Department of Environment
and Resource Management

Queensland 2009 air monitoring report

Prepared by:

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Department of Environment and Resource Management

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Summary

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

Air monitoring at National Environment Protection (Ambient Air Quality) Measure (AAQ NEPM) monitoring stations in Queensland between January and December 2009 showed no exceedences of the AAQ NEPM air quality standards for carbon monoxide, nitrogen dioxide, ozone and lead at any monitoring site during the year. Exceedences of the AAQ NEPM standards and advisory standards for $PM_{2.5}$ occurred for:

- 1-hour sulfur dioxide at the Menzies and The Gap sites in Mount Isa due to industrial emissions;
- 24-hour sulfur dioxide at the Menzies site in Mount Isa due to industrial emissions;
- 24-hour particles with an aerodynamic diameter less than 10µm (PM_{10}) in south-east Queensland, Toowoomba, Gladstone, Mackay, Townsville and Mount Isa due to dust storms, wind blown dust generated by strong winds associated with the passage of weather fronts and/or bushfire smoke;
- 24-hour PM_{10} at the West Mackay site due to locally generated dust from activities at adjoining commercial premises;
- 24-hour particles with an aerodynamic diameter less than 2.5µm ($PM_{2.5}$) in south-east Queensland and Gladstone due to dust storms and bushfire smoke; and
- 1-year $PM_{2.5}$ at Rocklea in south-east Queensland and South Gladstone due to the contribution of very high short-term $PM_{2.5}$ episodes (dust storms, bushfire smoke) in combination with background urban $PM_{2.5}$ sources.

The AAQ NEPM 2008 goal was met in all regions during 2009, with the exception of:

- 1-hour sulfur dioxide at the Menzies and The Gap sites in Mount Isa due to industrial emissions;
- 24-hour sulfur dioxide at the Menzies site in Mount Isa due to industrial emissions; and
- 24-hour PM_{10} at all monitoring sites in south-east Queensland, Gladstone, Mackay, Townsville and Mount Isa due to wind blown dust.

Compliance with the standards and the 2009 goal could not be demonstrated for nitrogen dioxide at the Springwood monitoring site in south-east Queensland, sulfur dioxide at the Springwood monitoring site and at The Gap monitoring site in Mount Isa, ozone at the Springwood and Central Gladstone monitoring sites and lead at The Gap monitoring site in 2009 because data availability was below the level required to make a valid assessment. Low data availability was the result of monitoring instrument removal for servicing (Springwood) or establishment of the monitoring site part-way through 2009 (Central Gladstone and The Gap).

There was a much higher than normal incidence and severity of wind blown dust events throughout Queensland during 2009. The number of exceedences of PM_{10} and $PM_{2.5}$ standards at monitoring sites in Queensland during 2009 was higher than for any previous year monitoring has been conducted. The PM_{10} and $PM_{2.5}$ concentrations measured during the major dust storms affecting the whole of Queensland in late September 2009 were the highest ever recorded.

Contents

Introduction

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

This report documents compliance information for Queensland for 2009 in accordance with technical paper No. 8. The report is divided into four sections:

Section A: Overview of the AAQ NEPM monitoring network and related activities during 2009.
Section B: Assessment of compliance with the AAQ NEPM Standards and Goals.
Section C: Assessment of monitoring data against the standards (including details of exceedences and the circumstances which led to these exceedences, and information on the highest values measured for all pollutants and regions).
Section D: Data analysis (including pollutant distribution summaries and selected multi-year data for trend stations).

Additional information on the circumstances which led to exceedences of standards during 2009 is provided in an appendix.

Section A – Monitoring summary

Queensland's ambient air monitoring plan (available from http://www.derm.qld.gov.au/register/p00579aa.pdf) outlines the monitoring to be undertaken in Queensland to determine compliance with the Standards and 2008 Goal of the AAQ NEPM. It should be noted that this monitoring is only a part of the overall air monitoring network operated by the Department of Environment and Resource Management (DERM). Details of AAQ NEPM monitoring and related activities in Queensland during 2009 follow.

Current AAQ NEPM monitoring stations

During 2009 monitoring was conducted in six of the ten regions identified in the Queensland monitoring plan – south-east Queensland (consisting of four sub-regions), Toowoomba, Gladstone, Mackay, Townsville and Mount Isa. Monitoring site locations are shown in Figure 1.

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

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

Sites are further characterised using the population coverage descriptors contained in the National Environment Protection (Ambient Air Quality) Measure Technical Paper No. 3, "Monitoring Strategy" (available from www.ephc.gov.au):

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

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

Monitoring methods employed by DERM comply with the relevant Australian Standard specified in the AAQ NEPM, with the exception of the Springwood and Central Gladstone sites where a differential optical absorption spectroscopy (DOAS) technique is used to measure ozone, nitrogen dioxide and sulfur dioxide levels. At the Rocklea (from October 2009) and South Gladstone sites, PM_{10} monitoring was conducted using TEOM instrumentation fitted with a Filter Dynamic Measurement System (FDMS) to account for possible losses of semi-volatile compounds present in the particles from heating of the air stream.

TEOM PM_{10} data in this report have been adjusted using the temperature-dependent factor described in option 2 in the National Environment Protection (Ambient Air Quality) Measure Technical Paper No. 10, "Collection and Reporting of TEOM PM_{10} Data" (available from www.ephc.gov.au). The resulting adjustments vary linearly from no change at daily average temperatures at or above 15deg to an increase of 40 percent at a temperature of 5deg.

$PM_{2.5}$ data in this report has been obtained using either reference samplers (Partisol 2025 sequential air samplers) operating on a one in three day basis or TEOM $PM_{2.5}$ instruments operating on a continuous basis. The TEOM instrumentation has been operated in accordance with the protocol outlined in the National Environment Protection (Ambient Air Quality) Measure Technical Paper on Monitoring for Particles as $PM_{2.5}$, or were fitted with FDMS units.

Figure 1: 2009 AAQ NEPM monitoring station locations.

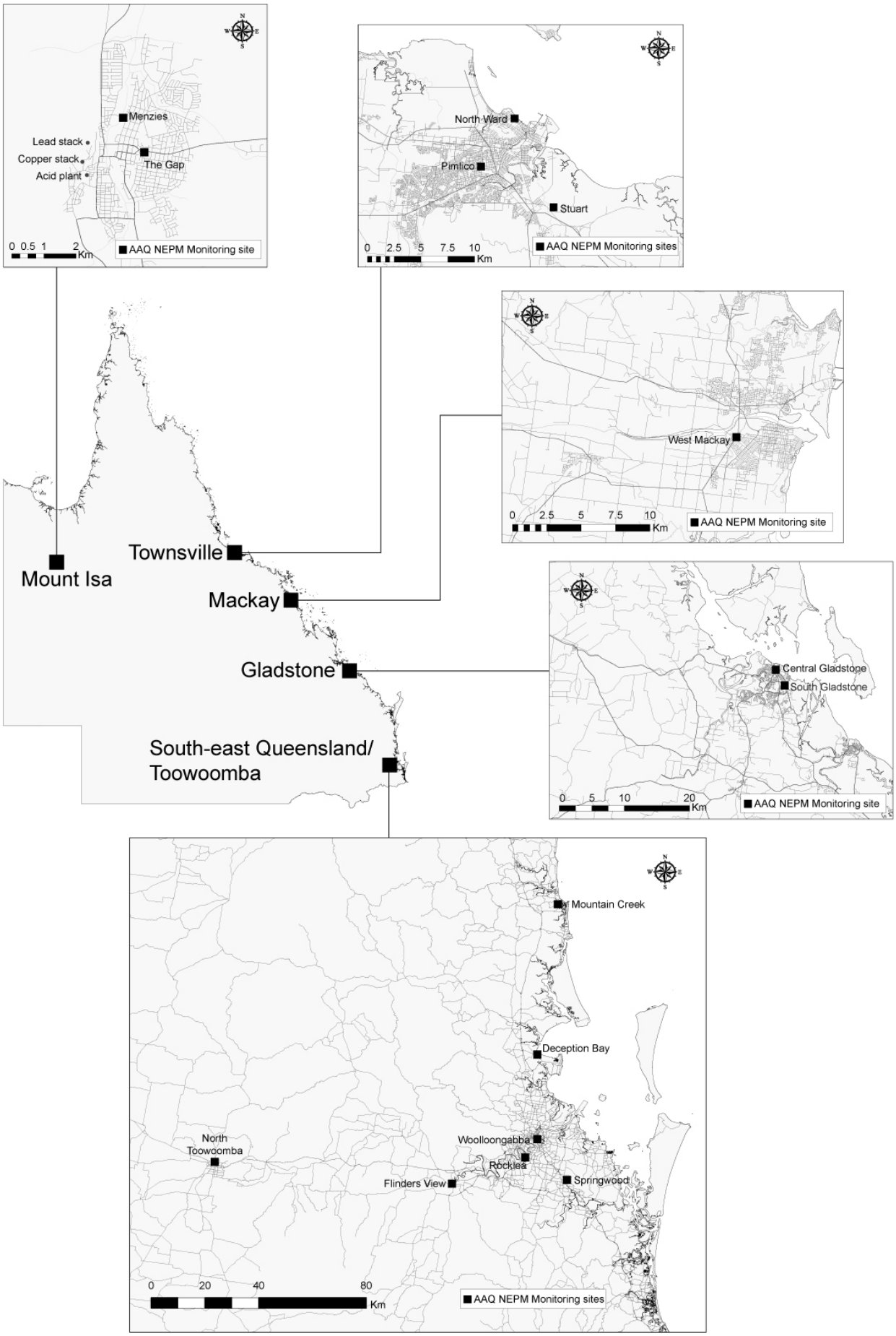


Table 1: 2009 Queensland AAQ NEPM monitoring sites.

Site	Station type	Established	Pollutants monitored	Monitoring techniques	Location category	Non-conformance with AS3580.1.1 siting criteria	Major pollutant sources
South-east Queensland *North Coast sub-region*							
Mountain Creek	PMS - GRUB	July 2001	Ozone Nitrogen dioxide PM_{10}	AS3580.6.1-1990 AS3580.5.1-1993 AS3580.9.8-2001	Residential	Nil	Major roads Forestry/agricultural burning
Brisbane sub-region							
Deception Bay	Trend – GRUB	June 1994	Ozone Nitrogen dioxide	AS3580.6.1-1990 AS3580.5.1-1993	Residential	Trees within 20m west of site	Major roads
Woolloongabba	Trend – Peak	June 1998	Carbon monoxide	AS3580.7.1-1992	Inner city roadside	Building within 20m west of site	Major roads
Rocklea	Trend – GRUB	January 1978	Ozone Nitrogen dioxide PM_{10} $PM_{2.5}$ $PM_{2.5}$	AS3580.6.1-1990 AS3580.5.1-1993 AS3580.9.8-2001 Reference method (Partisol sequential air sampler) FDMS TEOM, based on AS3580.9.8-2001	Light industrial / residential	Nil	Major roads
Springwood	PMS – Population average	March 1999	Ozone Nitrogen dioxide Sulfur dioxide PM_{10} $PM_{2.5}$	Differential Optical Absorption Spectroscopy Differential Optical Absorption Spectroscopy Differential Optical Absorption Spectroscopy AS3580.9.8-2001 TEOM, based on AS3580.9.8-2001	Residential	Nil	Major roads
Ipswich sub-region							
Flinders View	Trend – GRUB	January 1993	Ozone Nitrogen dioxide Sulfur dioxide PM_{10}	AS3580.6.1-1990 AS3580.5.1-1993 AS3580.4.1-2008 AS3580.9.8-2001	Industry / residential	Trees within 20m of site	Major roads Industry (power station)
Toowoomba							
North Toowoomba	Campaign – GRUB	July 2003	Carbon monoxide Ozone Nitrogen dioxide PM_{10}	AS3580.7.1-1992 AS3580.6.1-1990 AS3580.5.1-1993 AS3580.9.8-2001	Residential	Nil	Major roads Solid fuel heaters
Gladstone							
Central Gladstone	Campaign – Population average	June 2009	Ozone	Differential Optical Absorption Spectroscopy	Industry / residential	Nil	Major roads Industry (power generation, metals processing)
South Gladstone	Trend – GRUB	July 1992	Nitrogen dioxide Sulfur dioxide PM_{10}	AS3580.5.1-1993 AS3580.4.1-2008 FDMS TEOM, based on AS3580.9.8-2001	Industry / residential	Nil	Major roads Industry (power generation, metals processing)
Mackay							
West Mackay	PMS – GRUB	September 1997	PM_{10}	AS3580.9.8-2001	Light industry / residential	Extraneous dust sources nearby	Agricultural burning
Townsville							
North Ward	Campaign – GRUB	May 2008	Lead	AS3580.9.3-2003, with analysis by ICP	Residential	Buildings within 20m	Port operations involving metal concentrates
Pimlico	Campaign – Population average	May 2004	Ozone Nitrogen dioxide Sulfur dioxide PM_{10}	AS3580.6.1-1990 AS3580.5.1-1993 AS3580.4.1-2008 AS3580.9.8-2001	Residential	Nil	Major roads Industry (port operations, metals processing)
Stuart	Campaign – GRUB	September 2001	Sulfur dioxide	AS3580.4.1-2008	Industry / rural	Nil	Industry (metals processing)
Mount Isa							
Menzies	Trend – GRUB	January 1983	Sulfur dioxide	AS3580.4.1-2008	Industry / residential	Trees within 20m of site	Industry (metals smelting, sulfuric acid manufacture)
The Gap	PMS – Population average	January 2009	Lead Sulfur dioxide	AS3580.9.3-2003, with analysis by ICP AS3580.4.1-2008	Industry / residential	Building within 20m north-east of site	Industry (metals smelting, sulfuric acid manufacture)

Implementation activities

In 2009 DERM continued to monitor ambient air quality in the same six regions as in 2008.

Ozone monitoring commenced at a site in the Gladstone city centre in June 2009 as part of a wide-ranging investigation into air quality in the region being jointly conducted by the Department of Environment and Resource Management and Queensland Health. While previous campaign monitoring of ozone at Targinie between 2001 and 2006 had demonstrated that maximum ozone concentrations satisfied screening procedure criteria and that ongoing monitoring of ozone was not required in Gladstone, the monitoring results from the Central Gladstone site have been included in this report for completeness.

Lead monitoring commenced at North Ward in Townsville in May 2008 in response to ongoing community concerns about dust impacts from the Port of Townsville. Large quantities of mineral products (refined metals, concentrates and ore) are shipped through the Port of Townsville and dust emanating from Port operations could potentially contain heavy metals. The North Ward monitoring site is located in a residential suburb approximately 2.4 kilometres downwind of the Port on prevailing winds.

A new monitoring site was established at The Gap in Mount Isa in January 2009. The site is situated in a residential suburb approximately 1.6 kilometres east of metal smelting and sulfuric acid manufacturing facilities. Monitoring of sulfur dioxide, PM_{10} and lead was conducted at The Gap site.

$PM_{2.5}$ monitoring using a reference sampler on a one in three day basis continued in south-east Queensland at the Rocklea site for the entire year. $PM_{2.5}$ monitoring by a TEOM sampler operating in accordance with the Technical Paper on Monitoring for Particles as $PM_{2.5}$ requirements continued at the Springwood site for the entire year and at the Rocklea site until October 2009. $PM_{2.5}$ monitoring using FDMS TEOM instrumentation was conducted at Rocklea and South Gladstone for the entire year.

Variations to the approved monitoring plan for Queensland

Screening studies

Monitoring is not required to be undertaken in a region where screening procedures outlined in the National Environment Protection (Ambient Air Quality) Measure Technical Paper No. 4, "Screening Procedures" are satisfied, i.e. pollutant levels are reasonably expected to be consistently lower than the standards in the Measure. On the basis of the results of monitoring conducted in larger population centres and/or the findings of generic modelling studies detailed in Appendix A of Technical Paper No. 4, it has been concluded that campaign monitoring of nitrogen dioxide in Bundaberg, Cairns, Mackay, Maryborough/ Hervey Bay and Rockhampton, and campaign monitoring of ozone in Bundaberg, Mackay and Maryborough/Hervey Bay is not required (i.e. performance is "met"). Table 2 summarises those regions and pollutants for which screening procedures are satisfied.

Table 2: Satisfied screening procedures

Region	CO	NO_2	Ozone	SO_2	PM_{10}	Lead
South-east Queensland	–	–	–	–	–	A
Toowoomba	–	–	–	F	–	F
Maryborough/Hervey Bay	F	E & F	E & F	F	–	F
Bundaberg	F	E & F	E & F	F	–	F
Gladstone	F	–	A	–	–	F
Rockhampton	F	E & F	–	–	–	F
Mackay	F	E & F	E & F	F	–	F
Townsville	F	–	–	–	–	–
Cairns	F	E & F	–	F	–	F
Mount Isa	E	E	E	–	–	–

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

Monitoring plan timeframe changes

Other air monitoring priorities have meant that it has not been possible to begin the following monitoring according to the timeframes set out in the monitoring plan for Queensland:

- ozone and PM_{10} in Cairns,
- ozone, sulfur dioxide and PM_{10} in Rockhampton,
- PM_{10} in Bundaberg, and
- PM_{10} in Maryborough/Hervey Bay.

Section B – Assessment of compliance with standards and 2008 goal

This section provides details of the annual compliance assessment for January to December 2009. Compliance criteria are applied on an individual basis at each performance monitoring station operating in the various Queensland regions during the year. South-east Queensland performance monitoring stations are further classified under the respective sub-region.

The National Environment Protection (Ambient Air Quality) Measure Technical Paper No. 8 specifies that to make a valid assessment of compliance, a data availability rate of at least 75 percent in each calendar quarter is required. For this reason, compliance with the standards and 2008 goal could not be demonstrated for nitrogen dioxide at the Springwood monitoring station, sulfur dioxide at the Springwood and The Gap monitoring sites, ozone at the Springwood and Central Gladstone monitoring stations and lead at The Gap monitoring station. Low data availability was the result of instrument failure (Springwood) or establishment of the monitoring site part-way through 2009 (Central Gladstone and The Gap).

Tables 3 to 9 summarise compliance of monitoring with the standards and 2008 goal for AAQ NEPM pollutants for 2009. Performance is assessed as meeting the standards and goals if the number of exceedences of the standard is no more than the number specified in schedule 2 of the AAQ NEPM and data availability was at least 75 percent in each quarter of the year, or approved screening procedures are satisfied.

Carbon monoxide

Table 3: 2009 compliance summary for carbon monoxide in Queensland

AAQ NEPM Standard
9.0 ppm (8-hour average)

Region / Performance monitoring station	Data availability rates (% of hours)					Number of exceedences (days)	Performance against the standards and goal
	Q1	Q2	Q3	Q4	Annual		
South-east Queensland *Brisbane sub-region* Woolloongabba	95.5	95.1	95.3	95.4	95.3	0	met
Toowoomba North Toowoomba	94.0	95.2	94.7	84.5	92.1	0	met

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

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

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

Mount Isa satisfies screening criteria for carbon monoxide by generic modelling alone (procedure E in Table 1) and can be considered to comply with the AAQ NEPM 8-hour carbon monoxide standard.

Nitrogen dioxide

Table 4: 2009 compliance summary for nitrogen dioxide in Queensland

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

Region / Performance monitoring station	Data availability rates (% of hours)					Number of exceedences (days)	Annual mean (ppm)	Performance against the standards and goal	
	Q1	Q2	Q3	Q4	Annual			1-hour	1-year
South-east Queensland									
North Coast sub-region									
Mountain Creek	95.6	92.7	95.0	95.3	94.7	0	0.004	met	met
Brisbane sub-region									
Deception Bay	95.3	95.5	95.0	95.3	95.3	0	0.005	met	met
Rocklea	95.4	95.2	94.4	87.9	93.2	0	0.007	met	met
Springwood	63.2	95.1	98.9	88.3	86.5	0	0.008	ND	ND
Ipswich sub-region									
Flinders View	93.2	94.0	95.1	92.8	93.8	0	0.008	met	met
Toowoomba									
North Toowoomba	94.0	95.2	94.8	95.0	94.8	0	0.006	met	met
Gladstone									
South Gladstone	84.0	93.9	95.1	88.9	90.5	0	0.006	met	met
Townsville									
Pimlico	89.9	85.3	95.5	94.2	91.3	0	0.005	met	met

ND = "not demonstrated" due to insufficient data

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

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

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

Monitoring at the Pimlico site in Townsville over the period 2004 to 2009 has shown nitrogen dioxide levels to be consistently below 40 percent of the NEPM standards. The maximum 1-hour average nitrogen dioxide concentration during this period was 0.035ppm (29 percent of the standard). The highest annual average nitrogen dioxide concentration during this period was 0.006ppm (20 percent of the standard).

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

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

Ozone

Table 5: 2009 compliance summary for ozone in Queensland

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

Region / Performance monitoring station	Data availability rates (% of hours)					Number of exceedences (days)		Performance against the standards and goal	
	Q1	Q2	Q3	Q4	Annual	1-hour	4-hour	1-hour	4-hour
South-east Queensland									
North Coast sub-region									
Mountain Creek	95.6	93.7	95.1	95.4	95.0	0	0	met	met
Brisbane sub-region									
Deception Bay	94.9	95.4	94.9	95.3	95.1	0	0	met	met
Rocklea	95.3	95.2	94.4	87.8	93.2	0	0	met	met
Springwood	21.5	74.4	100.0	93.3	72.6	0	0	ND	ND
Ipswich sub-region									
Flinders View	95.2	92.0	95.1	94.3	94.1	0	0	met	met
Toowoomba									
North Toowoomba	94.0	95.2	94.6	95.0	94.7	0	0	met	met
Gladstone									
Central Gladstone	0.0	7.8	87.2	97.0	48.4	0	0	ND	ND
Townsville									
Pimlico	85.2	85.3	95.5	84.3	87.6	0	0	met	met

ND = "not demonstrated" due to insufficient data

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

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

From 2001 to mid-2006, ozone concentrations were monitored at Targinie in the Gladstone region. The Targinie campaign GRUB monitoring station was located 20km north-west of Gladstone and downwind of the major industrial and transport emission sources in the region. Ozone concentrations measured at the Targinie campaign monitoring station over this period were consistently less than 75 percent of the AAQ NEPM standards (maximum 1-hour average 0.056ppm; maximum 4 hour average 0.046ppm). On this basis, ozone monitoring in Gladstone is not required under screening procedure A in Table 2 of the National Environment Protection (Ambient Air Quality) Measure Technical Paper No. 4, "Screening Procedures". Monitoring for ozone was however undertaken in Gladstone in 2009 as part of a wide-ranging study into ambient air quality, and data from the new Central Gladstone monitoring site has been included in this report for completeness.

Appendix A of the National Environment Protection (Ambient Air Quality) Measure Technical Paper No. 4, "Screening Procedures" states that ozone monitoring is not required in coastal centres with a population below 62 000 and inland centres with a population below 25 000 on the basis of generic modelling conducted by CSIRO (procedure E in Table 2).

On this basis, ozone monitoring is not required in the coastal Queensland centres of Bundaberg, Mackay and Maryborough/Hervey Bay, and the inland centre of Mount Isa, as these centres can be considered to comply with the NEPM 1-hour and 4-hour ozone standards.

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

- Cairns
- Rockhampton

Sulfur dioxide

Table 6: 2009 compliance summary for sulfur dioxide in Queensland

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

Region/ Performance monitoring station	Data availability rates (% of hours)					Number of exceedences (days)		Annual mean (ppm)	Performance against the standards and goal		
	Q1	Q2	Q3	Q4	Annual	1h	24h		1h	24h	1y
South-east Queensland											
Brisbane sub-region											
Springwood	46.8	99.7	100.0	93.3	85.1	0	0	0.001	ND	ND	ND
Ipswich sub-region											
Flinders View	95.1	94.0	91.5	94.3	93.7	0	0	0.001	met	met	met
Gladstone											
South Gladstone	83.4	94.0	95.0	88.9	90.3	0	0	0.002	met	met	met
Townsville											
Pimlico	90.3	85.3	95.5	93.8	91.3	0	0	0.000	met	met	met
Stuart	93.0	91.7	94.4	94.7	93.5	0	0	0.000	met	met	met
Mount Isa											
Menzies	83.4	90.8	95.5	95.0	91.2	25	2	0.006	not met	not met	met
The Gap	21.6	95.4	95.2	94.6	76.9	10	0	0.004	not met	ND	ND

ND = "not demonstrated" due to insufficient data

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

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

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

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

- Rockhampton

Particles as PM_{10}

Table 7: 2009 compliance summary for PM_{10} in Queensland

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

Region/ Performance monitoring station	Data availability rates (% of days)					Number of exceedences (days)	Performance against the standards and goal
	Q1	Q2	Q3	Q4	Annual		
South-east Queensland							
North Coast sub-region							
Mountain Creek	92.2	97.8	100.0	100.0	97.5	8	not met
Brisbane sub-region							
Rocklea	98.9	96.7	97.8	95.7	97.3	9	not met
Springwood	86.7	97.8	100.0	90.2	93.7	10	not met
Ipswich sub-region							
Flinders View	98.9	96.7	100.0	98.9	98.6	8	not met
Toowoomba							
North Toowoomba	93.3	98.9	98.9	98.9	97.5	11	not met
Gladstone							
South Gladstone	84.4	95.6	91.3	60.9	83.0	7	not met
Mackay							
West Mackay	98.9	94.5	98.9	97.8	97.5	18	not met
Townsville							
Pimlico	85.6	100.0	100.0	88.0	93.4	9	not met
Mount Isa							
The Gap	53.3	58.2	89.1	52.2	63.3	21	not met

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

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

- Bundaberg
- Cairns
- Maryborough/Hervey Bay
- Rockhampton

Particles as $PM_{2.5}$

Table 8: 2009 compliance summary for $PM_{2.5}$ in Queensland

AAQ NEPM Advisory Standard
25 µg/m^3 (24-hour average)
8 µg/m^3 (1-year average)

Region/ Performance monitoring station	Data availability rates (% of days)					Number of exceedences (days)	Annual mean (µg/m^3)
	Q1	Q2	Q3	Q4	Annual		
South-east Queensland							
Brisbane sub-region							
Rocklea[†]	31.1	29.7	31.5	28.3	30.1	0	Insufficient data
Rocklea[‡]	100.0	82.4	0.0	0.0	45.2	0	Insufficient data
Rocklea[+]	81.1	100.0	91.3	97.8	92.6	7	10.9
Springwood[‡]	76.7	98.9	100.0	90.2	91.5	3	5.5
Gladstone							
South Gladstone[+]	84.4	95.6	91.3	60.9	83.0	7	9.2

[†] Monitoring by reference method (1 in 3 days)
[‡] Monitoring by TEOM instrumentation in accordance with Technical Paper on Monitoring for Particles as $PM_{2.5}$
[+] Monitoring by TEOM instrumentation fitted with Filter Dynamics Measurement System (FDMS)

There are no regions which do not require $PM_{2.5}$ monitoring on the basis of screening arguments that pollutant levels are reasonably expected to be consistently below the relevant NEPM standard.

