

Environment Report

## AIR MONITORING REPORT 2004: COMPLIANCE WITH THE NATIONAL ENVIRONMENT PROTECTION (AMBIENT AIR QUALITY) MEASURE

Publication 1001.1\* August 2005

Air quality in Victoria is monitored in accordance with a monitoring plan developed under the *Ambient Air Quality National Environment Protection Measure*<sup>1</sup> (AAQ NEPM). This report assesses compliance with this measure. In addition, EPA also produces an annual air quality report for a more general audience.<sup>2</sup>

#### SUMMARY

Victoria's monitoring results for 2004 indicated that:

- the goal of the AAQ NEPM, to achieve by 2008 the standards to the extent specified, was met for all pollutants at all monitoring stations, except particles (as PM<sub>10</sub>) at one station, which was influenced by local earthworks
- PM<sub>10</sub> exceeded the standard at most monitoring stations, on up to 11 days. On the overwhelming majority of these days the cause was windblown dust
- ozone standards were exceeded on one day at some stations
- the 24-hour advisory reporting standard for particles (as PM<sub>2.5</sub>) was exceeded at one of the two stations monitored in the Port Phillip region

 the high data capture rates required to demonstrate compliance with the AAQ NEPM goals were achieved in all but one case during the periods when stations operated. A significant improvement has occurred over previous years.

Performance monitoring stations operated continuously throughout the year and campaign monitoring was conducted to fulfil commitments in Victoria's monitoring plan.<sup>3</sup> Monitoring proceeded in accordance with the monitoring plan, AAQ NEPM Technical Papers and EPA's NATA accreditation.

## DETAILS

#### Current performance monitoring stations

Victoria's AAQ NEPM air monitoring plan was approved by the National Environment Protection Council (NEPC) Ministers in February 2001. Data presented in this report have been produced in accordance with the monitoring plan, except where amendments or other issues are noted.

The AAQ NEPM requires the monitoring of the pollutants carbon monoxide (CO), nitrogen dioxide  $(NO_2)$ , ozone  $(O_3)$ , sulfur dioxide  $(SO_2)$ , lead (Pb), particles less than 10 micrometres in diameter  $(PM_{10})$  and particles less than 2.5 micrometres in diameter ( $PM_{2.5}$ ).

#### because this is our home-

<sup>\*</sup> This replaces Publication 1001, issued July 2005. <sup>1</sup> National Environment Protection Measure for Ambient Air

*Quality*, National Environment Protection Council Publication, available from www.ephc.gov.au.

<sup>&</sup>lt;sup>2</sup> *Victoria's Air Quality – 2004* (EPA Publication 1000), available from www.epa.vic.gov.au, under 'Publications & Legislation'.

<sup>&</sup>lt;sup>3</sup> Ambient Air Quality NEPM Monitoring Plan Victoria, (EPA Publication 763), available from www.epa.vic.gov.au, under 'Publications & Legislation'.

Eight regions are defined in the monitoring plan: Port Phillip, Latrobe Valley, Ballarat, Bendigo, Shepparton, Wodonga, Warrnambool, and Mildura. They are shown in Figure 1. Monitoring stations in the Port Phillip region are shown in Figure 2.

The performance monitoring stations, pollutants monitored and site types are summarised in Appendix 1.

## Additions to the monitoring network

During 2004 Victoria established additional campaign monitoring stations at:

- Bendigo a mobile monitoring station commenced in May for a period of 12 months
- Outer South Metro ozone monitoring at Moorooduc commenced in December for 12 months

 Mildura – PM<sub>10</sub> monitoring commenced in December for 12 months.

During 2004, campaign monitoring was concluded at:

- Outer North Metro monitoring ozone at Craigieburn
- Shepparton monitoring PM<sub>10</sub> with a highvolume sampler operating one day in six.

Following the addition to the NEPM of the advisory reporting standard for particles as  $PM_{2.5}$ ,  $PM_{2.5}$  has been monitored by the reference method (on a oneday-in-three basis) at Inner East Metro and Inner West Metro stations.  $PM_{2.5}$  is also monitored continuously by tapered element oscillating microbalance (TEOM) at these stations for the  $PM_{2.5}$ Equivalence Program.

Further information on these additions and other changes to the monitoring plan is given in Appendix 1.



Figure 1: AAQ NEPM regions and population density in Victoria



Figure 2: Monitoring stations in Port Phillip region

# Assessment of compliance with standards and 2008 goal

Tables 1 to 6 summarise the compliance of monitoring with the standards and goal of the AAQ NEPM. Performance is assessed as meeting the 2008 goal if the number of exceedences of the standard is no more than the number specified in Schedule 2 of the AAQ NEPM and data availability was at least 75 per cent in each quarter of the year. Regions also meet the standards and goal if they do not require monitoring on the basis that screening<sup>4</sup> shows pollutant levels are reasonably expected to be consistently below the relevant standards.

Performance is assessed as 'not demonstrated' if there has been insufficient data collected to demonstrate that the standards and 2008 goal have been met or not met. Regions may also be assessed as 'not demonstrated' if screening has not been completed.

Additional monitoring statistics prepared in accordance with AAQ NEPM guidelines are shown in Appendix 2.

# Assessment of $PM_{2.5}$ against the advisory reporting standards

The NEPM was revised in 2003 to include advisory reporting standards for particles as  $PM_{2.5}$ . There is no time frame for compliance, but monitoring by the reference method and other acceptable methods is required to be reported. The goal is to gather sufficient data nationally to facilitate a review of the advisory reporting standards as part of the review of the NEPM scheduled to commence in 2005. Table 7 summarises Victoria's monitoring of  $PM_{2.5}$  by the reference method. Further monitoring statistics are given in Appendix 2.

<sup>&</sup>lt;sup>4</sup> National Environment Protection (Ambient Air Quality) Measure Technical Paper No. 4, Screening Procedures, available from www.ephc.gov.au.

## Table 1: 2004 compliance summary for carbon monoxide in Victoria

Region Performance monitoring	Location		Data	availabilit (% of houi	ry rates rs)		Number of exceedences	Performance against the standard and 2008 goal
Station		Q1	Q2	Q3	Q4	Annual	(uays)	
Port Phillip								
CBD	RMIT	94.4	94.5	76.8	90.0	88.9	0	Met
CBD South East	Richmond	92.4	92.5	93.1	93.7	92.9	0	Met
Inner East Metro	Alphington	94.0	94.4	89.6	94.7	93.1	0	Met
Geelong	Geelong South	75.2	76.4	92.3	94.6	84.7	0	Met
<u>Bendigo</u>	Bendigo		49.0	93.5	89.4	58.2	0	Not demonstrated <sup>a</sup>

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

a Campaign monitoring commenced in May. Insufficient data were collected in 2004 to confirm screening but, as all recorded values were low, it is likely that complete monitoring would have shown that the standard was met.

Regions which do not require monitoring on the basis that screening shows pollutant levels are reasonably expected to be consistently below the relevant AAQ NEPM standard: Latrobe Valley, Ballarat, Bendigo, Shepparton, Warrnambool, Wodonga, Mildura.

## AIR MONITORING REPORT 2004

#### Table 2: 2004 compliance summary for nitrogen dioxide in Victoria

AAQ NEPM standard: 0.12 ppm (1-hour average); 0.03 ppm (1-year average)

<b>Region</b> Performance monitoring station	Location		Data availability rates (% of hours)			Number of exceedences (days)	Annual mean (ppm)	Performan the stand 2008	ice against lards and 3 goal	
		Q1	Q2	Q3	Q4	Annual			1-hour	1-year
Port Phillip										
CBD	RMIT	78.0	94.5	94.0	89.9	89.1	0	0.017	Met	Met
Inner East Metro	Alphington	83.0	94.4	91.9	94.6	91.0	0	0.012	Met	Met
Inner West Metro	Footscray	82.2	94.6	93.5	94.0	91.1	0	0.012	Met	Met
South Metro	Brighton	94.3	94.0	88.5	91.1	92.0	0	0.008	Met	Met
Outer West Metro	Pt Cook	92.2	90.2	86.0	93.6	90.5	0	0.005	Met	Met
Geelong	Geelong South	85.8	76.4	93.2	94.6	87.5	0	0.006	Met	Met
Latrobe Valley										
LV East Central	Traralgon	91.1	95.5	95.5	95.6	94.4	0	0.008	Met	Met
LV West Central	Мое	95.6	95.7	95.7	95.7	95.7	0	0.006	Met	Met
<u>Bendigo</u>	Bendigo		49.4	94.4	94.4	59.7	0	0.006	Not demonstrated <sup>a</sup>	Not demonstrated <sup>a</sup>

a Campaign monitoring commenced in May. Insufficient data were collected in 2004 to confirm screening but, as all recorded values were low, it is likely that complete monitoring would have shown that standards were 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 AAQ NEPM standard: Shepparton, Warrnambool, Wodonga, Mildura.

Regions for which screening has not been completed and which are therefore reported as 'not demonstrated': Ballarat, Bendigo.

