary linearly from no change at daily average temperatures at or above 15 degrees Celsius to an increase of 40 per cent at or below a temperature of five degrees Celsius.

PM_{2.5} data for Rocklea and Springwood in South East Queensland and South Gladstone were collected using TEOM instruments fitted with FDMS units.

PM₁₀ and PM_{2.5} data at the North Ward monitoring site was obtained using a Teledyne API model T640X monitor. The T640X monitor is an optical aerosol spectrometer that uses back scattering of polychromatic light to determine particle mass concentration. The T640X monitor has United States Environment Protection Agency accreditation as an equivalent method for measurement of PM₁₀ and PM_{2.5}.

Figure 1 shows the location of all 2017 Queensland AAQ NEPM monitoring stations.

⁵ available from www.nepc.gov.au/resource/ephc-archive-air-quality-nepm

Table 1. Summary information for 2017 Queensland AAQ NEPM monitoring sites

Site	Station type	Date established	Pollutants measured	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	O ₃ NO ₂ 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	O ₃ NO ₂	AS3580.6.1–2011 AS3580.5.1–2011	Residential	Trees within 20m west of site	Major roads
Woolloongabba	Trend – Peak	June 1998 (relocated June 2017)	CO	AS3580.7.1–2011	Inner city roadside	Nil	Major roads
Rocklea	Trend – GRUB	January 1978 (relocated March 1994 and June 2007)	O ₃ NO ₂ PM ₁₀ PM _{2.5}	AS3580.6.1–2011 AS3580.5.1–2011 FDMS TEOM, based on AS3580.9.13:2013 AS3580.9.13:2013 (FDMS TEOM)	Light industry/ residential	Nil	Major roads
Springwood	PMS – Population average	March 1999	O ₃ NO ₂ SO ₂ PM ₁₀ PM _{2.5}	DOAS DOAS DOAS FDMS TEOM, based on AS3580.9.13:2013 AS3580.9.13:2013 (FDMS TEOM)	Residential	Nil	Major roads
<i>Ipswich sub-region</i>							
Flinders View	Trend – GRUB	January 1993	O ₃ NO ₂ SO ₂ 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)

Table 1 (continued). Summary information for 2017 Queensland AAQ NEPM monitoring sites

Site	Station type	Date established	Pollutants measured	Monitoring technique	Location category	Non-conformance with AS3580.1.1 siting criteria	Major pollutant sources
Gladstone							
South Gladstone	Trend – GRUB	July 1992	NO ₂ SO ₂ PM ₁₀ PM _{2.5}	AS3580.5.1–2011 AS3580.4.1–2008 FDMS TEOM, based on AS3580.9.13:2013 AS3580.9.13:2013 (FDMS TEOM)	Industry/ residential	Nil	Major roads, industry (power station, metals processing)
Mackay							
West Mackay	PMS – GRUB	September 1997 (relocated June 2010)	PM ₁₀	AS3580.9.8–2008	Residential/ rural	Nil	Agricultural burning
Townsville							
Coast Guard	Campaign – Peak	March 2008	Lead	AS3580.9.3–2003, with analysis by AS3580.9.15:2014 (ICP)	Industry	Trees within 20m of site	Port operations handling metal concentrates
North Ward	Campaign – Population average	December 2017	NO ₂ SO ₂ PM ₁₀ PM _{2.5}	AS3580.5.1–2011 AS3580.4.1–2008 TAPI T640X TAPI T640X	Residential	Trees within 20m of site	Major roads, industry (port operations, metals processing)
Stuart	Campaign – GRUB	September 2001	SO ₂	AS3580.4.1–2008	Industry/ rural	Nil	Industry (metals processing)
Mount Isa							
Menzies	Trend – GRUB	January 1983	SO ₂	AS3580.4.1–2008	Industry/ residential	Trees within 20m of site	Industry (metals smelting, sulfuric acid manufacture)
The Gap	PMS – Population average	January 2009	SO ₂ PM ₁₀ Lead	AS3580.4.1–2008 AS3580.9.8–2008 AS3580.9.3–2003, with analysis by AS3580.9.15:2014 (ICP)	Industry/ residential	Building within 20m north-east of site	Industry (metals smelting, sulfuric acid manufacture)
PMS = performance monitoring station GRUB = generally representative upper bound PM ₁₀ = particles less than 10 micrometres in diameter PM _{2.5} = particles less than 2.5 micrometres in diameter				FDMS = Filter Dynamics Measurement System TEOM = tapered element oscillating microbalance DOAS = differential optical absorption spectroscopy ICP = inductively coupled plasma TAPI T640X = Teledyne API optical particle detection			

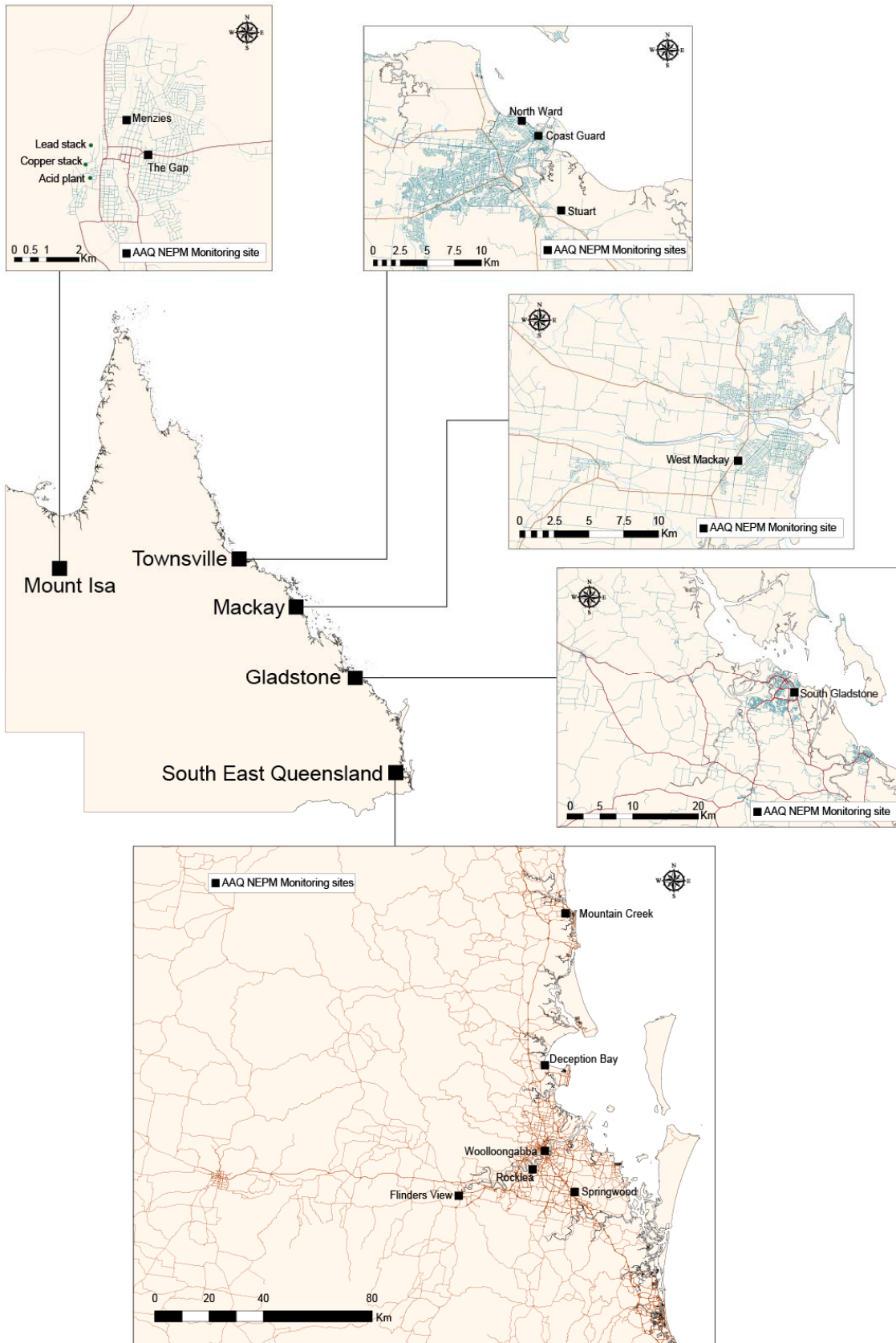


Figure 1. 2017 AAQ NEPM monitoring site locations

Variations to the approved monitoring plan for Queensland

Monitoring is not required if screening criteria specified in the *National Environment Protection (Ambient Air Quality) Measure Technical Paper No. 4 – Screening Procedures*⁶ (AAQ NEPM Technical Paper No. 4) are met.

Results of screening in Queensland showed that campaign monitoring of nitrogen dioxide in Bundaberg, Cairns, Mackay, Maryborough/Hervey Bay and Rockhampton, and campaign monitoring of ozone in Townsville, Bundaberg, Mackay and Maryborough/Hervey Bay is not required. This was based upon the results of monitoring conducted in larger population centres and/or findings of generic modelling studies detailed in Appendix 1 of AAQ NEPM Technical Paper No. 4.

Table 2 shows the regions and pollutants that satisfied the screening procedures.

Table 2. Regions that satisfy screening procedures and do not require campaign monitoring

Region	CO	NO ₂	Ozone	SO ₂	PM ₁₀	PM _{2.5}	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	F	–	–	F
Mackay	F	E & F	E & F	F	–	–	F
Townsville	F	–	A	–	–	–	–
Cairns	F	E & F	F	F	–	–	F
Mount Isa	E	E	E	–	–	–	–

A = Screening by campaign monitoring at a generally representative upper bound (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 a National Environment Protection (Ambient Air Quality) Measure 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*, available from www.nepc.gov.au/resource/ephc-archive-ambient-air-quality-nepm.

Section B – Assessment of compliance with standards and goals

This section presents details of the 2017 compliance assessment for Queensland. Compliance criteria are applied at each performance monitoring station in the state.

Compliance is achieved if approved screening procedures are satisfied or:

- the number of exceedances of the relevant standard was no more than the number specified in Schedule 2 of the AAQ NEPM, and
- data availability was at least 75 per cent in each calendar quarter.

In 2016 the AAQ NEPM was amended to include a PM₁₀ annual average standard (25 µg/m³) and replacement of the previous five-day exceedance form of the 24-hour particle standards with an exceptional event rule. Compliance with the AAQ NEPM goal for 24-hour PM_{2.5} and PM₁₀ concentrations now excludes exceptional events such as bushfires, jurisdiction authorised hazard reduction burning and continental scale windblown dust. Such events are still included in determination of compliance with the AAQ NEPM goal for annual PM_{2.5} and PM₁₀ concentrations.

⁶ available from www.nepc.gov.au/resource/ephc-archive-ambient-air-quality-nepm

AAQ NEPM Technical Paper No. 8 states that a data availability rate of at least 75 per cent in each calendar quarter is required to make a valid assessment of compliance. On this basis, compliance with the relevant standards and goals could not be demonstrated for carbon monoxide at Woolloongabba in South East Queensland; and nitrogen dioxide, sulfur dioxide, PM₁₀ and PM_{2.5} at North Ward in Townsville.

Compliance summaries for AAQ NEPM pollutants in 2017 are presented in Table 3 to Table 9.

Carbon monoxide

Table 3. 2017 CO compliance summary

Region/performance monitoring station	Data availability rates (% of hours)					Number of exceedances (days)	Performance against the standards and goals
	Q1	Q2	Q3	Q4	Annual		
South East Queensland Brisbane sub-region Woolloongabba	0.0	26.5	100.0	95.8	56.0	0	ND
ND = "not demonstrated" due to insufficient data in one or more quarters. AAQ NEPM standard for CO: 9.0 ppm (8-hour average). AAQ NEPM goal for CO: standard exceeded on no more than 1 day per year.							

Regions which do not require monitoring on the basis of screening arguments that carbon monoxide levels are reasonably expected to be consistently below the NEPM standard are:

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

Motor vehicles are the main contributor to ambient carbon monoxide concentrations in urban areas. Combustion stoves and wood heaters can also contribute, but their use in most monitored areas in Queensland is minimal.

Carbon monoxide concentrations at performance monitoring stations in South East Queensland (at Brisbane CBD from 2000 to 2004 and Woolloongabba from 2007 to 2017) were consistently less than 40 per cent of the AAQ NEPM standard (see Section D – Pollutant distribution and trends). Therefore, under screening procedure F in Table 1 of the AAQ NEPM Technical Paper No. 4, carbon monoxide monitoring is not required in coastal Queensland population centres with lower traffic density and warmer winter temperatures than South East Queensland.

Carbon monoxide concentrations at North Toowoomba were consistently less than 30 per cent of the AAQ NEPM standard during campaign monitoring from July 2003 to December 2010. This satisfies the 60 per cent acceptance limit specified in screening procedure A in Table 1 of the AAQ NEPM Technical Paper No. 4.

Mount Isa satisfies screening criteria for carbon monoxide by generic modelling alone (screening procedure E in Table 1 of the AAQ NEPM Technical Paper No. 4) and therefore is considered to comply with the AAQ NEPM carbon monoxide standard.

Nitrogen dioxide

Table 4. 2017 NO₂ compliance summary

Region/performance monitoring station	Data availability rates (% of hours)					Number of exceedances (days)	Annual mean (ppm)	Performance against the standards and goals	
	Q1	Q2	Q3	Q4	Annual			1-hour	1-year
<u>South East Queensland</u>									
<i>North Coast sub-region</i>									
Mountain Creek	93.9	95.5	95.5	95.6	95.4	0	0.004	met	met
<i>Brisbane sub-region</i>									
Deception Bay	94.1	95.5	95.0	95.5	95.3	0	0.005	met	met
Rocklea	94.2	95.0	95.4	95.4	95.3	0	0.006	met	met
Springwood	98.6	95.7	99.3	99.3	98.5	0	0.006	met	met
<i>Ipswich sub-region</i>									
Flinders View	94.4	92.7	95.1	95.6	94.7	0	0.007	met	met
<u>Gladstone</u>									
South Gladstone	94.0	95.2	94.8	95.6	95.2	0	0.005	met	met
<u>Townsville</u>									
North Ward	0.0	0.0	0.0	14.0	3.5	0	i.d.	ND	ND

i.d. = insufficient data to calculate value.
 ND = "not demonstrated" due to insufficient data in one or more quarters.
 AAQ NEPM standards for NO₂: 0.12 ppm (1-hour average); 0.03 ppm (1-year average).
 AAQ NEPM goal for NO₂: 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 nitrogen dioxide levels are reasonably expected to be consistently below the NEPM standards are:

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

Appendix 1 of the AAQ NEPM Technical Paper No. 4 states that nitrogen dioxide monitoring is not required in coastal and inland centres with populations below 250,000 on the bases of generic modelling conducted by CSIRO (screening procedure E in Table 1) and data from an AAQ NEPM compliant region with greater population, emissions and pollution potential showing nitrogen dioxide concentrations below 40 per cent of the NEPM standards (screening procedure F in Table 1).

Nitrogen dioxide monitoring at Pimlico in Townsville from 2004 to 2016 showed concentrations were consistently less than 40 per cent of the AAQ NEPM standards. The maximum one-hour average concentration during this period was 0.042 ppm (35 per cent of the standard). The highest annual average nitrogen dioxide concentration was 0.006 ppm (20 per cent of the standard). On this basis, nitrogen dioxide monitoring is not required at the coastal Queensland centres of Bundaberg, Cairns, Mackay, Maryborough/Hervey Bay and Rockhampton, which are considered to comply with the AAQ NEPM standards.

During campaign monitoring from July 2003 to December 2010, nitrogen dioxide concentrations at North Toowoomba were consistently less than 50 per cent of the AAQ NEPM standard. This satisfies the 60 per cent acceptance limit specified in screening procedure A in Table 1 of the AAQ NEPM Technical Paper No. 4.