Regions for which monitoring has not yet been carried out:

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

Lead

Table 9: 2009 compliance summary for lead in Queensland

AAQ NEPM Standard
0.5 µg/m^3 (1-year average)

Region/ Performance monitoring station	Data availability rates (% of days)					Annual mean (µg/m^3)	Performance against the standards and goal
	Q1	Q2	Q3	Q4	Annual		
Townsville North Ward	80.0	100.0	93.3	100.0	93.4	0.04	met
Mount Isa The Gap	33.3	80.0	100.0	93.8	77.0	0.13	ND

ND = "not demonstrated" due to insufficient data

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

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

In the absence of non-vehicle sources of lead (e.g. metals smelting), no significant sources of lead now exist in most Queensland regions following the phase-out of leaded motor vehicle fuel from March 2001. Annual lead concentrations measured at the south-east Queensland performance monitoring station (Woolloongabba) were less than 10 percent of the AAQ NEPM standard for both 2001 (0.03 µg/m3) and 2002 (0.02 µg/m3). As outlined in the National Environment Protection (Ambient Air Quality) Measure Technical Paper No. 9, "Lead Monitoring" (available from www.ephc.gov.au), these measurements demonstrate that compliance with the AAQ NEPM standard and 2008 goal has been achieved in south-east Queensland, and monitoring of lead ceased from the end of 2002.

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

Section C – Assessment of monitoring data against the standards

Annual summary statistics for the 2009 calendar year are presented in this section. Statistics provided include the listing of exceedences and circumstances which led to these exceedences, and annual maxima, the second highest (for carbon monoxide, nitrogen dioxide, ozone and sulfur dioxide) and sixth highest (for PM_{10}) daily concentrations, together with the date and site of each occurrence. Details of $PM_{2.5}$ measurements obtained using both reference samplers and TEOM instrumentation are also provided. The TEOM instruments were operated in accordance with the method outlined in the AAQ NEPM Technical Paper on Monitoring for Particles as $PM_{2.5}$, or were fitted with FDMS units.

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

There was a much higher than normal incidence and severity of wind blown dust events throughout Queensland during 2009. The number of exceedences of PM_{10} and $PM_{2.5}$ standards at monitoring sites in Queensland during 2009 was higher than for any previous year in which monitoring had been conducted. The PM_{10} and $PM_{2.5}$ concentrations measured during the two major dust storms in late September 2009 were the highest ever recorded.

Exceedence summary

During 2009, exceedences of AAQ NEPM standards occurred for sulfur dioxide and PM_{10}. There were also exceedences of the AAQ NEPM advisory reporting standards for $PM_{2.5}$. There were no exceedences of the AAQ NEPM standards for carbon monoxide, nitrogen dioxide, ozone and lead.

Additional information on the circumstances which led to exceedences of standards during 2009 is provided in an appendix.

Table 10: 2009 sulfur dioxide exceedences in Queensland

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

Region / Performance monitoring station	Standard	Concentration (ppm)	Date	Time	Circumstances
Mount Isa					
Menzies	1-hour	1.013	27-Jun	15	Industry emissions
		0.886	18-Feb	11	Industry emissions
		0.637	12-Jul	16	Industry emissions
		0.582	22-Jun	16	Industry emissions
		0.505	27-Nov	18	Industry emissions
		0.493	25-Aug	16	Industry emissions
		0.481	21-Aug	16	Industry emissions
		0.447	18-Jan	10	Industry emissions
		0.415	27-Nov	17	Industry emissions
		0.391	27-Jun	14	Industry emissions
		0.366	23-Jun	14	Industry emissions
		0.365	22-Dec	10	Industry emissions
		0.361	09-Aug	18	Industry emissions
		0.358	30-Aug	16	Industry emissions
		0.343	02-Oct	14	Industry emissions
		0.336	12-Dec	19	Industry emissions
		0.308	30-Aug	15	Industry emissions
		0.306	31-May	18	Industry emissions
		0.304	21-Aug	17	Industry emissions
		0.300	25-Sep	18	Industry emissions
		0.296	02-Oct	15	Industry emissions
		0.288	28-Jun	15	Industry emissions
		0.286	09-Sep	18	Industry emissions
		0.272	18-Feb	12	Industry emissions
		0.268	25-Dec	14	Industry emissions
		0.267	12-Dec	18	Industry emissions
		0.265	23-Jun	15	Industry emissions
		0.257	27-Jun	16	Industry emissions
		0.251	22-Nov	14	Industry emissions

Table 10: 2009 sulfur dioxide exceedences in Queensland (continued)

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

Region / Performance monitoring station	Standard	Concentration (ppm)	Date	Time	Circumstances
Mount Isa					
Menzies (continued)	1-hour	0.248	13-Oct	09	Industry emissions
		0.237	12-Dec	20	Industry emissions
		0.234	13-Sep	17	Industry emissions
		0.226	14-Jul	15	Industry emissions
		0.223	13-Sep	18	Industry emissions
		0.215	09-Aug	17	Industry emissions
		0.210	18-Feb	16	Industry emissions
		0.209	02-Jun	16	Industry emissions
		0.209	28-Nov	08	Industry emissions
		0.207	12-Jul	17	Industry emissions
		0.204	27-Jun	17	Industry emissions
		0.203	21-Aug	15	Industry emissions
Mount Isa					
Menzies	24-hour	0.088	27-Jun	24	Industry emissions
		0.087	18-Feb	24	Industry emissions
Mount Isa					
The Gap	1-hour	0.591	02-Oct	09	Industry emissions
		0.487	28-Jun	18	Industry emissions
		0.467	28-Jun	15	Industry emissions
		0.389	12-Jul	18	Industry emissions
		0.291	22-Dec	10	Industry emissions
		0.286	28-Jun	14	Industry emissions
		0.267	13-Sep	17	Industry emissions
		0.264	20-Dec	09	Industry emissions
		0.256	02-Oct	08	Industry emissions
		0.253	13-Oct	15	Industry emissions
		0.238	28-Nov	09	Industry emissions
		0.235	30-Oct	14	Industry emissions
		0.232	22-Dec	09	Industry emissions
		0.232	22-Dec	12	Industry emissions
		0.230	13-Oct	16	Industry emissions
		0.226	07-Sep	07	Industry emissions
		0.211	12-Jul	13	Industry emissions

Table 11: 2009 PM_{10} exceedences in Queensland

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

Region / Performance monitoring station	Standard	Concentration (µg/m^3)	Date	Time	Circumstances
South-east Queensland					
Mountain Creek	24-hour	863.8	23-Sep	24	Major dust storm
		261.9	26-Sep	24	Major dust storm
		176.2	27-Sep	24	Major dust storm
		116.2	24-Sep	24	Major dust storm
		87.8	02-Jul	24	Wind blown dust with passage of weather front
		69.0	14-Oct	24	Wind blown dust with passage of weather front
		63.0	25-Sep	24	Major dust storm
		62.2	17-Apr	24	Wind blown dust
Rocklea		1033.4	23-Sep	24	Major dust storm
		526.0	26-Sep	24	Major dust storm
		135.7	14-Oct	24	Wind blown dust with passage of weather front
		124.7	27-Sep	24	Major dust storm
		96.1	02-Jul	24	Wind blown dust with passage of weather front
		87.9	24-Sep	24	Major dust storm
		75.9	03-Oct	24	Wind blown dust with passage of weather front
		64.9	30-Nov	24	Smoke from bushfires in the Lockyer Valley
		60.9	01-Dec	24	Smoke from bushfires in the Lockyer Valley
Springwood		960.0	23-Sep	24	Major dust storm
		355.2	26-Sep	24	Major dust storm
		120.0	14-Oct	24	Wind blown dust with passage of weather front
		104.9	27-Sep	24	Major dust storm
		77.3	02-Jul	24	Wind blown dust with passage of weather front
		76.8	03-Oct	24	Wind blown dust with passage of weather front
		68.3	24-Sep	24	Major dust storm
		55.7	26-Aug	24	Wind blown dust and smoke from grassfires
		53.8	27-Aug	24	Wind blown dust and smoke from grassfires
		52.1	30-Nov	24	Smoke from bushfires in the Lockyer Valley
Flinders View		1001.8	23-Sep	24	Major dust storm
		564.9	26-Sep	24	Major dust storm
		131.0	14-Oct	24	Wind blown dust with passage of weather front
		111.3	27-Sep	24	Major dust storm
		93.4	03-Oct	24	Wind blown dust with passage of weather front
		83.5	02-Jul	24	Wind blown dust with passage of weather front
		72.4	24-Sep	24	Major dust storm
		55.7	30-Nov	24	Smoke from bushfires in the Lockyer Valley
Toowoomba					
North Toowoomba	24-hour	1131.0	23-Sep	24	Major dust storm
		657.3	26-Sep	24	Major dust storm
		178.1	14-Oct	24	Wind blown dust with passage of weather front
		127.8	02-Jul	24	Wind blown dust with passage of weather front
		127.1	27-Sep	24	Major dust storm
		89.8	03-Oct	24	Wind blown dust with passage of weather front
		87.8	24-Sep	24	Major dust storm
		61.6	05-Mar	24	Wind blown dust with passage of weather front
		58.9	13-Oct	24	Wind blown dust with passage of weather front
		51.9	26-Aug	24	Wind blown dust and smoke from grassfires
		50.4	01-Dec	24	Smoke from bushfires in the Lockyer Valley
Gladstone					
South Gladstone	24-hour	252.3	27-Sep	24	Major dust storm
		183.2	24-Sep	24	Major dust storm
		114.5	26-Sep	24	Major dust storm
		81.0	25-Sep	24	Major dust storm

Table 11: 2009 PM_{10} exceedences in Queensland (continued)

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

Region / Performance monitoring station	Standard	Concentration (µg/m^3)	Date	Time	Circumstances
Gladstone					
South Gladstone (continued)	24-hour	71.7	16-Oct	24	Wind blown dust with passage of weather front
		69.0	28-Sep	24	Major dust storm
		54.3	15-Oct	24	Wind blown dust with passage of weather front
Mackay					
West Mackay	24-hour	514.8	27-Sep	24	Major dust storm and bushfire smoke
		280.8	28-Sep	24	Major dust storm and bushfire smoke
		265.2	24-Sep	24	Major dust storm
		202.6	26-Sep	24	Major dust storm and bushfire smoke
		182.8	29-Sep	24	Major dust storm and bushfire smoke
		118.2	25-Sep	24	Major dust storm
		89.8	30-Sep	24	Major dust storm and bushfire smoke
		87.5	05-Oct	24	Wind blown dust with passage of weather front and local dust caused by movement of soil stockpiles at nearby commercial premises
		80.3	04-Oct	24	Wind blown dust and local dust
		80.2	15-Oct	24	Wind blown dust and local dust
		74.1	16-Oct	24	Wind blown dust and local dust
		63.1	06-Mar	24	Wind blown dust with passage of weather front
		62.9	17-Oct	24	Wind blown dust and local dust
		54.3	10-Sep	24	Local dust and smoke from agricultural burning
		52.0	06-Oct	24	Wind blown dust and local dust
		51.8	17-Jun	24	Local dust (not indicative of regional exposure)
		51.5	23-Sep	24	Major dust storm
		50.9	24-Jul	24	Local dust (not indicative of regional exposure)
Townsville					
Pimlico	24-hour	460.4	24-Sep	24	Major dust storm
		411.6	25-Sep	24	Major dust storm
		302.2	26-Sep	24	Major dust storm
		294.4	28-Sep	24	Major dust storm
		241.0	29-Sep	24	Major dust storm
		213.7	27-Sep	24	Major dust storm
		121.5	30-Sep	24	Major dust storm
		63.1	04-Oct	24	Wind blown dust with passage of weather front and bushfire smoke
		51.5	17-Oct	24	Wind blown dust with passage of weather front
Mount Isa					
The Gap	24-hour	508.5	23-Sep	24	Major dust storm
		283.6	26-Oct	24	Wind blown dust with passage of weather front
		265.5	26-Sep	24	Major dust storm
		146.4	25-Dec	24	Wind blown dust with passage of weather front
		135.6	10-Dec	24	Wind blown dust with passage of weather front
		128.0	02-Oct	24	Wind blown dust with passage of weather front
		126.2	04-Mar	24	Wind blown dust with passage of weather front
		102.2	01-Oct	24	Wind blown dust with passage of weather front
		98.1	27-Sep	24	Major dust storm
		83.4	22-Nov	24	Wind blown dust with passage of weather front
		78.4	27-Jul	24	Wind blown dust with passage of weather front
		72.1	05-Nov	24	Wind blown dust with passage of weather front
		67.8	01-Jul	24	Wind blown dust with passage of weather front
		65.6	19-Dec	24	Wind blown dust with passage of weather front
		65.3	17-Aug	24	Wind blown dust with passage of weather front

Table 11: 2009 PM_{10} exceedences in Queensland (continued)

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

Region / Performance monitoring station	Standard	Concentration (µg/m^3)	Date	Time	Circumstances
Mount Isa					
The Gap (continued)	24-hour	60.0	12-Feb	24	Wind blown dust with passage of weather front
		58.8	13-Feb	24	Wind blown dust with passage of weather front
		58.4	28-Oct	24	Wind blown dust with passage of weather front
		54.4	27-Oct	24	Wind blown dust with passage of weather front
		52.4	11-Feb	24	Wind blown dust with passage of weather front
		51.2	02-Jul	24	Wind blown dust with passage of weather front

Table 12: 2009 $PM_{2.5}$ exceedences in Queensland

AAQ NEPM advisory standards
25 µg/m^3 (24-hour average)
8 µg/m^3 (1-year average)

Region / Performance monitoring station	Standard	Concentration (µg/m^3)	Date	Time	Circumstances
South-east Queensland					
Rocklea	24-hour	163.6	23-Sep	24	Major dust storm
		112.8	26-Sep	24	Major dust storm
		34.3	14-Oct	24	Wind blown dust with passage of weather front
		32.1	03-Oct	24	Smoke from widespread grassfires
		30.7	02-Oct	24	Smoke from widespread grassfires
		29.7	28-Aug	24	Smoke from widespread grassfires
		25.7	13-Nov	24	Bushfire smoke
Springwood		150.6	23-Sep	24	Major dust storm
		72.1	26-Sep		Major dust storm
		25.3	14-Oct	24	Wind blown dust with passage of weather front
South-east Queensland					
Rocklea	1-year	10.9			Contribution of very high short-term $PM_{2.5}$ episodes (dust storms, bushfire smoke) in combination with background urban $PM_{2.5}$ levels
Gladstone					
South Gladstone	24-hour	50.8	27-Sep	24	Major dust storm
		31.3	24-Sep	24	Major dust storm
		29.8	16-Oct	24	Bushfire smoke
		29.3	14-Sep	24	Bushfire smoke
		27.5	17-Oct	24	Bushfire smoke
		26.9	13-Sep	24	Bushfire smoke
		26.3	28-Sep	24	Major dust storm
Gladstone					
South Gladstone	1-year	9.2			Contribution of very high short-term $PM_{2.5}$ episodes (dust storms, bushfire smoke) in combination with background urban $PM_{2.5}$ levels

2009 maximum, second-highest and sixth-highest concentration summaries

Table 13: 2009 summary statistics for daily peak 8-hour CO in Queensland

AAQ NEPM standard
9.0 ppm (8-hour average)

Region / Performance monitoring station	**Number of valid days**	**Highest** (ppm)	**Highest** (date:hour)	**2nd highest** (ppm)	**2nd highest** (date:time)
South-east Queensland					
Woolloongabba	365	2.4	22-May 23:00 30-Jun 01:00		
Toowoomba					
North Toowoomba	365	1.8	13-Jun 23:00	1.6	25-Jun 01:00

Table 14: 2009 summary statistics for daily peak 1-hour nitrogen dioxide in Queensland

AAQ NEPM standard
0.12 ppm (1-hour average)

Region / Performance monitoring station	**Number of valid days**	**Highest** (ppm)	**Highest** (date:hour)	**2nd highest** (ppm)	**2nd highest** (date:time)
South-east Queensland					
Mountain Creek	364	0.030	14-May 19:00	0.029	14-Aug 20:00 26-Aug 20:00 16-Oct 19:00
Deception Bay	365	0.036	26-Aug 08:00	0.031	30-Apr 19:00 29-Sep 21:00
Rocklea	359	0.039	01-Jul 18:00	0.037	24-Aug 10:00
Springwood	332	0.038	14-May 21:00 09-Sep 19:00		
Flinders View	363	0.042	13-Aug 19:00	0.039	28-Apr 19:00 29-Apr 20:00
Toowoomba					
North Toowoomba	365	0.044	27-Aug 19:00	0.042	28-Aug 19:00
Gladstone					
South Gladstone	356	0.033	09-Jun 19:00	0.029	11-Jun 19:00 15-Jun 11:00 30-Jun 18:00 17-Oct 12:00
Townsville					
Pimlico	354	0.035	19-Jun 19:00	0.034	16-Oct 22:00

Table 15: 2009 summary statistics for daily peak 1-hour ozone in Queensland

AAQ NEPM standard
0.10 ppm (1-hour average)

Region / Performance monitoring station	**Number of valid days**	**Highest** (ppm)	**Highest** (date:hour)	**2nd highest** (ppm)	**2nd highest** (date:time)
South-east Queensland					
Mountain Creek	365	0.053	20-Sep 15:00	0.052	05-Mar 18:00
Deception Bay	365	0.069	20-Sep 14:00	0.064	02-Jan 14:00
Rocklea	359	0.077	02-Mar 13:00	0.075	20-Feb 14:00
Springwood	269	0.054	21-Sep 14:00 30-Nov 13:00		
Flinders View	364	0.075	23-Aug 15:00	0.073	11-Dec 14:00
Toowoomba					
North Toowoomba	365	0.062	11-Dec 14:00	0.060	05-Nov 17:00
Gladstone					
Central Gladstone	185	0.047	17-Oct 12:00	0.045	16-Oct 18:00
Townsville					
Pimlico	341	0.060	27-Sep 12:00	0.059	17-Oct 13:00

Table 16: 2009 summary statistics for daily peak 4-hour ozone in Queensland

AAQ NEPM standard
0.08 ppm (4-hour average)

Region / Performance monitoring station	**Number of valid days**	**Highest** (ppm)	**Highest** (date:hour)	**2nd highest** (ppm)	**2nd highest** (date:time)
South-east Queensland					
Mountain Creek	365	0.049	27-Aug 16:00	0.047	20-Sep 16:00
Deception Bay	365	0.061	20-Sep 16:00	0.059	02-Jan 16:00
Rocklea	359	0.068	01-Mar 15:00	0.064	20-Feb 15:00
Springwood	269	0.052	21-Sep 16:00	0.046	01-Oct 14:00
Flinders View	364	0.066	11-Dec 15:00	0.065	23-Aug 17:00
Toowoomba					
North Toowoomba	365	0.057	14-Sep 17:00	0.055	05-Nov 17:00 20-Nov 17:00
Gladstone					
Central Gladstone	185	0.042	17-Oct 13:00	0.041	16-Oct 18:00
Townsville					
Pimlico	343	0.057	27-Sep 15:00	0.051	24-Sep 17:00 17-Oct 14:00

Table 17: 2009 summary statistics for daily peak 1-hour sulfur dioxide in Queensland

AAQ NEPM standard
0.20 ppm (1-hour average)

Region / Performance monitoring station	Number of valid days	Highest (ppm)	Highest (date:hour)	2nd highest (ppm)	2nd highest (date:time)
South-east Queensland					
Springwood	316	0.014	03-Aug 10:00 02-Oct 22:00		
Flinders View	363	0.046	25-Jan 10:00	0.043	13-Mar 14:00
Gladstone					
South Gladstone	356	0.053	15-Jun 11:00	0.042	12-Jan 14:00
Townsville					
Pimlico	354	0.006	22-Jan 20:00 31-Dec 24:00		
Stuart	363	0.004	30-May 22:00	0.003	21-Feb 18:00 29-Jul 20:00 20-Nov 24:00 01-Dec 17:00
Mount Isa					
Menzies	353	**1.013**	27-Jun 15:00	**0.886**	18-Feb 11:00
The Gap	296	**0.591**	02-Oct 09:00	**0.487**	28-Jun 18:00

Table 18: 2009 summary statistics for 24-hour sulfur dioxide in Queensland

AAQ NEPM standard
0.08 ppm (24-hour average)

Region / Performance monitoring station	Number of valid days	Highest (ppm)	Highest (date)	2nd highest (ppm)	2nd highest (date)
South-east Queensland					
Springwood	308	0.004	24-Aug	0.003	16-Aug 29-Aug 02-Oct 28-Nov 29-Nov
Flinders View	356	0.007	25-Jan	0.005	27-Jan 01-Apr 29-Oct
Gladstone					
South Gladstone	342	0.009	28-Oct	0.008	06-Jan 27-Mar 29-Oct 30-Oct 08-Nov
Townsville					
Pimlico	347	0.003	31-Dec	0.002	24-Dec 27-Dec 29-Dec 30-Dec
Stuart	352	0.002	21-Feb 21-Nov 26-Dec		
Mount Isa					
Menzies	347	**0.088**	27-Jun	**0.087**	18-Feb
The Gap	293	0.073	28-Jun	0.056	22-Dec

Table 19: 2009 summary statistics for 24-hour PM_{10} in Queensland

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

Region / Performance monitoring station	Number of valid days	Highest (µg/m^3)	Highest (date)	6th highest (µg/m^3)	6th highest (date)
South-east Queensland					
Mountain Creek	356	**863.8**	23-Sep	**69.0**	14-Oct
Rocklea	355	**1033.4**	23-Sep	**87.9**	24-Sep
Springwood	342	**960.0**	23-Sep	**76.8**	03-Oct
Flinders View	360	**1001.8**	23-Sep	**83.5**	02-Jul
Toowoomba					
North Toowoomba	356	**1131.0**	23-Sep	**89.8**	03-Oct
Gladstone					
South Gladstone	303	**252.3**	27-Sep	**69.0**	28-Sep
Mackay					
West Mackay	356	**514.8**	27-Sep	**118.2**	25-Sep
Townsville					
Pimlico	341	**460.4**	24-Sep	**213.7**	27-Sep
Mount Isa					
The Gap	231	**508.5**	23-Sep	**128.0**	02-Oct

Table 20: 2009 summary statistics for 24-hour $PM_{2.5}$ in Queensland

AAQ NEPM advisory reporting standard
25 µg/m^3 (24-hour average)
8 µg/m^3 (1-year average)

Region / Performance monitoring station	Number of valid days	Highest (µg/m^3)	Highest (date)
South-east Queensland			
Rocklea†	110	19.1	30-Nov
Rocklea‡	165	7.9	07-Mar
Rocklea^{+}	338	**163.6**	23-Sep
Springwood‡	334	**150.6**	23-Sep
Gladstone			
South Gladstone^{+}	303	**50.8**	27-Sep

†Monitoring by reference method (1 in 3 days)
‡Monitoring by TEOM instrumentation in accordance with Technical Paper on Monitoring for Particles as $PM_{2.5}$
$^{+}$ Monitoring by TEOM instrumentation fitted with Filter Dynamics Measurement System (FDMS)

Section D – Data analysis

This section provides pollutant distribution information for 2009 (Tables 21 to 28), and multi year data for nominated trend stations in the Queensland air monitoring plan (Tables 29 to 52).