## AIR MONITORING REPORT 2004

#### Table 3: 2004 compliance summary for ozone in Victoria

AAQ NEPM standard: 0.10 ppm (1-hour average); 0.08 ppm (4-hour average)

Region	Location		Data availability rates				Number of	exceedences	Performance against the	
Performance			(	% of hours	;)		(da	ays)	standards a	nd 2008 goal
monitoring station										
		Q1	Q2	Q3	Q4	Annual	1-hour	4-hour	1-hour	4-hour
Port Phillip										
Inner East Metro	Alphington	92.9	94.4	90.3	88.9	91.6	0	о	Met	Met
Inner West Metro	Footscray	82.6	93.6	93.8	94.1	91.0	1	1	Met	Met
North West Metro	Melton	75.1	94.6	94.0	93.3	89.3	0	о	Met	Met
South East Metro	Dandenong	93.7	94.1	85.2	94.1	91.8	0	о	Met	Met
South Metro	Brighton	94.9	75.3	93.9	94.2	89.6	1	1	Met	Met
Outer East Metro	Mooroolbark	94.5	94.6	82.8	90.1	90.5	0	о	Met	Met
Outer North Metro <sup>a</sup>	Craigieburn	88.4	87.8			43.8	0	о	Not demonstrated <sup>d</sup>	Not demonstrated <sup>d</sup>
Outer South Metro <sup>b</sup>	Moorooduc				9.5	2.4	0	о	Not demonstrated	Not demonstrated
Outer West Metro	Point Cook	94.4	92.5	94.0	93.6	93.6	0	1	Met	Met
Geelong	Geelong South	86.5	75.7	90.6	94.5	86.9	0	1	Met	Met
Outer Geelong	Point Henry	94.4	94.6	94.6	90.3	93.5	0	1	Met	Met
Latrobe Valley										
LV East Central	Traralgon	94.3	95.6	92.5	91.7	93.5	0	0	Met	Met
LV West Central	Moe	95.7	95.7	95.7	95.7	95.7	0	о	Met	Met
<u>Bendigo</u> <sup>c</sup>	Bendigo		32.3	93.3	94.4	55.2	0	0	Not demonstrated <sup>d</sup>	Not demonstrated <sup>d</sup>

a Campaign monitoring ceased in June. Since there were no exceedences during the peak ozone season it is likely that the standards were met.

b Campaign monitoring commenced in December for 12 months.

c Campaign monitoring commenced in May for 12 months.

d Insufficient data were collected in 2004 to confirm screening. As all recorded values were low, it is likely that complete monitoring would have shown that standards were 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 AAQ NEPM standard: Ballarat, Bendigo, Shepparton, Warrnambool, Wodonga, Mildura.

# AIR MONITORING REPORT 2004

## Table 4: 2004 compliance summary for sulfur dioxide in Victoria

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	Location	Data availability rates (% of hours)				Number of exceedences (days)		Annual mean (ppm)	Perfor s	Performance against the standards and 2008 goal		
		Q1	Q2	Q3	Q4	Annual	1-hour	24-hour		1-hour	24-hour	1-year
Port Phillip												
CBD	RMIT	94.5	94.5	93.9	89.9	93.2	0	0	0.001	Met	Met	Met
Inner East Metro	Alphington	94.0	94.4	93.6	94.7	94.2	0	0	0.001	Met	Met	Met
South West Metro	Paisley	90.2	94.5	93.0	92.8	92.6	0	0	0.001	Met	Met	Met
Geelong	Geelong South	85.8	76.0	82.0	91.6	83.9	0	0	0.000	Met	Met	Met
Latrobe Valley												
LV East Central	Traralgon	94.4	90.9	95.5	95.5	94.1	0	0	0.002	Met	Met	Met
LV West Central	Мое	95.7	95.7	95.7	95.2	95.6	0	0	0.001	Met	Met	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 AAQ NEPM standard: Ballarat, Bendigo, Shepparton, Warrnambool, Wodonga, Mildura.

## Table 5: 2004 compliance summary for lead in Victoria

AAQ NEPM standard: 0.50  $\mu$ g/m<sup>3</sup> (1-year average)

Region Performance monitoring station	Location	Data availability rates (% of days)					Annual mean (μg/m³)	Performance against the standard and 2008 goal
		Q1	Q2	Q3	Q4	Annual		
Port Phillip								
CBD North East	Collingwood	86.7	75.0	93.3	100.0	88.5	0.02	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 AAQ NEPM standard: Latrobe Valley, Ballarat, Bendigo, Shepparton, Warrnambool, Wodonga, Mildura

## Table 6: 2004 Compliance Summary for $PM_{10}$ in Victoria

AAQ NEPM Standard:  $50 \mu g/m^3$  (24-hour average)

Region Performance monitoring station	Location		Data a (	availability (% of days)	rates )		Number of exceedences (days)	Performance against the standard and 2008 goal
		Q1	Q2	Q3	Q4	Annual		
Port Phillip								
CBD <sup>a</sup>	RMIT	97.8	97.8	95.7	87.0	94.5	2	Met
CBD South East <sup>a</sup>	Richmond	100.0	100.0	100.0	100.0	100.0	0	Met
Inner East Metro <sup>a</sup>	Alphington	97.8	100.0	92.4	97.8	97.0	1	Met
Inner West Metro	Footscray	79.1	93.4	100.0	100.0	93.2	3	Met
South East Metro	Dandenong	93.4	97.8	88.0	90.2	92.3	1	Met
South Metro	Brighton	85.7	94.5	95.7	81.5	89.3	0	Met
Outer East Metro	Mooroolbark	95.6	90.1	100.0	93.5	94.8	1	Met
Geelong <sup>a</sup>	Geelong South	86.8	80.2	100.0	100.0	91.8	11	Not met
Latrobe Valley								
LV East Central	Traralgon	98.9	100.0	100.0	100.0	99.7	0	Met
LV West Central	Moe	98.9	63.7	97.8	100.0	90.2	1	Not demonstrated <sup>b</sup>
<u>Bendigo</u> <sup>c</sup>	Bendigo	0.0	51.6	100.0	100.0	63.1	1	Not demonstrated <sup>c</sup>
<u>Shepparton</u> <sup>d</sup>	Shepparton	13.2	16.5	13.0	14.1	14.2	1	Not demonstrated
<u>Mildura</u> <sup>e</sup>	Mildura	0.0	0.0	0.0	23.9	6.0	2	Not demonstrated

Monitoring was by TEOM unless indicated otherwise.

a In addition to TEOM monitoring, PM<sub>10</sub> was monitored by high-volume sampler one day in six at CBD, CBD South East, Inner East Metro and Geelong throughout the year – there were no additional exceedences.

b Compliance could not be demonstrated because of inadequate data capture in one quarter. The 2008 goal would most likely have been met.

c Campaign monitoring at Bendigo commenced in May. The 2008 goal would most likely have been met.

d Campaign monitoring at Shepparton by high-volume sampler one day in six ceased in December.

e Campaign monitoring at Mildura commenced in December.

Regions for which screening has not been completed and which are therefore reported as 'not demonstrated': Ballarat, Warrnambool, Wodonga.

## Table 7: 2004 monitoring summary for $PM_{2.5}$ in Victoria

<b>Region</b> Performance monitoring station	Location		Data a (	availability (% of days	rates )	Number of exceedences (days)	Annual mean (µg/m³)	
		Q1	Q2	Q3	Q4	Annual		
Port Phillip								
Inner East Metro	Alphington	100.0	96.8	90.0	90.3	94.3	1	6.6
Inner West Metro	Footscray	93.3	100.0	96.7	67.7	89.3	0	6.2

AAQ NEPM advisory reporting standard:  $25 \mu g/m^3$  (24-hour average);  $8 \mu g/m^3$  (1-year average)

Monitoring by reference method (one day in three).

# Progress towards achieving the AAQ NEPM 2008 goal

The AAQ NEPM goal for CO, NO<sub>2</sub>, O<sub>3</sub>, SO<sub>2</sub>, Pb and  $PM_{10}$  is to achieve the standards to the extent specified by the number of allowed exceedences by 2008. As assessed in accordance with the monitoring protocol, in 2004 the 2008 goal was met for all pollutants except for  $PM_{10}$ . at one station.

In the Port Phillip region the goal of no more than one exceedence of the ozone standards was achieved at all stations. There was a single exceedence of the four-hour standard at each of Inner West Metro, South Metro, Outer West Metro, Geelong and Outer Geelong. The one-hour standard was exceeded on the same days at Inner West Metro and South Metro stations. These exceedences occurred on three days when the photochemical generation of ozone followed a typical Melbourne pattern, with recirculation of air on a sea breeze.

Ozone monitored at the Outer North campaign monitoring station for 10 months (including the 2003–04 ozone season) was similar to other parts of Melbourne and there were no exceedences.

There were no ozone exceedences in the Latrobe Valley.

All performance monitoring stations except Geelong met the 2008 goal for  $PM_{10}$ . There were exceedences of the standard at most stations but the number of exceedences was much lower than in 2003. Most  $PM_{10}$  exceedences were caused by windblown dust and Geelong station was influenced by local earthworks.

There was one instance where compliance could not be demonstrated at a performance monitoring station.  $PM_{10}$  was assessed as 'Not demonstrated' at Latrobe Valley West Central due to insufficient data availability as detailed in Table 6. Comparison with other monitoring suggests that the 2008 goal for  $PM_{10}$  was most likely achieved there. There were fewer 'Not demonstrated' assessments than in previous years, due to Victoria's ongoing program to increase data capture through improvements to systems and instrument upgrades.

Data from campaign monitoring stations are also presented in this report. Compliance is 'Not demonstrated' because the period of monitoring does not cover the calendar year.

In addition, compliance is not demonstrated due to incomplete screening procedures for  $NO_2$  and  $PM_{10}$ in the rural regions. Campaign monitoring for  $PM_{10}$ , which has been performed at Bendigo,<sup>5</sup> Ballarat<sup>6</sup> and Shepparton<sup>7</sup> (and is currently under way at Mildura) has indicated that ongoing monitoring will be required. It is planned to extend  $PM_{10}$  campaign monitoring in the other regions sequentially in future years.

Screening procedures by campaign monitoring for  $NO_2$  are being progressively implemented, with a station located at Bendigo in the first instance. The mobile station at Bendigo will be moved to Ballarat in mid-2005 and will then be relocated to other rural regions sequentially in future years. It also monitors CO,  $O_3$  and PM<sub>10</sub>.