Mount Isa satisfies screening criteria for nitrogen dioxide by generic modelling alone (screening procedure E in Table 1 of the AAQ NEPM Technical Paper No. 4) and therefore is considered to comply with the AAQ NEPM nitrogen dioxide standards.

Ozone

Table 5. 2017 O₃ compliance summary

Region/performance monitoring station	Data availability rates (% of hours)					Number of exceedances (days)		Performance against the standards and goals	
	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	93.9	95.5	95.5	92.1	94.5	0	0	met	met
<i>Brisbane sub-region</i>									
Deception Bay	94.1	95.4	94.9	95.6	95.3	0	0	met	met
Rocklea	94.1	95.0	95.4	92.2	94.4	0	0	met	met
Springwood	96.5	79.2	98.2	97.3	93.1	0	0	met	met
<i>Ipswich sub-region</i>									
Flinders View	94.4	95.1	94.2	95.5	95.1	0	0	met	met

ND = "not demonstrated" due to insufficient data in one or more quarters.
 AAQ NEPM standards for O₃: 0.10 ppm (1-hour average); 0.08 ppm (4-hour average).
 AAQ NEPM goal for O₃: standards exceeded on no more than one day per year.

Regions which do not require monitoring on the basis of screening arguments that ozone levels are reasonably expected to be consistently below the NEPM standards are:

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

Appendix 1 of the AAQ NEPM Technical Paper No. 4 states that ozone monitoring is not required in coastal centres with a population below 25,000 on the basis of generic modelling conducted by CSIRO (screening procedure E in Table 2). Therefore, ozone monitoring is not required in the coastal Queensland centres of Bundaberg, Mackay, Maryborough/Hervey Bay and the inland centre of Mount Isa, which are considered to comply with the AAQ NEPM ozone standards.

Ozone concentrations monitored at North Toowoomba from July 2003 to December 2010 were consistently less than 75 per cent of the AAQ NEPM standards. This satisfied screening procedure A in Table 2 of the AAQ NEPM Technical Paper No. 4.

Ozone concentrations monitored at Targinie in the Gladstone region from 2001 to mid-2006 were consistently less than 60 per cent of the AAQ NEPM standards. The Targinie campaign GRUB monitoring station was located 20 kilometres north west of Gladstone and downwind of the region's major industrial and transport sources. Ozone monitoring is not required in Gladstone on the basis of this campaign monitoring, as ozone concentrations satisfied screening procedure A in Table 2 of the AAQ NEPM Technical Paper No. 4.

Under screening procedure F in Table 2 of AAQ NEPM Technical Paper No. 4, ozone monitoring is not required in Rockhampton based on ozone concentrations measured in the Gladstone region meeting the 60 per cent acceptance limit and emissions of precursor ozone pollutants being lower in Rockhampton than in the Gladstone airshed⁷.

Ozone concentrations at the Pimlico campaign monitoring site in Townsville, were consistently less than 75 per cent of the AAQ NEPM 1-hour and 4-hour standards between 2004 and 2016. This indicates that, in the absence of a significant increase in ozone precursor pollutant emissions, ongoing ozone monitoring is not required in

⁷ National Pollutant Inventory reporting for 2015–16 shows that industrial facilities in the Gladstone region emitted 46,000 tonnes of oxides of nitrogen and 570 tonnes of volatile organic compounds. Corresponding emissions from industrial facilities in the Rockhampton area (including the Stanwell Power Station) were 19,000 tonnes of oxides of nitrogen and 180 tonnes of volatile organic compounds (data obtained from www.npi.gov.au).

Townsville as ozone concentrations satisfy screening procedure A in Table 2 of the AAQ NEPM Technical Paper No. 4.

Under screening procedure F in Table 2 of the AAQ NEPM Technical Paper No. 4, ozone monitoring is not required in Cairns where population and emissions of precursor ozone pollutants are lower than in Townsville⁸.

Sulfur dioxide

Table 6. 2017 SO₂ compliance summary

Region/ performance monitoring station	Data availability rates (% of hours)					Number of exceedances (days)		Annual mean (ppm)	Performance against the standards and goals		
	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	97.4	94.7	70.7	93.3	89.2	0	0	0.001	met	met	met
<i>Ipswich sub-region</i> Flinders View	94.3	95.1	92.7	95.6	94.7	0	0	0.001	met	met	met
<u>Gladstone</u> South Gladstone	94	95.2	94.8	95.6	95.2	0	0	0.002	met	met	met
<u>Townsville</u> North Ward	0.0	0.0	0.0	24.8	6.2	0	0	i.d.	ND	ND	ND
Stuart	94.4	93.5	87.6	90	91.6	0	0	0.000	met	met	met
<u>Mount Isa</u> Menzies	94.5	95.4	95.7	95.5	95.5	24	0	0.005	not met	met	met
The Gap	94.2	95.5	95.6	86.5	93.2	13	0	0.005	not met	met	met

i.d. = insufficient data to calculate value.
 ND = "not demonstrated" due to insufficient data in one or more quarters.
 AAQ NEPM standards for SO₂: 0.20 ppm (1-hour average); 0.08 ppm (24-hour average); 0.02 ppm (1-year average).
 AAQ NEPM goal for SO₂: 1-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 sulfur dioxide levels are reasonably expected to be consistently below the NEPM standards are:

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

Concentrations of sulfur dioxide are typically low unless significant industrial sources of sulfur dioxide are present (e.g. coal-fired power stations or metals smelting). Peak sulfur dioxide concentrations in the Brisbane sub-region in South East Queensland are below 40 per cent of the AAQ NEPM standard (see Section D – Pollutant distribution and trends). On this basis, sulfur dioxide monitoring is not required in other Queensland centres with lower populations and no significant sulfur dioxide point sources under screening procedure F in Table 1 of the AAQ NEPM Technical Paper No. 4.

Sulfur dioxide concentrations at the South Gladstone monitoring site have been regularly below 40 per cent of the AAQ NEPM standards from 2009 to 2017. Therefore, under screening procedure F in Table 1 of the AAQ NEPM Technical Paper No. 4, sulfur dioxide monitoring is not required in Rockhampton based on the lower level of industrial emissions in Rockhampton⁹.

⁸ National Pollutant Inventory reporting for 2015–16 shows that industrial facilities in the Townsville region emitted 3500 tonnes of oxides of nitrogen and 280 tonnes of volatile organic compounds. Corresponding emissions from industrial facilities in the Cairns area were 630 tonnes of oxides of nitrogen and 190 tonnes of volatile organic compounds (data obtained from www.npi.gov.au).

⁹ National Pollutant Inventory reporting for 2015–16 shows that sulfur dioxide emissions from industrial facilities in the Gladstone region totalled 42,000 tonnes, compared with 34,000 tonnes from industrial facilities (including the Stanwell Power Station) in Rockhampton over the same period (data obtained from www.npi.gov.au/).

PM₁₀**Table 7. 2017 PM₁₀ compliance summary**

Region/performance monitoring station	Data availability rates (% of hours)					Number of exceedances (days)	Annual mean ($\mu\text{g}/\text{m}^3$)	Performance against the standards and goals	
	Q1	Q2	Q3	Q4	Annual			24-hour	1-year
South East Queensland									
<i>North Coast sub-region</i>									
Mountain Creek	93.4	95.5	98.1	95.7	95.9	0	17.5	met	met
<i>Brisbane sub-region</i>									
Rocklea	96.3	98.7	99.1	99.6	98.7	0	14.3	met	met
Springwood	97.7	99.4	99.6	98.2	99.0	0	11.7	met	met
<i>Ipswich sub-region</i>									
Flinders View	97.8	98.4	99.2	99.3	99.0	0	16.2	met	met
Gladstone									
South Gladstone	94.6	83.4	99.0	89.4	91.9	0	13.9	met	met
Mackay									
West Mackay	79.9	94.1	93.9	92.1	90.3	3*	21.6	met	met
Townsville									
North Ward ⁺	0.0	0.0	0.0	21.6	5.4	0	i.d.	ND	ND
Mount Isa									
The Gap	89.7	98.7	99.5	98.5	96.8	3 [‡]	18.2	met	met

⁺ Monitoring by TAPI T640X optical aerosol spectrometer.
^{*} All exceedances due to bushfire smoke. As exceptional events, these are excluded from determination of compliance with the 24-hour goal.
[‡] All exceedances due windblown dust. As exceptional events, these are excluded from determination of compliance with the 24-hour goal.
i.d. = insufficient data to calculate value.
ND = "not demonstrated" due to insufficient data in one or more quarters.
AAQ NEPM standards for PM₁₀: 50 $\mu\text{g}/\text{m}^3$ (24-hour average); 25 $\mu\text{g}/\text{m}^3$ (1-year average).
When reporting compliance with the PM₁₀ 24-hour goal, PM₁₀ monitoring data determined as being directly associated with an exceptional event (e.g. bushfire smoke, dust storm) is excluded.

PM₁₀ monitoring is required in all regions because screening procedure arguments that pollutant concentrations are reasonably expected to be consistently below the relevant AAQ NEPM standard are not satisfied.

PM₁₀ monitoring at North Toowoomba from July 2003 to December 2010 showed that bushfire smoke and continental scale windblown dust events were associated with exceedances of the AAQ NEPM 24-hour PM₁₀ standard. There was no evidence that domestic and commercial PM₁₀ emissions were, on their own, sufficient to cause exceedances of the PM₁₀ standard at the North Toowoomba station.

As no monitoring has been carried out to date, performance is 'not demonstrated' for the following regions:

- Bundaberg
- Cairns
- Maryborough/Hervey Bay
- Rockhampton.

PM_{2.5}**Table 8. 2017 PM_{2.5} compliance summary**

Region/performance monitoring station	Data availability rates (% of hours)					Number of exceedances (days)	Annual mean ($\mu\text{g}/\text{m}^3$)	Performance against the standards and goals	
	Q1	Q2	Q3	Q4	Annual			24-hour	1-year
<u>South East Queensland</u> <i>Brisbane sub-region</i>									
Rocklea [†]	96.3	98.7	99.1	99.6	98.7	1*	7.3	met	met
Springwood	97.7	99.4	99.6	98.2	99.0	0	5.4	met	met
<u>Gladstone</u>									
South Gladstone	94.6	83.4	99.0	89.4	91.9	1*	5.6	met	met
<u>Townsville</u>									
North Ward [‡]	0.0	0.0	0.0	21.6	5.4	0	i.d.	ND	ND

[†]Monitoring by TEOM Model 1405DF instrumentation fitted with FDMS.
[‡] Monitoring by TAPI T640X optical aerosol spectrometer.
 * Exceedance due to bushfire smoke. As exceptional events, these are excluded from determination of compliance with the 24-hour goal.
 i.d. = insufficient data to calculate value.
 ND = "not demonstrated" due to insufficient data in one or more quarters.

AAQ NEPM standards for PM_{2.5}: 25 $\mu\text{g}/\text{m}^3$ (24-hour average); 8 $\mu\text{g}/\text{m}^3$ (1-year average).
 When reporting compliance with the PM_{2.5} 24-hour goal, PM_{2.5} monitoring data determined as being directly associated with an exceptional event (e.g. bushfire smoke, dust storm) is excluded.

PM_{2.5} monitoring is required in all regions because screening procedure arguments that pollutant concentrations are reasonably expected to be consistently below the relevant AAQ NEPM advisory standard are not satisfied.

PM_{2.5} monitoring at North Toowoomba from July 2003 to December 2010 showed that bushfire smoke and widespread windblown dust events were associated with exceedances of the (then advisory) AAQ NEPM 24-hour PM_{2.5} standard. There was no evidence that domestic and commercial PM_{2.5} emissions were, on their own, sufficient to cause exceedances of the PM_{2.5} standard at the North Toowoomba station.

As no monitoring has been carried out to date, performance is 'not demonstrated' for the following regions:

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

Lead

Table 9. 2017 lead compliance summary

Region/performance monitoring station	Data availability rates (% of hours)					Annual mean ($\mu\text{g}/\text{m}^3$)	Performance against the standards and goals
	Q1	Q2	Q3	Q4	Annual		
<u>Townsville</u>							
Coast Guard	80.0	100.0	0.0	86.7	91.8	0.09	met
<u>Mount Isa</u>							
The Gap	93.3	100.0	100.0	75.0	91.8	0.08	met
AAQ NEPM standards for Lead: $0.5 \mu\text{g}/\text{m}^3$ (1-year average).							

Regions which do not require monitoring on the basis of screening arguments that lead levels are reasonably expected to be consistently below the NEPM standard are:

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

The phase-out of leaded motor vehicle fuel from March 2001 means that no significant sources of lead now exist in most Queensland regions. The exceptions to this are non-vehicle sources of lead such as metals smelting and handling of metal ore concentrates.

Lead concentrations measured at the Woolloongabba performance monitoring station in South East Queensland were less than ten per cent of the AAQ NEPM standard for both 2001 ($0.03 \mu\text{g}/\text{m}^3$) and 2002 ($0.02 \mu\text{g}/\text{m}^3$). These measurements demonstrate that compliance with the AAQ NEPM standard and goal has been achieved in South East Queensland, in accordance with the *National Environment Protection (Ambient Air Quality) Measure Technical Paper No. 9, Lead Monitoring*¹⁰. Lead monitoring in South East Queensland ceased in 2002.

Peak lead concentrations in South East Queensland were less than 40 per cent of the AAQ NEPM standard between 1999 and 2002 (see Section D – Pollutant distribution and trends). This means that, under screening procedure F in Table 1 of the AAQ NEPM Technical Paper No. 4, lead monitoring is not required in other Queensland centres with lower population and traffic density (except for Townsville and Mount Isa where other non-vehicle lead emission sources exist).

¹⁰ available from www.nepc.gov.au/resource/ephc-archive-ambient-air-quality-nepm

Section C – Analysis of monitoring data against standards

This section presents time, date and location information for the following annual summary statistics for 2017:

- exceedances of AAQ NEPM standards and circumstances under which they occurred;
- annual maximum and second-highest daily concentrations for carbon monoxide, nitrogen dioxide, ozone and sulfur dioxide, for which the AAQ NEPM allows one exceedance day per year; and
- annual maximum daily concentrations for PM₁₀ and PM_{2.5}, for which the AAQ NEPM does not allow any exceedance days per year (excluding exceptional events).

Exceedance details are presented in tables 10 to 12, and summary statistics are presented in tables 13 to 20. Concentrations exceeding AAQ NEPM standards are shown in bold text in the summary tables.

Exceedance summary

In 2017, there were no exceedances of AAQ NEPM standards at compliance monitoring sites in Queensland, with the exception of sulfur dioxide in Mount Isa, PM₁₀ in Mackay and Mount Isa and PM_{2.5} at Rocklea in South East Queensland and South Gladstone.

Industrial operations (metals smelting and sulfuric acid manufacture) emit sulfur dioxide into the atmosphere in Mount Isa. Prior to April 2012 smelter operations were controlled on the basis of meeting Mount Isa Mines Agreement Act 1985 (MIM Act) air quality limits. From April 2012 to December 2015, smelter operations were under a Transitional Environmental Program (TEP) that set out a staged program of works to achieve compliance with the air quality objectives contained in the Queensland Environmental Protection (Air) Policy 2008 (equivalent to the AAQ NEPM standards for sulfur dioxide). From January 2016 smelter operations have been operating under an amended Environmental Authority (EA) which sets alternative air quality limits for some air pollutants as part of the Copper Smelter Extension Project. Sulfur dioxide concentrations exceeded the more stringent AAQ NEPM one-hour standard on a number of days as smelter operations were only controlled to meet EA limit values during 2017. A listing of these exceedances is provided in Table 10.

Mount Isa is situated in a low rainfall area where winds associated with the passage of low pressure troughs through the region can result in high levels of windblown dust during dry ground conditions. Windblown dust generated by the passage of two troughs during September 2017 was responsible for exceedances of the AAQ NEPM 24-hour PM₁₀ standard on 13, 14 and 30 September in Mount Isa. Wind direction measurements during the periods when elevated PM₁₀ concentrations were measured indicated that PM₁₀ emissions from mining and industrial operations did not contribute to these exceedances.