2009 pollutant distribution information

Table 21: Percentiles of daily peak 8-hour carbon monoxide concentrations for 2009

AAQ NEPM standard
9.0 ppm (8-hour average)

	Data availability rates (%)	**Max conc.** (ppm)	**99th percentile** (ppm)	**98th percentile** (ppm)	**95th percentile** (ppm)	**90th percentile** (ppm)	**75th percentile** (ppm)	**50th percentile** (ppm)
South-east Queensland								
Woolloongabba	100.0	2.4	2.3	2.1	1.8	1.5	0.9	0.5
Toowoomba								
North Toowoomba	100.0	1.8	1.4	1.2	1.0	0.7	0.2	0.0

Table 22: Percentiles of daily peak 1-hour nitrogen dioxide concentrations for 2009

AAQ NEPM standard
0.12 ppm (1-hour average)

	Data availability rates (%)	**Max conc.** (ppm)	**99th percentile** (ppm)	**98th percentile** (ppm)	**95th percentile** (ppm)	**90th percentile** (ppm)	**75th percentile** (ppm)	**50th percentile** (ppm)
South-east Queensland								
Mountain Creek	99.7	0.030	0.029	0.027	0.024	0.021	0.015	0.008
Deception Bay	100.0	0.036	0.030	0.028	0.026	0.024	0.019	0.014
Rocklea	98.4	0.039	0.035	0.034	0.031	0.027	0.021	0.014
Springwood	91.0	0.038	0.037	0.032	0.031	0.030	0.026	0.019
Flinders View	98.5	0.042	0.038	0.036	0.034	0.030	0.024	0.016
Toowoomba								
North Toowoomba	100.0	0.044	0.040	0.038	0.033	0.029	0.022	0.012
Gladstone								
South Gladstone	97.5	0.033	0.029	0.028	0.025	0.022	0.018	0.014
Townsville								
Pimlico	97.0	0.035	0.030	0.028	0.025	0.023	0.019	0.012

Table 23: Percentiles of daily peak 1-hour ozone concentrations for 2009

AAQ NEPM standard
0.10 ppm (1-hour average)

	Data availability rates (%)	**Max conc.** (ppm)	**99th percentile** (ppm)	**98th percentile** (ppm)	**95th percentile** (ppm)	**90th percentile** (ppm)	**75th percentile** (ppm)	**50th percentile** (ppm)
South-east Queensland								
Mountain Creek	100.0	0.053	0.049	0.045	0.041	0.038	0.033	0.028
Deception Bay	100.0	0.069	0.057	0.054	0.048	0.045	0.038	0.031
Rocklea	98.4	0.077	0.073	0.067	0.055	0.048	0.039	0.032
Springwood	73.7	0.054	0.053	0.049	0.041	0.036	0.029	0.023
Flinders View	99.7	0.075	0.070	0.064	0.058	0.052	0.041	0.031
Toowoomba								
North Toowoomba	100.0	0.062	0.058	0.058	0.052	0.048	0.039	0.032
Gladstone								
Central Gladstone	50.7	0.047	0.045	0.034	0.031	0.028	0.025	0.021
Townsville								
Pimlico	93.4	0.060	0.056	0.051	0.043	0.040	0.034	0.028

Table 24: Percentiles of daily peak 4-hour ozone concentrations for 2009

AAQ NEPM standard
0.08 ppm (4-hour average)

	Data availability rates (%)	**Max conc.** (ppm)	**99th percentile** (ppm)	**98th percentile** (ppm)	**95th percentile** (ppm)	**90th percentile** (ppm)	**75th percentile** (ppm)	**50th percentile** (ppm)
South-east Queensland								
Mountain Creek	100.0	0.049	0.043	0.044	0.037	0.033	0.026	0.019
Deception Bay	100.0	0.061	0.053	0.050	0.045	0.042	0.036	0.030
Rocklea	98.4	0.068	0.061	0.056	0.050	0.043	0.037	0.030
Springwood	73.7	0.052	0.045	0.040	0.038	0.033	0.028	0.022
Flinders View	99.7	0.066	0.062	0.059	0.051	0.046	0.037	0.030
Toowoomba								
North Toowoomba	100.0	0.057	0.054	0.053	0.049	0.045	0.038	0.031
Gladstone								
Central Gladstone	50.7	0.042	0.041	0.031	0.029	0.028	0.024	0.020
Townsville								
Pimlico	94.0	0.057	0.051	0.048	0.041	0.038	0.033	0.027

Table 25: Percentiles of daily peak 1-hour sulfur dioxide concentrations for 2009

AAQ NEPM standard
0.20 ppm (1-hour average)

	Data availability rates (%)	**Max conc.** (ppm)	**99th percentile** (ppm)	**98th percentile** (ppm)	**95th percentile** (ppm)	**90th percentile** (ppm)	**75th percentile** (ppm)	**50th percentile** (ppm)
South-east Queensland								
Springwood	86.6	0.014	0.012	0.009	0.007	0.005	0.003	0.002
Flinders View	99.5	0.046	0.030	0.027	0.018	0.014	0.008	0.003
Gladstone								
South Gladstone	97.5	0.053	0.040	0.035	0.028	0.021	0.012	0.006
Townsville								
Pimlico	97.0	0.006	0.005	0.004	0.003	0.002	0.001	0.001
Stuart	99.5	0.004	0.003	0.002	0.002	0.001	0.001	0.000
Mount Isa								
Menzies	96.7	**1.013**	**0.582**	**0.481**	**0.286**	0.126	0.021	0.003
The Gap	81.1	**0.591**	**0.389**	**0.264**	0.155	0.103	0.007	0.002

Table 26: Percentiles of daily 24-hour sulfur dioxide concentrations for 2009

AAQ NEPM standard
0.08 ppm (24-hour average)

	Data availability rates (%)	**Max conc.** (ppm)	**99th percentile** (ppm)	**98th percentile** (ppm)	**95th percentile** (ppm)	**90th percentile** (ppm)	**75th percentile** (ppm)	**50th percentile** (ppm)
South-east Queensland								
Springwood	84.4	0.004	0.003	0.003	0.002	0.001	0.001	0.001
Flinders View	97.5	0.007	0.005	0.004	0.003	0.002	0.001	0.001
Gladstone								
South Gladstone	93.7	0.009	0.008	0.007	0.006	0.004	0.002	0.001
Townsville								
Pimlico	95.1	0.003	0.002	0.001	0.001	0.001	0.001	0.000
Stuart	96.4	0.002	0.001	0.001	0.001	0.001	0.000	0.000
Mount Isa								
Menzies	95.1	**0.088**	0.056	0.051	0.032	0.015	0.003	0.002
The Gap	80.3	0.073	0.047	0.027	0.018	0.011	0.002	0.001

Table 27: Percentiles of daily 24-hour PM_{10} concentrations for 2009

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

	Data availability rates (%)	**Max conc.** (µg/m^3)	**99th percentile** (µg/m^3)	**98th percentile** (µg/m^3)	**95th percentile** (µg/m^3)	**90th percentile** (µg/m^3)	**75th percentile** (µg/m^3)	**50th percentile** (µg/m^3)
South-east Queensland								
Mountain Creek	97.5	**863.8**	**116.2**	**63.0**	35.6	24.7	19.2	14.5
Rocklea	97.3	**1033.4**	**124.7**	**75.9**	40.8	35.2	24.7	17.7
Springwood	93.7	**960.0**	**120.0**	**68.3**	32.2	28.2	18.5	14.8
Flinders View	98.6	**1001.8**	**111.3**	**72.4**	32.3	27.9	18.9	15.1
Toowoomba								
North Toowoomba	97.5	**1131.0**	**127.8**	**87.8**	41.7	32.2	22.3	15.2
Gladstone								
South Gladstone	83.0	**252.3**	**114.5**	**69.0**	38.8	30.8	24.8	20.3
Mackay								
West Mackay	97.5	**514.8**	**202.6**	**89.8**	**50.9**	40.8	29.5	22.8
Townsville								
Pimlico	93.4	**460.4**	**302.2**	**121.5**	33.9	23.6	17.7	14.4
Mount Isa								
The Gap	63.3	**508.5**	**283.6**	**135.6**	**67.8**	45.8	29.1	18.3

Table 28: Percentiles of daily 24-hour $PM_{2.5}$ concentrations for 2009

AAQ NEPM advisory reporting standards
25 µg/m^3 (24-hour average)
8 µg/m^3 (1-year average)

	Data availability rates (%)	**Max conc.** (µg/m^3)	**99th percentile** (µg/m^3)	**98th percentile** (µg/m^3)	**95th percentile** (µg/m^3)	**90th percentile** (µg/m^3)	**75th percentile** (µg/m^3)	**50th percentile** (µg/m^3)
South-east Queensland								
Rocklea[†]	30.1	19.1	19.1	13.8	12.3	10.4	8.2	6.5
Rocklea[‡]	45.2	7.9	7.8	7.7	6.6	5.7	4.7	3.1
Rocklea[+]	92.6	**163.6**	**34.3**	**25.7**	21.5	18.0	13.3	8.4
Springwood[‡]	91.5	**150.6**	**25.3**	18.0	11.4	9.0	6.2	4.0
Gladstone								
South Gladstone[+]	83.0	**50.8**	**29.8**	**26.9**	12.7	13.8	10.5	8.2

[†]Monitoring by reference method (1 in 3 days)
[‡]Monitoring by TEOM instrumentation in accordance with Technical Paper on Monitoring for Particles as $PM_{2.5}$
[+] Monitoring by TEOM instrumentation fitted with Filter Dynamics Measurement System (FDMS)

Multi-year statistics for trend stations

Table 29: Daily peak 8-hour carbon monoxide summary 1998 to 2004

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

AAQ NEPM standard
9.0 ppm (8-hour average)

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

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

Table 30: Daily peak 8-hour carbon monoxide summary 1998 to 2009

Trend station/region: Woolloongabba, south-east Queensland

AAQ NEPM standard
9.0 ppm (8-hour average)

Year	Data availability (%)	No. of exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
1998	*57.0**	*0*	*5.1*	*5.0*	*4.4*	*4.1*	*3.4*
1999	92.3*	0	5.7	5.3	4.9	4.0	3.2
2000	92.9	0	5.0	4.7	4.2	3.4	2.9
2001	97.0	0	7.0	4.4	4.3	3.9	3.2
2002	97.0	0	4.7	4.7	4.1	3.6	3.0
2003	83.3*	0	5.4	4.4	4.2	3.5	2.7
2004	98.9	0	4.7	4.2	3.8	3.3	2.6
2005	95.1	0	4.0	3.5	3.3	2.6	2.1
2006	95.3	0	4.0	3.7	3.1	2.4	2.1
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

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

Table 31: Daily peak 1-hour nitrogen dioxide summary 1995 to 2009

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

AAQ NEPM standards
0.12 ppm (1-hour average)
0.03 ppm (annual average)

Year	Data availability (%)	No. of exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)	Annual average (ppm)
1995	93.4	0	0.058	0.054	0.046	0.038	0.033	0.007
1996	*68.6**	*0*	*0.048*	*0.043*	*0.042*	*0.034*	*0.030*	*0.007*
1997	95.6	0	0.043	0.038	0.036	0.032	0.028	0.007
1998	97.5	0	0.066	0.050	0.039	0.031	0.026	0.006
1999	96.4	0	0.058	0.039	0.030	0.028	0.024	0.006
2000	99.5	0	0.053	0.038	0.034	0.029	0.025	0.005
2001	95.1	0	0.047	0.040	0.039	0.034	0.030	0.006
2002	87.4*	0	0.065	0.044	0.042	0.036	0.030	0.006
2003	94.5	0	0.053	0.036	0.033	0.030	0.028	0.006
2004	97.8	0	0.045	0.036	0.036	0.030	0.027	0.006
2005	95.3	0	0.034	0.033	0.030	0.028	0.026	0.006
2006	99.5	0	0.044	0.035	0.033	0.028	0.027	0.008
2007	94.2*	0	0.063	0.035	0.033	0.030	0.027	0.006
2008	84.7*	0	0.037	0.034	0.031	0.029	0.027	0.008
2009	100.0	0	0.036	0.030	0.028	0.026	0.024	0.005

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

Table 32: Daily peak 1-hour nitrogen dioxide summary 1995 to 2009

Trend station/region: Flinders View, south-east Queensland

AAQ NEPM standards
0.12 ppm (1-hour average)
0.03 ppm (annual average)

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

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

Table 33: Daily peak 1-hour nitrogen dioxide summary 1980 to 2009

Trend station/region: Rocklea, south-east Queensland

AAQ NEPM standards
0.12 ppm (1-hour average)
0.03 ppm (annual average)

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

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

Table 34: Daily peak 1-hour nitrogen dioxide summary 1994 to 2009

Trend station/region: South Gladstone, Gladstone

AAQ NEPM standards
0.12 ppm (1-hour average)
0.03 ppm (annual average)

Year	Data availability (%)	No. of exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)	Annual average (ppm)
1994	81.6*	0	0.049	0.047	0.044	0.038	0.028	0.005
1995	91.8	0	0.038	0.030	0.028	0.025	0.022	0.005
1996	84.2*	0	0.045	0.039	0.035	0.032	0.029	0.006
1997	*65.8**	*0*	*0.031*	*0.030*	*0.029*	*0.022*	*0.017*	*0.003*
1998	*72.9**	*0*	*0.022*	*0.020*	*0.018*	*0.015*	*0.012*	*0.002*
1999	88.8*	0	0.034	0.029	0.029	0.025	0.021	0.003
2000	97.8	0	0.031	0.025	0.024	0.022	0.019	0.003
2001	96.4	0	0.048	0.033	0.031	0.026	0.023	0.004
2002	98.4	0	0.036	0.031	0.029	0.026	0.021	0.004
2003	95.3	0	0.035	0.030	0.027	0.024	0.022	0.004
2004	100.0	0	0.042	0.030	0.029	0.026	0.023	0.004
2005	99.7	0	0.035	0.030	0.028	0.024	0.022	0.004
2006	100.0	0	0.034	0.027	0.027	0.024	0.021	0.003
2007	98.4	0	0.035	0.030	0.029	0.027	0.024	0.005
2008	98.6	0	0.033	0.030	0.026	0.023	0.020	0.003
2009	97.5	0	0.033	0.029	0.028	0.025	0.022	0.006

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

Table 35: Daily peak 1-hour ozone summary 1995 to 2009

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

AAQ NEPM standard
0.10 ppm (1-hour average)

Year	Data availability (%)	No. of exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
1995	95.9	0	0.083	0.075	0.070	0.052	0.047
1996	95.9	0	0.091	0.073	0.064	0.055	0.048
1997	100.0	0	0.079	0.065	0.057	0.048	0.043
1998	94.2	0	0.069	0.060	0.053	0.048	0.044
1999	99.2	0	0.092	0.062	0.057	0.048	0.043
2000	99.7	0	0.070	0.058	0.054	0.046	0.041
2001	86.6*	0	0.079	0.058	0.054	0.048	0.044
2002	89.6*	0	0.071	0.063	0.061	0.048	0.044
2003	97.0	0	0.095	0.063	0.057	0.047	0.043
2004	96.7	0	0.070	0.058	0.055	0.048	0.045
2005	98.4	0	0.079	0.065	0.056	0.050	0.044
2006	99.5	0	0.064	0.056	0.052	0.047	0.042
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

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

Table 36: Daily peak 1-hour ozone summary 1980 to 2009

Trend station/region: Rocklea, south-east Queensland

AAQ NEPM standard
0.10 ppm (1-hour average)

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

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

Table 37: Daily peak 1-hour ozone summary 1994 to 2009

Trend station/region: Flinders View, south-east Queensland

AAQ NEPM standard
0.10 ppm (1-hour average)

Year	Data availability (%)	No. of exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
1994	97.5	0	0.076	0.069	0.062	0.056	0.048
1995	95.1	0	0.079	0.071	0.065	0.056	0.051
1996	98.6	2	**0.125**	0.082	0.075	0.063	0.055
1997	97.5	2	**0.106**	0.094	0.078	0.066	0.056
1998	95.1	0	0.100	0.085	0.076	0.066	0.056
1999	98.6	1	**0.127**	0.082	0.077	0.055	0.048
2000	99.2	1	**0.116**	0.073	0.070	0.060	0.054
2001	99.5	0	0.079	0.074	0.070	0.059	0.051
2002	95.3	0	0.098	0.080	0.078	0.070	0.062
2003	96.7	0	0.087	0.073	0.068	0.056	0.048
2004	100.0	2	**0.114**	0.079	0.077	0.066	0.058
2005	100.0	0	0.085	0.075	0.073	0.063	0.056
2006	100.0	0	0.077	0.069	0.065	0.057	0.050
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

Table 38: Daily peak 4-hour ozone summary 1995 to 2009

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

AAQ NEPM standard
0.08 ppm (4-hour average)

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

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

Table 39: Daily peak 4-hour ozone summary 1980 to 2009

Trend station/region: Rocklea, south-east Queensland

AAQ NEPM standard
0.08 ppm (4-hour average)

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

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

Table 40: Daily peak 4-hour ozone summary 1994 to 2009

Trend station/region: Flinders View, south-east Queensland

AAQ NEPM standard
0.08 ppm (4-hour average)

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

Table 41: Daily peak 1-hour sulfur dioxide summary 1993 to 2009

Trend station/region: Flinders View, south-east Queensland

AAQ NEPM standards
0.20 ppm (1-hour average)
0.02 ppm (annual average)

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

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

Table 42: Daily peak 1-hour sulfur dioxide summary 1991 to 2009

Trend station/region: South Gladstone, Gladstone

AAQ NEPM standards
0.20 ppm (1-hour average)
0.02 ppm (annual average)

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

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

Table 43: Daily peak 1-hour sulfur dioxide summary 1983 to 2009

Trend station/region: Menzies, Mount Isa

AAQ NEPM standards
0.20 ppm (1-hour average)
0.02 ppm (annual average)

Year	Data availability (%)	No. of exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)	Annual average (ppm)
1983	*67.4**	*25*	***0.725***	***0.515***	***0.430***	***0.270***	*0.200*	***0.021***
1984	93.7	31	**1.155**	**0.555**	**0.515**	**0.330**	0.185	0.017
1985	97.3	7	**1.080**	**0.325**	**0.210**	0.100	0.055	0.016
1986	88.5	50	**1.406**	**1.255**	**0.788**	**0.577**	**0.296**	**0.031**
1987	98.9	51	**1.755**	**1.016**	**0.853**	**0.546**	**0.324**	**0.022**
1988	91.0*	31	**0.798**	**0.682**	**0.562**	**0.342**	0.159	0.017
1989	85.2	41	**0.957**	**0.585**	**0.503**	**0.348**	**0.241**	0.020
1990	*44.7**	*6*	***0.577***	***0.493***	***0.222***	*0.145*	*0.091*	***0.030***
1991	*54.8**	*28*	***0.673***	***0.638***	***0.440***	***0.294***	***0.215***	*0.018*
1992	88.5*	25	**0.540**	**0.457**	**0.406**	**0.286**	0.170	0.012
1993	95.6	24	**0.718**	**0.434**	**0.403**	**0.282**	0.134	0.015
1994	91.5	20	**0.688**	**0.483**	**0.343**	**0.250**	0.135	0.019
1995	98.9	11	**0.443**	**0.254**	**0.239**	0.184	0.109	0.005
1996	98.6	16	**0.598**	**0.409**	**0.285**	0.198	0.131	0.005
1997	98.9	7	**0.300**	**0.256**	**0.216**	0.128	0.083	0.003
1998	*48.8**	*16*	***0.693***	***0.548***	***0.368***	***0.265***	*0.190*	*0.005*
1999	90.4*	17	**0.675**	**0.366**	**0.269**	**0.202**	0.141	0.004
2000	96.4	31	**0.584**	**0.373**	**0.357**	**0.250**	0.191	0.006
2001	98.9	41	**0.581**	**0.438**	**0.422**	**0.295**	**0.222**	0.006
2002	91.2	49	**1.254**	**0.551**	**0.526**	**0.385**	**0.272**	0.009
2003	98.9	42	**0.658**	**0.503**	**0.493**	**0.312**	**0.217**	0.007
2004	97.5	36	**0.888**	**0.665**	**0.444**	**0.302**	**0.207**	0.007
2005	93.7*	49	**0.964**	**0.663**	**0.512**	**0.395**	**0.271**	0.009
2006	97.0	25	**0.567**	**0.398**	**0.356**	**0.246**	0.176	0.005
2007	96.7	31	**0.608**	**0.408**	**0.375**	**0.282**	0.185	0.007
2008	97.0	38	**0.751**	**0.528**	**0.482**	**0.289**	**0.203**	0.007
2009	96.7	25	**1.013**	**0.582**	**0.481**	**0.286**	0.126	0.006

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

Table 44: Daily 24-hour sulfur dioxide summary 1993 to 2009

Trend station/region: Flinders View, south-east Queensland

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

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

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

Table 45: Daily 24-hour sulfur dioxide summary 1991 to 2009

Trend station/region: South Gladstone, Gladstone

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

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

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

Table 46: Daily 24-hour sulfur dioxide summary 1984 to 2009

Trend station/region: Menzies, Mount Isa

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

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

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

Table 47: Daily 24-hour PM_{10} summary 1997 to 2009

Trend station/region: Rocklea, south-east Queensland

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

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

Table 48: Daily 24-hour PM_{10} summary 1999 to 2009

Trend station/region: Flinders View, south-east Queensland

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

Year	Data availability (%)	No. of exceedences (days)	Max conc. (µg/m^3)	99th percentile (µg/m^3)	98th percentile (µg/m^3)	95th percentile (µg/m^3)	90th percentile (µg/m^3)
1999	95.3	0	44.2	28.4	25.5	20.3	17.9
2000	97.3	1	**61.1**	42.3	38.5	32.0	26.4
2001	99.7	0	42.5	37.5	35.0	25.5	22.9
2002	97.3	7	**197.2**	**103.3**	**60.8**	35.9	31.8
2003	94.8	1	**119.1**	35.1	30.5	26.0	23.0
2004	99.2	3	**64.1**	40.8	38.5	32.9	28.9
2005	97.0	3	**64.3**	44.7	40.7	26.8	24.0
2006	100.0	0	35.7	29.5	28.6	26.0	22.5
2007	99.2	0	44.6	39.6	36.7	28.3	23.4
2008	99.2	2	**68.5**	45.6	38.8	26.6	22.0
2009	98.6	8	**1001.8**	**111.3**	**72.4**	32.2	27.9

Table 49: Daily 24-hour PM_{10} summary 2001 to 2009

Trend station/region: South Gladstone, Gladstone

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

Year	Data availability (%)	No. of exceedences (days)	Max conc. (µg/m^3)	99th percentile (µg/m^3)	98th percentile (µg/m^3)	95th percentile (µg/m^3)	90th percentile (µg/m^3)
2001	95.6	4	**66.6**	**51.6**	36.0	30.3	25.9
2002	98.1	5	**197.0**	**83.0**	48.5	33.8	26.3
2003	96.4	0	41.3	35.5	33.1	26.2	23.2
2004	99.7	0	42.7	35.6	30.0	25.6	22.4
2005	97.8	4	**196.7**	**53.8**	37.1	26.6	23.0
2006	98.4	1	**54.6**	37.5	34.3	28.6	23.7
2007	96.7	0	38.8	29.5	28.4	25.4	22.9
2008	95.9	2	**65.6**	43.7	36.7	28.8	24.9
2009	83.0*	7	**252.3**	**114.5**	**69.0**	38.8	30.8

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

Table 50: Daily 24-hour $PM_{2.5}$ summary 1998 to 2009

Trend station/region: Rocklea, south-east Queensland†

AAQ NEPM advisory standards
25 µg/m^3 (24-hour average)
8 µg/m^3 (annual average)

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

†Monitoring by TEOM instrumentation in accordance with Technical Paper on Monitoring for Particles as $PM_{2.5}$ from 1998 to 2008. Monitoring by TEOM instrumentation fitted with Filter Dynamics Measurement System (FDMS) in 2009.