<sup>&</sup>lt;sup>5</sup> Air quality assessment of fine particles in Bendigo – a pilot study (EPA Publication 869), available from www.epa.gov.au, under 'Publications & Legislation'.

 <sup>&</sup>lt;sup>6</sup> Airborne particle monitoring at Ballarat, February 2002 to September 2003 (EPA Publication 936), available from www.epa.gov.au, under 'Publications & Legislation'.
 <sup>7</sup> Airborne particle monitoring at Shepparton, December 2003 to December 2004 (EPA Publication 992), available from www.epa.gov.au, under 'Publications & Legislation'.

The AAQ NEPM goal for  $PM_{2.5}$  is to gather sufficient data to facilitate a review of the advisory reporting standards as part of the 2005 review of the NEPM.  $PM_{2.5}$  has been monitored at two stations in the Port Phillip region and results are presented in Appendix 2.

## Extent to which standards are met

On the basis of available data, the following observations may be made:

- For CO, no exceedences were recorded and compliance was demonstrated at all stations where there was adequate data capture.
- For NO<sub>2</sub>, no exceedences were recorded and compliance was demonstrated at all stations where there was adequate data capture.
- For O<sub>3</sub>, no exceedences were recorded in the Latrobe Valley but five stations in the Port Phillip region recorded one exceedence day. All stations with adequate data capture achieved the 2008 goal. A description of the circumstances leading to these exceedences is given in Appendix 3.
- For SO<sub>2</sub>, no exceedences were recorded and compliance was demonstrated at all stations.
- For Pb, compliance was demonstrated at the peak station in Port Phillip region. Following the phasing out of leaded petrol, levels are below the level of precision threshold<sup>8</sup> (Figure 3) and EPA intends to cease monitoring lead in Melbourne in 2005.



 For PM<sub>10</sub>, the 2008 goal was met at all Port Phillip stations, except Geelong. Geelong was influenced by local earthworks and had 11 exceedence days. Other stations in the Port Phillip region had between zero and three exceedences.

In the Latrobe Valley region, Latrobe Valley West Central had one exceedence but inadequate data availability to demonstrate compliance. The campaign stations at Bendigo, Shepparton and Mildura recorded one, one and two exceedences respectively, but had insufficient data capture to demonstrate compliance. On the basis of available data, it is expected that Bendigo would have achieved the 2008 goal, Shepparton may have and Mildura would not have.

A description of the circumstances leading to these exceedences is given in Appendix 3.

<sup>&</sup>lt;sup>8</sup> National Environment Protection (Ambient Air Quality) Measure Technical Paper No. 9, Lead Monitoring, available from www.ephc.gov.au.

## APPENDIX 1: MONITORING DETAILS

#### Performance monitoring stations

The performance monitoring stations, pollutants monitored and site types are summarised in Table 8. Site types are defined<sup>9</sup> as: generally representative upper bound for community exposure sites; population-average sites; and peak sites.

Re	gion	Location	Location		Site type					
Pe sta	rformance monitoring ation		category	(	20	NO <sub>2</sub>	0,3	S0 <sub>2</sub>	Pb	PM <sub>10</sub>
Po	ort Phillip									
CE	BD	RMIT	CBD	(	G*	G*		G		G*
CE	BD North East	Collingwood	LI/Res						Pk*	
CE	BD South East	Richmond	Res		G					G
In	ner East Metro	Alphington	Res/LI	(	G*	G*	Рор	Pop*		G*
In	ner West Metro	Footscray	I/Res			G*	G*			G*
No	orth West Metro	Melton	Res				G			
Sc	outh East Metro	Dandenong	LI				Рор			Рор
Sc	outh Metro	Brighton	Res			G	Pop*			Рор
Sc	outh West Metro	Paisley	I/Res					G		
Οι	uter East Metro	Mooroolbark	Res				Рор			Рор
Οι	uter West Metro	Pt Cook	Rur/Res			Pop*	G*			
Ge	elong	Geelong South	LI/Res	(	G*	G*	Pop*	G*		G*
0ι	ıter Geelong	Point Henry	I/Rur				Рор			
La	trobe Valley									
LV	East Central	Traralgon	Res			G*	G*	G*		G*
LV	West Central	Moe	Res			Рор	G	G		G
CBD	Central business dist	rict	·	RMIT		RMIT Uni	versity			
I	Industrial			LI		Light ind	ustrial			
Res	Residential			Rur		Rural				
G	Generally representative upper bound			Рор		Population-average				
Pk	Peak			*		Trend sta	tion			

#### Table 8: Victorian performance monitoring stations

<sup>9</sup> National Environment Protection (Ambient Air Quality) Measure Technical Paper No. 3, Monitoring Strategy, available from www.ephc.gov.au.

## **Description of exposed population**

The exposed population represented by each monitoring station is described qualitatively by the location category column in Table 8. Further information is given in Appendix C of the monitoring plan.

#### Implementation of the monitoring plan

The monitoring plan provided for campaign monitoring of  $PM_{10}$  in rural regions. In past years this has been done by one-day-in-six monitoring by high-volume sampler. In 2004 continuous TEOM monitors were installed at Bendigo and Mildura. O<sub>3</sub>, NO<sub>2</sub> and CO are also monitored at Bendigo.

Campaign monitoring for  $O_3$  in the Port Phillip region continued according to the monitoring plan with the establishment of the Outer South station at Moorooduc.

Each of these campaign stations meets the requirements of the Australian standard for siting of sampling units, except for proximity to trees at Bendigo as shown in Table 9, and the data are included in this report. Inner East Metro, CBD South East and Latrobe Valley West Central also continue to have minor non-compliances due to the proximity of trees.

	Height above ground	Min. distance to support structure	Clear sky angle of 120°	Unrestricted airflow of 270°/360°	20m from trees	No boiler or incinerators nearby	Minimum distance from road or traffic
Bendigo	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	×	$\checkmark$	$\checkmark$
Mildura	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$
Moorooduc	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$

#### Table 9: Summary of new stations' siting compliance with AS 2922-1987

TEOM  $PM_{10}$  data quoted in this report have been adjusted according to the default procedure<sup>10</sup>, using the temperature-dependent formula with a constant value of K equal to 0.04. The resulting adjustments vary from no change at daily average temperatures at or above 15°C to an increase of 40 per cent at a temperature of 5°C.

<sup>&</sup>lt;sup>10</sup> National Environment Protection (Ambient Air Quality) Measure Technical Paper No. 10, Collection and Reporting of TEOM PM<sub>10</sub> Data, available from www.ephc.gov.au.

#### **NATA status**

All performance monitoring stations and AAQ NEPM campaign monitoring operated by EPA are covered by its NATA accreditation (number 1576). The NATA status of the monitoring network and laboratory was confirmed by a reaccreditation audit carried out during the year.

Monitoring in the Latrobe Valley region was performed by Connell Wagner PPI under its NATA accreditation (Number 4669).

#### Screening

For regions other than Port Phillip and Latrobe Valley, the monitoring plan presents a process to demonstrate whether levels of O<sub>3</sub>, NO<sub>2</sub>, PM<sub>10</sub> and CO are consistently below the standards. As reported in the 2003 compliance report this has been done, using Screening Procedure E of the Technical Paper, for O<sub>3</sub> in Ballarat, Bendigo, Shepparton, Wodonga, Warrnambool and Mildura, and for NO<sub>2</sub> in Shepparton, Wodonga, Warrnambool and Mildura, and for NO<sub>2</sub> in Shepparton, Wodonga, Warrnambool and Mildura. CO in Melbourne, although low, is not low enough to satisfy the screening criteria. CO data from Toowoomba satisfy Screening Procedure F and, as proposed in the monitoring plan, establish that CO levels in all rural regions are reasonably expected to be consistently lower than the standard. It is expected that current monitoring at Bendigo will establish the screening of NO<sub>2</sub> and confirm that of O<sub>3</sub> and CO. Screening procedures for NO<sub>2</sub> at Ballarat and Bendigo are not completed pending data acquisition and compliance is reported as 'not demonstrated'.

Campaign monitoring for  $PM_{10}$  at Bendigo, Ballarat and Shepparton has not met the screening criteria (based on high-volume sampler monitoring, one day in six). Monitoring at Albury by the NSW EPA indicates that this is so for Wodonga also. Until resources become available for continuous monitoring in rural regions,  $PM_{10}$  compliance will be reported as 'not demonstrated'.

## PM<sub>2.5</sub> monitoring

The 2003 modifications to the NEPM commit Victoria to monitoring  $PM_{2.5}$  at at least one  $PM_{10}$  performance monitoring station.  $PM_{2.5}$  was monitored by the reference method (on a one-day-in-three basis) at two stations (Inner East Metro and Inner West Metro) throughout 2004. Difficulties in controlling the humidity of the filter weighing room prevented full compliance with the recommended operating procedures.<sup>11</sup>

Victoria also participates in the  $PM_{2.5}$  Equivalence Program, with TEOM monitors located at Inner East Metro (Alphington) and Inner West Metro (Footscray) – not Alphington and Mooroolbark, as proposed in the NEPM. TEOM  $PM_{2.5}$  readings are taken with the inbuilt adjustment for  $PM_{10}$  removed (A and B constants set to 0 and 1) and no adjustment for loss of volatiles.

<sup>&</sup>lt;sup>11</sup> National Environment Protection (Ambient Air Quality) Measure Technical Paper on Monitoring for PM<sub>2.9</sub>, available from www.ephc.gov.au.