In Mackay, the AAQ NEPM 24-hour PM₁₀ standard was exceeded on three occasions during September 2017. On these days there were extensive bushfires in the Shoalwater area, south-east of Mackay. Elevated PM₁₀ levels occurred during south-easterly winds and coincided with increased visibility-reducing particle levels, consistent with smoke from these bushfires being transported over the Mackay region.

Details of the PM₁₀ exceedances are summarised in Table 11.

The AAQ NEPM 24-hour PM_{2.5} standard was exceeded once at Rocklea in South East Queensland and once at South Gladstone during September 2017. Smoke from a large bushfire at Kurwongbah north of Brisbane, added to background local PM_{2.5} emission sources including motor vehicles, collectively led to the exceedance at Rocklea on 4 September. On the 29 September, north-westerly winds transported smoke from the bushfires in the Shoalwater area previously mentioned over the Gladstone region, leading to an exceedance of AAQ NEPM 24-hour PM_{2.5} standard at South Gladstone on this day. Details of the PM_{2.5} exceedances are summarised in Table 12.

Table 10. 2017 SO₂ exceedances

Region/performance monitoring station	Standard	Concentration (ppm)	Date	Time	Circumstances
<u>Mount Isa</u> Menzies	1-hour	0.958	Jul 3	16	All exceedances at the Menzies monitoring site were due to industry emissions.
		0.601	Aug 5	15	
		0.448	Jan 1	14	
		0.392	Sep 21	14	
		0.379	May 2	14	
		0.349	Nov 19	16	
		0.345	Nov 18	13	
		0.320	Aug 3	17	
		0.317	Feb 26	10	
		0.314	Sep 13	17	
		0.311	Mar 13	17	
		0.307	Aug 21	16	
		0.299	May 19	17	
		0.295	Mar 15	15	
		0.290	Oct 4	18	
		0.282	Nov 3	15	
		0.275	Sep 12	12	
		0.270	Sep 26	16	
		0.255	Jul 16	17	
		0.251	Sep 30	21	
0.242	Jan 15	3			
0.225	May 18	17			
0.223	Oct 3	17			
0.210	Apr 30	17			
<u>Mount Isa</u> The Gap	1 hour	0.579	Jul 3	16	All exceedances at The Gap monitoring site were due to industry emissions.
		0.521	Dec 15	10	
		0.464	Jan 1	13	
		0.433	Mar 6	7	
		0.366	Oct 4	18	
		0.350	Sep 12	11	
		0.319	Sep 30	18	
		0.313	Feb 12	9	
		0.265	Nov 22	10	
		0.232	Sep 26	13	
		0.226	Jan 28	11	
		0.219	Jan 21	11	
		0.217	May 2	14	

Table 10. 2017 SO₂ exceedances (continued)

Region/performance monitoring station	Standard	Concentration (ppm)	Date	Time	Circumstances
<u>Mount Isa</u> The Gap	1 hour	0.207 0.206 0.204	Sep 12 Mar 6 Sep 26	12 5 15	All exceedances at The Gap monitoring site were due to industry emissions.
AAQ NEPM standards for SO ₂ : 0.20 ppm (1-hour average); 0.08 ppm (24-hour average); 0.02 ppm (1-year average). AAQ NEPM goals for SO ₂ : 1-hour average and 24-hour average standards exceeded on no more than one day per year.					

Table 11. 2017 PM₁₀ exceedances

Region/performance monitoring station	Standard	Concentration (µg/m ³)	Date	Time	Circumstances
<u>Mackay</u> West Mackay	24-hour	69.0 59.7 53.1	Sep 15 Sep 9 Sep 1	24 24 24	All exceedances were due to smoke from extensive bushfires in the Shoalwater area transported over the Mackay region by south-easterly winds.
<u>Mount Isa</u> The Gap	24-hour	89.7 69.3 50.5	Sep 14 Sep 13 Sep 30	24 24 24	All exceedances were due to windblown dust generated during the passage of low pressure troughs. Wind direction indicated that industry emissions did not contribute.
AAQ NEPM standard for PM ₁₀ : 50 µg/m ³ (24-hour average); 25 µg/m ³ (1-year average). When reporting compliance with the PM ₁₀ 24-hour goal, PM ₁₀ monitoring data determined to be directly associated with an exceptional event (e.g. bushfire smoke, dust storm) is excluded.					

Table 12. 2017 PM_{2.5} exceedances

Region/performance monitoring station	Standard	Concentration (µg/m ³)	Date	Time	Circumstances
<u>South east Queensland</u> Rocklea	24-hour	28.9	Sep 04	24	Smoke from bushfires
<u>Gladstone</u> South Gladstone	24-hour	28.6	Sep 29	24	Smoke from bushfires
AAQ NEPM standard for PM _{2.5} : 25 µg/m ³ (24-hour average); 8 µg/m ³ (1-year average). When reporting compliance with the PM _{2.5} 24-hour goal, PM _{2.5} monitoring data determined to be directly associated with an exceptional event (e.g. bushfire smoke, dust storm) is excluded.					

Summaries of maximum and second-highest pollutant concentrations

Table 13 to Table 20 present daily peak concentrations, and the time and date on which these occurred, for all pollutants and monitoring sites for 2017. Second-highest daily concentrations are also shown for carbon monoxide, nitrogen dioxide, ozone and sulfur dioxide, for which the AAQ NEPM allows one exceedance day per year.

Table 13. 2017 summary statistics for daily peak 8-hour average CO concentrations

Region/performance monitoring station	Number of valid days	Highest (ppm)	Highest (date:hour)	2 nd highest (ppm)	2 nd highest (date:hour)
<u>South East Queensland</u> Woolloongabba	204	1.1	Jul 25:24 Jul 26:01		
AAQ NEPM standard for CO: 9.0 ppm (8-hour average). AAQ NEPM goal for CO: standard exceeded on no more than one day per year.					

Table 14. 2017 summary statistics for daily peak 1-hour average NO₂ concentrations

Region/performance monitoring station	Number of valid days	Highest (ppm)	Highest (date:hour)	2 nd highest (ppm)	2 nd highest (date:hour)
<u>South East Queensland</u> Mountain Creek	364	0.044	Jul 26:19	0.034	Jul 24:19
Deception Bay	365	0.038	May 29:19 May 31:19		
Rocklea	363	0.042	Aug 09:19	0.040	May 16:01
Springwood	360	0.038	Sep 08:23	0.035	Jul 24:23 Aug 11:09
Flinders View	361	0.044	May 16:18	0.042	May 26:18 Jul 25:18
<u>Gladstone</u> South Gladstone	362	0.074	Jul 25:08	0.037	Aug 13:13
<u>Townsville</u> North Ward	13	0.005	Dec 12:04 Dec 13:07 Dec 14:07		
AAQ NEPM standard for NO ₂ : 0.12 ppm (1-hour average). AAQ NEPM goal for NO ₂ : standard exceeded on no more than one day per year.					

Table 15. 2017 summary statistics for daily peak 1-hour average O₃ concentrations

Region/performance monitoring station	Number of valid days	Highest (ppm)	Highest (date:hour)	2 nd highest (ppm)	2 nd highest (date:hour)
<u>South East Queensland</u> Mountain Creek	360	0.063	Sep 30:14	0.057	Nov 07:13
Deception Bay	365	0.065	Sep 30:15	0.064	Sep 29:14
Rocklea	359	0.085	Jan 12:15	0.081	Feb 12:13
Springwood	340	0.063	Feb 11:14	0.062	Feb 12:12
Flinders View	362	0.073	Dec 21:15	0.071	Jan 25:14 Feb 13:14 Dec 09:13
AAQ NEPM standard for O ₃ : 0.10 ppm (1-hour average). AAQ NEPM goal for O ₃ : standard exceeded on no more than one day per year.					

Table 16. 2017 summary statistics for daily peak 4-hour average O₃ concentrations

Region/performance monitoring station	Number of valid days	Highest (ppm)	Highest (date:hour)	2 nd highest (ppm)	2 nd highest (date:hour)
<u>South East Queensland</u> Mountain Creek	360	0.060	Sep 30:15	0.051	Aug 15:17 Oct 10:15 Feb 20:16
Deception Bay	365	0.061	Sep 29:15	0.058	Sep 30:16
Rocklea	359	0.069	Jan 12:16	0.068	Feb 12:14
Springwood	336	0.056	Feb 11:15	0.051	Feb 12:13
Flinders View	362	0.065	Feb 13:15	0.062	Dec 09:15

AAQ NEPM standard for O₃: 0.08 ppm (4-hour average).
AAQ NEPM goal for O₃: standard exceeded on no more than one day per year.

Table 17. 2017 summary statistics for daily peak 1-hour average SO₂ concentrations

Region/performance monitoring station	Number of valid days	Highest (ppm)	Highest (date:hour)	2 nd highest (ppm)	2 nd highest (date:hour)
<u>South East Queensland</u> Springwood	309	0.017	Dec 03:18	0.013	Jan 18:20
Flinders View	360	0.006	Jul 12:09	0.005	Jul 21:07 Oct 05:17 Dec 08:11
<u>Gladstone</u> South Gladstone	362	0.073	Jan 19:10	0.045	Nov 12:13
<u>Townsville</u> North Ward	23	0.004	Dec 16:23	0.003	Dec 15:21
Stuart	346	0.003	Feb 03:20 Feb 04:21 Apr 02:15 Apr 03:14 May 22:16 Nov 25:09		
<u>Mount Isa</u> Menzies	364	0.958	Jul 03:16	0.601	Aug 05:15
The Gap	354	0.579	Jul 03:16	0.521	Dec 15:10

Bold text indicates a value greater than the AAQ NEPM standard.
AAQ NEPM standard for SO₂: 0.20 ppm (1-hour average).
AAQ NEPM goal for SO₂: standard exceeded on no more than one day per year.

Table 18. 2017 summary statistics for daily 24-hour average SO₂ concentrations

Region/performance monitoring station	Number of valid days	Highest (ppm)	Highest (date)	2 nd highest (ppm)	2 nd highest (date)
<u>South East Queensland</u> Springwood	309	0.004	Dec 3 Dec 21		
Flinders View	360	0.002	38 days in total		
<u>Gladstone</u> South Gladstone	362	0.011	Jan 29	0.010	Jan 30 Feb 22
<u>Townsville</u> North Ward	23	0.001	Dec 15 Dec 16		
Stuart	346	0.001	82 days in total		
<u>Mount Isa</u> Menzies	364	0.080	Nov 19	0.076	Jul 03 Aug 05
The Gap	354	0.053	Jul 03 Sep 12		

AAQ NEPM standard for SO₂: 0.08 ppm (24-hour average).
AAQ NEPM goal for SO₂: standard exceeded on no more than one day per year.

Table 19. 2017 summary statistics for daily 24-hour average PM₁₀ concentrations

Region/performance monitoring station	Number of valid days	Highest (µg/m ³)	Highest (date)
<u>South East Queensland</u> Mountain Creek	353	37.5	Feb 22
Rocklea	364	43.2	Sep 04
Springwood	365	34.4	Sep 04
Flinders View	363	41.2	Sep 26
<u>Gladstone</u> South Gladstone	336	40.2	Sep 29
<u>Mackay</u> West Mackay	330	69.0	Sep 15
<u>Townsville</u> North Ward*	18	20.8	Dec 13
<u>Mount Isa</u> The Gap	358	89.7	Sep 14

Bold text indicates a value greater than the AAQ NEPM standard.
*Monitoring by TAPI T640X optical aerosol spectrometer.
AAQ NEPM standard for PM₁₀: 50 µg/m³ (24-hour average); 25 µg/m³ (1-year average).
When reporting compliance with the PM₁₀ 24-hour goal, PM₁₀ monitoring data determined to be directly associated with an exceptional event (e.g. bushfire smoke, dust storm) is excluded.

Table 20. 2017 summary statistics for daily 24-hour average PM_{2.5} concentrations

Region/ performance monitoring station	Number of valid days	Highest (µg/m ³)	Highest (date)
<u>South East Queensland</u> Rocklea [†]	364	28.9	Sep 04
Springwood [†]	365	23.9	Sep 04
<u>Gladstone</u> South Gladstone [†]	336	28.6	Sep 29
<u>Townsville</u> North Ward [‡]	18	7.6	Dec 13

Bold text indicates a value greater than the AAQ NEPM standard.
[†]Monitoring by TEOM Model 1405 instrumentation fitted with FDMS.
[‡]Monitoring by TAPI T640X optical aerosol spectrometer.
 AAQ NEPM standards for PM_{2.5}: 25 µg/m³ (24-hour average); 8 µg/m³ (1-year average).
 When reporting compliance with the PM_{2.5} 24-hour goal, PM_{2.5} monitoring data determined to be directly associated with an exceptional event (e.g. bushfire smoke, dust storm) is excluded.

Section D – Pollutant distribution and trends

This section presents results of further analysis of the monitoring data. Percentiles of 2017 daily peak concentrations are presented for each monitoring station and pollutant. Daily peak concentrations were only included in this analysis if at least 75 per cent of the daily data were valid. Percentiles for eight-hour average carbon monoxide and four-hour average ozone were calculated for daily peak concentrations. Daily peak concentrations were calculated from running hourly values, including those that overlap from one calendar day to the next. Concentrations exceeding the corresponding AAQ NEPM standard are shown in bold text.

The tables in this section also present annual statistics for all trend monitoring stations identified in the Queensland AAQ NEPM monitoring plan. For regions and sub regions where a pollutant is not monitored at a trend station, annual statistics are presented for performance monitoring stations. Concentrations where less than 75 per cent of the annual data were valid are shown in italics. Trend data for lead at Woolloongabba in South East Queensland is presented in Table 72 although monitoring ceased in 2002.

Carbon monoxide

Table 21. 2017 percentiles of daily peak 8-hour average CO concentrations

Region/performance monitoring station	Data availability (% of days)	Maximum (ppm)	Percentiles (ppm)					
			99 th	98 th	95 th	90 th	75 th	50 th
<u>South East Queensland</u> Woolloongabba	55.9	1.1	1.0	0.9	0.8	0.7	0.5	0.3

AAQ NEPM standard for CO: 9.0 ppm (8-hour average).
 AAQ NEPM goal for CO: standard exceeded on no more than one day per year.

Table 22. Percentiles of daily peak 8-hour average CO concentrations at Woolloongabba (1998–2017)

Year	Data availability (% of days)	No. of exceedances (days)	Maximum (ppm)	Percentiles (ppm)			
				99 th	98 th	95 th	90 th
1998	57.0*	0	5.1	5.0	4.4	4.1	3.4
1999	92.3*	0	5.7	5.3	4.9	4.0	3.2
2000	92.9	0	5.0	4.7	4.2	3.4	2.9
2001	97.0	0	7.0	4.4	4.3	3.9	3.2
2002	97.0	0	4.7	4.7	4.1	3.6	3.0
2003	83.3*	0	5.4	4.4	4.2	3.5	2.7
2004	98.9	0	4.7	4.2	3.8	3.3	2.6
2005	95.1	0	4.0	3.5	3.3	2.6	2.1
2006	95.3	0	4.0	3.7	3.1	2.4	2.1
2007	26.0*	0	1.1	1.1	1.1	1.1	1.0
2008	66.9*	0	2.9	2.7	2.5	2.2	1.8
2009	100.0	0	2.4	2.3	2.1	1.8	1.5
2010	97.0	0	2.7	1.9	1.8	1.3	1.1
2011	99.5	0	1.9	1.7	1.6	1.3	1.0
2012	98.9	0	1.8	1.7	1.7	1.4	1.1
2013	99.7	0	1.6	1.4	1.3	1.1	0.9
2014	97.0	0	1.9	1.6	1.5	1.0	0.6
2015	98.1	0	1.6	1.4	1.3	1.0	0.8
2016	45.8*	0	1.2	1.2	1.2	1.0	0.8
2017	55.9*	0	1.1	1.0	0.9	0.8	0.7

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

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

AAQ NEPM standard for CO: 9.0 ppm (8-hour average).