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

Table 51: Daily 24-hour $PM_{2.5}$ summary 1999 to 2009

Trend station/region: Springwood, south-east Queensland[†]

AAQ NEPM advisory standards
25 µg/m^3 (24-hour average)
8 µg/m^3 (annual average)

Year	Data availability (%)	No. of exceedences (days)	Max conc. (µg/m^3)	99th percentile (µg/m^3)	98th percentile (µg/m^3)	95th percentile (µg/m^3)	90th percentile (µg/m^3)	Annual average (µg/m^3)
1999	82.7*	0	22.3	12.9	11.8	8.7	7.1	4.3
2000	96.7	6	**35.4**	**28.9**	23.6	17.3	13.2	6.4
2001	97.0	0	19.4	18.0	16.2	11.8	9.1	5.3
2002	95.9	5	**38.9**	**28.4**	20.1	14.9	11.7	6.2
2003	96.2	0	20.5	16.6	15.4	10.9	9.2	5.5
2004	98.4	0	21.7	16.9	15.4	11.7	9.5	5.5
2005	96.4	0	15.2	14.9	13.3	10.3	8.6	4.7
2006	94.0	1	**25.5**	20.1	15.3	9.3	7.9	4.8
2007	98.4	0	17.8	14.0	12.0	9.4	7.8	4.3
2008	96.7	0	10.9	9.9	8.8	7.9	6.7	4.1
2009	91.5	3	**150.6**	**25.3**	18.0	11.4	9.0	5.5

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

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

Table 52: Annual lead summary 1980 to 2002

Trend station/region: Woolloongabba, south-east Queensland

AAQ NEPM standard
0.5 µg/m^3 (annual average)

Year	Data availability (%)	Annual average (µg/m^3)
1980	91.8	**2.21**
1981	85.2*	**2.69**
1982	96.7	**2.34**
1983	96.7	**2.21**
1984	93.4	**2.56**
1985	86.9*	**2.40**
1986	100.0	**1.90**
1987	96.7	**1.91**
1988	98.4	**2.13**
1989	98.4	**1.64**
1990	98.4	**1.47**
1991	100.0	**0.97**
1992	90.2	**0.63**
1993	93.4	**0.57**
1994	96.7	0.48
1995	100.0	0.38
1996	98.4	0.25
1997	100.0	0.27
1998	*65.6**	*0.22*
1999	98.3	0.19
2000	88.5	0.14
2001	93.4	0.03
2002	96.7	0.02

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

Appendix – Description of 2009 exceedence events

Sulfur dioxide exceedences in Mount Isa in 2009

Industrial operations (metals smelting and sulfuric acid manufacture) emit sulfur dioxide into the atmosphere in Mount Isa. Under the Mount Isa Mines Agreement Act 1985, smelter operations must be managed to maintain ambient sulfur dioxide concentrations in Mount Isa below the levels specified in the Act (these were equivalent to the United States Environmental Protection Agency three-hour secondary, 24-hour primary and annual average primary sulfur dioxide standards existing at the time the Act was promulgated). As smelter operations were only controlled to meet Mount Isa Mines Agreement Act 1985 air quality limits during 2009, sulfur dioxide levels exceeded the more stringent Air NEPM 1-hour and 24-hour standards on occasions.

Amendments made to the Environmental Protection Act 1994 (EP Act) in May 2008 will bring all Special Agreement Act mine operations, including the Mount Isa smelters, under contemporary environmental controls under the EP Act. DERM will assess the environmental authority application against the standard criteria in the EP Act which require that any applicable Commonwealth plans, standards, agreements or requirements, including those relating to NEPMs, are considered. The Environmental Protection (Air) Policy 2008, which includes ambient air quality objectives for sulfur dioxide, will also be considered as part of this process.

The smelters and sulfuric acid manufacturing plant are situated to the south-southwest of the Menzies monitoring site and to the west of The Gap monitoring site. The relationship between one-hour average wind direction and sulfur dioxide concentrations greater than 0.200ppm (Figures 2 and 3) demonstrates that exceedences are highly correlated with winds blowing from these plants towards the monitoring sites.

Figure 2: Relationship between 1-hour average wind direction and sulfur dioxide concentrations at the Menzies site during 2009.

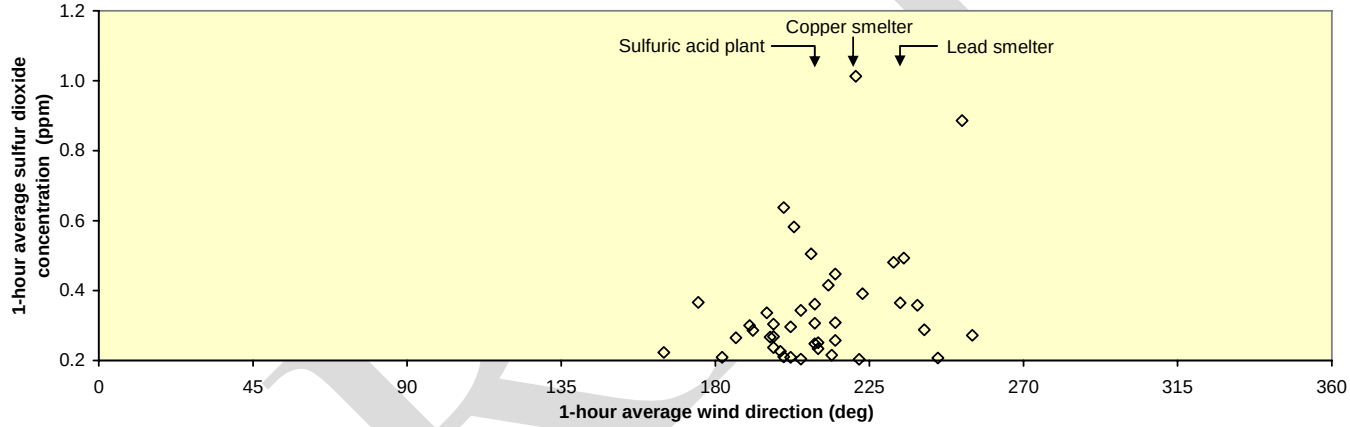
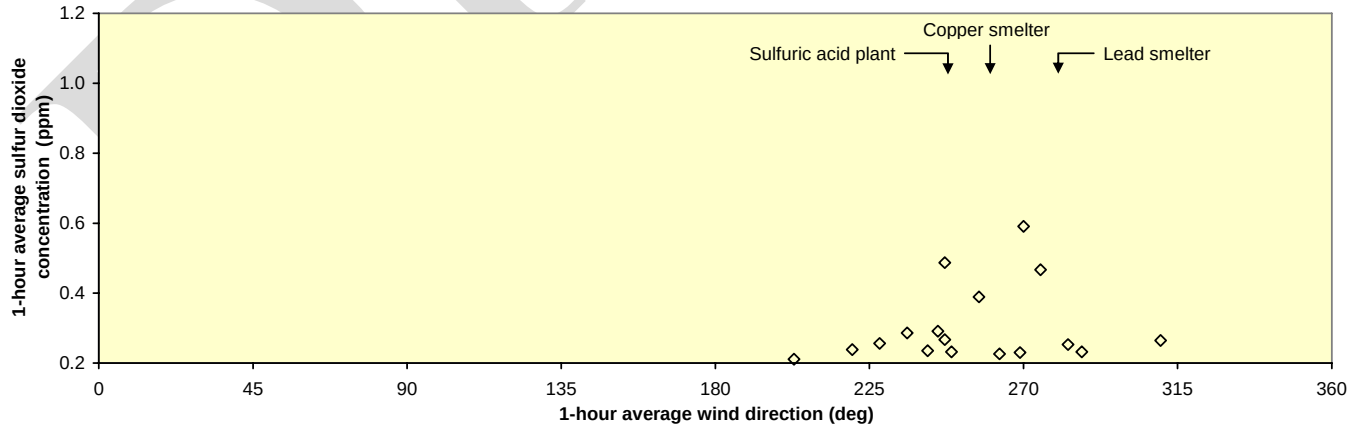


Figure 3: Relationship between 1-hour average wind direction and sulfur dioxide concentrations at The Gap site during 2009.

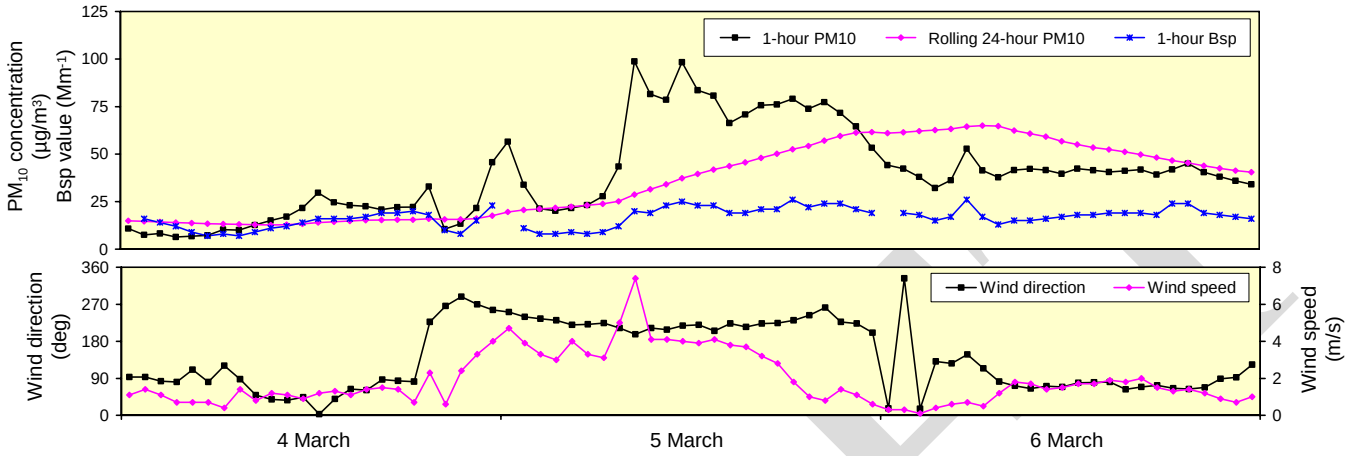


PM_{10} exceedence at North Toowoomba on 5 March 2009

Strong south westerly winds associated with the passage of a weather front on 5 March carried dust from western Queensland over south-east Queensland. This wind blown dust led to an exceedence of the Air NEPM PM_{10} 24-hour standard at the North Toowoomba monitoring site on this day. Figure 4 shows that the increase in PM_{10} levels coincided with a change in wind direction from easterly to south-westerly.

The fact that Bsp (nephelometer) measurements at North Toowoomba were relatively unchanged during this period indicates a high proportion of coarse particles, consistent with wind blown dust particles.

Figure 4: Particle concentrations at the North Toowoomba site from 4 March to 6 March 2009.

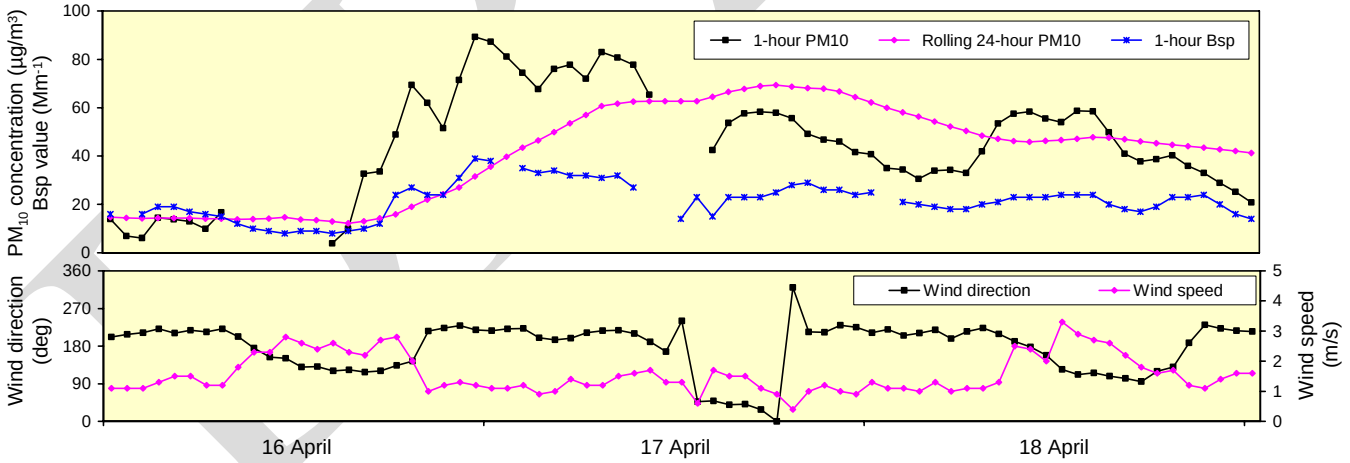


PM_{10} exceedence at Mountain Creek on 17 April 2009

Soil particles from a dust storm event affecting south-eastern Australia on 15 April were subsequently transported up the eastern coastline to south-east Queensland by south-easterly winds following the weather front. On 16 and 17 April elevated PM_{10} levels were measured at the coastal south-east Queensland monitoring site at Mountain Creek (Figure 5), leading to an exceedence of the Air NEPM 24-hour PM_{10} standard on 17 April. Winds were south-easterly when elevated levels were first measured.

The fact that Bsp (nephelometer) measurements at Mountain Creek were relatively unchanged during this period indicates a high proportion of coarse particles, consistent with wind blown dust particles.

Figure 5: Particle concentrations at the Mountain Creek site from 16 April to 18 April 2009.



PM_{10} exceedences in south-east Queensland and Toowoomba on 2 July 2009

Dust transported from northern South Australia across southern Queensland by gusty westerly winds was responsible for exceedences of the Air NEPM 24-hour PM_{10} standard at monitoring sites in southeast Queensland and Toowoomba on 2 July. The increase in PM_{10} levels corresponds to the change in wind direction and speed with the arrival of the weather front giving rise to the strong winds.

The much smaller variation in $PM_{2.5}$ and Bsp measurements at the time of the elevated PM_{10} measurements points to coarse wind blown dust particles being the primary cause of the PM_{10} standard exceedences at the south-east Queensland and Toowoomba sites on this day.

Figure 6: Particle concentrations at the Mountain Creek site from 2 July to 3 July 2009.

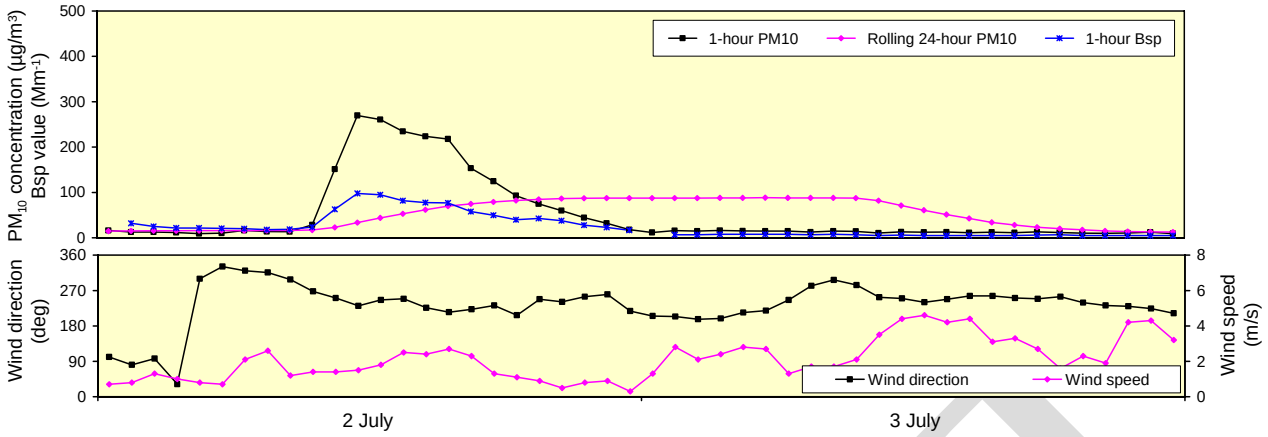


Figure 7: Particle concentrations at the Rocklea site in south-east Queensland from 2 July to 3 July 2009.

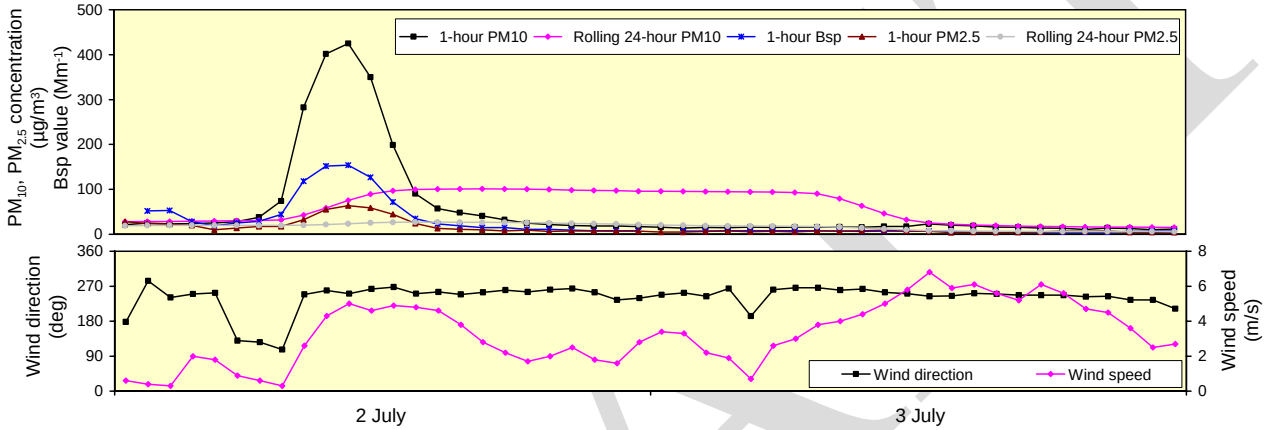


Figure 8: Particle concentrations at the Springwood site in south-east Queensland from 2 July to 3 July 2009.

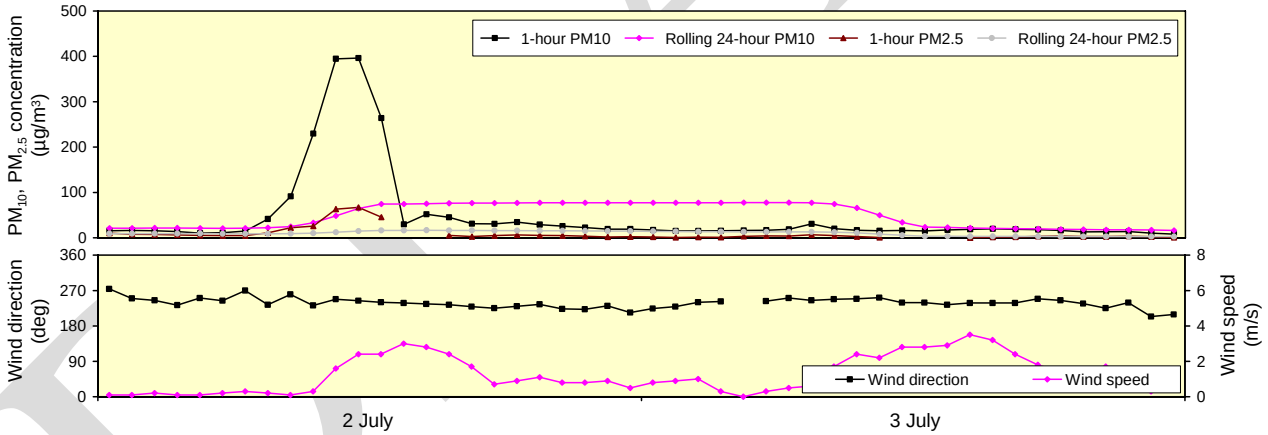


Figure 9: Particle concentrations at the Flinders View site in south-east Queensland from 2 July to 3 July 2009.

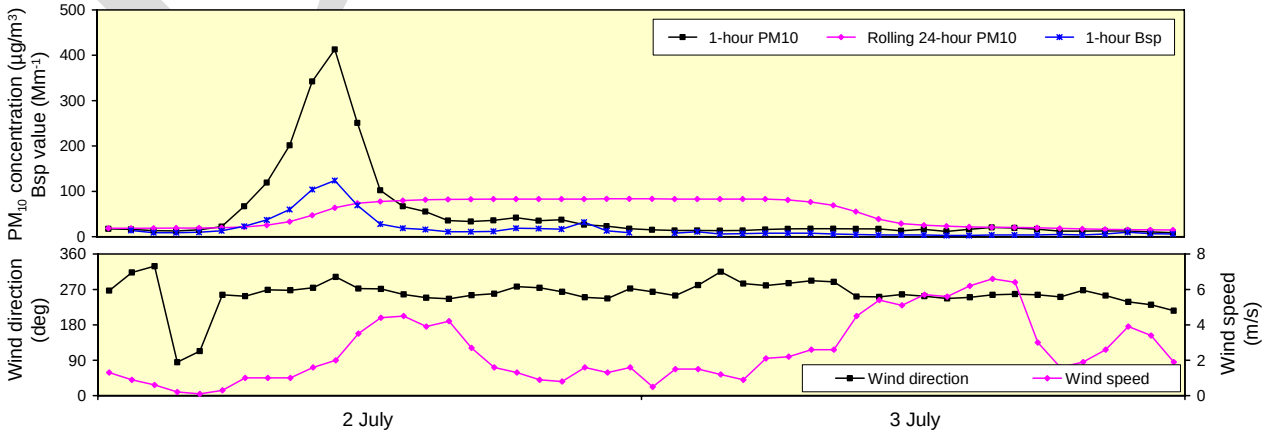
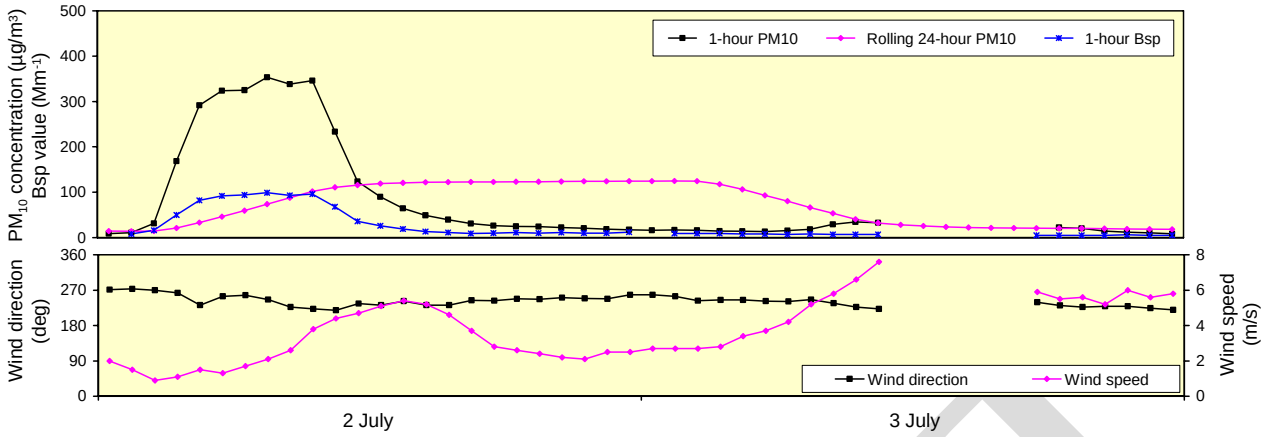


Figure 10: Particle concentrations at the North Toowoomba site from 2 July to 3 July 2009.



PM_{10} and $PM_{2.5}$ exceedences in south-east Queensland and Toowoomba between 26 August and 28 August 2009

A combination of wind blown dust generated by hot dry gusty westerly to north-westerly winds and smoke from widespread grass fires across the south-east Queensland region led to elevated particle concentrations at monitoring sites in late August. The 24-hour PM_{10} standard was exceeded on 26 August at the Springwood and North Toowoomba sites, and again at the Springwood site on 27 August, predominantly due to wind blown dust as indicated by the corresponding low $PM_{2.5}$ and Bsp measurements (Figures 12 and 13).

The 24-hour $PM_{2.5}$ advisory standard was exceeded at the Rocklea site on 28 August. Figure 11 shows that Bsp measurements were elevated at Rocklea on this day, indicating that smoke from grassfires was a major contributing factor in this exceedence.

Figure 11: Particle concentrations at the Rocklea site in south-east Queensland from 26 August to 28 August 2009.

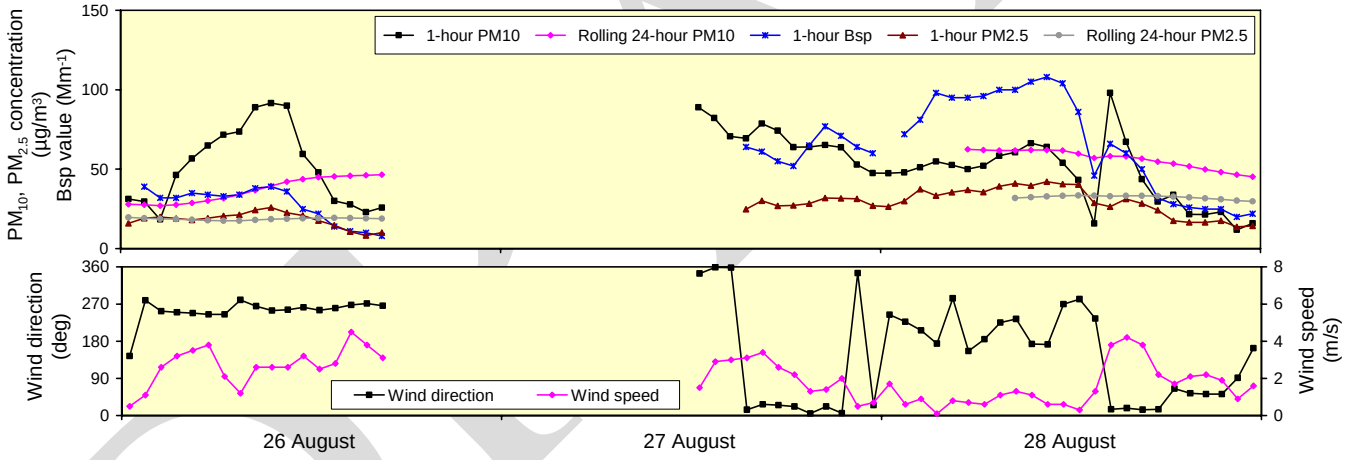


Figure 12: Particle concentrations at the Springwood site in south-east Queensland from 26 August to 28 August 2009.