#### **APPENDIX 2: DATA ANALYSIS**

Tables of monitoring statistics presented in this Appendix have been prepared according to AAQ NEPM guidelines.12

#### **Summary statistics**

Annual summary statistics that allow assessment of how close air quality was to the standards are presented in Tables 11 to 18. The AAQ NEPM states that the short-term standards should not be exceeded on more than one day for CO, NO<sub>2</sub>, O<sub>2</sub>, SO<sub>2</sub>, and on more than five days per year for PM<sub>10</sub>. The second highest daily value for the year (or the sixth for PM<sub>10</sub>) can indicate the extent to which the standards are, or are not, met. Concentrations exceeding the standard are highlighted in bold.

#### Percentiles

Results of further analysis of the monitoring data are presented in Tables 19 to 26. In these tables daily peak values are formed only when at least 75 percent of the data for the day are valid. Data for stations with less than 15 per cent data availability are omitted and stations with less than 75 per cent data availability are shown in italics. The percentiles in Table 19 and Table 22 are based on running averages, including those that overlap from one day to the next.

#### **Equivalence Program**

Monitoring for the PM<sub>2.5</sub> Equivalence Program was conducted using TEOM instruments. Results are presented in Tables 27 to 29. Preliminary results of comparisons indicate that the ratio of TEOM to reference method is less than one on average and lower in winter than in summer, which is similar to behaviour established for PM<sub>10</sub>. Seasonal regression analyses such as those in Table 10 may allow readings from the two methods to be related.

	Regr	ession p	arameters <sup>a</sup>	Ave(TEOM)/					
	В	А	Correlation	Ave (reference)					
<u>Alphington</u>									
Summer	1.10	-0.73	0.92	0.99					
Autumn	0.71	0.98	0.91	0.76					
Winter	0.97	-1.53	0.75	0.61					
Spring	0.91	-0.78	0.71	0.78					
All seasons	0.90	-0.47	0.83	0.84					
Footscray									
Summer	0.90	-0.21	0.74	0.87					
Autumn	0.78	-0.54	0.91	0.71					
Winter	0.62	-0.20	0.92	0.58					
Spring	0.77	-0.27	0.93	0.72					
All seasons	0.80	-0.41	0.86	0.74					
a TEOM =	B * (Ref	erence m	ethod) + A						

#### Table 10: Preliminary results of Equivalence Program

TEOM = B \* (Reference method) + A

(Reduced major axis regression and R<sup>2</sup> correlation.)

<sup>&</sup>lt;sup>12</sup> National Environment Protection (Ambient Air Quality) Measure Technical Paper No. 8, Annual Reports, available from www.ephc.gov.au.

## Trends

Trends of annual statistics are presented in Tables 30 to 49 for stations designated as 'trend stations'. Only stations with at least five years of data are included; years with less than 15 per cent data availability are omitted and years with less than 75 per cent data availability are shown in italics. Trends at different stations and for different statistics have different significance and in most cases there is no obvious overall trend over the ten-year period shown, in spite of increasing population pressures. Pb is an exception, where annual averages have decreased markedly (Figure 3). CO has also decreased over the period.

## Table 11: 2004 summary statistics for daily peak eight-hour carbon monoxide in Victoria

Region Performance monitoring	Location	Number of valid days	Highest (ppm)	Highest (date:hour)	2nd highest	2nd highest
					(ppiii)	(uale:nour)
<u>Port Pnillip</u>						
CBD	RMII	335	2.1	May 08:07		
				May 14:03		
CBD South East	Richmond	352	3.9	May 14:02	2.7	Jul 22:03
Inner East Metro	Alphington	354	3.7	May 14:02	3.1	Jul 22:03
Geelong	Geelong South	314	2.9	Jul 21:23	2.1	Jun 12:02
<u>Bendigo<sup>a</sup></u>	Bendigo	219	2.1	May 22:02	1.8	Jul 22:02

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

## Table 12: 2004 summary statistics for daily peak one-hour nitrogen dioxide in Victoria

Region	Location	Number of	Highest	Highest	2nd	2nd highest
Performance monitoring		valid days	(ppm)	(date:hour)	highest	(date:hour)
station					(ppm)	
<u>Port Phillip</u>						
CBD	RMIT	343	0.075	Feb 14:13	0.053	Aug 17:13
Inner East Metro	Alphington	350	0.056	Nov 29:23	0.048	May 13:17
Inner West Metro	Footscray	350	0.056	Feb 14:17	0.055	May 14:16
South Metro	Brighton	353	0.049	May 14:21	0.044	Oct 06:20
Outer West Metro	Pt Cook	347	0.066	May 14:14	0.052	Feb 10:17
Geelong	Geelong South	341	0.050	Apr 21:20	0.048	May 14:20
Latrobe Valley						
LV East Central	Traralgon	361	0.036	May 14:18	0.035	Apr 14:18
LV West Central	Мое	366	0.032	May 14:18	0.030	Apr 22:19
Bendigo <sup>a</sup>	Bendigo	231	0.046	Nov 25:21	0.032	May 14:20

AAQ NEPM standard: 0.12 ppm (1-hour average)

## Table 13: 2004 summary statistics for daily peak one-hour ozone in Victoria

Region	Location	Number of	Highest	Highest	2nd	2nd highest
Performance		valid days	(ppm)	(date:hour)	highest	(date:hour)
monitoring station					(ppm)	
<u>Port Phillip</u>						
Inner East Metro	Alphington	354	0.073	Feb 14:13	0.053	Dec 05:13
Inner West Metro	Footscray	347	0.106	Feb 14:16	0.062	Dec 05:13
North West Metro	Melton	344	0.076	Nov 25:18	0.058	Dec 05:15
South East Metro	Dandenong	353	0.080	Feb 14:15	0.068	Dec 31:17
South Metro	Brighton	346	0.106	Feb 14:15	0.070	Dec 23:16
Outer East Metro	Mooroolbark	350	0.072	Dec 12:14	0.063	Feb 14:15
Outer North Metro	Craigieburn	168	0.094	Feb 14:17	0.053	Feb 15:11
Outer South Metro	Moorooduc	9	0.071	Dec 23:14	0.050	Dec 31:12
Outer West Metro	Pt Cook	361	0.093	Dec 23:16	0.081	Feb 14:17
Geelong	Geelong South	337	0.094	Nov 26:17	0.079	Dec 23:15
Outer Geelong	Pt Henry	356	0.093	Dec 23:16	0.074	Feb 14:16
Latrobe Valley						
LV East Central	Traralgon	357	0.058	Feb 08:17	0.052	Jan 16:16
LV West Central	Мое	366	0.055	Nov 26:17	0.052	Feb 15:11
Bendigo <sup>a</sup>	Bendigo	212	0.051	Nov 25:18		
				Dec 05:21		

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

## Table 14: 2004 summary statistics for daily peak four-hour ozone in Victoria

Region	Location	Number of	Highest	Highest	2nd	2nd highest
Performance		valid days	(ppm)	(date:hour)	highest	(date:hour)
monitoring station					(ppm)	
Port Phillip						
Inner East Metro	Alphington	353	0.069	Feb 14:15	0.052	Dec 05:15
Inner West Metro	Footscray	347	0.083	Feb 14:17	0.056	Nov 25:18
North West Metro	Melton	344	0.068	Nov 25:19	0.055	Dec 05:16
South East Metro	Dandenong	354	0.067	Feb 14:16	0.062	Dec 31:18
South Metro	Brighton	346	0.092	Feb 14:16	0.065	Dec 23:17
Outer East Metro	Mooroolbark	350	0.059	Feb 14:17	0.058	Dec 12:16
Outer North Metro	Craigieburn	167	0.068	Feb 14:19	0.049	Feb 26:19
Outer South Metro	Moorooduc	9	0.065	Dec 23:17	0.045	Dec 31:15
Outer West Metro	Pt Cook	361	0.082	Dec 23:18	0.077	Feb 14:19
Geelong	Geelong South	334	0.085	Nov 26:19	0.069	Dec 23:17
Outer Geelong	Pt Henry	356	0.085	Dec 23:17	0.063	Feb 14:18
Latrobe Valley						
LV East Central	Traralgon	356	0.050	Feb 15:14	0.046	Feb 08:18
LV West Central	Мое	366	0.051	Nov 26:18	0.049	Feb 15:14
Bendigo <sup>a</sup>	Bendigo	211	0.050	Dec 18:19		
				Nov 25:18		

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

## Table 15: 2004 summary statistics for daily peak one-hour sulfur dioxide in Victoria

Region	Location	Number of valid	Highest	Highest	2nd	2nd
Performance		days	(ppm)	(date:hour)	highest	highest
monitoring station					(ppm)	(date:hour)
Port Phillip						
CBD	RMIT	360	0.023	Mar 12:06	0.022	May 15:09
Inner East Metro	Alphington	365	0.014	Dec 25:07	0.012	Mar 12:09
South West Metro	Paisley	357	0.044	Aug 14:13	0.030	Feb 03:04
Geelong	Geelong South	332	0.069	Nov 27:24	0.027	Jul 09:23
Latrobe Valley						
LV East Central	Traralgon	360	0.079	Mar 01:15	0.071	Dec 17:15
LV West Central	Moe	365	0.048	Mar 01:18	0.026	Jan 19:11

AAQ NEPM standard: 0.20 ppm (1-hour average)

## Table 16: 2004 summary statistics for daily peak 24-hour sulfur dioxide in Victoria

Region Performance monitoring station	Location	Number of valid days	Highest (ppm)	Highest (date)	2nd highest (ppm)	2nd highest (date)
Port Phillip						
CBD	RMIT	360	0.007	May 26		
				Mar 12		
Inner East Metro	Alphington	365	0.003	Mar 12		
				Aug 18		
South West Metro	Paisley	357	0.013	Dec 19	0.011	Aug 14
Geelong	Geelong South	332	0.006	Nov 27	0.005	Oct 26
Latrobe Valley						
LV East Central	Traralgon	360	0.010	Mar 01		
				Jul 31		
LV West Central	Мое	365	0.006	Jan 19	0.005	Feb 24