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

Table 23. Percentiles of daily peak 8-hour average CO concentrations at North Toowoomba (2003–2010)

Year	Data availability (% of days)	No. of exceedances (days)	Maximum (ppm)	Percentiles (ppm)			
				99 th	98 th	95 th	90 th
2003	42.4*	0	2.6	2.5	2.3	2.2	1.9
2004	97.0	0	3.4	2.8	2.5	2.0	1.5
2005	99.5	0	2.3	1.8	1.7	1.1	0.7
2006	95.3	0	1.9	1.8	1.7	1.3	1.1
2007	97.5	0	2.2	1.8	1.6	1.0	0.4
2008	98.4	0	1.9	1.7	1.5	1.1	0.8
2009	100.0	0	1.8	1.4	1.2	1.0	0.7
2010	92.6*	0	1.7	1.5	1.3	0.9	0.5

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

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

AAQ NEPM standard for CO: 9.0 ppm (8-hour average).

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

Nitrogen dioxide

Table 24. 2017 percentiles of daily peak 1-hour average NO₂ concentrations

Region/performance monitoring station	Data availability (% of days)	Maximum (ppm)	Percentiles (ppm)						
			99 th	98 th	95 th	90 th	75 th	50 th	
<u>South East Queensland</u>									
Mountain Creek	99.7	0.044	0.032	0.032	0.027	0.023	0.014	0.008	
Deception Bay	100.0	0.038	0.036	0.033	0.030	0.027	0.021	0.013	
Rocklea	99.5	0.042	0.036	0.033	0.027	0.025	0.019	0.013	
Springwood	98.6	0.038	0.032	0.031	0.029	0.026	0.021	0.015	
Flinders View	98.9	0.044	0.040	0.040	0.032	0.030	0.022	0.015	
<u>Gladstone</u>									
South Gladstone	99.2	0.074	0.033	0.030	0.027	0.025	0.018	0.013	
<u>Townsville</u>									
North Ward	3.6*	0.005	0.005	0.005	0.005	0.005	0.004	0.003	

*Data availability less than 75% for one or more quarters.
Years shown in italics have less than 75% annual data availability.
AAQ NEPM standard for NO₂: 0.12 ppm (1-hour average).
AAQ NEPM goal for NO₂: standard exceeded on no more than one day per year.

Table 25. Percentiles of daily peak 1-hour average NO₂ concentrations at Mountain Creek (2002–2017)

Year	Data availability (% of days)	No. of exceedances (days)	Maximum (ppm)	Annual average (ppm)	Percentiles (ppm)			
					99 th	98 th	95 th	90 th
2002	91.5*	0	0.036	0.006	0.036	0.034	0.031	0.028
2003	91.4	0	0.033	0.005	0.029	0.028	0.026	0.023
2004	98.1	0	0.041	0.005	0.036	0.035	0.029	0.026
2005	100.0	0	0.032	0.005	0.031	0.028	0.025	0.022
2006	100.0	0	0.035	0.005	0.032	0.030	0.027	0.024
2007	100.0	0	0.034	0.004	0.030	0.028	0.026	0.022
2008	95.6	0	0.030	0.004	0.030	0.029	0.026	0.021
2009	99.7	0	0.030	0.004	0.029	0.027	0.024	0.021
2010	98.6	0	0.029	0.005	0.028	0.026	0.023	0.021
2011	97.8	0	0.032	0.004	0.027	0.027	0.023	0.021
2012	96.7	0	0.030	0.004	0.028	0.027	0.022	0.021
2013	99.7	0	0.031	0.004	0.029	0.026	0.023	0.020
2014	99.5	0	0.031	0.004	0.027	0.026	0.023	0.021
2015	100.0	0	0.030	0.003	0.027	0.024	0.021	0.019
2016	100.0	0	0.031	0.004	0.029	0.025	0.023	0.021
2017	99.7	0	0.044	0.004	0.032	0.032	0.027	0.023

*Data availability less than 75% for one or more quarters.
AAQ NEPM standards for NO₂: 0.12 ppm (1-hour average); 0.03 ppm (annual average).
AAQ NEPM goal for NO₂: 1-hour standard exceeded on no more than one day per year.

Table 26. Percentiles of daily peak 1-hour average NO₂ concentrations at Deception Bay (1995–2017)

Year	Data availability (% of days)	No. of exceedances (days)	Maximum (ppm)	Annual average (ppm)	Percentiles (ppm)			
					99 th	98 th	95 th	90 th
1995	93.4	0	0.058	0.007	0.054	0.046	0.038	0.033
1996	68.6*	0	0.048	<i>i.d.</i>	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
2012	97.8	0	0.040	0.006	0.034	0.033	0.030	0.027
2013	67.9*	0	0.033	<i>i.d.</i>	0.033	0.031	0.029	0.025
2014	98.9	0	0.041	0.005	0.035	0.034	0.030	0.026
2015	100.0	0	0.048	0.005	0.033	0.032	0.029	0.025
2016	100.0	0	0.037	0.005	0.035	0.034	0.030	0.026
2017	100.0	0	0.038	0.005	0.036	0.033	0.030	0.027

*Data availability less than 75% for one or more quarters.
Years shown in italics have less than 75% annual data availability.
i.d. = insufficient data to calculate value.
AAQ NEPM standards for NO₂: 0.12 ppm (1-hour average); 0.03 ppm (annual average).
AAQ NEPM goal for NO₂: 1-hour standard exceeded on no more than one day per year.

Table 27. Percentiles of daily peak 1-hour average NO₂ concentrations at Rocklea (1983–2017)

Year	Data availability (% of days)	No. of exceedances (days)	Maximum (ppm)	Annual average (ppm)	Percentiles (ppm)			
					99 th	98 th	95 th	90 th
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	60.1*	0	<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	<i>0.020</i>	<i>i.d.</i>	<i>0.020</i>	<i>0.020</i>	<i>0.020</i>	<i>0.020</i>
2012	63.9*	0	<i>0.039</i>	<i>i.d.</i>	<i>0.035</i>	<i>0.032</i>	<i>0.030</i>	<i>0.027</i>
2013	98.6	0	0.037	0.007	0.034	0.032	0.030	0.025
2014	99.5	0	0.047	0.007	0.040	0.037	0.032	0.027
2015	100.0	0	0.041	0.006	0.036	0.033	0.027	0.024
2016	99.5	0	0.057	0.007	0.037	0.034	0.028	0.025
2017	99.5	0	0.042	0.006	0.036	0.033	0.027	0.025

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

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

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

i.d. = insufficient data to calculate value.

AAQ NEPM standards for NO₂: 0.12 ppm (1-hour average); 0.03 ppm (annual average).

AAQ NEPM goal for NO₂: 1-hour standard exceeded on no more than one day per year.

Table 28. Percentiles of daily peak 1-hour average NO₂ concentrations at Flinders View (1995–2017)

Year	Data availability (% of days)	No. of exceedances (days)	Maximum (ppm)	Annual average (ppm)	Percentiles (ppm)			
					99 th	98 th	95 th	90 th
1995	91.2*	0	0.038	0.009	0.037	0.035	0.031	0.028
1996	98.4	0	0.055	0.009	0.050	0.044	0.037	0.033
1997	96.4	0	0.046	0.009	0.042	0.040	0.036	0.030
1998	96.4	0	0.048	0.009	0.041	0.039	0.034	0.030
1999	98.4	0	0.046	0.008	0.039	0.038	0.032	0.029
2000	99.2	0	0.042	0.008	0.040	0.038	0.034	0.031
2001	100.0	0	0.045	0.009	0.037	0.036	0.034	0.031
2002	88.8*	0	0.062	0.010	0.057	0.043	0.036	0.033
2003	94.0	0	0.046	0.009	0.039	0.037	0.033	0.029
2004	100.0	0	0.054	0.009	0.047	0.038	0.034	0.030
2005	100.0	0	0.055	0.008	0.046	0.038	0.032	0.028
2006	100.0	0	0.050	0.012	0.043	0.041	0.035	0.032
2007	96.2	0	0.039	0.008	0.036	0.035	0.031	0.029
2008	96.7	0	0.040	0.010	0.039	0.038	0.031	0.028
2009	99.5	0	0.042	0.008	0.038	0.036	0.034	0.030
2010	99.5	0	0.039	0.008	0.037	0.034	0.028	0.025
2011	99.5	0	0.040	0.008	0.036	0.034	0.031	0.028
2012	99.7	0	0.039	0.007	0.037	0.035	0.028	0.025
2013	100.0	0	0.043	0.008	0.038	0.037	0.032	0.029
2014	95.9	0	0.050	0.008	0.046	0.043	0.036	0.030
2015	100.0	0	0.041	0.006	0.038	0.036	0.031	0.026
2016	98.6	0	0.046	0.008	0.040	0.038	0.033	0.029
2017	98.9	0	0.044	0.007	0.040	0.040	0.032	0.030

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

AAQ NEPM standards for NO₂: 0.12 ppm (1-hour average); 0.03 ppm (annual average).

AAQ NEPM goal for NO₂: 1-hour standard exceeded on no more than one day per year.

Table 29. Percentiles of daily peak 1-hour average NO₂ concentrations at North Toowoomba (2003–2010)

Year	Data availability (% of days)	No. of exceedances (days)	Maximum (ppm)	Annual average (ppm)	Percentiles (ppm)			
					99 th	98 th	95 th	90 th
2003	43.7*	0	0.057	<i>i.d.</i>	0.042	0.038	0.032	0.029
2004	98.4	0	0.054	0.007	0.041	0.039	0.035	0.031
2005	99.2	0	0.057	0.006	0.038	0.036	0.033	0.030
2006	94.8	0	0.042	0.005	0.037	0.033	0.031	0.027
2007	96.4	0	0.043	0.005	0.039	0.038	0.034	0.029
2008	98.1	0	0.041	0.007	0.035	0.033	0.031	0.029
2009	100.0	0	0.044	0.006	0.040	0.038	0.033	0.029
2010	93.2*	0	0.042	0.005	0.036	0.033	0.030	0.026

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

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

i.d. = insufficient data to calculate value.

AAQ NEPM standards for NO₂: 0.12 ppm (1-hour average); 0.03 ppm (annual average).

AAQ NEPM goal for NO₂: 1-hour standard exceeded on no more than one day per year.

Table 30. Percentiles of daily peak 1-hour average NO₂ concentrations at South Gladstone (1994–2017)

Year	Data availability (% of days)	No. of exceedances (days)	Maximum (ppm)	Annual average (ppm)	Percentiles (ppm)			
					99 th	98 th	95 th	90 th
1994	81.6*	0	0.049	0.005	0.047	0.044	0.038	0.028
1995	91.8	0	0.038	0.005	0.030	0.028	0.025	0.022
1996	84.2*	0	0.045	0.006	0.039	0.035	0.032	0.029
1997	65.8*	0	0.031	<i>i.d.</i>	0.030	0.029	0.022	0.017
1998	72.9*	0	0.022	<i>i.d.</i>	0.020	0.018	0.015	0.012
1999	88.8*	0	0.034	0.003	0.029	0.029	0.025	0.021
2000	97.8	0	0.031	0.003	0.025	0.024	0.022	0.019
2001	96.4	0	0.048	0.004	0.033	0.031	0.026	0.023
2002	98.4	0	0.036	0.004	0.031	0.029	0.026	0.021
2003	95.3	0	0.035	0.004	0.030	0.027	0.024	0.022
2004	100.0	0	0.042	0.004	0.030	0.029	0.026	0.023
2005	99.7	0	0.035	0.004	0.030	0.028	0.024	0.022
2006	100.0	0	0.034	0.003	0.027	0.027	0.024	0.021
2007	98.4	0	0.035	0.005	0.030	0.029	0.027	0.024
2008	98.6	0	0.033	0.003	0.030	0.026	0.023	0.020
2009	97.5	0	0.033	0.006	0.029	0.028	0.025	0.022
2010	98.4	0	0.033	0.006	0.031	0.029	0.026	0.023
2011	96.7	0	0.035	0.006	0.034	0.032	0.029	0.026
2012	94.0*	0	0.042	0.007	0.037	0.035	0.032	0.029
2013	95.3	0	0.042	0.007	0.037	0.035	0.032	0.027
2014	99.7	0	0.046	0.005	0.033	0.032	0.029	0.025
2015	99.7	0	0.043	0.005	0.036	0.032	0.028	0.025
2016	100.0	0	0.037	0.005	0.035	0.032	0.029	0.026
2017	99.2	0	0.074	0.005	0.033	0.030	0.027	0.025

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

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

i.d. = insufficient data to calculate value.

AAQ NEPM standards for NO₂: 0.12 ppm (1-hour average); 0.03 ppm (annual average).

AAQ NEPM goal for NO₂: 1-hour standard exceeded on no more than one day per year.

Table 31. Percentiles of daily peak 1-hour average NO₂ concentrations at Pimlico (2004–2016)

Year	Data availability (% of days)	No. of exceedances (days)	Maximum (ppm)	Annual average (ppm)	Percentiles (ppm)			
					99 th	98 th	95 th	90 th
2004	59.0*	0	0.034	<i>i.d.</i>	0.032	0.031	0.030	0.027
2005	100.0	0	0.034	0.005	0.032	0.031	0.028	0.024
2006	98.6	0	0.034	0.006	0.032	0.029	0.025	0.022
2007	99.2	0	0.035	0.004	0.027	0.024	0.023	0.020
2008	100.0	0	0.030	0.006	0.028	0.027	0.025	0.023
2009	97.0	0	0.035	0.005	0.030	0.028	0.025	0.023
2010	99.5	0	0.032	0.005	0.028	0.026	0.023	0.020
2011	98.9	0	0.042	0.006	0.038	0.036	0.031	0.027
2012	99.5	0	0.034	0.005	0.031	0.028	0.026	0.022
2013	98.9	0	0.033	0.004	0.029	0.027	0.023	0.018
2014	99.7	0	0.031	0.004	0.030	0.029	0.026	0.020
2015	97.8	0	0.039	0.004	0.030	0.028	0.025	0.021
2016	8.5*	0	0.022	<i>i.d.</i>	0.022	0.022	0.020	0.015

*Data availability less than 75% for one or more quarters.
Years shown in italics have less than 75% annual data availability.
i.d. = insufficient data to calculate value.
AAQ NEPM standards for NO₂: 0.12 ppm (1-hour average); 0.03 ppm (annual average).
AAQ NEPM goal for NO₂: 1-hour standard exceeded on no more than one day per year.

Ozone

Table 32. 2017 percentiles of daily peak 1-hour average O₃ concentrations

Region/performance monitoring station	Data availability (% of days)	Maximum (ppm)	Percentiles (ppm)					
			99 th	98 th	95 th	90 th	75 th	50 th
<u>South East Queensland</u> Mountain Creek	98.6	0.063	0.056	0.049	0.045	0.042	0.036	0.031
Deception Bay	100.0	0.065	0.057	0.055	0.050	0.045	0.039	0.033
Rocklea	98.4	0.085	0.065	0.060	0.052	0.048	0.040	0.034
Springwood	93.2	0.063	0.049	0.046	0.043	0.040	0.034	0.027
Flinders View	99.2	0.073	0.070	0.066	0.058	0.051	0.044	0.035

AAQ NEPM standard for O₃: 0.10 ppm (1-hour average).
AAQ NEPM goal for O₃: standard exceeded on no more than one day per year.