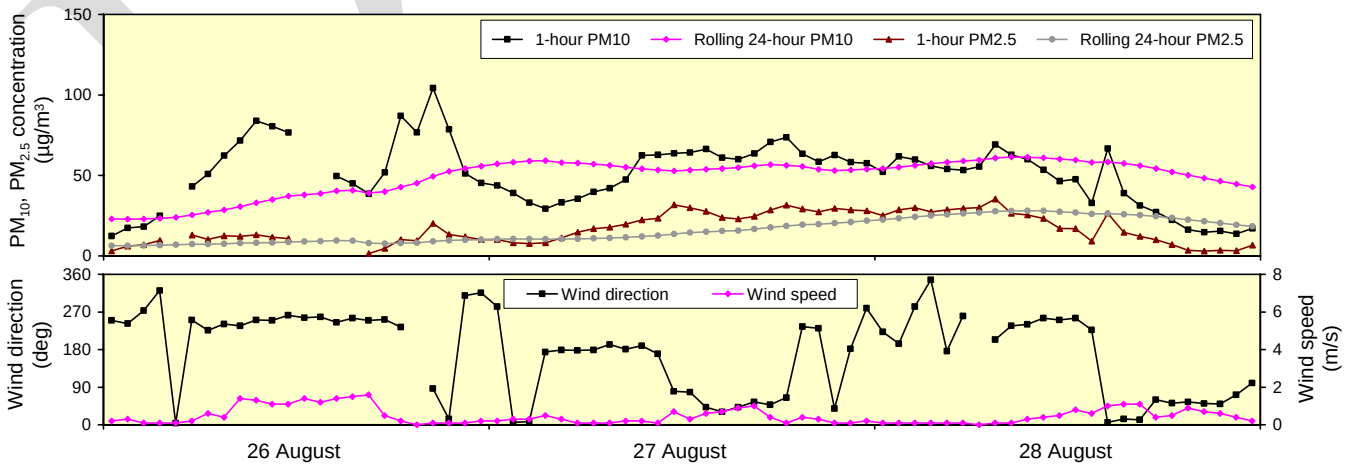
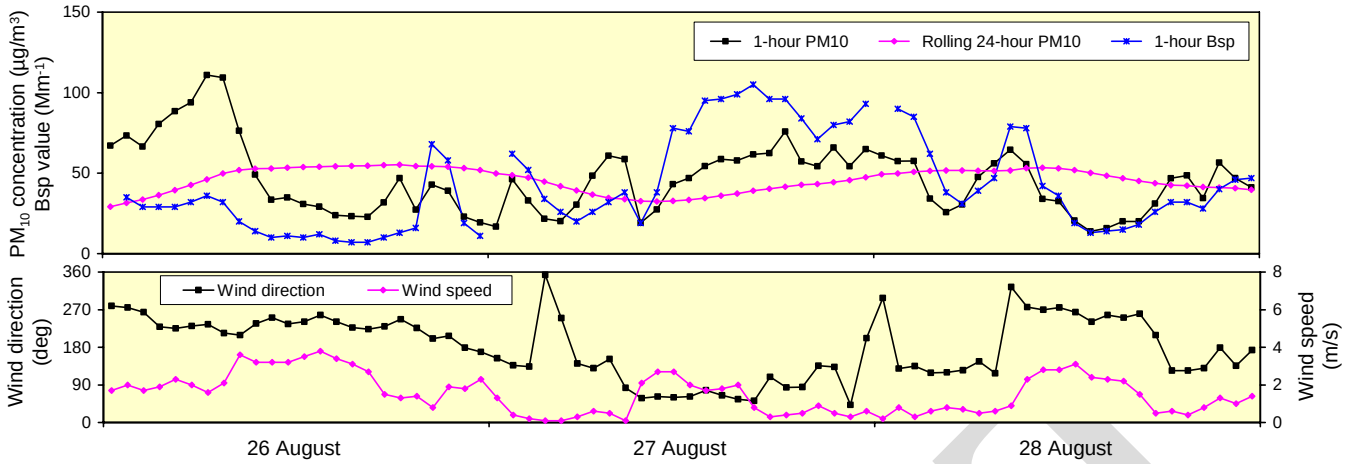


Figure 13: Particle concentrations at the North Toowoomba site from 26 August to 28 August 2009.

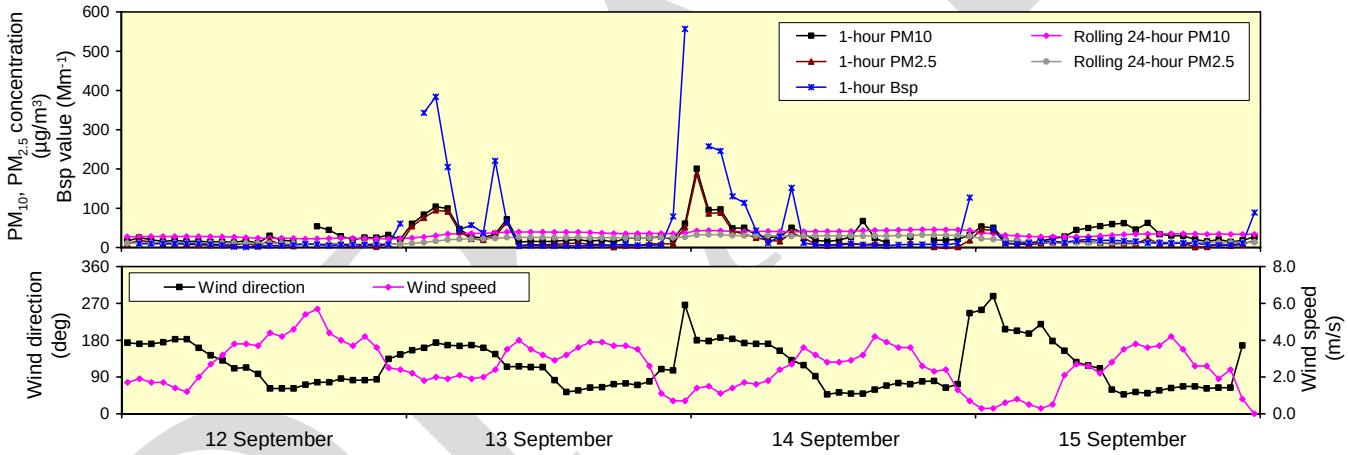


$PM_{2.5}$ exceedences at South Gladstone on 13 September and 14 September 2009

Smoke from a large grassfire at Broadacres south of Tannum Sands caused high particles levels at the South Gladstone monitoring site on 13 September and 14 September, leading to exceedences of the 24-hour $PM_{2.5}$ advisory standard on these days. The fire was located south-south-east of the South Gladstone monitoring site and elevated particle levels closely correlated with winds from this direction.

The high Bsp measurements and high $PM_{2.5}$ to PM_{10} ratio are consistent with fine particulate matter arising from combustion processes.

Figure 14: Particle concentrations at the South Gladstone site from 12 September to 15 September 2009.



Particle standard exceedences at all Queensland sites during the period 23 to 30 September 2009

Two major dust storms within four days of each other resulted in very high particle levels across the Queensland monitoring network between 23 September and 30 September. Measured PM_{10} and $PM_{2.5}$ levels exceeded the previous highest levels, recorded during a dust storm in October 2002. The magnitude of the dust storms has been attributed to fine sediment from inland evaporation pans and floodplains in central Australia deposited by floods in February. Strong winds associated with the passage of two weather fronts whipped up the dry sediment into extensive dust storms that affected much of eastern Australia. The initial dust storm on 23 September gave rise to the highest particle concentrations at south-east Queensland, Toowoomba, Townsville and Mount Isa monitoring sites. Highest particle levels occurred during the second dust storm on 27 September at the South Gladstone and West Mackay monitoring sites.

$PM_{2.5}$ measurements were considerably less than the corresponding PM_{10} measurements at those sites where $PM_{2.5}$ monitoring was conducted, indicating a high proportion of coarse particles consistent with wind-blown dust. However, the sheer magnitude of the two dust storms was sufficient to result in exceedences of the Air NEPM 24-hour average $PM_{2.5}$ advisory standard in south-east Queensland and Gladstone.

Across the south-east Queensland monitoring network, the 24-hour PM_{10} standard was exceeded on four days (five days at Mountain Creek) and the 24-hour $PM_{2.5}$ advisory standard was exceeded on two days during the period 23 September to 30 September. At South Gladstone the 24-hour PM_{10} standard was exceeded on five days and the 24-hour $PM_{2.5}$ advisory standard

on three days. At The Gap site in Mount Isa the 24-hour PM_{10} standard was exceeded on three days. Particle concentrations in these regions returned to typical levels within two days of the passage of the dust storm.

In Mackay, 24-hour average PM_{10} concentrations were above the Air NEPM standard from 23 September to 30 September due to smoke from a large bushfire south of Mackay as evidenced by the elevated nephelometer readings from 26 September (Figure 21). In Townsville, particle levels also remained high from 24 September to 30 September (Figure 22) because meteorological conditions following the dust storms limited dispersion of the dust.

Figure 15: Particle concentrations at the Mountain Creek site in south-east Queensland from 23 September to 30 September 2009.

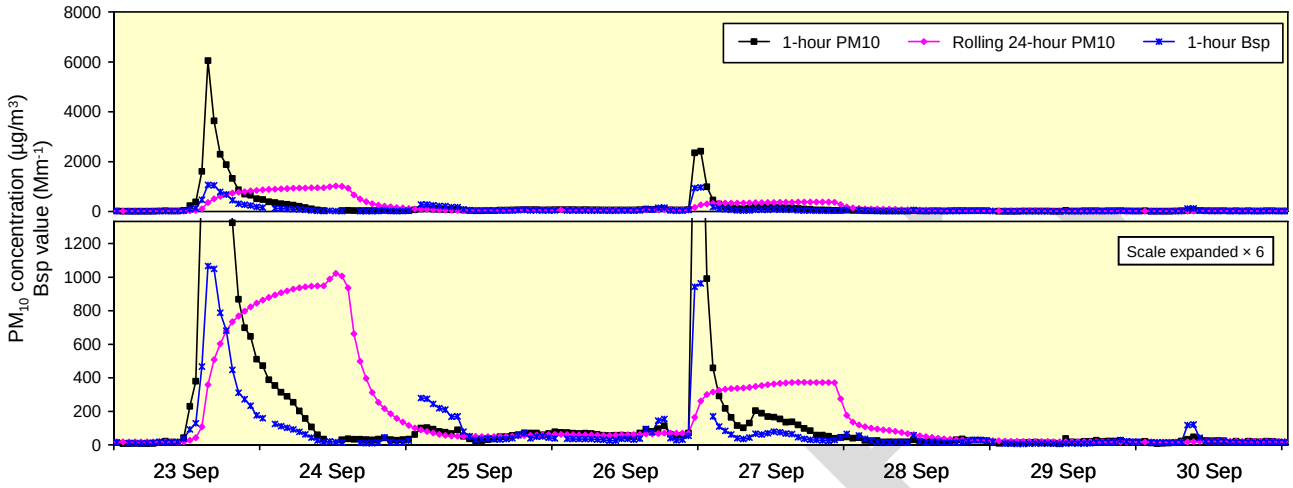


Figure 16: Particle concentrations at the Rocklea site in south-east Queensland from 23 September to 30 September 2009.

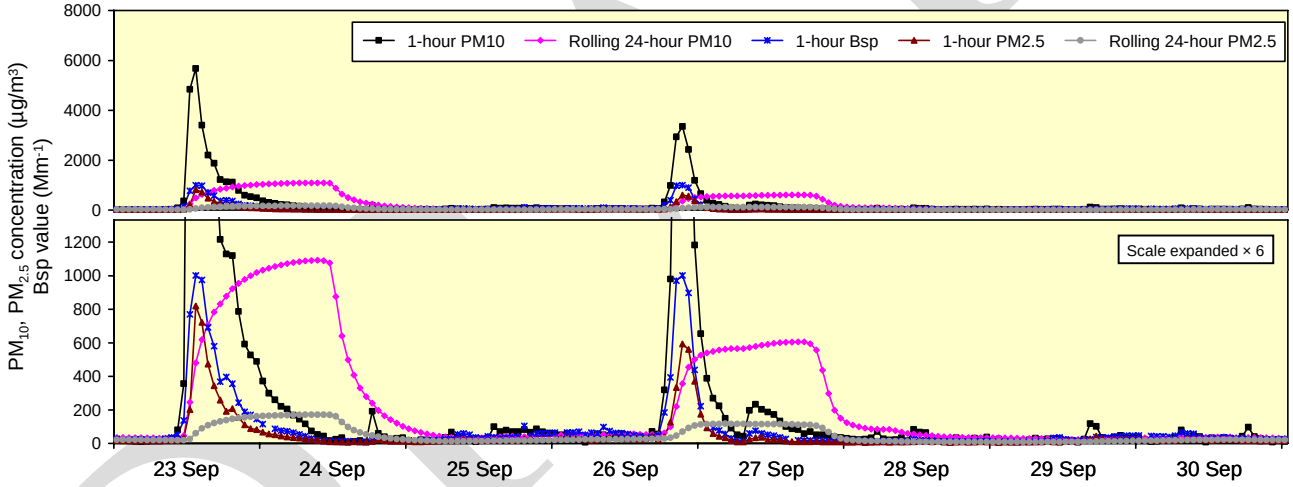


Figure 17: Particle concentrations at the Springwood site in south-east Queensland from 23 September to 30 September 2009.

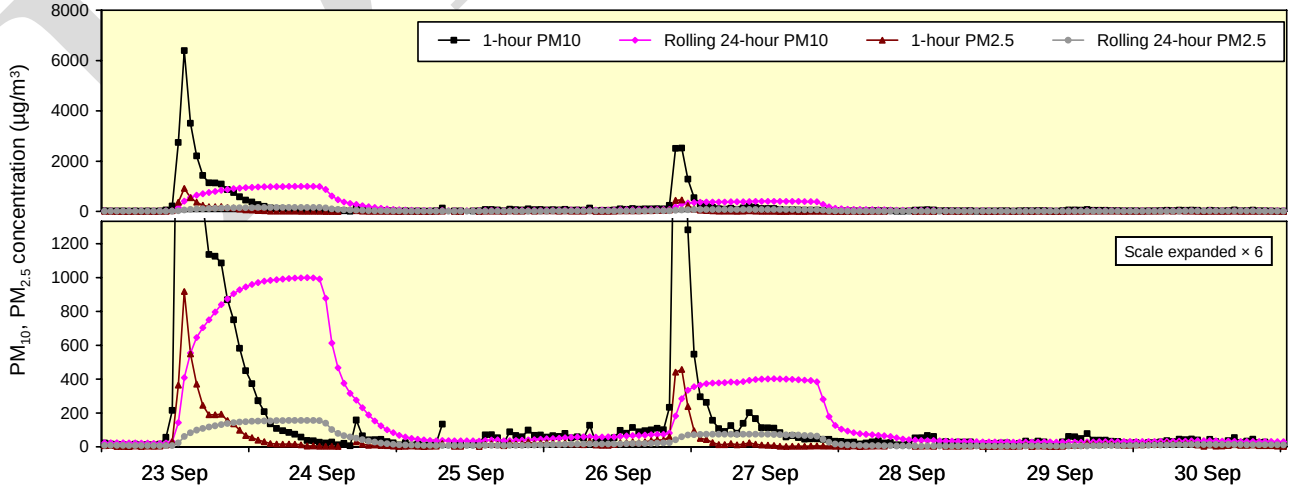


Figure 18: Particle concentrations at the Flinders View site in south-east Queensland from 23 September to 30 September 2009.

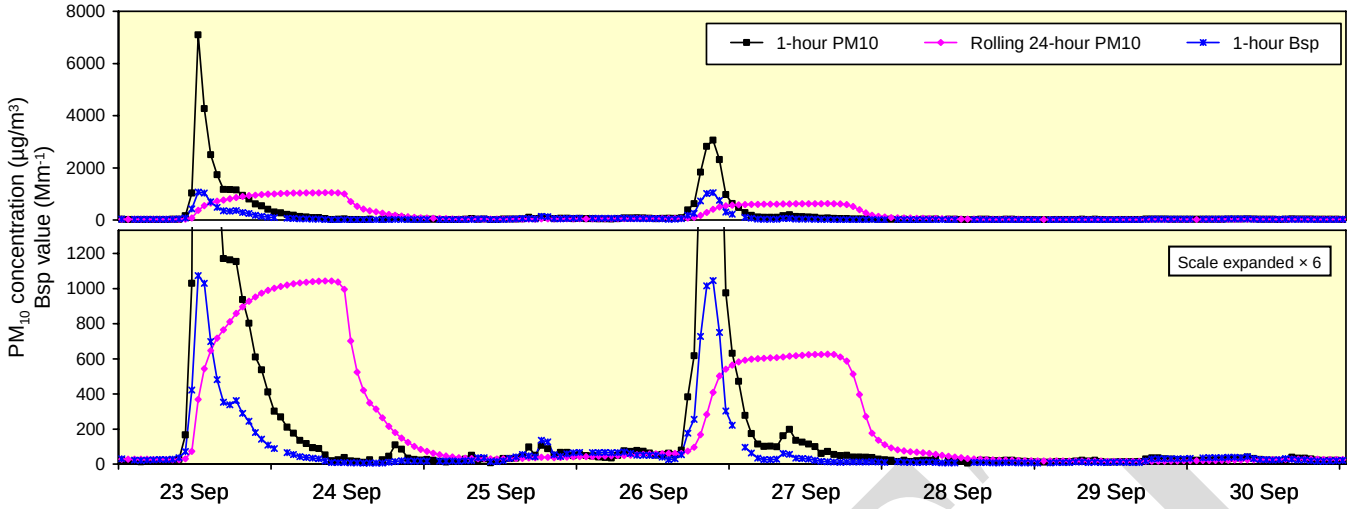


Figure 19: Particle concentrations at the North Toowoomba site from 23 September to 30 September 2009.

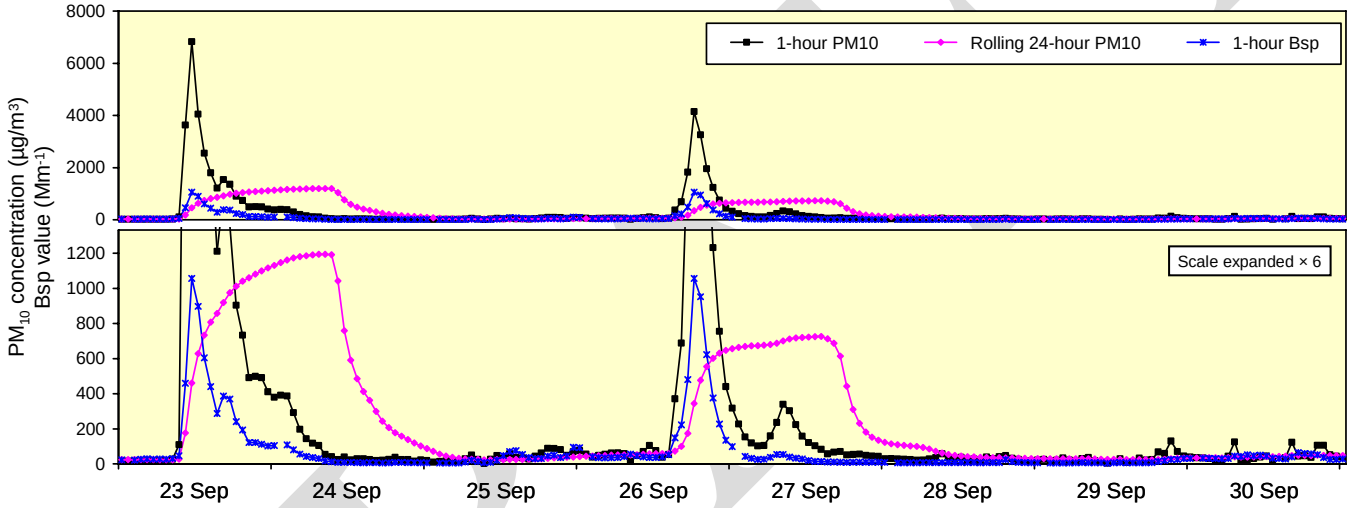


Figure 20: Particle concentrations at the South Gladstone site from 23 September to 30 September 2009.

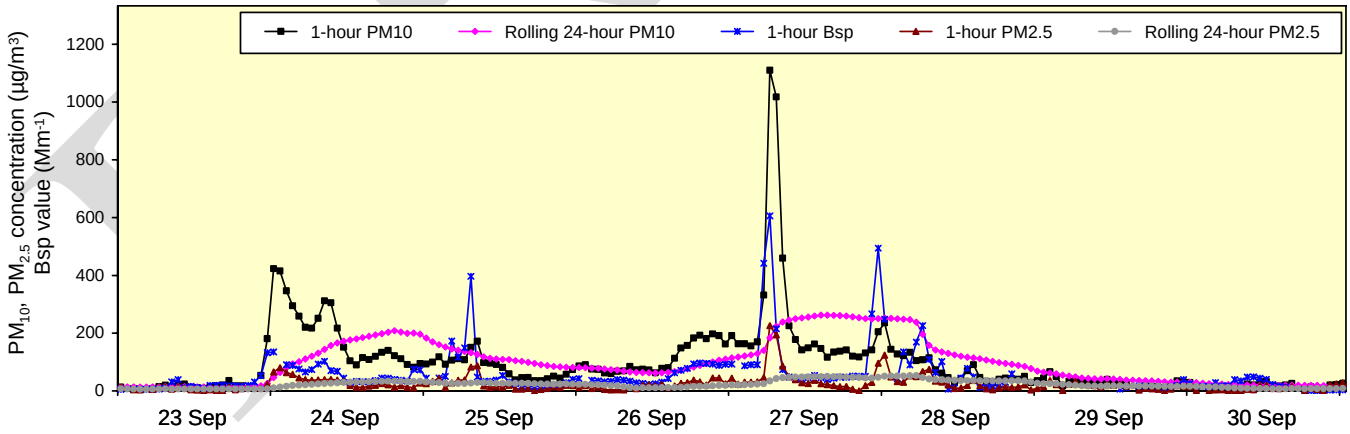


Figure 21: Particle concentrations at the West Mackay site from 23 September to 30 September 2009.

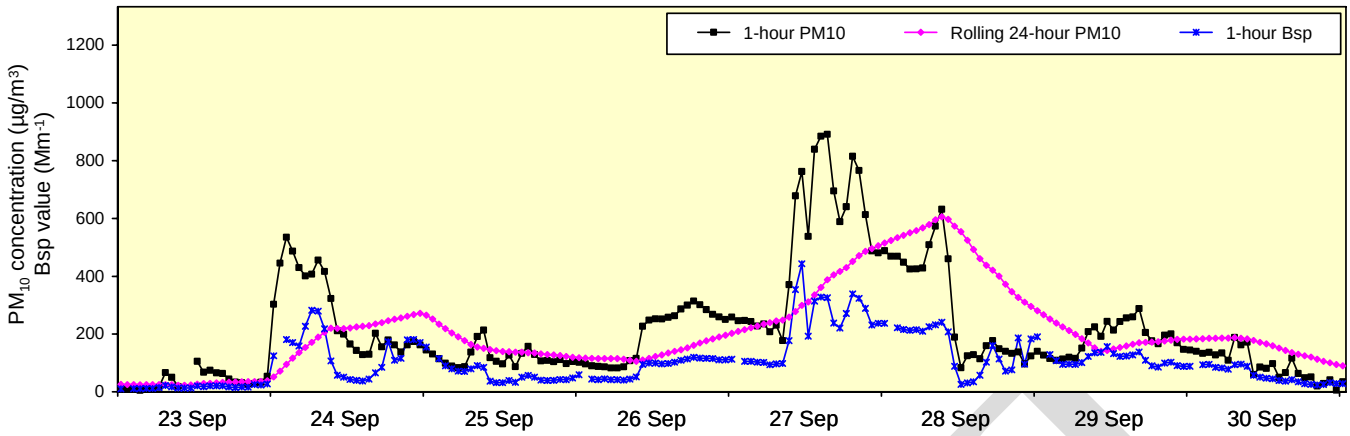


Figure 22: Particle concentrations at the Pimlico site in Townsville from 23 September to 30 September 2009.