AAQ NEPM standard: 0.08 ppm (24-hour average)

## Table 17: 2004 summary statistics for 24-hour $\text{PM}_{\scriptscriptstyle 10}$ in Victoria

Region	Location	Number of	Highest	Highest	6th	6th
Performance monitoring		valid days	(µg/m³)	(date)	nignest	nignest
station					(µg/m³)	(date)
<u>Port Phillip</u>						
CBD	RMIT	346	79.8	May 15	45.5	Mar 04
CBD South East	Richmond	366	43.9	Apr 14	39.2	Mar 25
Inner East Metro	Alphington	355	51.6	Apr 14	41.4	Apr 02
Inner West Metro	Footscray	341	58.1	Mar 25	45.7	Feb 20
South East Metro	Dandenong	338	50.1	Mar 28	42.6	Dec 07
South Metro	Brighton	327	44.9	May 14	38.6	Mar 25
Outer East Metro	Mooroolbark	347	63.9	Mar 25	44.9	May 13
Geelong	Geelong South	336	149.0	Feb 20	55.5	May 14
Latrobe Valley						
LV East Central	Traralgon	365	44.5	Apr 14	32.5	Jun 23
LV West Central	Moe	330	56.3	Apr 14	38.6	Mar 05
<b>Bendigo</b> <sup>a</sup>	Bendigo	231	59.2	Jun 28	31.4	Aug 19
Shepparton <sup>b</sup>	Shepparton	52	54.7	Nov 27	39·9 <sup>b</sup>	Apr 13
<u>Mildura</u> <sup>c</sup>	Mildura	22	102.3	Dec 23	23.8	Dec 21

#### AAQ NEPM standard: $50 \mu g/m^3$ (24-hour average)

Monitoring was by TEOM unless indicated otherwise. In addition to TEOM monitoring,  $PM_{10}$  was monitored by high-volume sampler one day in six at CBD, CBD South East, Inner East Metro and Geelong throughout the year. The highest high-volume sampler readings were 47.3, 46.9, 38.8, **63.2**  $\mu$ g/m<sup>3</sup>, respectively.

- a Campaign monitoring at Bendigo commenced in May.
- b Campaign monitoring at Shepparton by high-volume sampler one day in six ceased in December. As monitoring was only one day in six, the 2nd highest reading is presented.
- c Campaign monitoring at Mildura commenced in December.

## Table 18: 2004 summary statistics for 24-hour $PM_{2.5}$ in Victoria

Region	Location	Number of	Highest	Highest
Performance monitoring station		valid days	(µg/m³)	(date)
Port Phillip				
Inner East Metro	Alphington	115	26.5	May 13
Inner West Metro	Footscray	109	21.5	May 13

AAQ NEPM advisory reporting standard: 25  $\mu$ g/m<sup>3</sup> (24-hour average)

Monitoring by reference method (one day in three).

		-	•••		•				
Region	Location	Data	Max	99th	98th	95th	90th	75th	50th
Performance		availability	conc.	%ile	%ile	%ile	%ile	%ile	%ile
monitoring station		(% of days)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
Port Phillip									
CBD	RMIT	91.5	2.1	1.9	1.8	1.5	1.1	0.8	0.6
CBD South East	Richmond	96.2	3.9	2.4	2.2	1.8	1.2	0.6	0.3
Inner East Metro	Alphington	96.7	3.7	2.4	2.3	1.7	1.3	0.8	0.5
Geelong	Geelong South	85.8	2.9 <sup>a</sup>	1.7	1.6	0.9	0.6	0.4	0.1
<u>Bendigo<sup>b</sup></u>	Bendigo	<i>59.8</i>	2.1	1.7	1.4	1.0	0.8	0.3	0.1

## Table 19: 2004 percentiles of daily peak eight-hour carbon monoxide concentrations in Victoria

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

a Recorded on a day with less than 75% of valid 8-hour averages.

b Monitoring commenced in May.

#### Table 20: 2004 percentiles of daily peak one-hour nitrogen dioxide concentrations in Victoria

AAQ NEPM standard: 0.12	ppm	(1-hour average)
-------------------------	-----	------------------

Region Performance monitoring station	Location	Data availability (% of days)	Max conc. (ppm)	99th %ile (ppm)	98th %ile (ppm)	95th %ile (ppm)	90th %ile (ppm)	75th %ile (ppm)	50th %ile (ppm)
Port Phillip									
CBD	RMIT	93.7	0.075	0.049	0.046	0.040	0.037	0.031	0.026
Inner East Metro	Alphington	95.6	0.056	0.044	0.039	0.034	0.032	0.028	0.023
Inner West Metro	Footscray	95.6	0.056	0.047	0.044	0.040	0.035	0.029	0.023
South Metro	Brighton	96.4	0.049	0.042	0.039	0.035	0.031	0.025	0.019
Outer West Metro	Pt Cook	94.8	0.066	0.041	0.035	0.030	0.026	0.020	0.013
Geelong	Geelong South	93.2	0.050	0.037	0.030	0.027	0.024	0.020	0.015
Latrobe Valley									
LV East Central	Traralgon	98.6	0.036	0.034	0.030	0.028	0.024	0.019	0.015
LV West Central	Мое	100.0	0.032	0.026	0.024	0.023	0.021	0.018	0.014
<u>Bendigo</u> ª	Bendigo	63.1	0.046	0.029	0.028	0.026	0.025	0.021	0.014

## Table 21: 2004 percentiles of daily peak one-hour ozone concentrations in Victoria

Region	Location	Data	Max	99th	98th	95th	90th	75th	50th
Performance		availability	conc.	%ile	%ile	%ile	%ile	%ile	%ile
monitoring station		(% of days)	(ppm)						
Port Phillip									
Inner East Metro	Alphington	96.7	0.073	0.048	0.046	0.040	0.037	0.028	0.023
Inner West Metro	Footscray	94.8	0.106	0.058	0.049	0.042	0.036	0.028	0.024
North West Metro	Melton	94.0	0.076	0.053	0.050	0.047	0.040	0.033	0.028
South East Metro	Dandenong	96.4	0.080	0.064	0.049	0.042	0.038	0.029	0.024
South Metro	Brighton	94.5	0.106	0.062	0.058	0.043	0.039	0.030	0.025
Outer East Metro	Mooroolbark	95.6	0.072	0.056	0.053	0.047	0.042	0.034	0.027
Outer North Metro <sup>a</sup>	Craigieburn	<i>45.9</i>	0.094	0.052	0.051	0.045	0.038	0.031	0.024
Outer South Metro <sup>b</sup>	Moorooduc	2.5							
Outer West Metro	Pt Cook	98.6	0.093	0.065	0.056	0.047	0.039	0.028	0.025
Geelong	Geelong South	92.1	0.094	0.061	0.058	0.044	0.035	0.030	0.025
Outer Geelong	Pt Henry	97.3	0.093	0.060	0.054	0.043	0.037	0.029	0.025
Latrobe Valley									
LV East Central	Traralgon	97.5	0.058	0.049	0.048	0.042	0.037	0.031	0.025
LV West Central	Moe	100.0	0.055	0.052	0.049	0.044	0.039	0.031	0.027
<u>Bendigo</u> <sup>c</sup>	Bendigo	<i>57.9</i>	0.051	0.051	0.049	0.044	0.040	0.034	0.029

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

a Monitoring ceased in June.

b Monitoring commenced in December.

## Table 22: 2004 percentiles of daily peak four-hour ozone concentrations in Victoria

Region	Location	Data	Max	99th	98th	95th	90th	75th	50th
Performance		availability	conc.	%ile	%ile	%ile	%ile	%ile	%ile
monitoring station		(% of days)	(ppm)						
Port Phillip									
Inner East Metro	Alphington	96.4	0.069	0.045	0.044	0.038	0.034	0.026	0.022
Inner West Metro	Footscray	94.8	0.083	0.051	0.045	0.039	0.034	0.027	0.022
North West Metro	Melton	94.0	0.068	0.050	0.047	0.043	0.038	0.031	0.027
South East Metro	Dandenong	96.7	0.067	0.058	0.046	0.040	0.035	0.027	0.023
South Metro	Brighton	94.5	0.092	0.057	0.051	0.042	0.036	0.029	0.024
Outer East Metro	Mooroolbark	95.6	0.059	0.050	0.049	0.044	0.038	0.032	0.025
Outer North Metro <sup>a</sup>	Craigieburn	45.6	0.068	0.048	0.047	0.042	0.036	0.028	0.023
Outer South Metro <sup>b</sup>	Moorooduc	2.5							
Outer West Metro	Pt Cook	98.6	0.082	0.058	0.051	0.044	0.036	0.027	0.024
Geelong	Geelong South	91.3	0.085	0.054	0.052	0.041	0.034	0.028	0.023
Outer Geelong	Pt Henry	97.3	0.085	0.056	0.048	0.041	0.035	0.027	0.024
Latrobe Valley									
LV East Central	Traralgon	97.3	0.050	0.044	0.043	0.039	0.034	0.029	0.023
LV West Central	Мое	100.0	0.051	0.046	0.044	0.040	0.036	0.030	0.025
<u>Bendigo</u> <sup>c</sup>	Bendigo	57.7	0.050	0.047	0.046	0.043	0.038	0.032	0.028

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

a Monitoring ceased in June.

b Monitoring commenced in December.