Table 33. 2017 percentiles of daily peak 4-hour average O₃ concentrations

Region/performance monitoring station	Data availability (% of days)	Maximum (ppm)	Percentiles (ppm)					
			99 th	98 th	95 th	90 th	75 th	50 th
<u>South East Queensland</u> Mountain Creek	98.6	0.060	0.050	0.046	0.043	0.040	0.035	0.030
Deception Bay	100.0	0.061	0.053	0.051	0.046	0.042	0.038	0.032
Rocklea	98.4	0.069	0.056	0.053	0.048	0.044	0.037	0.032
Springwood	92.1	0.056	0.044	0.042	0.039	0.036	0.031	0.026
Flinders View	99.2	0.065	0.060	0.059	0.053	0.047	0.042	0.033

AAQ NEPM standard for O₃: 0.08 ppm (4-hour average).
AAQ NEPM goal for O₃: standard exceeded on no more than one day per year.

Table 34. Percentiles of daily peak 1-hour average O₃ concentrations at Mountain Creek (2002–2017)

Year	Data availability (% of days)	No. of exceedances (days)	Maximum (ppm)	Percentiles (ppm)			
				99 th	98 th	95 th	90 th
2002	91.5*	0	0.064	0.060	0.050	0.043	0.040
2003	91.6	0	0.060	0.045	0.044	0.039	0.035
2004	100.0	0	0.060	0.050	0.045	0.041	0.037
2005	99.7	0	0.051	0.047	0.045	0.040	0.037
2006	100.0	0	0.053	0.047	0.043	0.038	0.035
2007	99.2	0	0.053	0.048	0.046	0.040	0.036
2008	95.6	0	0.055	0.047	0.045	0.038	0.036
2009	100.0	0	0.053	0.049	0.045	0.041	0.038
2010	98.4	0	0.065	0.044	0.043	0.039	0.036
2011	81.9*	0	0.077	0.061	0.052	0.043	0.037
2012	96.7	0	0.059	0.051	0.047	0.041	0.039
2013	98.9	0	0.057	0.049	0.045	0.042	0.039
2014	100.0	0	0.058	0.045	0.045	0.041	0.037
2015	95.6	0	0.051	0.045	0.043	0.040	0.036
2016	98.1	0	0.054	0.045	0.042	0.040	0.036
2017	98.6	0	0.063	0.056	0.049	0.045	0.042

*Data availability less than 75% for one or more quarters.
AAQ NEPM standard for O₃: 0.10 ppm (1-hour average).
AAQ NEPM goal for O₃: standard exceeded on no more than one day per year.

Table 35. Percentiles of daily peak 1-hour average O₃ concentrations at Deception Bay (1995–2017)

Year	Data availability (% of days)	No. of exceedances (days)	Maximum (ppm)	Percentiles (ppm)			
				99 th	98 th	95 th	90 th
1995	95.9	0	0.083	0.075	0.070	0.052	0.047
1996	95.9	0	0.091	0.073	0.064	0.055	0.048
1997	100.0	0	0.079	0.065	0.057	0.048	0.043
1998	94.2	0	0.069	0.060	0.053	0.048	0.044
1999	99.2	0	0.092	0.062	0.057	0.048	0.043
2000	99.7	0	0.070	0.058	0.054	0.046	0.041
2001	86.6*	0	0.079	0.058	0.054	0.048	0.044
2002	89.6*	0	0.071	0.063	0.061	0.048	0.044
2003	97.0	0	0.095	0.063	0.057	0.047	0.043
2004	96.7	0	0.070	0.058	0.055	0.048	0.045
2005	98.4	0	0.079	0.065	0.056	0.050	0.044
2006	99.5	0	0.064	0.056	0.052	0.047	0.042
2007	99.5	0	0.086	0.056	0.054	0.047	0.042
2008	99.7	0	0.082	0.069	0.064	0.047	0.042
2009	100.0	0	0.069	0.057	0.054	0.048	0.045
2010	98.6	0	0.058	0.050	0.046	0.044	0.039
2011	98.9	0	0.099	0.069	0.059	0.046	0.041
2012	98.9	0	0.059	0.056	0.053	0.048	0.044
2013	68.2*	0	0.068	0.064	0.052	0.049	0.047
2014	98.4	0	0.065	0.057	0.052	0.046	0.042
2015	99.7	0	0.063	0.055	0.051	0.044	0.040
2016	99.5	0	0.064	0.061	0.053	0.045	0.041
2017	100.0	0	0.065	0.057	0.055	0.050	0.045

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

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

AAQ NEPM standard for O₃: 0.10 ppm (1-hour average).

AAQ NEPM goal for O₃: standard exceeded on no more than one day per year.

Table 36. Percentiles of daily peak 1-hour average O₃ concentrations at Rocklea (1983–2017)

Year	Data availability (% of days)	No. of exceedances (days)	Maximum (ppm)	Percentiles (ppm)			
				99 th	98 th	95 th	90 th
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	<i>72.1*</i>	4	0.125	0.106	<i>0.100</i>	<i>0.078</i>	<i>0.055</i>
1988	<i>67.5*</i>	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	<i>2.7*</i>	0	<i>0.036</i>	<i>0.036</i>	<i>0.036</i>	<i>0.036</i>	<i>0.036</i>
2012	<i>62.6*</i>	0	<i>0.081</i>	<i>0.073</i>	<i>0.062</i>	<i>0.058</i>	<i>0.050</i>
2013	100.0	0	0.070	0.066	0.063	0.053	0.048
2014	99.5	0	0.076	0.072	0.068	0.057	0.049
2015	98.6	1	0.101	0.076	0.062	0.055	0.046
2016	98.1	0	0.073	0.064	0.058	0.053	0.047
2017	98.4	0	0.085	0.065	0.060	0.052	0.048

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

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

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

AAQ NEPM standard for O₃: 0.10 ppm (1-hour average).

AAQ NEPM goal for O₃: standard exceeded on no more than one day per year.

Table 37. Percentiles of daily peak 1-hour average O₃ concentrations at Flinders View (1994–2017)

Year	Data availability (% of days)	No. of exceedances (days)	Maximum (ppm)	Percentiles (ppm)			
				99 th	98 th	95 th	90 th
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	95.8	1	0.103	0.071	0.065	0.054	0.048
2012	94.3	0	0.090	0.086	0.067	0.056	0.051
2013	99.2	0	0.082	0.063	0.061	0.056	0.050
2014	96.4	0	0.075	0.069	0.068	0.061	0.055
2015	99.5	1	0.101	0.080	0.065	0.057	0.049
2016	99.2	0	0.082	0.066	0.062	0.056	0.050
2017	99.2	0	0.073	0.070	0.066	0.058	0.051

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

AAQ NEPM standard for O₃: 0.10 ppm (1-hour average).

AAQ NEPM goal for O₃: standard exceeded on no more than one day per year.

Table 38. Percentiles of daily peak 1-hour average O₃ concentrations at North Toowoomba (2003–2010)

Year	Data availability (% of days)	No. of exceedances (days)	Maximum (ppm)	Percentiles (ppm)			
				99 th	98 th	95 th	90 th
2003	43.7*	0	0.066	0.061	0.061	0.051	0.046
2004	99.2	0	0.084	0.064	0.058	0.052	0.048
2005	99.2	0	0.064	0.061	0.055	0.051	0.045
2006	96.2	0	0.063	0.059	0.058	0.052	0.046
2007	99.7	0	0.062	0.057	0.056	0.050	0.046
2008	98.4	0	0.063	0.051	0.048	0.043	0.040
2009	100.0	0	0.062	0.058	0.058	0.052	0.048
2010	93.2*	0	0.061	0.055	0.050	0.042	0.039

*Data availability less than 75% for one or more quarters.
 Years shown in italics have less than 75% annual data availability.
 AAQ NEPM standard for O₃: 0.10 ppm (1-hour average).
 AAQ NEPM goal for O₃: standard exceeded on no more than one day per year.

Table 39. Percentiles of daily peak 1-hour average O₃ concentrations at Targinie (2001–2006)

Year	Data availability (% of days)	No. of exceedances (days)	Maximum (ppm)	Percentiles (ppm)			
				99 th	98 th	95 th	90 th
2001	79.2*	0	0.026	0.026	0.025	0.023	0.022
2002	93.7	0	0.046	0.044	0.042	0.038	0.034
2003	97.4	0	0.045	0.035	0.034	0.032	0.031
2004	84.7	0	0.040	0.034	0.032	0.030	0.027
2005	95.9	0	0.038	0.033	0.032	0.028	0.027
2006	34.0*	0	0.035	0.035	0.035	0.028	0.025

*Data availability less than 75% for one or more quarters.
 Years shown in italics have less than 75% annual data availability.
 AAQ NEPM standard for O₃: 0.10 ppm (1-hour average).
 AAQ NEPM goal for O₃: standard exceeded on no more than one day per year.

Table 40. Percentiles of daily peak 1-hour average O₃ concentrations at Pimlico (2004–2016)

Year	Data availability (% of days)	No. of exceedances (days)	Maximum (ppm)	Percentiles (ppm)			
				99 th	98 th	95 th	90 th
2004	58.7*	0	0.047	0.047	0.045	0.041	0.039
2005	100.0	0	0.054	0.043	0.043	0.040	0.035
2006	98.6	0	0.048	0.042	0.040	0.037	0.035
2007	100.0	0	0.049	0.043	0.040	0.038	0.036
2008	100.0	0	0.059	0.045	0.043	0.038	0.036
2009	93.4	0	0.060	0.056	0.051	0.043	0.040
2010	94.5	0	0.055	0.042	0.040	0.038	0.036
2011	94.5	0	0.073	0.064	0.055	0.046	0.040
2012	98.1	0	0.051	0.043	0.042	0.040	0.038
2013	84.7*	0	0.053	0.043	0.042	0.040	0.037
2014	99.2	0	0.051	0.047	0.043	0.040	0.037
2015	99.2	0	0.051	0.046	0.043	0.038	0.037
2016	16.1*	0	0.054	0.054	0.054	0.045	0.040

*Data availability less than 75% for one or more quarters.
 Years shown in italics have less than 75% annual data availability.
 AAQ NEPM standard for O₃: 0.10 ppm (1-hour average).
 AAQ NEPM goal for O₃: standard exceeded on no more than one day per year.

Table 41. Percentiles of daily peak 4-hour average O₃ concentrations at Mountain Creek (2002–2017)

Year	Data availability (% of days)	No. of exceedances (days)	Maximum (ppm)	Percentiles (ppm)			
				99 th	98 th	95 th	90 th
2002	91.8*	0	0.059	0.051	0.045	0.040	0.037
2003	91.6	0	0.057	0.043	0.041	0.036	0.033
2004	100.0	0	0.047	0.044	0.042	0.038	0.035
2005	100.0	0	0.049	0.044	0.042	0.038	0.035
2006	100.0	0	0.048	0.041	0.039	0.035	0.033
2007	99.2	0	0.049	0.044	0.042	0.038	0.034
2008	95.9	0	0.049	0.043	0.041	0.036	0.034
2009	100.0	0	0.049	0.045	0.044	0.037	0.033
2010	98.4	0	0.062	0.041	0.040	0.036	0.034
2011	81.9*	0	0.068	0.058	0.049	0.039	0.035
2012	97.0	0	0.056	0.046	0.044	0.040	0.037
2013	98.9	0	0.050	0.046	0.044	0.040	0.037
2014	100.0	0	0.047	0.044	0.043	0.039	0.036
2015	95.6	0	0.050	0.042	0.040	0.038	0.035
2016	98.1	0	0.047	0.042	0.040	0.038	0.034
2017	98.6	0	0.060	0.050	0.046	0.043	0.040

*Data availability less than 75% for one or more quarters.
 AAQ NEPM standard for O₃: 0.08 ppm (4-hour average).
 AAQ NEPM goal for O₃: standard exceeded on no more than one day per year.

Table 42. Percentiles of daily peak 4-hour average O₃ concentrations at Deception Bay (1995–2017)

Year	Data availability (% of days)	No. of exceedances (days)	Maximum (ppm)	Percentiles (ppm)			
				99 th	98 th	95 th	90 th
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
2012	98.9	0	0.057	0.051	0.050	0.044	0.041
2013	68.2*	0	<i>0.060</i>	<i>0.057</i>	<i>0.049</i>	<i>0.047</i>	<i>0.044</i>
2014	98.4	0	0.053	0.050	0.047	0.043	0.040
2015	99.7	0	0.054	0.050	0.047	0.041	0.038
2016	99.5	0	0.059	0.054	0.047	0.042	0.038
2017	100.0	0	0.061	0.053	0.051	0.046	0.042

Bold text indicates a value greater than the AAQ NEPM standard.
 *Data availability less than 75% for one or more quarters.
 Years shown in italics have less than 75% annual data availability.
 AAQ NEPM standard for O₃: 0.08 ppm (4-hour average).
 AAQ NEPM goal for O₃: standard exceeded on no more than one day per year.

Table 43. Percentiles of daily peak 4-hour average O₃ concentrations at Rocklea (1983–2017)

Year	Data availability (% of days)	No. of exceedances (days)	Maximum (ppm)	Percentiles (ppm)			
				99 th	98 th	95 th	90 th
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>
2012	62.6*	0	<i>0.066</i>	<i>0.064</i>	<i>0.054</i>	<i>0.051</i>	<i>0.046</i>
2013	100.0	0	0.063	0.057	0.055	0.049	0.044
2014	99.5	0	0.069	0.062	0.058	0.051	0.046
2015	98.6	1	0.083	0.064	0.055	0.048	0.042
2016	98.1	0	0.062	0.052	0.050	0.047	0.043
2017	98.4	0	0.069	0.056	0.053	0.048	0.044

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

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

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

AAQ NEPM standard for O₃: 0.08 ppm (4-hour average).

AAQ NEPM goal for O₃: standard exceeded on no more than one day per year.

Table 44. Percentiles of daily peak 4-hour average O₃ concentrations at Flinders View (1994–2017)

Year	Data availability (% of days)	No. of exceedances (days)	Maximum (ppm)	Percentiles (ppm)			
				99 th	98 th	95 th	90 th
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
2012	94.3	0	0.080	0.079	0.062	0.052	0.046
2013	99.2	0	0.070	0.057	0.054	0.051	0.047
2014	96.4	0	0.067	0.063	0.062	0.055	0.049
2015	99.5	1	0.081	0.067	0.058	0.052	0.046
2016	99.2	0	0.065	0.059	0.054	0.050	0.046
2017	99.2	0	0.065	0.060	0.059	0.053	0.047

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

AAQ NEPM standard for O₃: 0.08 ppm (4-hour average).

AAQ NEPM goal for O₃: standard exceeded on no more than one day per year.

Table 45. Percentiles of daily peak 4-hour average O₃ concentrations at North Toowoomba (2003–2010)

Year	Data availability (% of days)	No. of exceedances (days)	Maximum (ppm)	Percentiles (ppm)			
				99 th	98 th	95 th	90 th
2003	43.7*	0	0.062	0.055	0.053	0.046	0.043
2004	99.2	0	0.070	0.058	0.053	0.048	0.044
2005	99.5	0	0.057	0.053	0.052	0.047	0.042
2006	96.2	0	0.057	0.055	0.053	0.047	0.042
2007	99.7	0	0.056	0.054	0.051	0.046	0.043
2008	98.4	0	0.056	0.046	0.045	0.040	0.037
2009	100.0	0	0.057	0.054	0.053	0.049	0.045
2010	93.2"	0	0.056	0.050	0.046	0.041	0.037

*Data availability less than 75% for one or more quarters.
Years shown in italics have less than 75% annual data availability.
AAQ NEPM standard for O₃: 0.08 ppm (4-hour average).
AAQ NEPM goal for O₃: standard exceeded on no more than one day per year.

Table 46. Percentiles of daily peak 4-hour average O₃ concentrations at Targinie (2001–2006)

Year	Data availability (% of days)	No. of exceedances (days)	Maximum (ppm)	Percentiles (ppm)			
				99 th	98 th	95 th	90 th
2001	75.1*	0	0.026	0.026	0.025	0.023	0.022
2002	94.2	0	0.044	0.042	0.038	0.035	0.031
2003	97.4	0	0.041	0.033	0.032	0.030	0.028
2004	84.7	0	0.030	0.028	0.027	0.026	0.024
2005	95.9	0	0.031	0.030	0.027	0.026	0.024
2006	34.0*	0	0.030	0.030	0.028	0.023	0.020

*Data availability less than 75% for one or more quarters.
Years shown in italics have less than 75% annual data availability.
AAQ NEPM standard for O₃: 0.08 ppm (4-hour average).
AAQ NEPM goal for O₃: standard exceeded on no more than one day per year.