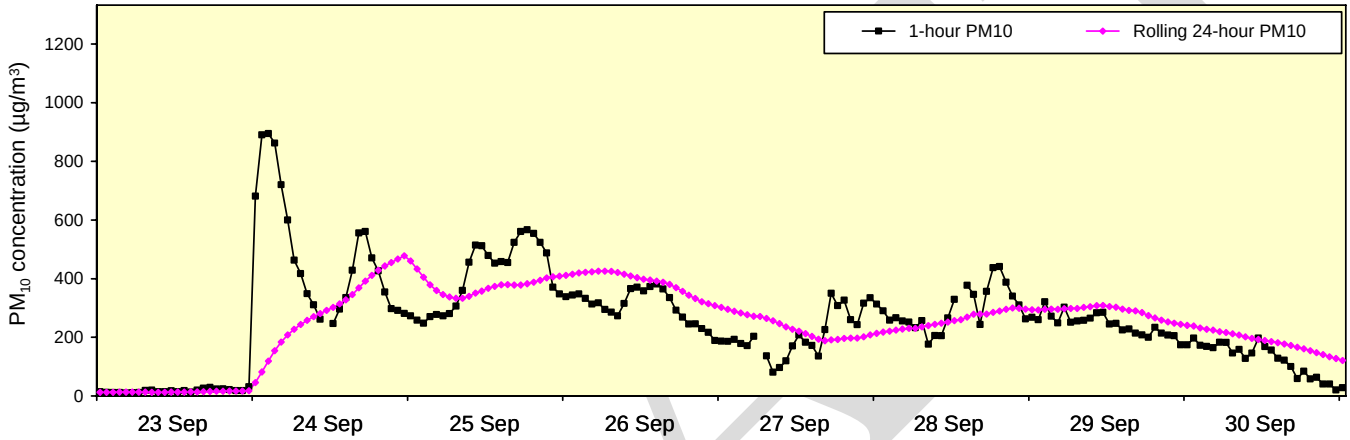
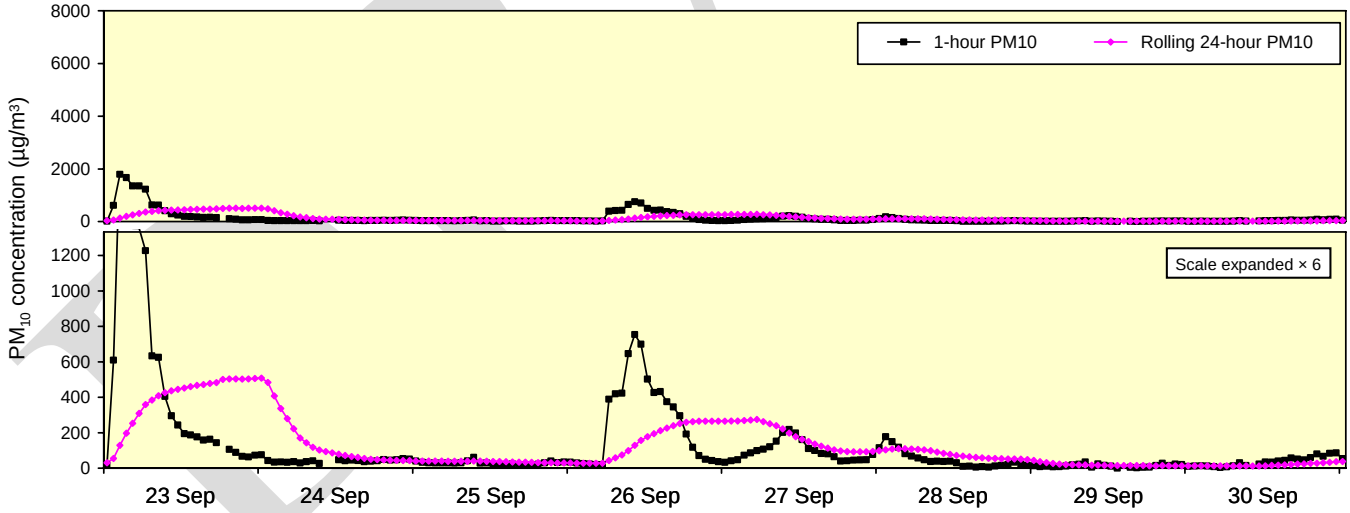


Figure 23: Particle concentrations at The Gap site in Mount Isa from 23 September to 30 September 2009.



PM_{10} and $PM_{2.5}$ standard exceedences in south-east Queensland on 2 October and 3 October 2009

Strong winds accompanying the passage of a weather front carried dust from inland Australia over the southeast Queensland region on 3 October. The 24-hour PM_{10} standard was exceeded at all south-east Queensland PM_{10} monitoring sites, with the exception of Mountain Creek, on 3 October. Figures 24 to 27 show that elevated PM_{10} concentrations on 3 October coincide with the onset of strong westerly winds.

In early October there were a number of grassfires to the west and south of Brisbane. Smoke from these fires, combined with $PM_{2.5}$ emissions from other combustion sources such as motor vehicles, led to exceedences of the 24-hour $PM_{2.5}$ advisory standard at the Rocklea monitoring site on 2 and 3 October. The wind blown dust present on 3 October will also have contributed to overall $PM_{2.5}$ concentrations on this day.

Figure 24: Particle concentrations at the Rocklea site in south-east Queensland from 1 October to 4 October 2009.

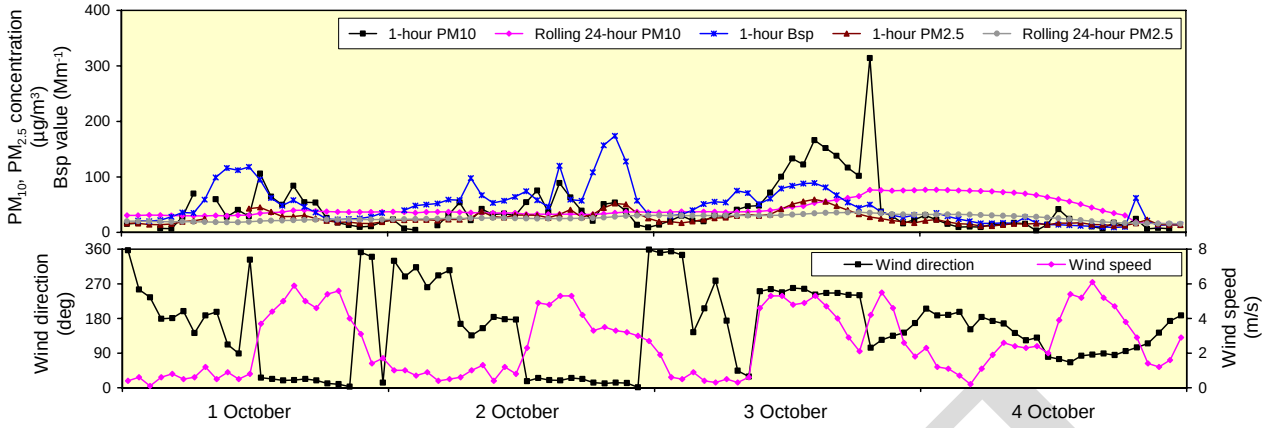


Figure 25: Particle concentrations at the Springwood site in south-east Queensland from 1 October to 4 October 2009.

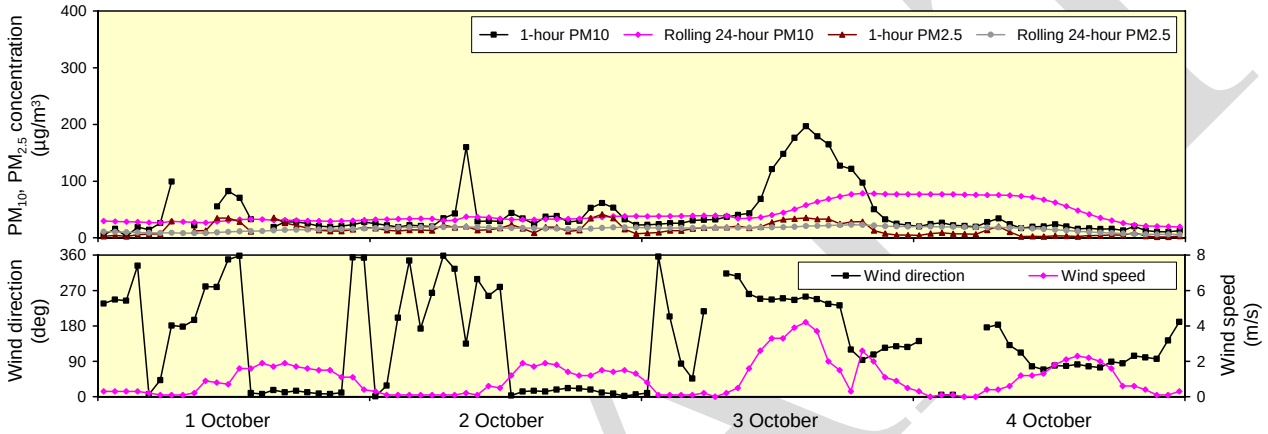


Figure 26: Particle concentrations at the Flinders View site in south-east Queensland from 1 October to 4 October 2009.

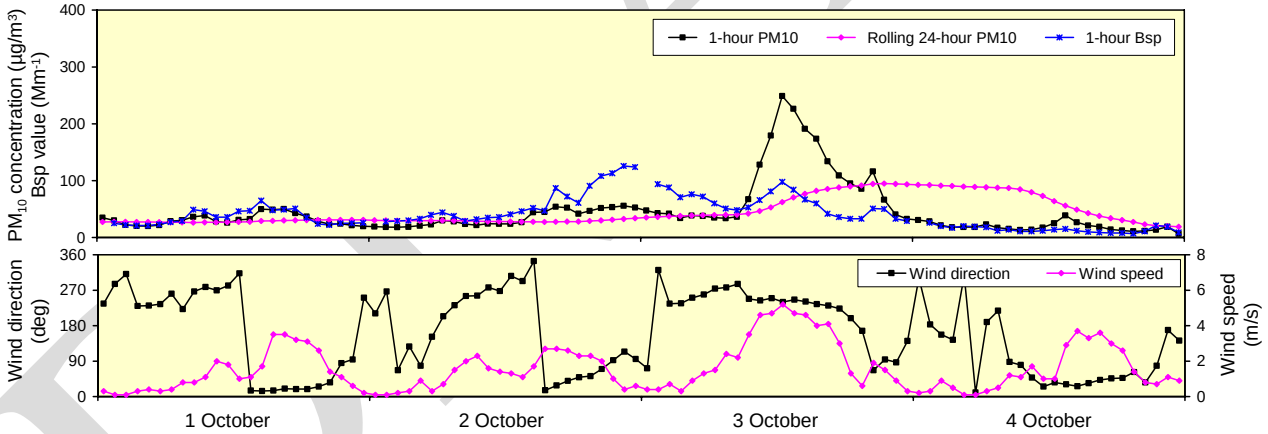
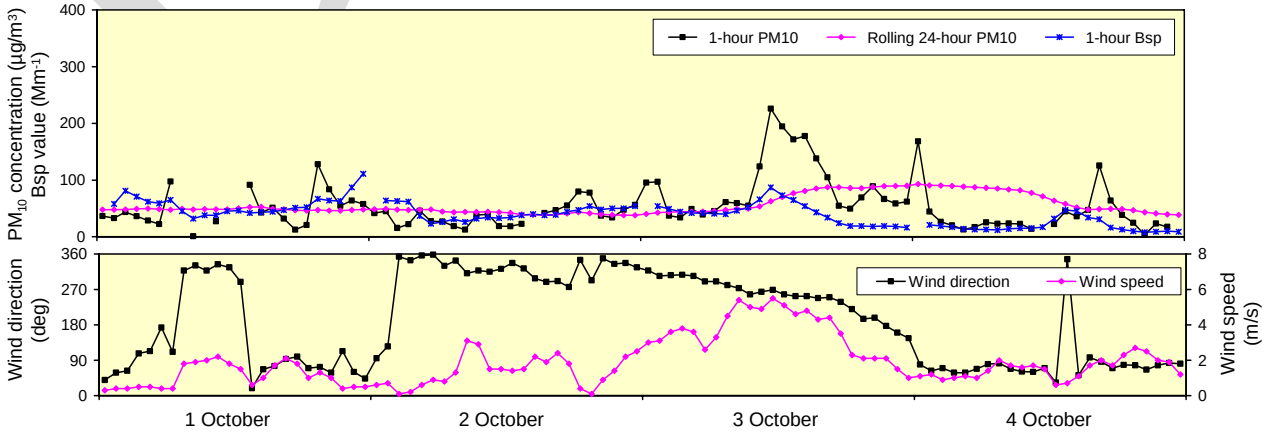


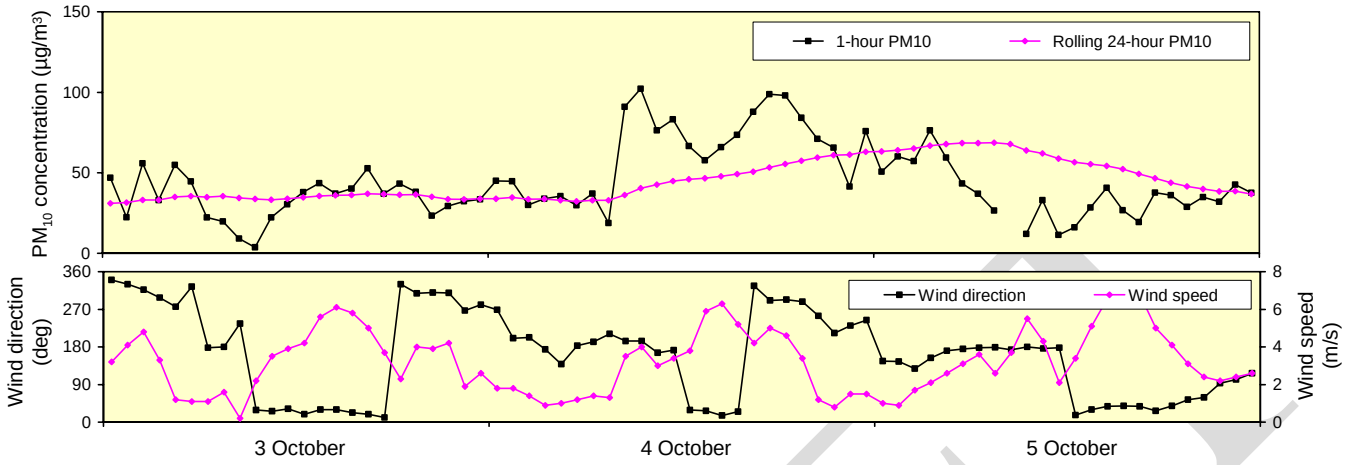
Figure 27: Particle concentrations at the North Toowoomba site from 1 October to 4 October 2009.



PM_{10} exceedence at Pimlico on 4 October 2009

During October, strong winds associated with the passage of a weather front carried dust from inland Australia over the Townsville region on 4 October. Smoke from large fires at Bluewater north of Townsville and Julago south of Townsville also contributed to overall particle concentrations on 4 October.

Figure 28: Particle concentrations at the Pimlico site in Townsville from 3 October to 5 October 2009.



Particle standard exceedences in Queensland between 13 October and 17 October 2009

Strong winds accompanying the passage of a weather front carried dust from inland Australia over Queensland in mid-October. The dust reached south-east Queensland and Toowoomba on 13 October and Gladstone, Mackay and Townsville on 15 October.

The dust resulted in exceedences of the 24-hour PM_{10} standard at the Toowoomba monitoring site on 13 and 14 October, and at all south-east Queensland PM_{10} monitoring sites on 14 October. The dust was also responsible for exceedences of the 24-hour $PM_{2.5}$ advisory standard at the Rocklea and Springwood monitoring sites on 14 October.

The dust led to exceedences of the 24-hour PM_{10} standard at the South Gladstone monitoring site on 15 and 16 October. With the change in wind direction following the passage of the weather front on 15 October, smoke from a large bushfire between Gin Gin and Miriam Vale was carried over the Gladstone region at times during the period 16 to 17 October. The combination of windblown dust and bushfire smoke was responsible for exceedences of the 24-hour $PM_{2.5}$ advisory standard at South Gladstone on 16 and 17 October.

Exceedences of the 24-hour PM_{10} standard were measured at the West Mackay monitoring site on 15, 16 and 17 October. At this site local dust generated by activities taking place at a nearby commercial premises and smoke from vegetation burning is likely to have contributed to overall PM_{10} levels.

The 24-hour PM_{10} standard was exceeded at the Pimlico monitoring site in Townsville on 17 October.

Figure 29: Particle concentrations at the Mountain Creek site in south-east Queensland from 13 October to 17 October 2009.

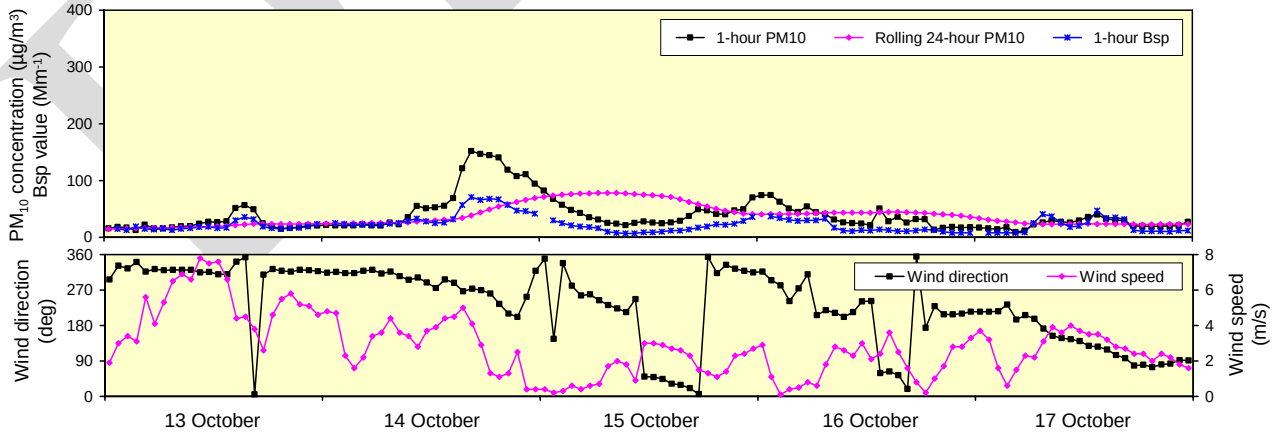


Figure 30: Particle concentrations at the Rocklea site in south-east Queensland from 13 October to 17 October 2009.

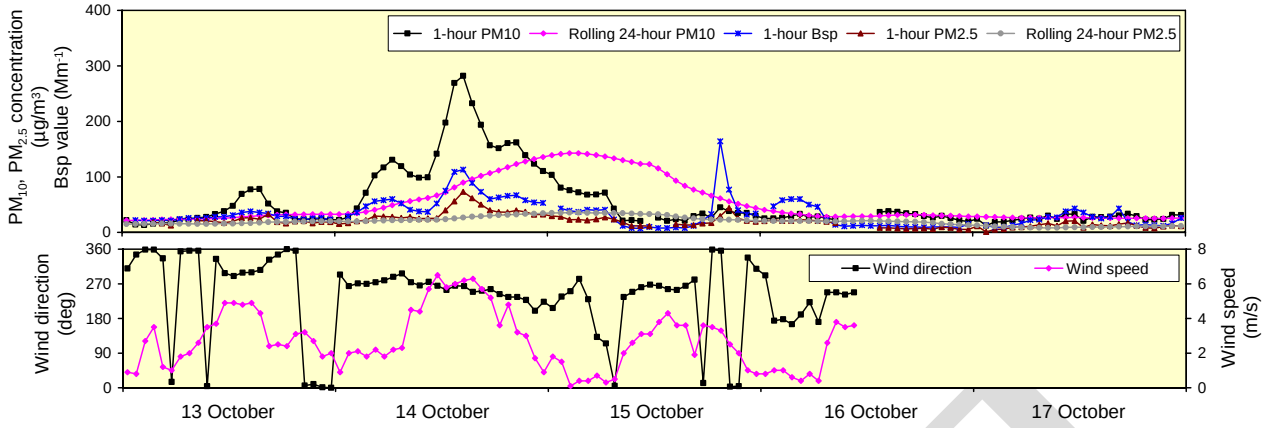


Figure 31: Particle concentrations at the Springwood site in south-east Queensland from 13 October to 17 October 2009.

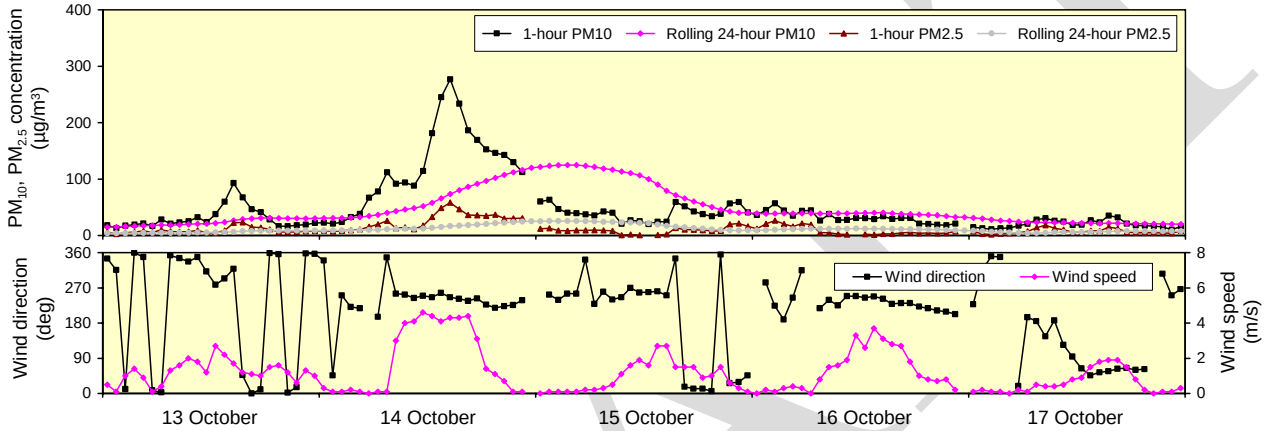


Figure 32: Particle concentrations at the Flinders View site in south-east Queensland from 13 October to 17 October 2009.

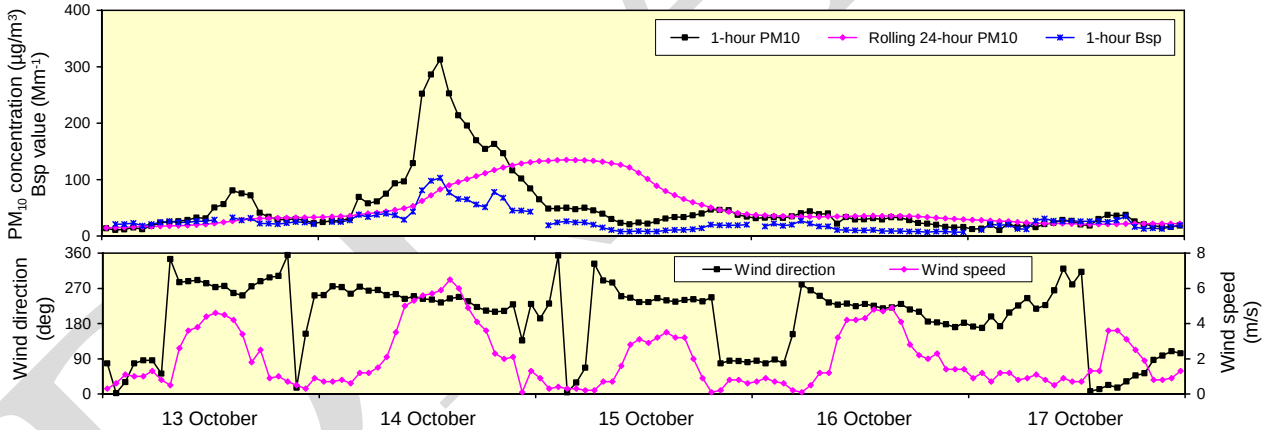


Figure 33: Particle concentrations at the North Toowoomba site from 13 October to 17 October 2009.

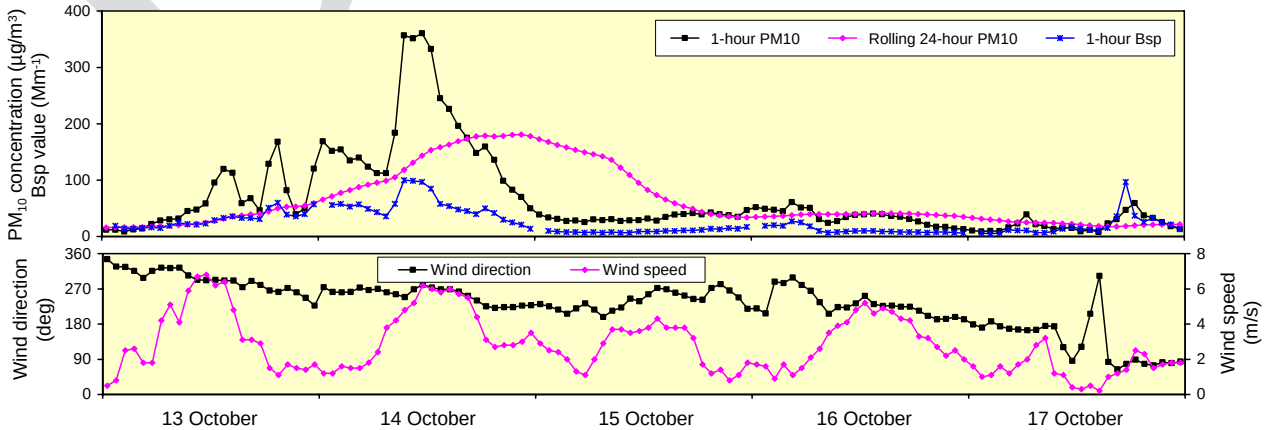


Figure 34: Particle concentrations at the South Gladstone site from 13 October to 17 October 2009.