## Table 23: 2004 percentiles of daily peak one-hour sulfur dioxide concentrations in Victoria

<b>Region</b> Performance monitoring station	Location	Data availability (% of days)	Max conc. (ppm)	99th %ile (ppm)	98th %ile (ppm)	95th %ile (ppm)	90th %ile (ppm)	75th %ile (ppm)	50th %ile (ppm)
<u>Port Phillip</u>									
CBD	RMIT	98.4	0.023	0.017	0.015	0.011	0.009	0.006	0.003
Inner East Metro	Alphington	99.7	0.014	0.009	0.007	0.005	0.004	0.003	0.001
South West Metro	Paisley	97.5	0.044	0.028	0.026	0.021	0.017	0.010	0.005
Geelong	Geelong South	90.7	0.069	0.026	0.023	0.019	0.013	0.007	0.003
Latrobe Valley									
LV East Central	Traralgon	98.4	0.079	0.042	0.030	0.018	0.013	0.008	0.005
LV West Central	Мое	99.7	0.048	0.024	0.021	0.016	0.009	0.004	0.001

## AAQ NEPM standard: 0.20 ppm (1-hour average)

## Table 24: 2004 percentiles of daily sulfur dioxide concentrations in Victoria

Region Performance monitoring station	Location	Data availability (% of days)	Max conc. (ppm)	99th %ile (ppm)	98th %ile (ppm)	95th %ile (ppm)	90th %ile (ppm)	75th %ile (ppm)	50th %ile (ppm)
Port Phillip									
CBD	RMIT	98.4	0.007	0.004	0.004	0.003	0.003	0.002	0.001
Inner East Metro	Alphington	99.7	0.003	0.002	0.002	0.001	0.001	0.001	0.000
South West Metro	Paisley	97.5	0.013	0.008	0.006	0.005	0.003	0.002	0.001
Geelong	Geelong South	90.7	0.006	0.004	0.003	0.003	0.002	0.001	0.000
Latrobe Valley									
LV East Central	Traralgon	98.4	0.010	0.007	0.006	0.004	0.003	0.002	0.001
LV West Central	Мое	99.7	0.006	0.005	0.004	0.003	0.002	0.001	0.000

AAQ NEPM standard: 0.08 ppm (24-hour average)

## Table 25: 2004 percentiles of daily $\text{PM}_{\scriptscriptstyle 10}$ concentrations in Victoria

<u>Region</u>	Location	Data	Max	99th	98th	95th	90th	75th	50th
Performance		availability	conc.	%ile	%ile	%ile	%ile	%ile	%ile
monitoring station		(% of days)	(µg/m³)						
Port Phillip									
CBD	RMIT	94.5	79.8	46.7	41.8	32.3	28.9	23.5	18.2
CBD South East	Richmond	100.0	43.9	40.6	35.7	30.0	26.0	20.7	15.9
Inner East Metro	Alphington	97.0	51.6	45.2	36.8	30.9	27.6	22.0	16.5
Inner West Metro	Footscray	93.2	58.1	48.4	40.4	33.5	29.1	22.3	16.1
South East Metro	Dandenong	92.3	50.1	44.5	42.1	35.7	30.8	23.4	16.7
South Metro	Brighton	89.3	44.9	40.5	36.6	30.4	26.4	20.9	15.9
Outer East Metro	Mooroolbark	94.8	63.9	46.0	42.8	34.7	30.1	23.9	17.3
Geelong	Geelong South	91.8	149.0	62.5	53.5	44.0	34.3	26.1	18.3
Latrobe Valley									
LV East Central	Traralgon	99.7	44.5	34.2	31.8	29.8	25.9	20.6	15.9
LV West Central	Moe	90.2	56.3	41.2	37.6	31.8	27.8	20.0	14.5
<b>Bendigo</b> <sup>a</sup>	Bendigo	63.1	59.2	34.8	31.5	25.3	22.1	17.5	13.2
<u>Shepparton<sup>b</sup></u>	Shepparton	14.2	54.7	47.2	39.8	33.6	29.1	23.1	14.6
<u>Mildura</u> <sup>c</sup>	Mildura	6.0							

AAQ NEPM standard:  $50 \mu g/m^3$  (24-hour average)

a Campaign monitoring commenced in May.

b Campaign monitoring by high-volume sampler one day in six.

c Campaign monitoring commenced in December.

## Table 26: 2004 percentiles of daily $\rm PM_{2.5}$ concentrations in Victoria

AAQ NEPM Advisor	/ Reporting	Standard: 25 µg	/m³ (24-l	hour average)
------------------	-------------	-----------------	-----------	---------------

<u>Region</u>	Location	Data	Max	99th	98th	95th	90th	75th	50th
Performance		availability	conc.	%ile	%ile	%ile	%ile	%ile	%ile
monitoring station		(% of days)	(µg/m³)						
Port Phillip									
Inner East Metro	Alphington	94.3	26.5	23.4	18.4	12.5	10.8	8.1	5.7
Inner West Metro	Footscray	89.3	21.5	21.0	19.1	13.0	9.6	7.0	5.4

Monitoring by reference method (one day in three).

Region	Location		Data av	vailability	/ rates		Annual mean
Performance		% of days		(µg/m³)			
station	Q1	Q2	Q3	Q4	Annual		
Port Phillip							
Inner East Metro	Alphington	82.4	98.9	100.0	97.8	94.8	4.9
Inner West Metro	Footscray	62.6	91.2	100.0	100.0	88.5	4.5

## Table 27: PM<sub>2.5</sub> Equivalence Program 2004 TEOM monitoring – summary

## Table 28: PM<sub>2.5</sub> Equivalence Program 2004 TEOM monitoring – daily statistics

Region Performance monitoring station	Location	Number of valid days	Highest (µg/m³)	Highest (date)
<u>Port Phillip</u>				
Inner East Metro	Alphington	347	21.7	May 14
Inner West Metro	Footscray	324	23.8	May 14

## Table 29: PM<sub>2.5</sub> Equivalence Program 2004 TEOM monitoring – daily percentiles

Region	Location	Data	Max	99th	98th	95th	90th	75th	50th
Performance		availability	conc.	%ile	%ile	%ile	%ile	%ile	%ile
monitoring station	nitoring station (		(µg/m³)						
Port Phillip									
Inner East Metro	Alphington	94.8	21.7	15.6	12.3	10.1	7.8	6.1	4.3
Inner West Metro	Footscray	88.5	23.8	14.1	12.5	9.9	8.2	5.8	3.8

## Table 30: Percentiles of daily maximum eight-hour CO at CBD (1996–2004)

Vear	Data availability	No. of exceedences	Max conc.	99th %ile	98th %ile	95th %ile	90th %ile	75th %ile	50th %ile
rear	(% of days)	(days)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
1996	90.4	0	5.5	4.5	3.8	2.8	2.2	1.6	0.9
1997	98.4	0	5.5	4.3	3.8	2.9	2.4	1.4	0.9
1998	86.3	0	5.9	4.7	4.4	3.0	2.1	1.4	0.8
1999	35.6	0	5.9	5.0	3.3	2.7	2.0	1.5	1.2
2000	96.4	0	5.0	3.4	3.2	2.5	1.8	1.1	0.8
2001	88.8	0	3.6	2.7	2.4	2.1	1.7	1.1	0.7
2002	85.2	0	3.2	2.9	2.7	1.8	1.5	0.9	0.5
2003	96.7	0	3.9	3.0	2.6	1.8	1.5	0.9	0.6
2004	91.5	0	2.1	1.9	1.8	1.5	1.2	0.8	0.6

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

Years with data availability below 75% shown in italics.

## Table 31: Percentiles of daily maximum eight-hour CO at Inner East Metro (1995–2004)

-	1		1	1	1	1		1	1
	Data	No. of	Max	99th %ile	98th %ile	95th %ile	90th %ile	75th %ile	50th %ile
	availability	exceedences	conc.		-	• -	-		-
Year	aranaziney								
	(% of days)	(days)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
1995	92.1	0	6.0	4.9	4.5	3.4	2.5	1.5	0.8
1996	98.6	0	6.5	5.8	5.0	3.3	2.5	1.6	0.8
1007	08.0	0	6 г			2.4	26	1 5	0.8
1997	90.9	0	0.5	5.5	4.4	3.4	2.0	1.5	0.0
1008	95.3	0	6.8	6.0	5.1	3.0	2.7	1.7	0.7
- / / 0	75.5	Ū.	010	0.0	J	5.7	=-/	/	0.17
1999	55.1	0	6.2	4.7	4.1	3.0	2.1	1.1	0.6
						-			
2000	96.7	0	5.0	4.5	4.3	3.1	2.4	1.2	0.6
				- 0					- (
2001	92.9	0	5.2	3.8	3.4	2.9	2.0	1.1	0.6
2002	02.7	0	28	2.5	2.1	2.7	2.0	0.0	0.4
2002	93.7	0	3.0	3.5	3.1	2.7	2.0	0.9	0.4
2003	96.7	0	5.4	3.0	3.5	2.7	1.8	0.9	0.5
	,,,,	Ĵ	5.4	وبر	ر.ر	/			2.7
2004	97.0	0	3.7	2.4	2.3	1.7	1.3	0.8	0.5

#### AAQ NEPM standard: 9.0 ppm (8-hour average)

Years with data availability below 75% shown in italics.