Table 47. Percentiles of daily peak 4-hour average O₃ concentrations at Pimlico (2004–2016)

Year	Data availability (% of days)	No. of exceedances (days)	Maximum (ppm)	Percentiles (ppm)			
				99 th	98 th	95 th	90 th
2004	58.7*	0	0.045	0.045	0.042	0.040	0.037
2005	100.0	0	0.049	0.041	0.040	0.038	0.034
2006	98.6	0	0.045	0.039	0.038	0.035	0.034
2007	100.0	0	0.046	0.042	0.038	0.036	0.034
2008	100.0	0	0.054	0.043	0.040	0.037	0.034
2009	94.0	0	0.057	0.051	0.048	0.041	0.038
2010	94.5	0	0.045	0.041	0.038	0.036	0.034
2011	94.5	0	0.062	0.061	0.049	0.044	0.039
2012	98.1	0	0.045	0.041	0.041	0.038	0.036
2013	84.7*	0	0.045	0.042	0.041	0.039	0.036
2014	99.2	0	0.047	0.044	0.042	0.038	0.036
2015	99.2	0	0.049	0.043	0.040	0.037	0.035
2016	16.1*	0	0.050	0.050	0.046	0.042	0.038

*Data availability less than 75% for one or more quarters.
 Years shown in italics have less than 75% annual data availability.
 AAQ NEPM standard for O₃: 0.08 ppm (4-hour average).
 AAQ NEPM goal for O₃: standard exceeded on no more than one day per year.

Sulfur dioxide

Table 48. 2017 percentiles of daily peak 1-hour average SO₂ concentrations

Region/performance monitoring station	Data availability (% of days)	Maximum (ppm)	Percentiles (ppm)					
			99 th	98 th	95 th	90 th	75 th	50 th
<u>South East Queensland</u> Springwood	84.7	0.017	0.011	0.010	0.008	0.006	0.003	0.002
Flinders View	98.6	0.006	0.004	0.004	0.004	0.003	0.002	0.001
<u>Gladstone</u> South Gladstone	99.2	0.073	0.038	0.036	0.030	0.021	0.013	0.007
<u>Townsville</u> North Ward	6.3	0.004	0.004	0.004	0.003	0.002	0.002	0.001
Stuart	94.8	0.003	0.003	0.002	0.002	0.002	0.001	0.001
<u>Mount Isa</u> Menzies	99.7	0.958	0.384	0.319	0.254	0.136	0.036	0.002
The Gap	97.0	0.579	0.397	0.310	0.188	0.131	0.039	0.001

Bold text indicates a value greater than the AAQ NEPM standard.
 AAQ NEPM standard for SO₂: 0.20 ppm (1-hour average).
 AAQ NEPM goal for SO₂: standard exceeded on no more than one day per year.

Table 49. 2017 percentiles of daily 24-hour average SO₂ concentrations

Region/performance monitoring station	Data availability (% of days)	Maximum (ppm)	Percentiles (ppm)					
			99 th	98 th	95 th	90 th	75 th	50 th
<u>South East Queensland</u> Springwood	84.7	0.004	0.003	0.003	0.002	0.002	0.001	0.001
Flinders View	98.6	0.002	0.002	0.002	0.002	0.002	0.001	0.001
<u>Gladstone</u> South Gladstone	99.2	0.011	0.009	0.008	0.005	0.004	0.002	0.001
<u>Townsville</u> North Ward	6.3	0.001	0.001	0.001	0.001	0.000	0.000	0.000
Stuart	94.8	0.001	0.001	0.001	0.001	0.001	0.000	0.000
<u>Mount Isa</u> Menzies	99.7	0.080	0.058	0.040	0.029	0.017	0.005	0.001
The Gap	97.0	0.053	0.051	0.046	0.024	0.014	0.005	0.000

Bold text indicates a value greater than the AAQ NEPM standard.
 AAQ NEPM standard for SO₂: 0.08 ppm (24-hour average).
 AAQ NEPM goal for SO₂: standard exceeded on no more than one day per year.

Table 50. Percentiles of daily peak 1-hour average SO₂ concentrations at Flinders View (1993–2017)

Year	Data availability (% of days)	No. of exceedances (days)	Maximum (ppm)	Annual average (ppm)	Percentiles (ppm)			
					99 th	98 th	95 th	90 th
1993	88.2*	0	0.049	0.002	0.030	0.024	0.018	0.014
1994	98.9	0	0.033	0.003	0.027	0.025	0.021	0.017
1995	59.5*	0	0.041	<i>i.d.</i>	0.029	0.027	0.020	0.014
1996	88.3*	0	0.047	0.002	0.037	0.027	0.023	0.017
1997	97.0	0	0.047	0.002	0.040	0.035	0.023	0.019
1998	95.9	0	0.090	0.002	0.037	0.033	0.024	0.019
1999	96.4	0	0.070	0.002	0.035	0.033	0.028	0.021
2000	89.9	0	0.081	0.002	0.049	0.036	0.027	0.022
2001	99.5	0	0.053	0.001	0.048	0.043	0.029	0.023
2002	97.0	0	0.057	0.001	0.035	0.033	0.025	0.018
2003	96.4	0	0.046	0.001	0.031	0.030	0.023	0.017
2004	99.5	0	0.063	0.001	0.036	0.031	0.021	0.016
2005	100.0	0	0.034	0.001	0.028	0.024	0.020	0.014
2006	100.0	0	0.040	0.001	0.037	0.027	0.023	0.018
2007	100.0	0	0.026	0.001	0.024	0.022	0.018	0.014
2008	100.0	0	0.042	0.001	0.030	0.028	0.019	0.016
2009	99.5	0	0.046	0.001	0.030	0.027	0.018	0.014
2010	99.4	0	0.034	0.001	0.022	0.018	0.015	0.012
2011	95.6	0	0.028	0.001	0.022	0.017	0.014	0.009
2012	100.0	0	0.015	0.001	0.014	0.012	0.009	0.007
2013	100.0	0	0.013	0.001	0.005	0.005	0.004	0.004
2014	96.4	0	0.008	0.000	0.005	0.004	0.003	0.003
2015	100.0	0	0.010	0.000	0.005	0.004	0.003	0.003
2016	99.7	0	0.007	0.001	0.005	0.004	0.003	0.003
2017	98.6	0	0.006	0.001	0.004	0.004	0.004	0.003

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

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

i.d. = insufficient data to calculate value.

AAQ NEPM standards for SO₂: 0.20 ppm (1-hour average); 0.02 ppm (annual average).

AAQ NEPM goal for SO₂: 1-hour standard exceeded on no more than one day per year.

Table 51. Percentiles of daily peak 1-hour average SO₂ concentrations at South Gladstone (1991–2017)

Year	Data availability (% of days)	No. of exceedances (days)	Maximum (ppm)	Annual average (ppm)	Percentiles (ppm)			
					99 th	98 th	95 th	90 th
1991	92.6	0	0.011	0.002	0.011	0.009	0.008	0.006
1992	94.3	0	0.052	0.003	0.039	0.029	0.020	0.015
1993	98.3	0	0.075	0.004	0.059	0.050	0.039	0.032
1994	97.0	0	0.070	0.003	0.042	0.040	0.031	0.024
1995	96.7	0	0.168	0.004	0.083	0.065	0.047	0.035
1996	99.2	0	0.083	0.002	0.053	0.042	0.026	0.018
1997	98.9	0	0.049	0.001	0.029	0.023	0.014	0.010
1998	97.5	0	0.076	0.001	0.050	0.042	0.027	0.020
1999	94.2	0	0.051	0.002	0.042	0.039	0.027	0.022
2000	84.7*	0	0.092	0.001	0.071	0.045	0.034	0.024
2001	98.1	0	0.068	0.001	0.046	0.035	0.023	0.018
2002	94.5	0	0.123	0.001	0.040	0.031	0.025	0.020
2003	93.2	0	0.112	0.001	0.058	0.041	0.025	0.019
2004	96.4	0	0.064	0.001	0.040	0.032	0.022	0.017
2005	99.7	0	0.084	0.002	0.063	0.053	0.032	0.027
2006	100.0	0	0.093	0.002	0.071	0.064	0.049	0.034
2007	98.4	0	0.075	0.002	0.069	0.061	0.044	0.035
2008	98.6	0	0.140	0.002	0.065	0.056	0.042	0.026
2009	97.5	0	0.053	0.002	0.040	0.035	0.028	0.021
2010	98.4	0	0.052	0.002	0.038	0.035	0.028	0.022
2011	97.3	0	0.091	0.003	0.049	0.045	0.033	0.026
2012	99.5	0	0.059	0.002	0.050	0.045	0.030	0.024
2013	95.3	0	0.067	0.002	0.053	0.042	0.033	0.028
2014	99.7	0	0.068	0.002	0.060	0.059	0.040	0.033
2015	95.1	0	0.077	0.002	0.057	0.052	0.039	0.025
2016	97.8	0	0.061	0.002	0.053	0.051	0.038	0.030
2017	99.2	0	0.073	0.002	0.038	0.036	0.030	0.021

*Data availability less than 75% for one or more quarters.
AAQ NEPM standards for SO₂: 0.20 ppm (1-hour average); 0.02 ppm (annual average).
AAQ NEPM goal for SO₂: 1-hour standard exceeded on no more than one day per year.

Table 52. Percentiles of daily peak 1-hour average SO₂ concentrations at Pimlico (2005–2016)

Year	Data availability (% of days)	No. of exceedances (days)	Maximum (ppm)	Annual average (ppm)	Percentiles (ppm)			
					99 th	98 th	95 th	90 th
2005	18.6*	0	0.003	<i>i.d.</i>	0.003	0.003	0.002	0.002
2006	98.6	0	0.006	0.000	0.005	0.004	0.003	0.002
2007	98.1	0	0.005	0.001	0.005	0.004	0.003	0.003
2008	100.0	0	0.006	0.000	0.005	0.003	0.002	0.002
2009	97.0	0	0.006	0.000	0.005	0.004	0.003	0.002
2010	90.1*	0	0.007	0.000	0.006	0.004	0.003	0.002
2011	94.2	0	0.009	0.001	0.007	0.006	0.005	0.005
2012	99.5	0	0.006	0.001	0.004	0.004	0.003	0.003
2013	94.8	0	0.004	0.000	0.003	0.003	0.002	0.002
2014	99.7	0	0.005	0.001	0.004	0.003	0.003	0.002
2015	99.5	0	0.004	0.001	0.004	0.004	0.003	0.003
2016	16.1*	0	0.007	<i>i.d.</i>	0.007	0.007	0.005	0.004

*Data availability less than 75% for one or more quarters.
Years shown in italics have less than 75% annual data availability.
i.d. = insufficient data to calculate value.
AAQ NEPM standards for SO₂: 0.20 ppm (1-hour average); 0.02 ppm (annual average).
AAQ NEPM goal for SO₂: 1-hour standard exceeded on no more than one day per year.

Table 53. Percentiles of daily peak 1-hour average SO₂ concentrations at Menzies (1983–2017)

Year	Data availability (% of days)	No. of exceedances (days)	Maximum (ppm)	Annual average (ppm)	Percentiles (ppm)			
					99 th	98 th	95 th	90 th
1983	67.4*	25	0.725	<i>i.d.</i>	0.515	0.430	0.270	0.200
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	0.145	0.091
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	0.190
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	0.006	0.426	0.348	0.236	0.173
2012	99.5	30	0.670	0.005	0.434	0.410	0.274	0.165
2013	96.7	34	0.594	0.006	0.398	0.375	0.311	0.191
2014	97.0	20	0.622	0.005	0.429	0.352	0.206	0.131
2015	100.0	30	0.577	0.006	0.466	0.371	0.260	0.164
2016	100.0	32	0.717	0.007	0.478	0.438	0.286	0.180
2017	99.7	24	0.958	0.005	0.384	0.319	0.254	0.136

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

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

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

i.d. = insufficient data to calculate value.

AAQ NEPM standards for SO₂: 0.20 ppm (1-hour average); 0.02 ppm (annual average).

AAQ NEPM goal for SO₂: 1-hour standard exceeded on no more than one day per year.

Table 54. Percentiles of daily 24-hour average SO₂ concentrations at Flinders View (1993–2017)

Year	Data availability (% of days)	No. of exceedances (days)	Maximum (ppm)	Annual average (ppm)	Percentiles (ppm)			
					99 th	98 th	95 th	90 th
1993	88.2*	0	0.006	0.002	0.005	0.005	0.004	0.003
1994	98.9	0	0.008	0.003	0.007	0.006	0.006	0.005
1995	59.5*	0	0.009	<i>i.d.</i>	0.008	0.006	0.005	0.004
1996	88.3*	0	0.010	0.002	0.005	0.005	0.004	0.004
1997	97.0	0	0.009	0.002	0.006	0.005	0.004	0.003
1998	95.9	0	0.011	0.002	0.007	0.006	0.004	0.004
1999	96.4	0	0.009	0.002	0.007	0.007	0.005	0.004
2000	89.9	0	0.013	0.002	0.012	0.008	0.006	0.005
2001	99.5	0	0.014	0.001	0.007	0.006	0.004	0.003
2002	97.0	0	0.006	0.001	0.006	0.005	0.003	0.003
2003	96.4	0	0.006	0.001	0.005	0.004	0.003	0.002
2004	99.5	0	0.007	0.001	0.006	0.005	0.003	0.003
2005	100.0	0	0.006	0.001	0.004	0.004	0.002	0.002
2006	99.7	0	0.007	0.001	0.006	0.004	0.004	0.003
2007	99.5	0	0.006	0.001	0.004	0.004	0.003	0.002
2008	98.6	0	0.006	0.001	0.005	0.004	0.003	0.002
2009	97.5	0	0.007	0.001	0.005	0.004	0.003	0.002
2010	99.5	0	0.008	0.001	0.004	0.003	0.003	0.002
2011	95.6	0	0.005	0.001	0.004	0.003	0.002	0.002
2012	100.0	0	0.004	0.001	0.003	0.003	0.002	0.002
2013	100.0	0	0.003	0.001	0.002	0.002	0.002	0.002
2014	96.4	0	0.002	0.000	0.001	0.001	0.001	0.001
2015	100.0	0	0.002	0.000	0.001	0.001	0.001	0.001
2016	99.7	0	0.002	0.001	0.002	0.002	0.001	0.001
2017	98.6	0	0.002	0.001	0.002	0.002	0.002	0.002

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

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

i.d. = insufficient data to calculate value.

AAQ NEPM standards for SO₂: 0.08 ppm (24-hour average); 0.02 ppm (annual average).

AAQ NEPM goal for SO₂: 24-hour standard exceeded on no more than one day per year.