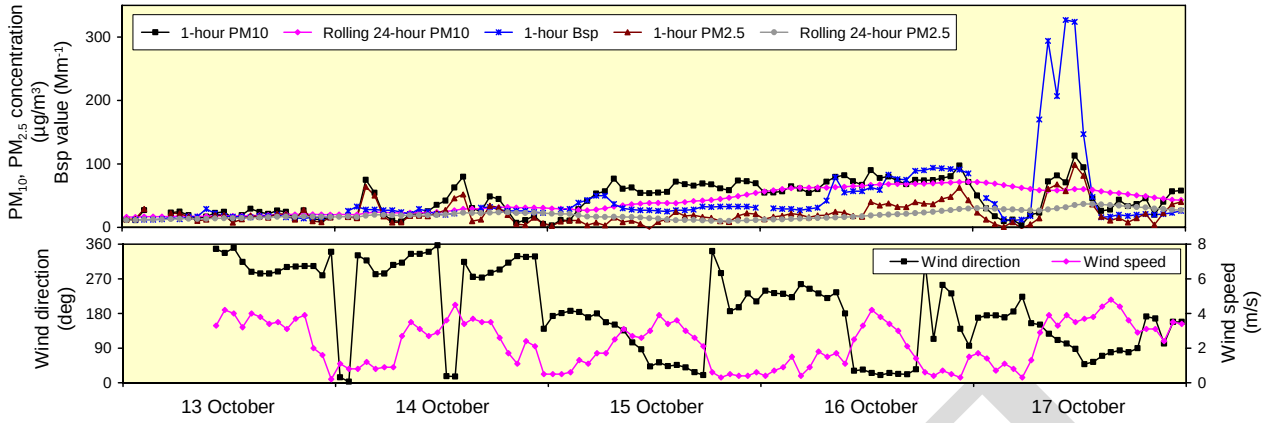


Figure 35: Particle concentrations at the West Mackay site from 13 October to 17 October 2009.

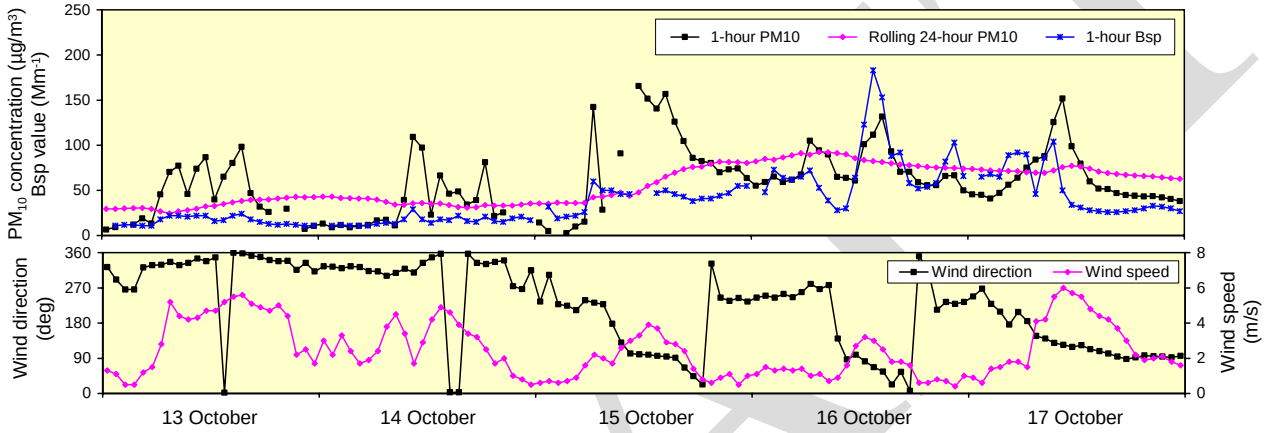
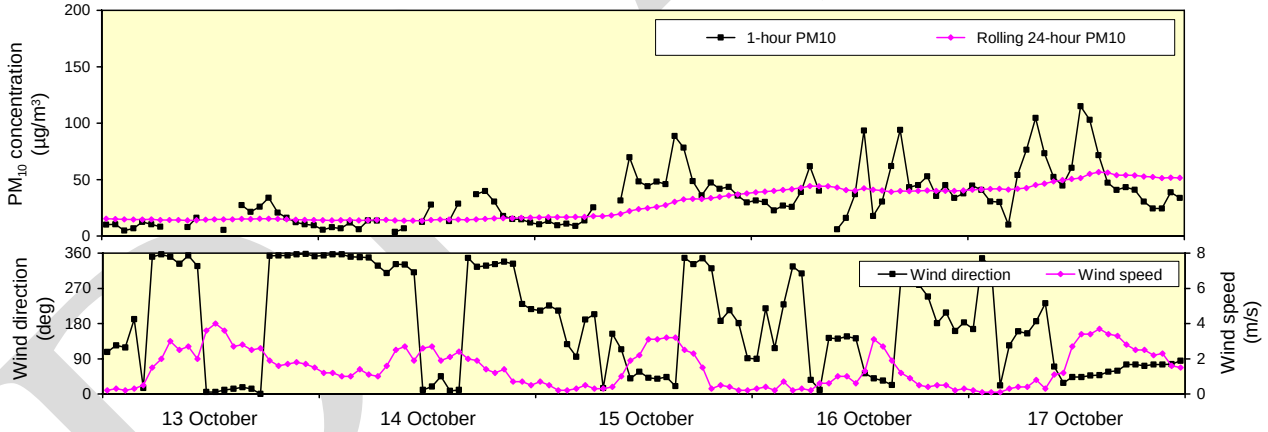


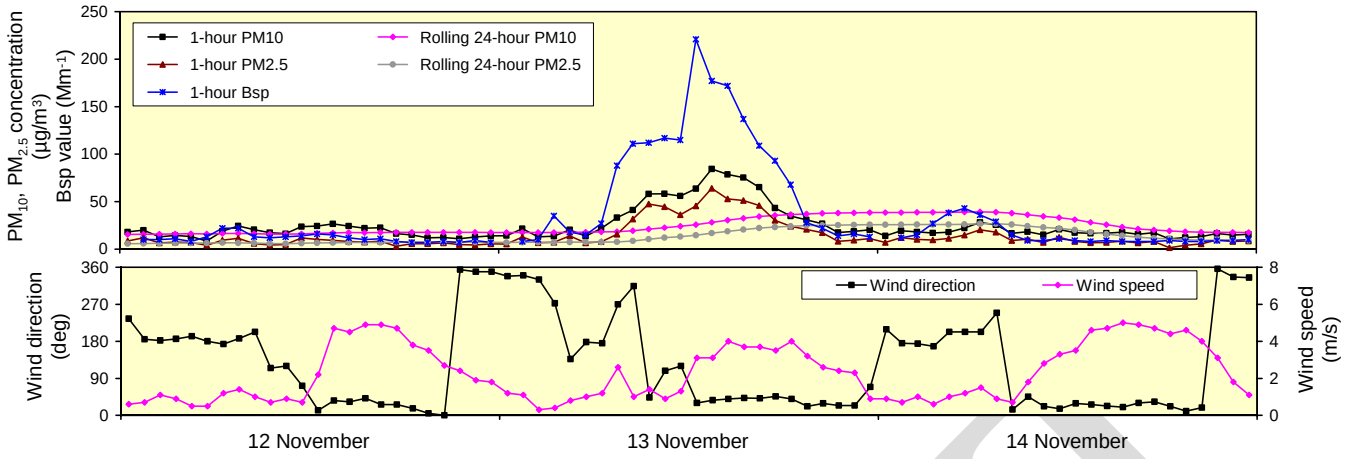
Figure 36: Particle concentrations at the Pimlico site in Townsville from 13 October to 17 October 2009.



$PM_{2.5}$ exceedence at Rocklea on 13 November 2009

On 13 November smoke from a large bushfire in the Cooloola section of the Great Sandy National Park, which burnt through more than 12,000 hectares, was transported over south-east Queensland by northerly winds. The presence of a temperature inversion kept the smoke particles trapped close to the ground and limited dispersion. Smoke from a large grassfire at Nudgee on 12 November is likely to have also added to atmospheric particle levels. The smoke particles resulted in an exceedence of the 24-hour $PM_{2.5}$ advisory standard at the Rocklea monitoring site on 13 November.

Figure 37: Particle concentrations at the Rocklea site from 12 November to 14 November 2009.



PM_{10} exceedences in south-east Queensland and Toowoomba between 30 November and 1 December 2009

In the second half of November 2009 there were a number of large fires in bushland in the Lockyer Valley west of Brisbane. Westerly winds associated with the passage of a weather front on 30 November transported wind blown dust and particles from the Lockyer Valley fires over coastal areas of south-east Queensland. This additional source of particles contributed to exceedences of the 24-hour PM_{10} standard at the Rocklea, Springwood and Flinders View monitoring sites on 30 November and at the Rocklea site on 1 December.

On 1 December, easterly winds carried smoke from the Lockyer Valley fires over Toowoomba at times. The smoke contributed to an exceedence of the 24-hour PM_{10} standard at the Toowoomba monitoring site on this day.

Figure 38: Particle concentrations at the Rocklea site in south-east Queensland from 30 November to 2 December 2009.

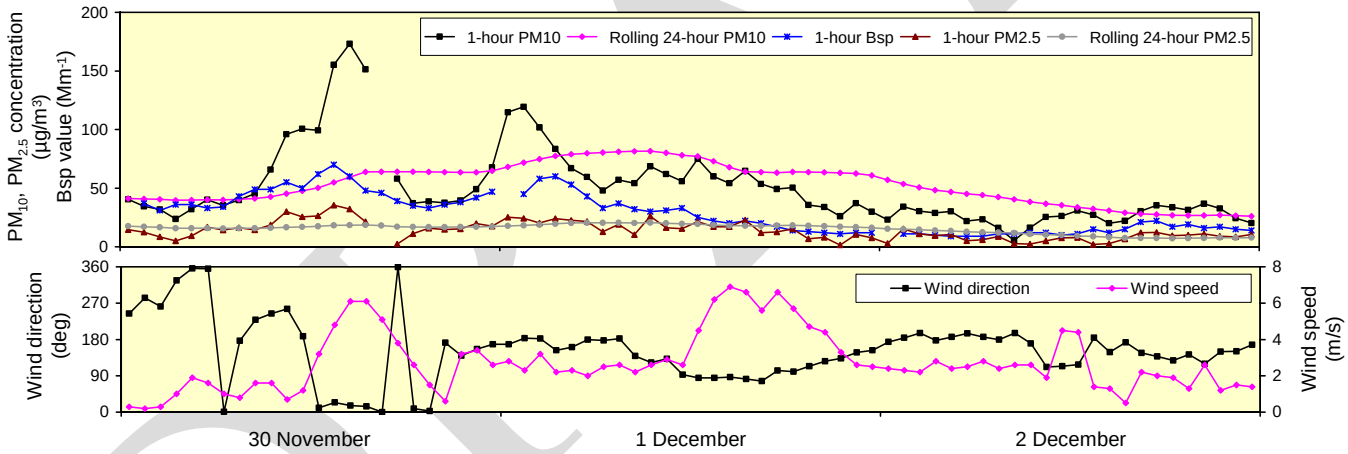


Figure 39: Particle concentrations at the Springwood site in south-east Queensland from 30 November to 2 December 2009.

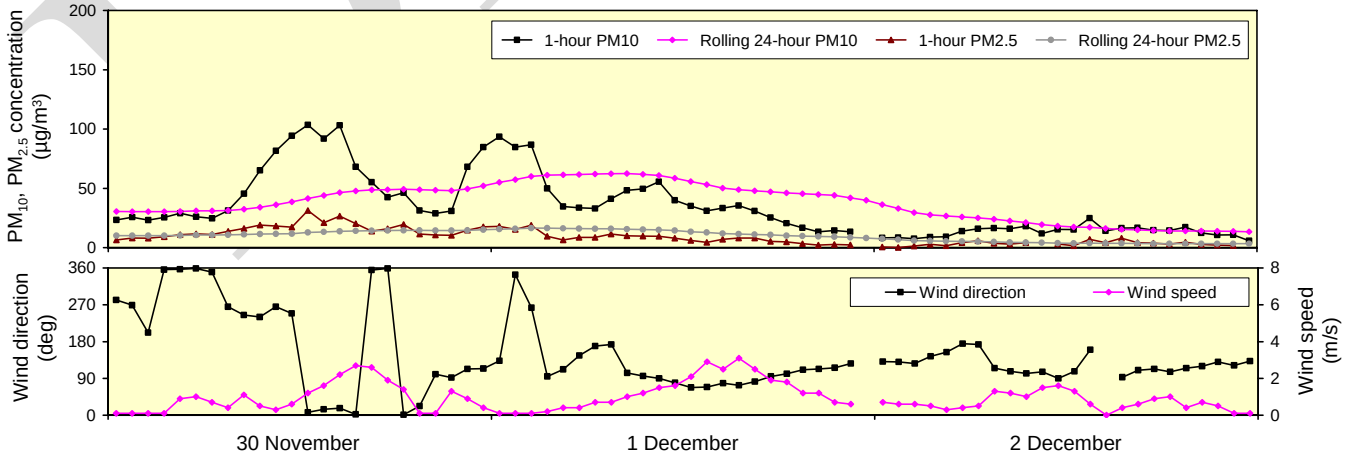


Figure 40: Particle concentrations at the Flinders View site in south-east Queensland from 30 November to 2 December 2009.

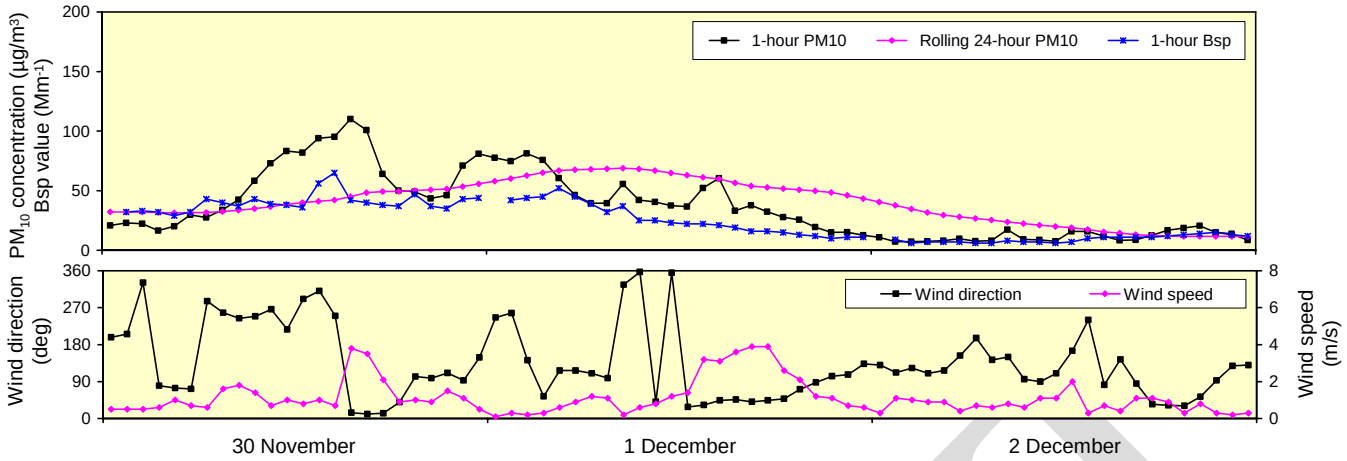
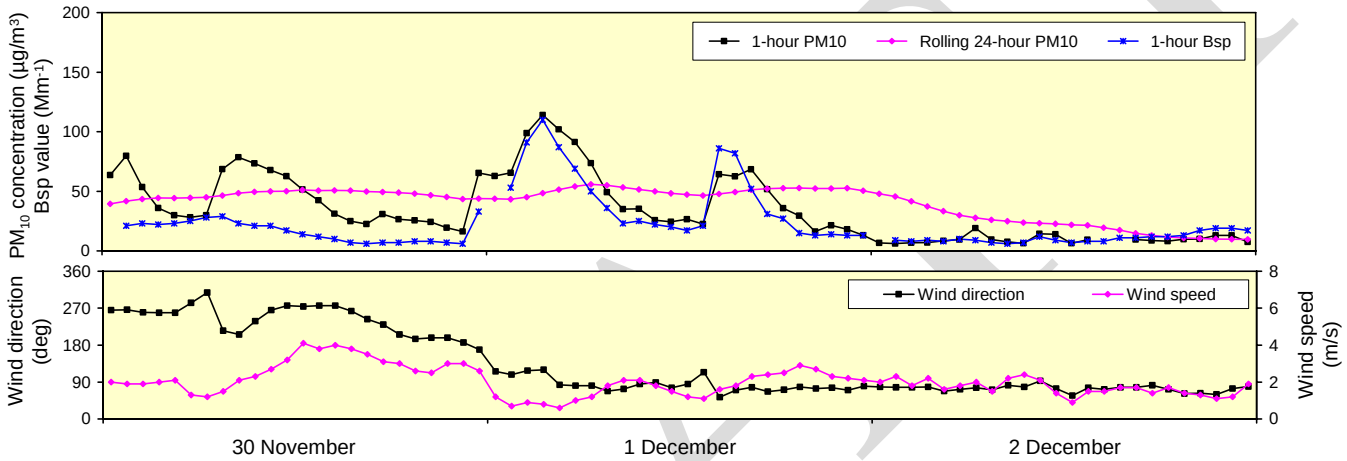


Figure 41: Particle concentrations at the North Toowoomba site from 30 November to 2 December 2009.



PM_{10} exceedences at West Mackay in 2009

A major source of airborne particles in the Mackay region has historically been pre- and post-harvest burning of sugar cane in the Pioneer Valley west of Mackay during the crushing season from June to November each year. With increasing amounts of cane being harvested green (currently over 98 percent of the total crop is green harvested), occurrences of agricultural smoke impacts in Mackay have decreased in recent years.

However, changes in activities at commercial premises in the immediate vicinity of the West Mackay monitoring site (principally movement of soil stockpiles) have seen an increase in occasional but significant episodes of local dust generation impacting on the monitoring site. Elevated dust concentrations due to these activities are not representative of general population exposure in Mackay as a whole. In 2010 the West Mackay monitoring site was moved to a new location away from local dust impacts in order to obtain measurement results that are more indicative of regional exposure.

These localised dust-generating activities were the major contributor to exceedences of the PM_{10} 24-hour standard measured at the West Mackay site on 6 March, 17 June, 24 July, 10 September, 4 October, 5 October and 6 October 2009. Figures 42 to 46 show that on these days PM_{10} particle levels were often elevated from approximately 6:00am to 4:00pm, which corresponds to the hours of work at nearby premises.

For the most part, corresponding Bsp measurements during these times tended to show much smaller variation, pointing to larger dust particles, rather than smaller smoke particles from agricultural burning, being the cause of these exceedences. An exception to this was on the morning of 10 September when both PM_{10} and Bsp levels rose sharply, indicating smoke from agricultural burning contributed to the PM_{10} exceedence on this day. At the time of the elevated Bsp readings, winds were blowing from the direction of agricultural areas in the Pioneer Valley.

Figure 42: Particle concentrations at the West Mackay site from 5 March to 7 March 2009.

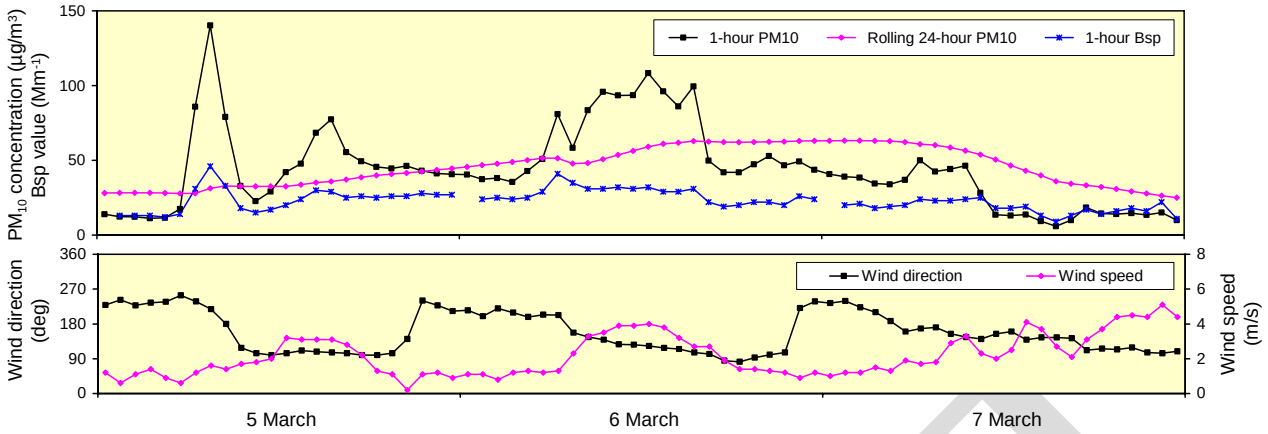


Figure 43: Particle concentrations at the West Mackay site from 16 June to 18 June 2009.

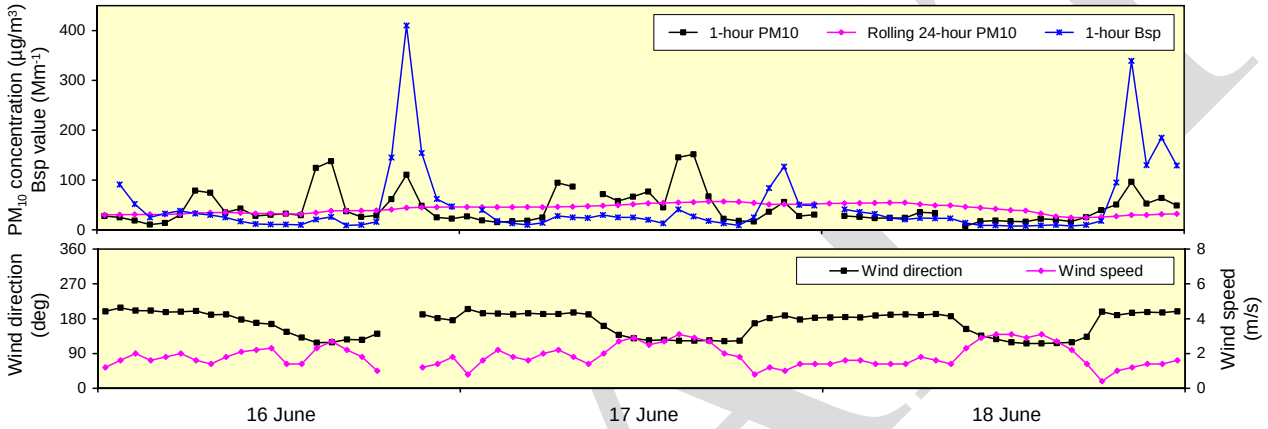


Figure 44: Particle concentrations at the West Mackay site from 23 July to 25 July 2009.

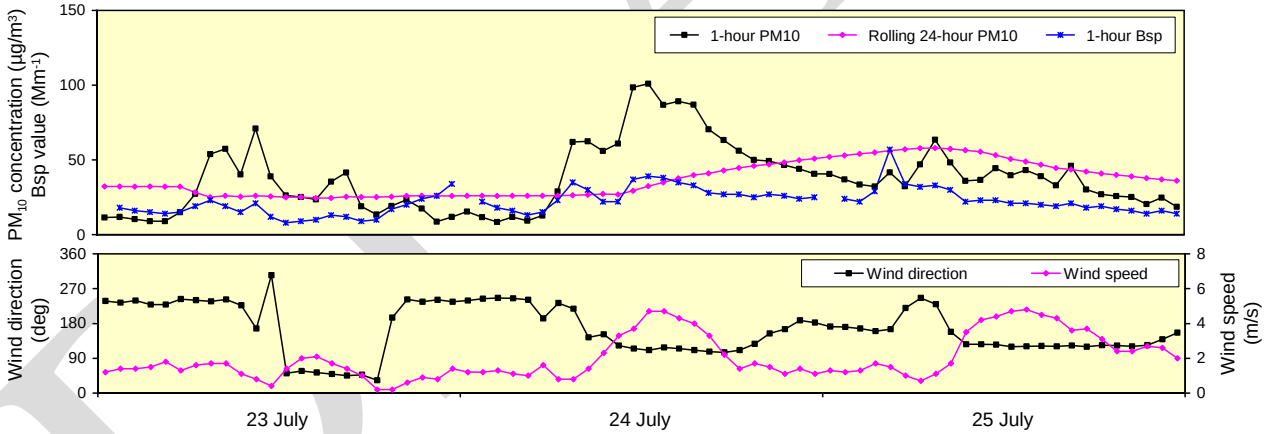


Figure 45: Particle concentrations at the West Mackay site from 9 September to 11 September 2009.