## Table 32: Percentiles of daily maximum eight-hour CO at Geelong (1995–2004)

Year	Data availability	No. of exceedences	Max conc.	99th %ile	98th %ile	95th %ile	90th %ile	75th %ile	50th %ile
rear	(% of days)	(days)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
1995	80.5	0	4.2	3.2	2.9	2.4	1.6	0.8	0.4
1996	86.3	0	4.3	3.3	2.9	1.9	1.2	0.5	0.3
1997									
1998	66.0	0	3.3	2.8	2.6	2.3	1.6	0.7	0.4
1999	92.6	0	3.0	2.7	2.3	1.6	1.1	0.7	0.3
2000	85.8	0	2.7	2.1	1.9	1.4	1.0	0.5	0.3
2001	87.7	0	2.2	1.9	1.6	1.2	0.9	0.5	0.2
2002	87.1	0	2.3	1.8	1.4	1.0	0.6	0.3	0.1
2003	87.1	0	3.2	1.8	1.6	1.1	0.7	0.4	0.2
2004	85.8	0	2.9	1.7	1.6	0.9	0.6	0.4	0.1

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

Years with data availability below 75% shown in italics. Years with data availability below 15% omitted.

Table 33: Percentiles	of daily maximum	one-hour NO.	at CBD (1996-200	<u>эд)</u>
	or durty maximum	one nour no <sub>2</sub>		~~

Year	Data availability	No. of exceedences	Max conc.	99th %ile	98th %ile	95th %ile	90th %ile	75th %ile	50th %ile
rear	(% of days)	(days)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
1996	92.1	0	0.085	0.059	0.052	0.045	0.040	0.032	0.027
1997	90.4	0	0.100	0.074	0.065	0.055	0.046	0.039	0.032
1998	83.8	0	0.089	0.067	0.057	0.049	0.046	0.036	0.028
1999	97.3	0	0.078	0.062	0.050	0.045	0.041	0.033	0.028
2000	91.5	0	0.090	0.064	0.058	0.049	0.041	0.032	0.026
2001	93.4	0	0.071	0.055	0.050	0.043	0.036	0.029	0.024
2002	94.2	0	0.079	0.053	0.046	0.039	0.035	0.028	0.023
2003	98.9	0	0.069	0.059	0.053	0.045	0.039	0.032	0.026
2004	93.7	0	0.075	0.049	0.046	0.040	0.037	0.031	0.026

#### AAQ NEPM standard: 0.12 ppm (1-hour average)

## Table 34: Percentiles of daily maximum one-hour NO<sub>2</sub> at Inner East Metro (1995–2004)

Vaar	Data availability	No. of exceedences	Max conc.	99th %ile	98th %ile	95th %ile	90th %ile	75th %ile	50th %ile
real	(% of days)	(days)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
1995	72.6	0	0.051	0.046	0.043	0.039	0.035	0.030	0.025
1996	93.7	0	0.061	0.046	0.043	0.038	0.034	0.029	0.024
1997	84.4	0	0.075	0.059	0.051	0.044	0.038	0.030	0.025
1998	95.9	0	0.073	0.058	0.055	0.045	0.039	0.031	0.026
1999	97.5	0	0.065	0.046	0.045	0.038	0.035	0.029	0.025
2000	89.0	0	0.069	0.053	0.048	0.040	0.035	0.029	0.024
2001	90.4	0	0.060	0.052	0.047	0.039	0.034	0.029	0.024
2002	93.7	0	0.060	0.048	0.046	0.038	0.034	0.030	0.023
2003	90.1	0	0.065	0.050	0.046	0.037	0.032	0.027	0.023
2004	95.6	0	0.056	0.044	0.039	0.034	0.032	0.028	0.023

AAQ NEPM standard: 0.12 ppm (1-hour average)

Years with data availability below 75% shown in italics.

#### Table 35: Percentiles of daily maximum one-hour NO<sub>2</sub> at Inner West Metro (1995–2004)

Year	Data availability	No. of exceedences	Max conc.	99th %ile	98th %ile	95th %ile	90th %ile	75th %ile	50th %ile
rear	(% of days)	(days)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
1995	87.1	0	0.056	0.051	0.048	0.043	0.038	0.031	0.024
1996	91.5	о	0.071	0.054	0.049	0.043	0.037	0.028	0.023
1997	98.1	0	0.088	0.066	0.058	0.048	0.040	0.032	0.026
1998	89.9	0	0.070	0.057	0.053	0.048	0.042	0.032	0.024
1999	97.8	0	0.081	0.057	0.051	0.045	0.040	0.033	0.026
2000	82.7	о	0.070	0.060	0.054	0.046	0.039	0.030	0.025
2001	32.6	0	0.041	0.040	0.039	0.036	0.033	0.028	0.021
2002	91.8	0	0.059	0.055	0.049	0.040	0.035	0.029	0.022
2003	97.8	0	0.065	0.058	0.054	0.044	0.037	0.029	0.022
2004	95.6	0	0.056	0.047	0.044	0.040	0.035	0.029	0.023

AAQ NEPM standard: 0.12 ppm (1-hour average)

Years with data availability below 75% shown in italics.

## Table 36: Percentiles of daily maximum one-hour NO2 at Outer West Metro (1995-2004)

Voor	Data availability	No. of exceedences	Max conc.	99th %ile	98th %ile	95th %ile	90th %ile	75th %ile	50th %ile
real	(% of days)	(days)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
1995	83.6	0	0.048	0.041	0.038	0.032	0.028	0.020	0.014
1996	91.5	0	0.054	0.046	0.045	0.038	0.029	0.023	0.015
1997									
1998	92.1	0	0.064	0.049	0.046	0.036	0.028	0.022	0.015
1999	84.4	0	0.044	0.037	0.036	0.032	0.028	0.018	0.011
2000	68.8	0	0.048	0.043	0.039	0.032	0.028	0.020	0.014
2001	87.7	0	0.054	0.044	0.040	0.033	0.029	0.022	0.015
2002	96.2	0	0.056	0.045	0.041	0.031	0.027	0.021	0.013
2003	93.2	0	0.064	0.048	0.044	0.031	0.028	0.020	0.013
2004	94.8	0	0.066	0.041	0.035	0.030	0.026	0.020	0.013

#### AAQ NEPM standard: 0.12 ppm (1-hour average)

Years with data availability below 75% shown in italics. Years with data availability below 15% not shown.

#### Table 37: Percentiles of daily maximum one-hour NO, at Geelong (1995-2004)

Year	Data availability	No. of exceedences	Max conc.	99th %ile	98th %ile	95th %ile	90th %ile	75th %ile	50th %ile
rear	(% of days)	(days)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
1995	68.8	0	0.048	0.039	0.038	0.034	0.031	0.025	0.021
1996	86.6	о	0.044	0.041	0.038	0.033	0.028	0.024	0.018
1997									
1998	68.5	0	0.067	0.039	0.037	0.034	0.032	0.026	0.020
1999	93.7	о	0.046	0.038	0.035	0.031	0.028	0.022	0.016
2000	85.2	0	0.048	0.038	0.037	0.028	0.024	0.019	0.015
2001	91.2	0	0.047	0.035	0.032	0.029	0.027	0.022	0.015
2002	94.2	о	0.056	0.036	0.031	0.027	0.025	0.019	0.012
2003	87.7	0	0.050	0.034	0.033	0.028	0.025	0.021	0.014
2004	93.2	0	0.050	0.037	0.030	0.027	0.024	0.020	0.015

AAQ NEPM standard: 0.12 ppm (1-hour average)

Years with data availability below 75% shown in italics. Years with data availability below 15% not shown.

## Table 38: Percentiles of daily maximum one-hour NO<sub>2</sub> at Latrobe Valley East Central (1995–2004)

	Data availability	No. of exceedences	Max conc.	99th %ile	98th %ile	95th %ile	90th %ile	75th %ile	50th %ile
Year	(% of days)	(days)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
1995	94.0	0	0.040	0.029	0.028	0.027	0.024	0.021	0.016
1996	85.8	0	0.035	0.032	0.029	0.027	0.025	0.022	0.016
1997	64.7	0	0.038	0.037	0.034	0.031	0.028	0.024	0.018
1998	89.0	0	0.036	0.030	0.029	0.027	0.025	0.022	0.016
1999	80.8	0	0.042	0.034	0.031	0.028	0.027	0.023	0.018
2000	98.4	0	0.041	0.037	0.033	0.027	0.025	0.021	0.017
2001	98.9	0	0.033	0.031	0.026	0.024	0.022	0.019	0.015
2002	98.1	0	0.033	0.031	0.030	0.027	0.025	0.020	0.015
2003	99.2	0	0.053	0.032	0.030	0.028	0.026	0.022	0.016
2004	98.6	0	0.036	0.034	0.030	0.028	0.024	0.019	0.015

AAQ NEPM standard: 0.12 ppm (1-hour average)

Years with data availability below 75% shown in italics.

## Table 39: Percentiles of daily maximum one-hour O<sub>3</sub> at Inner West Metro (1995–2004)

	Data availability	No. of	Max	99th %ile	98th %ile	95th %ile	90th %ile	75th %ile	50th %ile
Year	availability	CALCEUCIICES	conc.						
	(% of days)	(days)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
1995	95.9	0	0.091	0.063	0.058	0.043	0.037	0.029	0.025
1996	96.4	0	0.082	0.069	0.063	0.049	0.040	0.028	0.025
1997	98.1	1	0.105	0.090	0.073	0.055	0.042	0.030	0.025
1998	94.2	1	0.113	0.064	0.059	0.048	0.038	0.028	0.023
1999	95.9	0	0.079	0.070	0.066	0.054	0.041	0.032	0.025
2000	88.2	0	0.064	0.054	0.052	0.046	0.038	0.027	0.022
2001	34.5	0	0.044	0.043	0.041	0.038	0.036	0.030	0.026
2002	96.7	0	0.095	0.066	0.047	0.042	0.038	0.028	0.024
2003	98.1	1	0.105	0.072	0.061	0.051	0.041	0.027	0.023
2004	94.8	1	0.106	0.058	0.049	0.042	0.036	0.028	0.024

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

Years with data availability below 75% shown in italics. Exceedences shown in bold.