Table 55. Percentiles of daily 24-hour average SO₂ concentrations at South Gladstone (1991–2017)

Year	Data availability (% of days)	No. of exceedances (days)	Maximum (ppm)	Annual average (ppm)	Percentiles (ppm)			
					99 th	98 th	95 th	90 th
1991	92.6	0	0.007	0.002	0.006	0.006	0.004	0.004
1992	94.3	0	0.012	0.003	0.011	0.010	0.009	0.008
1993	98.3	0	0.014	0.004	0.010	0.010	0.008	0.007
1994	97.0	0	0.013	0.003	0.007	0.007	0.006	0.005
1995	96.7	0	0.017	0.004	0.014	0.012	0.008	0.007
1996	99.2	0	0.010	0.002	0.007	0.006	0.005	0.004
1997	98.9	0	0.007	0.001	0.004	0.003	0.002	0.002
1998	97.5	0	0.012	0.001	0.010	0.007	0.005	0.003
1999	94.2	0	0.009	0.002	0.008	0.006	0.005	0.004
2000	84.7*	0	0.022	0.001	0.008	0.006	0.004	0.003
2001	98.1	0	0.006	0.001	0.005	0.004	0.003	0.002
2002	94.5	0	0.029	0.001	0.029	0.006	0.004	0.003
2003	93.2	0	0.013	0.001	0.011	0.007	0.005	0.003
2004	96.4	0	0.007	0.001	0.006	0.006	0.004	0.003
2005	98.9	0	0.011	0.002	0.009	0.006	0.004	0.004
2006	97.5	0	0.019	0.003	0.014	0.011	0.008	0.006
2007	97.5	0	0.021	0.002	0.012	0.010	0.007	0.005
2008	97.0	0	0.018	0.002	0.010	0.009	0.006	0.005
2009	93.7	0	0.009	0.002	0.008	0.007	0.006	0.004
2010	98.4	0	0.010	0.002	0.009	0.007	0.005	0.004
2011	97.3	0	0.011	0.003	0.011	0.009	0.008	0.005
2012	99.5	0	0.010	0.002	0.009	0.008	0.006	0.005
2013	95.3	0	0.013	0.002	0.010	0.008	0.006	0.004
2014	99.7	0	0.014	0.002	0.013	0.011	0.008	0.005
2015	95.1	0	0.013	0.002	0.012	0.010	0.008	0.005
2016	97.8	0	0.012	0.002	0.011	0.010	0.007	0.005
2017	99.2	0	0.011	0.002	0.009	0.008	0.005	0.004

*Data availability less than 75% for one or more quarters.
AAQ NEPM standards for SO₂: 0.08 ppm (24-hour average); 0.02 ppm (annual average).
AAQ NEPM goal for SO₂: 24-hour standard exceeded on no more than one day per year.

Table 56. Percentiles of daily 24-hour average SO₂ concentrations at Pimlico (2005–2016)

Year	Data availability (% of days)	No. of exceedances (days)	Maximum (ppm)	Annual average (ppm)	Percentiles (ppm)			
					99 th	98 th	95 th	90 th
2005	<i>18.1*</i>	<i>0</i>	<i>0.001</i>	<i>i.d.</i>	<i>0.001</i>	<i>0.001</i>	<i>0.001</i>	<i>0.000</i>
2006	96.2	0	0.003	0.000	0.002	0.002	0.002	0.001
2007	97.0	0	0.003	0.001	0.003	0.002	0.002	0.001
2008	98.9	0	0.001	0.000	0.001	0.001	0.001	0.000
2009	95.1	0	0.003	0.000	0.002	0.001	0.001	0.001
2010	90.1*	0	0.003	0.000	0.003	0.003	0.002	0.001
2011	94.2	0	0.006	0.001	0.006	0.005	0.004	0.003
2012	99.5	0	0.003	0.001	0.002	0.002	0.002	0.001
2013	94.8	0	0.002	0.000	0.001	0.001	0.001	0.001
2014	99.7	0	0.002	0.001	0.002	0.002	0.001	0.001
2015	99.5	0	0.003	0.001	0.003	0.002	0.001	0.001
2016	<i>16.1</i>	<i>0</i>	<i>0.001</i>	<i>i.d.</i>	<i>0.001</i>	<i>0.001</i>	<i>0.001</i>	<i>0.001</i>

*Data availability less than 75% for one or more quarters.
Years shown in italics have less than 75% annual data availability.
i.d. = insufficient data to calculate value.
AAQ NEPM standards for SO₂: 0.08 ppm (24-hour average); 0.02 ppm (annual average).
AAQ NEPM goal for SO₂: 1-hour standard exceeded on no more than one day per year.

Table 57. Percentiles of daily 24-hour average SO₂ concentrations at Menzies (1984–2017)

Year	Data availability (% of days)	No. of exceedances (days)	Maximum (ppm)	Annual average (ppm)	Percentiles (ppm)			
					99 th	98 th	95 th	90 th
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	44.7*	1	0.088	i.d.	0.078	0.072	0.052	0.046
1991	54.8*	3	0.117	i.d.	0.100	0.073	0.053	0.038
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	48.8*	0	0.055	i.d.	0.041	0.037	0.029	0.019
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
2012	99.5	0	0.063	0.005	0.056	0.055	0.031	0.016
2013	96.7	1	0.091	0.006	0.063	0.057	0.037	0.021
2014	97.0	1	0.096	0.005	0.048	0.039	0.030	0.017
2015	100.0	2	0.106	0.006	0.047	0.044	0.034	0.019
2016	100.0	1	0.111	0.007	0.062	0.056	0.038	0.025
2017	99.7	0	0.080	0.005	0.058	0.040	0.029	0.017

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

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

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

i.d. = insufficient data to calculate value.

AAQ NEPM standards for SO₂: 0.08 ppm (24-hour average); 0.02 ppm (annual average).

AAQ NEPM goal for SO₂: 24-hour standard exceeded on no more than one day per year.

PM₁₀

Table 58. 2017 percentiles of daily 24-hour average PM₁₀ concentrations

Region/performance monitoring station	Data availability (% of days)	Maximum (µg/m ³)	Percentiles (µg/m ³)					
			99 th	98 th	95 th	90 th	75 th	50 th
<u>South East Queensland</u> Mountain Creek	96.7	37.5	34.7	31.0	28.8	25.2	20.6	16.5
Rocklea	99.7	43.2	30.2	27.7	25.1	21.0	17.3	13.5
Springwood	100	34.4	27.9	24.9	21.0	19.1	14.3	10.6
Flinders View	99.5	41.2	33.1	31.2	27.2	24.0	19.6	15.7
<u>Gladstone</u> South Gladstone	92.1	40.2	27.3	25.3	21.6	19.5	16.0	13.5
<u>Mackay</u> West Mackay	90.4	69.0	45.4	42.4	37.0	32.7	24.9	19.7
<u>Townsville</u> North Ward	4.9*	20.8	20.2	19.6	17.8	16.3	15.3	11.0
<u>Mount Isa</u> The Gap	98.1	89.7	43.3	37.9	32.3	27.6	22.2	16.3

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

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

AAQ NEPM standards for PM₁₀: 50 µg/m³ (24-hour average); 25 µg/m³ (1-year average).

When reporting compliance with the PM₁₀ 24-hour goal, PM₁₀ monitoring data determined to be directly associated with an exceptional event (e.g. bushfire smoke, dust storm) is excluded.

Table 59. Percentiles of daily 24-hour average PM₁₀ concentrations at Mountain Creek (2001–2017)

Year	Data availability (% of days)	No. of exceedances (days)	Maximum (µg/m ³)	Annual average (µg/m ³)	Percentiles (µg/m ³)			
					99 th	98 th	95 th	90 th
2001	47.9*	1	50.8	<i>i.d.</i>	39.9	38.1	27.2	23.8
2002	88.2*	8	146.9	19.1	76.0	56.3	36.6	28.1
2003	99.5	1	69.0	15.1	37.0	32.4	27.4	22.4
2004	96.7	1	66.6	15.4	39.2	34.6	29.1	23.3
2005	95.9	2	62.9	14.5	37.6	29.7	24.4	20.3
2006	98.9	0	39.8	14.6	33.3	28.4	23.9	20.9
2007	98.9	0	41.9	14.6	34.4	31.1	24.0	21.1
2008	93.4	1	53.3	15.8	42.4	35.3	27.6	23.4
2009	97.5	8	863.8	20.2	116.25	63.0	35.6	24.7
2010	97.0	0	33.7	13.1	25.2	23.8	21.3	18.9
2011	97.0	0	49.5	13.2	29.5	28.3	21.7	19.3
2012	95.1	1	57.1	13.7	37.8	31.1	24.7	20.9
2013	98.6	1	78.1	15.8	38.7	30.6	26.6	24.0
2014	97.8	1	59.5	14.5	32.8	28.4	25.1	21.2
2015	98.4	0	44.8	13.8	29.6	26.6	21.8	19.5
2016	97.5	0	38.8	16.0	31.7	28.3	25.6	23.0
2017	96.7	0	37.5	17.5	34.7	31.0	28.8	25.2

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

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

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

i.d. = insufficient data to calculate value.

AAQ NEPM standards for PM₁₀: 50 µg/m³ (24-hour average); 25 µg/m³ (1-year average).

Prior to 2016, the AAQ NEPM goal for PM₁₀ was that the standard was exceeded on no more than five days per year. From January 2016, PM₁₀ monitoring data determined as being directly associated with an exceptional event (e.g. dust storm) is excluded from reporting compliance with the PM₁₀ 24-hour goal.

Table 60. Percentiles of daily 24-hour average PM₁₀ concentrations at Rocklea (1996–2017)

Year	Data availability (% of days)	No. of exceedances (days)	Maximum (µg/m ³)	Annual average (µg/m ³)	Percentiles (µg/m ³)			
					99 th	98 th	95 th	90 th
1996	62.0*	2	59.5	<i>i.d.</i>	44.8	42.0	35.7	31.2
1997	92.1	0	41.3	18.1	37.4	31.3	27.6	25.9
1998	91.2	0	32.8	17.0	30.6	28.1	25.4	23.3
1999	96.4	1	56.7	15.7	31.4	27.9	25.4	22.2
2000	92.6	0	47.5	17.8	40.5	37.1	31.4	26.5
2001	97.3	1	70.8	16.8	34.8	32.1	26.5	24.2
2002	99.2	8	177.3	20.2	82.2	49.0	32.9	29.6
2003	98.1	2	119.9	16.4	40.4	33.4	28.3	24.2
2004	92.6	0	47.3	19.1	40.8	38.1	33.3	28.2
2005	89.9	2	52.6	16.9	39.8	36.2	27.0	23.3
2006	96.2	0	39.5	16.1	31.5	29.4	26.8	23.8
2007	99.2	1	53.4	17.5	39.1	36.6	31.7	26.3
2008	95.1	1	86.8	16.7	39.6	36.4	28.9	24.8
2009	97.3	9	1033.4	25.2	109.2	64.6	40.3	35.1
2010	96.7	0	38.0	16.7	30.5	27.8	25.3	22.6
2011	2.7*	0	20.4	<i>i.d.</i>	20.3	20.2	19.9	19.3
2012	56.3*	0	41.0	<i>i.d.</i>	34.8	34.6	26.7	22.8
2013	85.8	0	32.2	14.2	29.8	27.3	24.0	21.0
2014	94.8	0	31.6	14.0	30.4	29.7	23.4	21.1
2015	96.2	0	44.0	14.9	31.1	27.4	24.2	21.5
2016	90.7	0	31.2	15.1	29.5	27.1	24.4	21.7
2017	99.7	0	43.2	14.3	30.2	27.7	25.1	21.0

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

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

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

i.d. = insufficient data to calculate value.

AAQ NEPM standards for PM₁₀: 50 µg/m³ (24-hour average); 25 µg/m³ (1-year average).

Prior to January 2016, the AAQ NEPM goal for PM₁₀ was that the standard was exceeded on no more than five days per year. From January 2016, PM₁₀ monitoring data determined as being directly associated with an exceptional event (e.g. dust storm) is excluded from reporting compliance with the PM₁₀ 24-hour goal.

Table 61. Percentiles of daily 24-hour average PM₁₀ concentrations at Flinders View (1998–2017)

Year	Data availability (% of days)	No. of exceedances (days)	Maximum (µg/m ³)	Annual average (µg/m ³)	Percentiles (µg/m ³)			
					99 th	98 th	95 th	90 th
1998	68.2*	0	26.6	<i>i.d.</i>	24.6	22.2	20.8	19.0
1999	95.3	0	44.2	12.3	27.4	25.1	19.7	17.5
2000	97.3	1	62.8	16.6	39.2	36.2	31.3	26.0
2001	99.7	0	42.5	15.1	36.5	32.9	25.4	22.4
2002	97.3	7	197.2	19.8	92.1	47.0	36.2	30.3
2003	94.8	1	119.1	15.7	35.3	30.6	26.1	23.1
2004	99.2	3	64.1	18.5	39.1	37.4	32.2	28.5
2005	97.0	3	64.3	16.1	43.5	40.1	26.8	23.6
2006	100.0	0	35.7	14.7	29.4	28.5	25.3	22.4
2007	99.2	0	44.6	15.7	38.4	34.3	27.5	23.3
2008	99.2	2	68.5	14.6	44.7	36.0	26.3	21.1
2009	98.6	8	1001.8	21.2	100.7	54.0	32.1	26.9
2010	99.2	0	33.9	12.2	25.5	24.2	20.2	18.3
2011	99.2	2	67.0	14.1	32.8	29.7	22.2	19.9
2012	98.4	2	73.8	15.0	42.2	35.3	27.2	23.1
2013	99.2	0	42.2	15.0	32.3	29.8	24.9	22.0
2014	94.8	0	38.8	15.9	35.7	33.3	28.9	24.6
2015	99.7	0	44.5	14.6	34.5	31.4	24.5	21.8
2016	98.6	0	34.0	13.1	31.4	28.1	24.2	20.2
2017	99.5	0	41.2	16.2	33.1	31.2	27.2	24.0

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

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

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

i.d. = insufficient data to calculate value.

AAQ NEPM standards for PM₁₀: 50 µg/m³ (24-hour average); 25 µg/m³ (1-year average).

Prior to January 2016, the AAQ NEPM goal for PM₁₀ was that the standard was exceeded on no more than five days per year. From January 2016, PM₁₀ monitoring data determined as being directly associated with an exceptional event (e.g. dust storm) is excluded from reporting compliance with the PM₁₀ 24-hour goal.

Table 62. Percentiles of daily 24-hour average PM₁₀ concentrations at North Toowoomba (2003–2010)

Year	Data availability (% of days)	No. of exceedances (days)	Maximum (µg/m ³)	Annual average (µg/m ³)	Percentiles (µg/m ³)			
					99 th	98 th	95 th	90 th
2003	41.1*	1	139.8	<i>i.d.</i>	42.0	35.2	33.2	30.1
2004	98.9	1	54.5	17.0	47.8	42.1	35.4	29.7
2005	95.9	3	111.7	15.3	43.1	34.6	28.5	24.6
2006	92.9	1	55.6	15.8	39.3	33.2	30.0	25.9
2007	97.5	1	51.5	13.8	43.0	36.6	27.2	24.0
2008	95.9	4	105.2	14.7	51.9	46.5	30.2	25.8
2009	97.5	11	1131.0	23.3	127.8	87.8	41.7	32.2
2010	90.7*	0	35.1	12.6	31.8	27.1	23.1	20.9

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

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

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

i.d. = insufficient data to calculate value.

AAQ NEPM standards for PM₁₀: 50 µg/m³ (24-hour average); 25 µg/m³ (1-year average).

Prior to January 2016, the AAQ NEPM goal for PM₁₀ was that the standard was exceeded on no more than five days per year. From January 2016, PM₁₀ monitoring data determined as being directly associated with an exceptional event (e.g. dust storm) is excluded from reporting compliance with the PM₁₀ 24-hour goal.

Table 63. Percentiles of daily 24-hour average PM₁₀ concentrations at South Gladstone (2000–2017)

Year	Data availability (% of days)	No. of exceedances (days)	Maximum (µg/m ³)	Annual average (µg/m ³)	Percentiles (µg/m ³)			
					99 th	98 th	95 th	90 th
2000	63.1*	4	65.2	<i>i.d.</i>	54.8	44.5	32.0	28.2
2001	95.6	4	66.7	17.7	47.4	35.9	30.4	25.8
2002	98.1	5	197.1	18.2	75.1	46.0	33.6	25.8
2003	96.4	0	41.3	15.5	36.1	33.4	26.2	23.6
2004	99.7	0	42.7	16.3	34.5	29.1	25.3	22.4
2005	97.8	4	196.7	16.9	48.5	32.7	26.4	22.8
2006	98.4	1	54.6	16.7	37.0	34.1	27.9	23.1
2007	96.7	0	38.8	15.7	29.5	28.3	25.1	22.7
2008	93.7	2	65.6	17.0	42.3	36.8	29.5	25.5
2009	83.0*	7	252.3	23.2	80.8	54.1	38.1	29.9
2010	78.4*	0	35.6	16.5	32.1	30.3	26.5	23.5
2011	76.7*	3	136.7	14.0	40.7	32.1	27.6	23.2
2012	88.5*	1	63.0	14.6	31.8	28.4	25.1	21.9
2013	95.3	0	37.6	16.8	30.3	28.8	25.5	23.0
2014	95.1	0	49.3	16.2	34.4	30.3	27.9	23.5
2015	93.4	0	31.5	12.9	26.6	25.9	22.0	19.8
2016	97.8	0	32.1	14.5	27.6	25.8	23.3	21.9
2017	92.1	0	40.2	13.9	27.3	25.3	21.6	19.5

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

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

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

i.d. = insufficient data to calculate value.