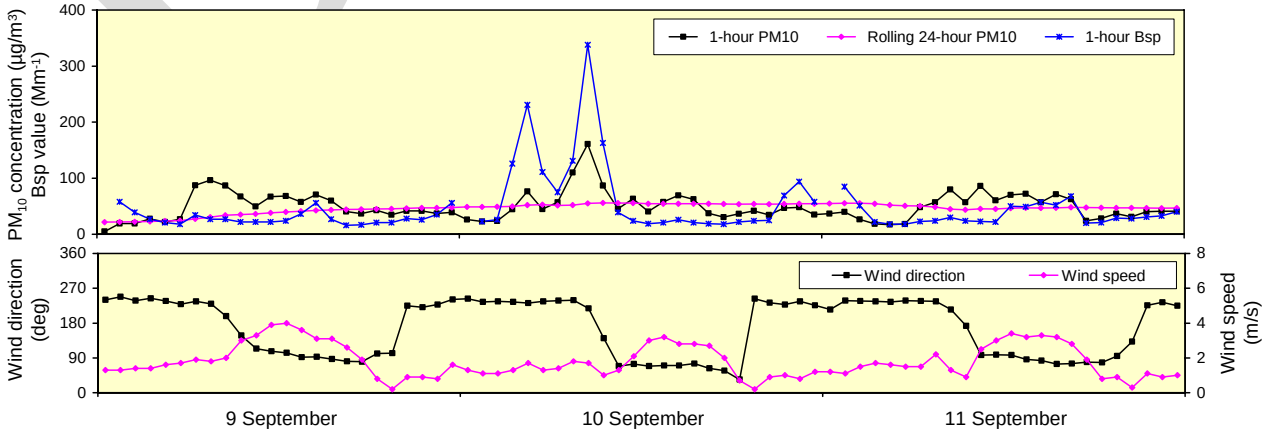
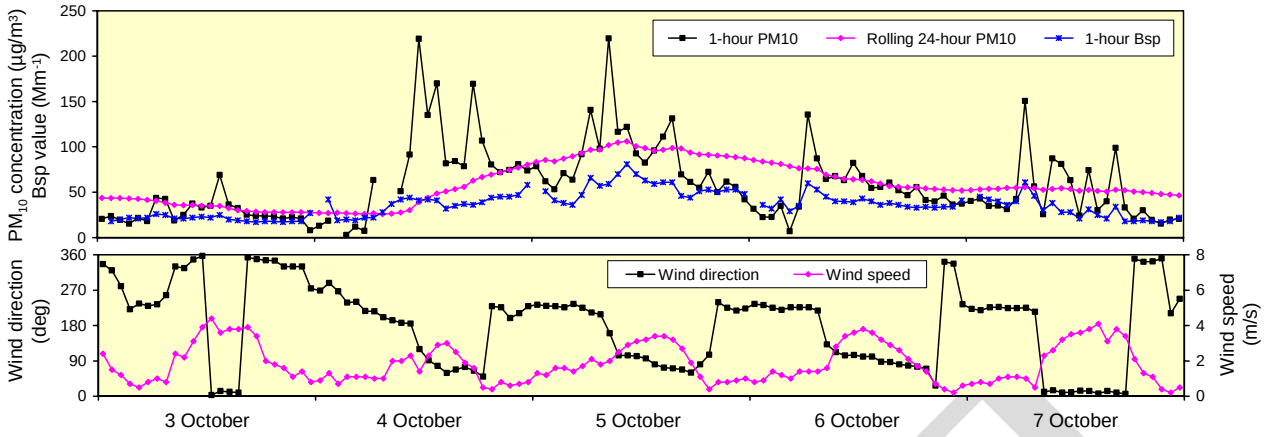


Figure 46: Particle concentrations at the West Mackay site from 3 October to 7 October 2009.



PM_{10} exceedences at The Gap, Mount Isa, in 2009

Mount Isa is located in a semi-arid region. During the dry season which runs from April to November sparse vegetation cover and minimal rainfall means that strong winds can often generate significant amount of wind blown dust through re-entrainment of surface soils.

Exceedences of the 24-hour PM_{10} standard in Mount Isa are often the result of wind blown dust generated by strong winds accompanying the passage of weather fronts. In addition to the Queensland-wide dust storm in late September described previously, PM_{10} exceedences in Mount Isa during 2009 occurred on 11 to 13 February, 4 March, 1 July, 2 July, 27 July, 17 August, 1 October, 2 October, 26 to 28 October, 5 November, 22 November, 10 December, 19 December and 25 December. Figures 47 to 58 show that on these days elevated PM_{10} particle levels are often associated with a change in wind direction and increased wind speed that indicated the passage of a weather front.

Figure 47: Particle concentrations at The Gap site from 11 February to 14 February 2009.

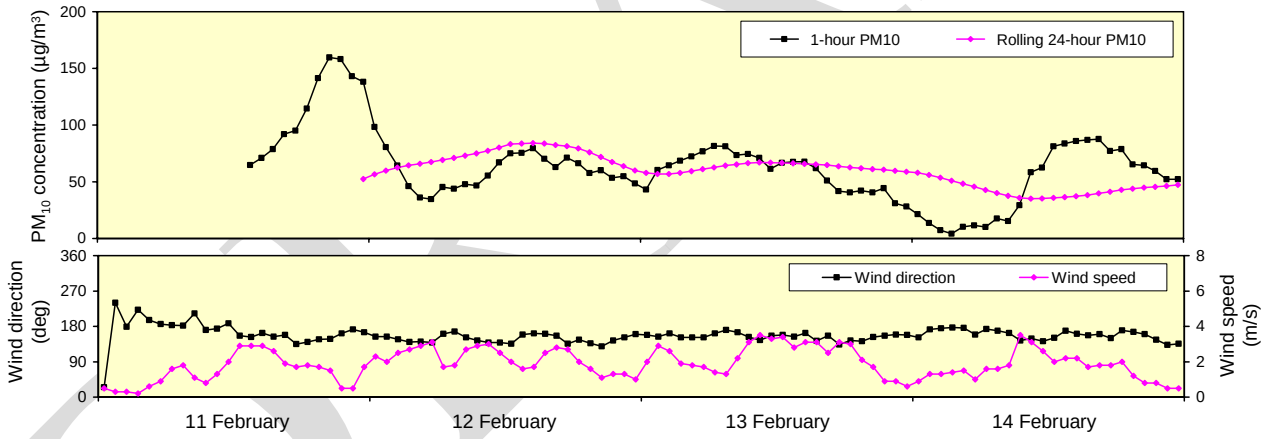


Figure 48: Particle concentrations at The Gap site from 3 March to 5 March 2009.

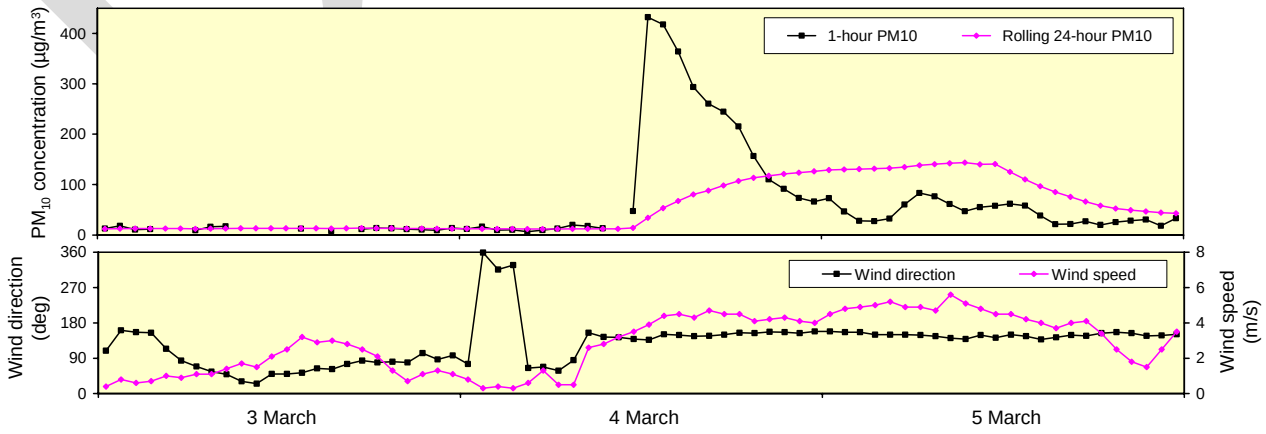


Figure 49: Particle concentrations at The Gap site from 1 July to 3 July 2009.

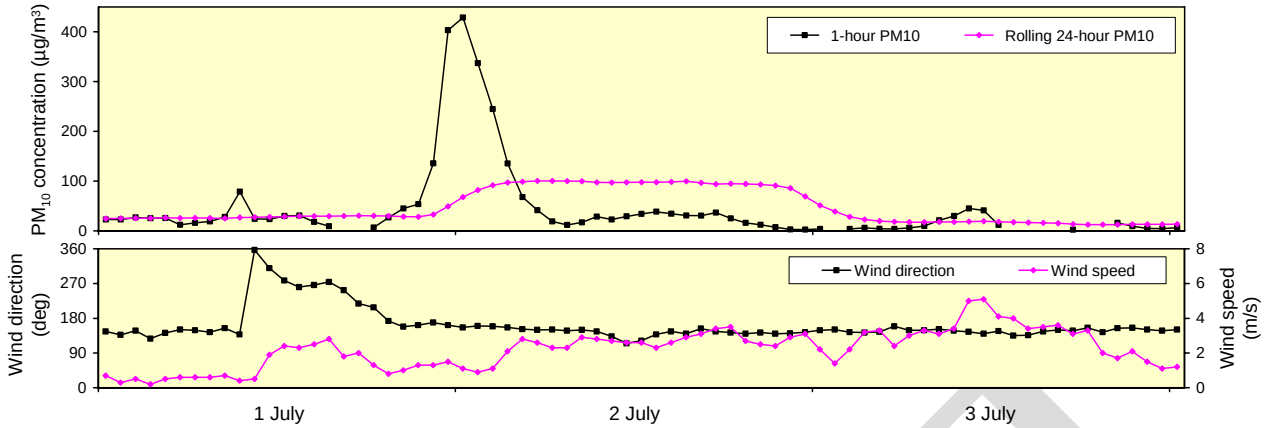


Figure 50: Particle concentrations at The Gap site from 26 July to 28 July 2009.

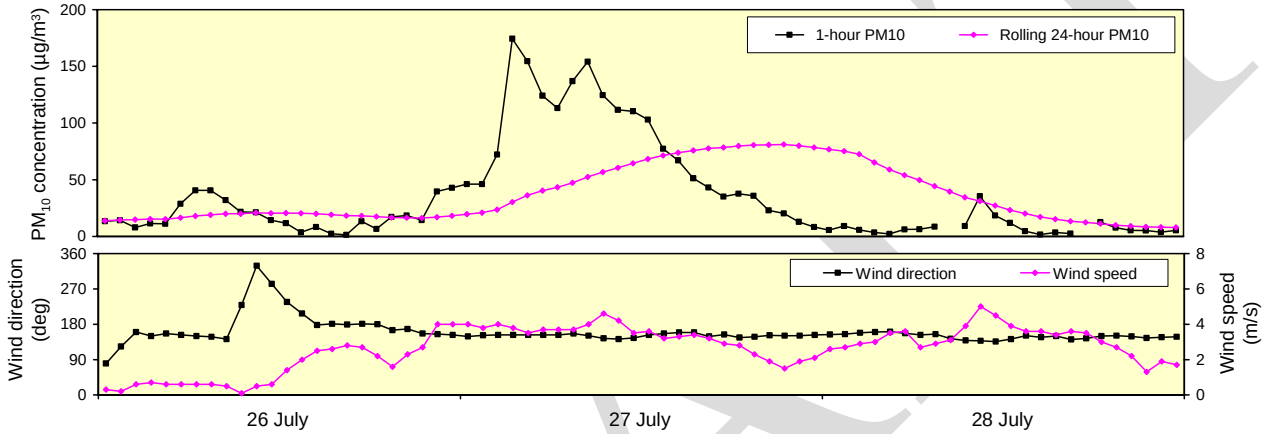


Figure 51: Particle concentrations at The Gap site from 16 August to 18 August 2009.

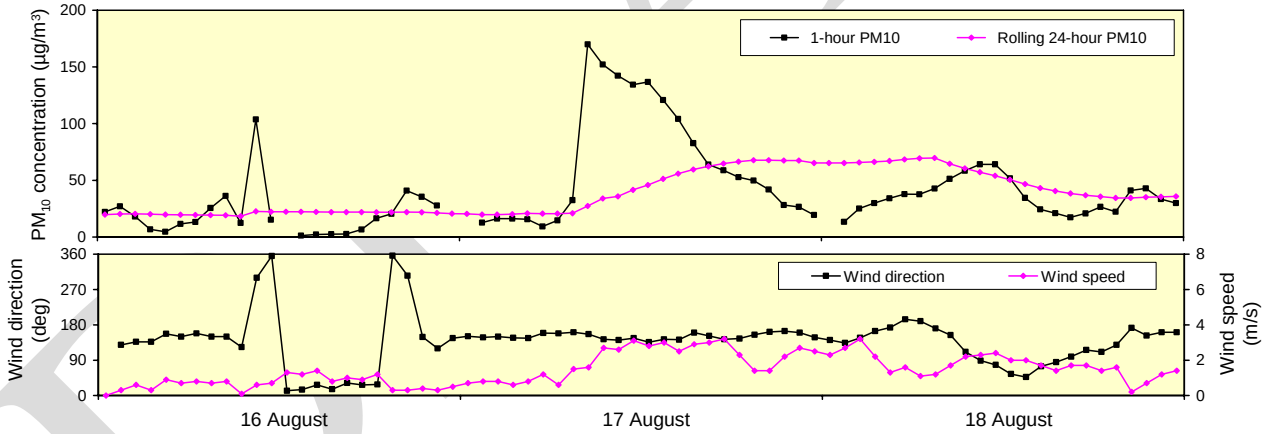


Figure 52: Particle concentrations at The Gap site from 1 October to 3 October 2009.

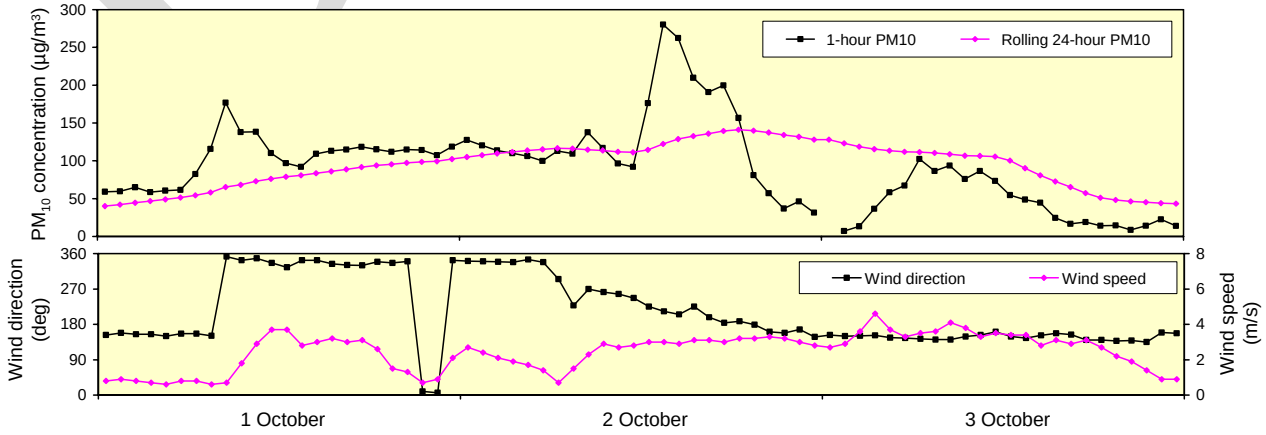


Figure 53: Particle concentrations at The Gap site from 25 October to 29 October 2009.

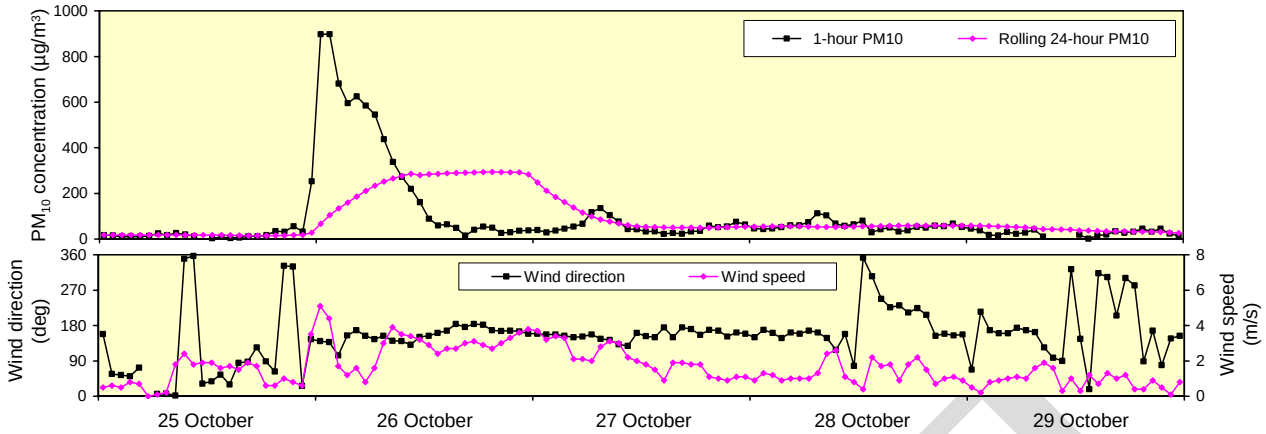


Figure 54: Particle concentrations at The Gap site from 4 November to 6 November 2009.

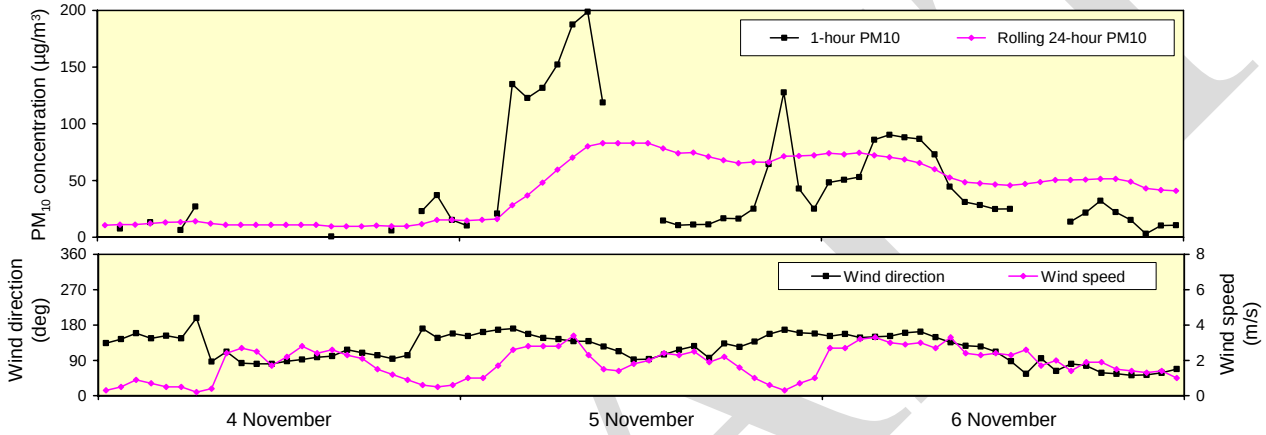


Figure 55: Particle concentrations at The Gap site from 21 November to 23 November 2009.

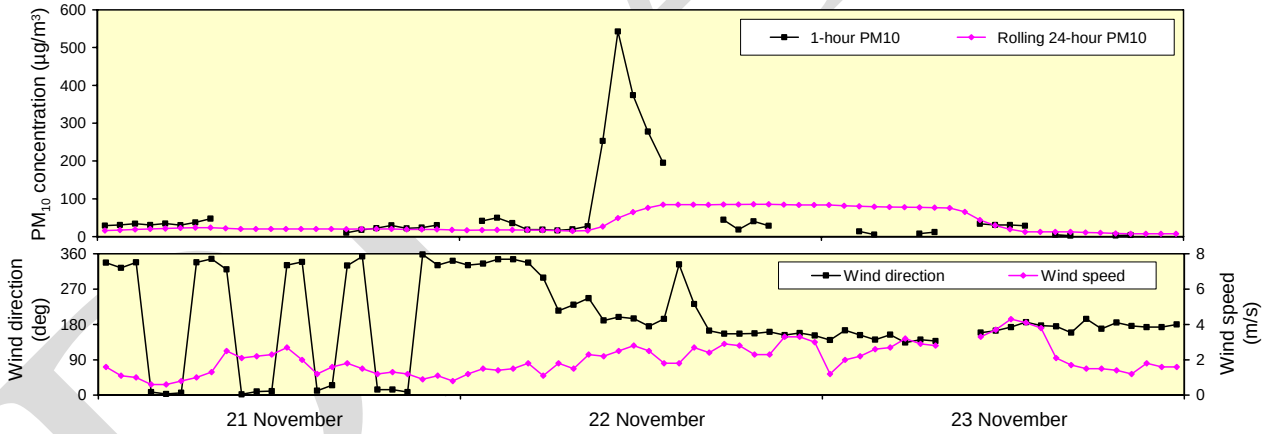


Figure 56: Particle concentrations at The Gap site from 9 December to 11 December 2009.

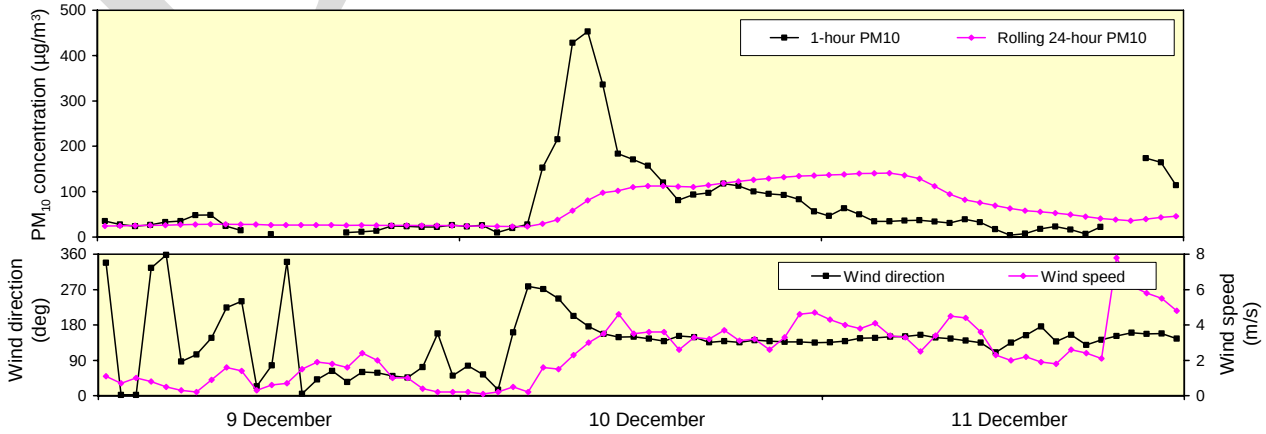


Figure 57: Particle concentrations at The Gap site from 18 December to 20 December 2009.

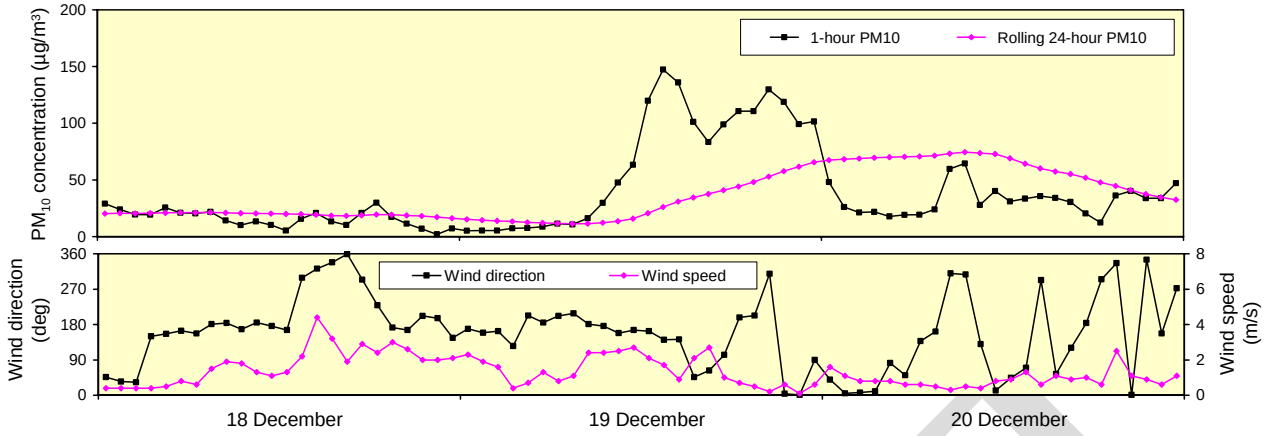


Figure 58: Particle concentrations at The Gap site from 24 December to 26 December 2009.