AAQ NEPM standards for PM₁₀: 50 µg/m³ (24-hour average); 25 µg/m³ (1-year average).

Prior to January 2016, the AAQ NEPM goal for PM₁₀ was that the standard was exceeded on no more than five days per year. From January 2016, PM₁₀ monitoring data determined as being directly associated with an exceptional event (e.g. dust storm) is excluded from reporting compliance with the PM₁₀ 24-hour goal.

Table 64. Percentiles of daily 24-hour average PM₁₀ concentrations at West Mackay (1998–2017)

Year	Data availability (% of days)	No. of exceedances (days)	Maximum (µg/m ³)	Annual average (µg/m ³)	Percentiles (µg/m ³)			
					99 th	98 th	95 th	90 th
1998	39.5*	0	28.9	<i>i.d.</i>	28.8	28.7	22.3	20.7
1999	93.2	1	50.4	17.3	37.6	32.2	27.7	25.6
2000	98.9	2	51.6	18.9	48.4	43.0	34.0	29.9
2001	98.6	2	52.6	22.0	48.5	42.8	37.9	33.5
2002	98.6	5	475.4	24.6	51.2	46.4	37.4	33.1
2003	92.3	7	85.0	21.5	53.2	49.1	38.9	32.2
2004	97.3	0	45.3	20.7	39.6	37.7	33.6	29.6
2005	97.0	7	146.0	22.0	105.1	52.6	36.3	31.1
2006	95.6	1	106.0	19.8	41.5	36.2	31.7	28.4
2007	95.6	2	61.1	21.6	49.1	46.1	38.5	33.1
2008	98.4	9	94.0	23.6	61.4	53.1	43.9	36.4
2009	97.5	18	514.8	28.6	202.6	89.8	50.9	40.8
2010	83.0*	0	44.0	18.5	41.4	35.8	30.7	27.1
2011	92.9	1	65.8	19.9	41.8	39.4	36.2	30.2
2012	98.9	1	64.9	17.8	40.0	37.4	27.6	24.3
2013	96.4	0	42.4	18.5	36.4	30.1	26.4	24.5
2014	91.2	0	34.3	18.2	29.0	27.9	25.2	24.0
2015	91.8	0	46.5	22.0	41.9	37.8	34.1	29.5
2016	97.5	0	44.5	19.8	34.4	33.1	28.4	27.0
2017	90.4	3	69.0	21.6	45.4	42.4	37.0	32.7

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

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

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

i.d. = insufficient data to calculate value.

AAQ NEPM standards for PM₁₀: 50 µg/m³ (24-hour average); 25 µg/m³ (1-year average).

Prior to January 2016, the AAQ NEPM goal for PM₁₀ was that the standard was exceeded on no more than five days per year. From January 2016, PM₁₀ monitoring data determined as being directly associated with an exceptional event (e.g. dust storm) is excluded from reporting compliance with the PM₁₀ 24-hour goal.

Table 65. Percentiles of daily 24-hour average PM₁₀ concentrations at Pimlico (2004–2016)

Year	Data availability (% of days)	No. of exceedances (days)	Maximum (µg/m ³)	Annual average (µg/m ³)	Percentiles (µg/m ³)			
					99 th	98 th	95 th	90 th
2004	52.2*	0	28.1	<i>i.d.</i>	27.0	25.9	23.2	21.4
2005	91.8	5	141.9	16.1	113.0	31.7	23.4	20.5
2006	89.6*	2	61.5	14.6	28.3	24.0	22.2	20.1
2007	94.0	0	29.1	12.9	26.9	24.2	20.5	18.3
2008	97.0	1	50.6	16.4	36.1	32.6	29.3	23.9
2009	93.4	9	460.4	21.2	302.2	121.5	33.9	23.6
2010	80.3*	0	31.5	13.9	29.3	25.6	22.8	19.4
2011	93.7	1	64.9	15.4	33.9	31.8	27.7	22.3
2012	92.1	0	30.0	12.9	26.3	23.6	21.5	18.8
2013	95.1	0	27.6	15.1	27.0	26.1	24.4	22.5
2014	98.4	0	29.4	15.1	27.7	26.2	23.1	20.6
2015	91.2	0	42.0	17.6	36.6	32.6	26.7	24.1
2016	11.7*	0	33.4	<i>i.d.</i>	33.4	33.4	32.5	24.5

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

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

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

i.d. = insufficient data to calculate value.

AAQ NEPM standards for PM₁₀: 50 µg/m³ (24-hour average); 25 µg/m³ (1-year average).

Prior to January 2016, the AAQ NEPM goal for PM₁₀ was that the standard was exceeded on no more than five days per year. From January 2016, PM₁₀ monitoring data determined as being directly associated with an exceptional event (e.g. dust storm) is excluded from reporting compliance with the PM₁₀ 24-hour goal.

Table 66. Percentiles of daily 24-hour average PM₁₀ concentrations at The Gap (2009–2017)

Year	Data availability (% of days)	No. of exceedances (days)	Maximum (µg/m ³)	Annual average (µg/m ³)	Percentiles (µg/m ³)			
					99 th	98 th	95 th	90 th
2009	63.3*	19	508.5	<i>i.d.</i>	283.6	135.6	67.8	45.8
2010	75.1*	0	32.1	8.9	25.7	23.9	18.8	15.8
2011	87.4*	13	124.0	17.3	91.2	71.5	42.6	32.4
2012	99.2	16	74.5	19.5	59.3	56.7	49.2	38.8
2013	79.7*	13	154.1	23.1	137.0	67.7	45.9	37.5
2014	96.7	12	153.7	20.4	80.0	57.7	43.4	33.6
2015	98.1	6	153.3	19.5	56.9	50.0	39.5	31.5
2016	95.6	1	350.8	16.8	43.3	41.1	31.5	26.5
2017	98.1	3	89.7	18.2	43.3	37.9	32.3	27.6

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

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

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

i.d. = insufficient data to calculate value.

AAQ NEPM standards for PM₁₀: 50 µg/m³ (24-hour average); 25 µg/m³ (1-year average).

Prior to January 2016, the AAQ NEPM goal for PM₁₀ was that the standard was exceeded on no more than five days per year. From January 2016, PM₁₀ monitoring data determined as being directly associated with an exceptional event (e.g. dust storm) is excluded from reporting compliance with the PM₁₀ 24-hour goal.

PM_{2.5}

Table 67. 2017 percentiles of daily 24-hour average PM_{2.5} concentrations

Region/performance monitoring station	Data availability (% of days)	Maximum (µg/m ³)	Percentiles (µg/m ³)					
			99 th	98 th	95 th	90 th	75 th	50 th
<u>South East Queensland</u> Rocklea [†]	99.7	28.9	19.5	17.3	13.8	11.9	9.0	6.5
Springwood [†]	100.0	23.9	15.0	13.8	11.6	9.8	7.2	4.6
<u>Gladstone</u> South Gladstone [†]	92.1	28.6	13.4	10.6	9.3	8.4	6.6	5.3
<u>Townsville</u> North Ward [‡]	4.9*	7.6	7.4	7.2	6.5	6.1	5.6	4.2
<p>*Monitoring by TEOM Model 1405 instrumentation fitted with FDMS. †Monitoring by TAPI T640X optical aerosol spectrometer. *Data availability less than 75% for one or more quarters. AAQ NEPM standards for PM_{2.5}: 25 µg/m³ (24-hour average); 8 µg/m³ (1-year average). When reporting compliance with the PM_{2.5} 24-hour goal, PM_{2.5} monitoring data determined to be directly associated with an exceptional event (e.g. bushfire smoke, dust storm) is excluded.</p>								

Table 68. Percentiles of daily 24-hour average PM_{2.5} concentrations at Rocklea (1998–2017)

Year	Data availability (% of days)	No. of exceedances (days)	Maximum (µg/m ³)	Annual average (µg/m ³)	Percentiles (µg/m ³)			
					99 th	98 th	95 th	90 th
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
2012	56.3*	0	23.7	<i>i.d.</i>	22.8	16.7	13.9	11.3
2013	85.8	0	17.2	6.6	16.4	14.7	12.0	10.3
2014	94.8	0	21.9	5.8	19.1	15.5	13.0	9.6
2015	96.2	0	20.3	7.3	16.6	15.8	13.5	11.5
2016	90.7	0	19.9	6.5	16.7	15.2	13.4	10.7
2017	99.7	1	28.9[‡]	7.3	19.5	17.3	13.8	11.9

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

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

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

i.d. = insufficient data to calculate value.

Monitoring by TEOM Model 1400 instrumentation in accordance with Technical Paper on Monitoring for Particles as PM_{2.5} from 1998 to 2008. Monitoring by TEOM Model 1405 instrumentation fitted with FDMS since 2009.

AAQ NEPM standards for PM_{2.5}: 25 µg/m³ (24-hour average); 8 µg/m³ (1-year average).

[‡]When reporting compliance with the PM_{2.5} 24-hour goal, PM_{2.5} monitoring data determined to be directly associated with an exceptional event (e.g. bushfire smoke, dust storm) is excluded.

Table 69. Percentiles of daily 24-hour average PM_{2.5} concentrations at Springwood (1999–2017)

Year	Data availability (% of days)	No. of exceedances (days)	Maximum (µg/m ³)	Annual average (µg/m ³)	Percentiles (µg/m ³)			
					99 th	98 th	95 th	90 th
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
2012	98.1	0	23.7	4.4	15.6	13.3	10.2	7.5
2013	96.7	0	14.2	4.5	11.9	11.6	10.1	8.6
2014	97.3	0	17.6	4.9	14.8	13.1	10.0	8.0
<i>2015</i>	<i>71.0*</i>	<i>0</i>	<i>12.6</i>	<i>i.d.</i>	<i>10.9</i>	<i>9.8</i>	<i>7.5</i>	<i>6.5</i>
2016	95.6	0	20.1	5.7	16.0	13.6	10.9	9.3
2017	100.0	0	23.9	5.4	15.0	13.8	11.6	9.8

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

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

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

i.d. = insufficient data to calculate value.

Monitoring by TEOM Model 1400 instrumentation in accordance with Technical Paper on Monitoring for Particles as PM_{2.5} (to 25 February 2016). From 25 February, monitoring by TEOM Model 1405 instrumentation fitted with FDMS.

AAQ NEPM standards for PM_{2.5}: 25 µg/m³ (24-hour average); 8 µg/m³ (1-year average).

When reporting compliance with the PM_{2.5} 24-hour goal, PM_{2.5} monitoring data determined to be directly associated with an exceptional event (e.g. bushfire smoke, dust storm) is excluded.

Table 70. Percentiles of daily 24-hour average PM_{2.5} concentrations at North Toowoomba (2003–2007)

Year	Data availability (% of days)	No. of exceedances (days)	Maximum (µg/m ³)	Annual average (µg/m ³)	Percentiles (µg/m ³)			
					99 th	98 th	95 th	90 th
2003	34.8*	1	28.1	<i>i.d.</i>	19.0	17.1	15.3	12.1
2004	98.6	1	33.2	5.1	19.1	17.3	14.6	11.7
2005	97.3	0	24.8	4.7	14.7	13.6	10.9	8.6
2006	93.2	0	16.0	4.1	15.3	12.0	9.6	7.9
2007	92.9	0	17.8	3.6	11.9	10.8	8.7	6.8

Bold text indicates a value greater than the AAQ NEPM standard.
 *Data availability less than 75% for one or more quarters.
 Years shown in italics have less than 75% annual data availability.
 i.d. = insufficient data to calculate value.
 Monitoring by TEOM Model 1400 instrumentation in accordance with Technical Paper on Monitoring for Particles as PM_{2.5}.
 AAQ NEPM standards for PM_{2.5}: 25 µg/m³ (24-hour average); 8 µg/m³ (1-year average).
 When reporting compliance with the PM_{2.5} 24-hour goal, PM_{2.5} monitoring data determined to be directly associated with an exceptional event (e.g. bushfire smoke, dust storm) is excluded.

Table 71. Percentiles of daily 24-hour average PM_{2.5} concentrations at South Gladstone (2008–2017)

Year	Data availability (% of days)	No. of exceedances (days)	Maximum (µg/m ³)	Annual average (µg/m ³)	Percentiles (µg/m ³)			
					99 th	98 th	95 th	90 th
2008	13.9*	0	15.2	<i>i.d.</i>	12.6	12.6	12.3	11.1
2009	83.0*	7	50.8	9.2	29.8	26.9	17.7	13.8
2010	78.4*	0	17.5	6.2	16.3	14.8	12.9	9.9
2011	90.4*	9	126.7	7.6	62.2	33.5	16.4	12.0
2012	88.5*	1	49.6	5.2	21.4	12.1	9.5	7.5
2013	95.3	0	18.3	5.6	16.9	12.1	10.3	8.6
2014	95.1	1	44.0	6.0	14.6	12.8	10.9	9.4
2015	93.4	0	13.8	4.3	10.1	9.4	8.0	6.7
2016	97.8	0	15.9	5.7	14.8	13.2	10.3	8.4
2017	92.1	1	28.6[‡]	5.6	13.4	10.6	9.3	8.4

Bold text indicates a value greater than the AAQ NEPM standard.
 *Data availability less than 75% for one or more quarters.
 Years shown in italics have less than 75% annual data availability.
 i.d. = insufficient data to calculate value.
 Monitoring by TEOM Model 1405 instrumentation fitted with FDMS.
 AAQ NEPM standards for PM_{2.5}: 25 µg/m³ (24-hour average); 8 µg/m³ (1-year average).
 ‡When reporting compliance with the PM_{2.5} 24-hour goal, PM_{2.5} monitoring data determined to be directly associated with an exceptional event (e.g. bushfire smoke, dust storm) is excluded.

Lead

Table 72. Annual average lead concentrations at Woolloongabba (1980–2002)

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% for one or more quarters.

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

i.d. = insufficient data to calculate value.

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

Table 73. Annual average lead concentrations at Townsville Coast Guard (2011–2017)

Year	Data availability (% of days)	Annual average ($\mu\text{g}/\text{m}^3$)
2011	85.0*	0.14
2012	96.7	0.12
2013	88.5	0.24
2014	96.7	0.29
2015	91.8	0.16
2016	100.0	0.05
2017	91.8	0.09

*Data availability less than 75% for one or more quarters.
AAQ NEPM standard for lead: $0.5 \mu\text{g}/\text{m}^3$ (annual average).

Table 74. Annual average lead concentrations at The Gap (2009–2017)

Year	Data availability (% of days)	Annual average ($\mu\text{g}/\text{m}^3$)
2009	77.0*	0.13
2010	95.0	0.13
2011	96.7	0.14
2012	91.8	0.10
2013	73.8*	<i>i.d.</i>
2014	91.8*	0.11
2015	100.0	0.09
2016	80.3*	0.06
2017	91.8	0.08

*Data availability less than 75% for one or more quarters.
Years shown in italics have less than 75% annual data availability.
i.d. = insufficient data to calculate value.
AAQ NEPM standard for lead: $0.5 \mu\text{g}/\text{m}^3$ (annual average).