## Table 40: Percentiles of daily maximum one-hour $O_3$ at South Metro (1995–2004)

Veer	Data availability	No. of exceedences	Max conc.	99th %ile	98th %ile	95th %ile	90th %ile	75th %ile	50th %ile
rear	(% of days)	(days)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
1995	95.1	1	0.108	0.078	0.071	0.047	0.039	0.030	0.025
1996	95.6	0	0.089	0.077	0.062	0.049	0.039	0.029	0.024
1997	95.6	3	0.112	0.082	0.072	0.056	0.039	0.028	0.024
1998	95.6	0	0.085	0.070	0.060	0.050	0.037	0.027	0.022
1999	99.5	0	0.070	0.067	0.063	0.052	0.041	0.030	0.024
2000	96.4	0	0.073	0.068	0.060	0.048	0.041	0.028	0.023
2001	80.3	0	0.078	0.071	0.058	0.049	0.039	0.029	0.024
2002	93.7	0	0.085	0.063	0.053	0.043	0.036	0.029	0.025
2003	99.2	2	0.109	0.070	0.065	0.056	0.046	0.029	0.025
2004	94.5	1	0.106	0.062	0.058	0.043	0.039	0.030	0.025

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

Exceedences shown in bold.

## Table 41: Percentiles of daily maximum one-hour $O_3$ at Outer West Metro (1995–2004)

Year	Data availability	No. of exceedences	Max conc.	99th %ile	98th %ile	95th %ile	90th %ile	75th %ile	50th %ile
rear	(% of days)	(days)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
1995	99.7	1	0.111	0.076	0.060	0.046	0.039	0.031	0.027
1996	99.5	0	0.090	0.079	0.069	0.051	0.038	0.030	0.026
1997	86.8	2	0.126	0.080	0.064	0.049	0.037	0.030	0.025
1998	94.5	1	0.107	0.083	0.063	0.044	0.034	0.025	0.021
1999	91.2	0	0.083	0.071	0.067	0.055	0.040	0.028	0.023
2000	85.2	0	0.079	0.067	0.063	0.049	0.040	0.032	0.028
2001	91.0	0	0.099	0.072	0.064	0.050	0.044	0.031	0.025
2002	97.0	0	0.093	0.068	0.063	0.048	0.039	0.030	0.027
2003	97.0	0	0.094	0.080	0.069	0.053	0.041	0.031	0.025
2004	98.6	0	0.093	0.065	0.056	0.047	0.039	0.028	0.025

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

Exceedences shown in bold.

## Table 42: Percentiles of daily maximum one-hour O<sub>3</sub> at Geelong (1995–2004)

	Data availability	No. of	Max	99th %ile	98th %ile	95th %ile	90th %ile	75th %ile	50th %ile
Year	(% of days)	(days)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
1995	82.2	0	0.071	0.056	0.052	0.040	0.030	0.026	0.023
1996	86.8	0	0.091	0.063	0.056	0.044	0.033	0.027	0.022
1997	80.8	0	0.079	0.061	0.051	0.038	0.032	0.023	0.019
1998	95.3	0	0.083	0.056	0.046	0.035	0.031	0.027	0.024
1999	95.3	0	0.073	0.053	0.048	0.040	0.033	0.027	0.022
2000	88.8	0	0.065	0.057	0.049	0.040	0.033	0.021	0.017
2001	92.3	0	0.082	0.064	0.057	0.040	0.032	0.024	0.020
2002	90.7	0	0.058	0.056	0.053	0.043	0.032	0.025	0.021
2003	97.3	0	0.081	0.069	0.063	0.043	0.033	0.023	0.020
2004	92.1	0	0.094	0.061	0.058	0.044	0.035	0.030	0.025

#### AAQ NEPM standard: 0.10 ppm (1-hour average)

## Table 43: Percentiles of daily maximum one-hour $O_3$ at Latrobe Valley East Central (1995–2004)

Veer	Data availability	No. of exceedences	Max conc.	99th %ile	98th %ile	95th %ile	90th %ile	75th %ile	50th %ile
Year	(% of days)	(days)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
1995	92.6	0	0.050	0.043	0.041	0.036	0.031	0.025	0.021
1996	80.8	0	0.049	0.043	0.041	0.036	0.033	0.028	0.022
1997	60.3	0	0.072	0.058	0.057	0.052	0.041	0.030	0.025
1998	92.3	0	0.075	0.062	0.054	0.044	0.037	0.030	0.026
1999	31.8	0	0.060	0.055	0.050	0.043	0.036	0.028	0.023
2000	96.2	0	0.056	0.050	0.047	0.039	0.033	0.027	0.023
2001	97.0	0	0.064	0.053	0.048	0.040	0.034	0.028	0.024
2002	100.0	0	0.057	0.048	0.043	0.036	0.033	0.029	0.024
2003	97.3	0	0.077	0.062	0.060	0.049	0.037	0.030	0.024
2004	97.5	о	0.058	0.049	0.048	0.042	0.037	0.031	0.025

AAQ NEPM standard: 0.08 ppm (1-hour average)

Years with data availability below 75% shown in italics.

## Table 44: Percentiles of daily maximum one-hour SO<sub>2</sub> at Inner East Metro (1995–2004)

Voar	Data availability	No. of exceedences	Max conc.	99th %ile	98th %ile	95th %ile	90th %ile	75th %ile	50th %ile
Tear	(% of days)	(days)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
1995	71.5	0	0.015	0.008	0.007	0.005	0.004	0.002	0.000
1996	97.0	0	0.008	0.006	0.006	0.005	0.003	0.002	0.001
1997	94.2	0	0.012	0.010	0.008	0.006	0.004	0.003	0.001
1998	97.0	0	0.015	0.012	0.008	0.007	0.005	0.003	0.002
1999	97.8	0	0.012	0.007	0.006	0.005	0.003	0.002	0.001
2000	97.8	0	0.010	0.007	0.006	0.004	0.003	0.001	0.000
2001	93.4	0	0.009	0.008	0.007	0.006	0.004	0.002	0.000
2002	98.4	0	0.012	0.008	0.007	0.006	0.004	0.002	0.000
2003	96.7	0	0.009	0.007	0.006	0.004	0.003	0.002	0.001
2004	99.7	0	0.014	0.009	0.007	0.005	0.004	0.003	0.001

#### AAQ NEPM standard: 0.20 ppm (1-hour average)

Years with data availability below 75% shown in italics.

#### Table 45: Percentiles of daily maximum one-hour SO<sub>2</sub> at Geelong (1995–2004)

Year	Data availability	No. of exceedences	Max conc.	99th %ile	98th %ile	95th %ile	90th %ile	75th %ile	50th %ile	
rear	(% of days)	(days)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	
1995	88.2	1	0.088	0.030	0.023	0.015	0.011	0.006	0.002	
1996	76.8	0	0.032	0.026	0.023	0.016	0.010	0.004	0.001	
1997										
1998	68.8	0	0.038	0.023	0.021	0.016	0.012	0.008	0.003	
1999	94.0	0	0.029	0.020	0.019	0.015	0.011	0.007	0.003	
2000	88.2	0	0.029	0.019	0.014	0.010	0.007	0.004	0.001	
2001	50.7	0	0.037	0.024	0.023	0.018	0.012	0.006	0.002	
2002	84.9	0	0.040	0.029	0.024	0.016	0.012	0.005	0.001	
2003	96.2	0	0.039	0.032	0.026	0.015	0.011	0.005	0.001	
2004	90.7	0	0.069	0.026	0.023	0.019	0.013	0.007	0.003	

AAQ NEPM standard: 0.20 ppm (1-hour average)

Years with data availability below 75% shown in italics. Years with data availability below 15% omitted.

## Table 46: Percentiles of daily maximum one-hour SO<sub>2</sub> at Latrobe Valley East Central (1995–2004)

Year	Data availability	No. of	Max	99th %ile	98th %ile	95th %ile	90th %ile	75th %ile	50th %ile
	(% of days)	(days)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
1995	88.5	0	0.049	0.021	0.020	0.015	0.011	0.007	0.004
1996	82.8	0	0.032	0.017	0.014	0.011	0.008	0.006	0.003
1997	97.8	О	0.116	0.025	0.021	0.014	0.011	0.007	0.004
1998	84.1	0	0.055	0.022	0.020	0.016	0.013	0.009	0.006
1999	80.3	0	0.032	0.020	0.017	0.013	0.012	0.007	0.004
2000	90.4	0	0.061	0.038	0.024	0.018	0.013	0.008	0.004
2001	98.6	0	0.063	0.036	0.020	0.014	0.011	0.008	0.005
2002	93.7	0	0.062	0.032	0.022	0.016	0.012	0.008	0.005
2003	94.8	0	0.082	0.038	0.030	0.020	0.015	0.009	0.005
2004	98.4	0	0.079	0.042	0.030	0.018	0.013	0.008	0.005

AAQ NEPM standard: 0.20 ppm (1-hour average)

#### Table 47: Annual average Pb at CBD North East (1995–2005)

Year	Data availability	Annual concentration				
	(% of days)	(µg/m³)				
1995	80.5	0.27				
1996	100.0	0.20				
1997	100.0	0.24				
1998	90.4	0.16				
1999	98.6	0.16				
2000	100.0	0.11				
2001	92.1	0.05				
2002	92.1	0.08				
2003	98.6	0.03				
2004	88.5	0.02				

AAQ NEPM standard: 0.5  $\mu$ g/m<sup>3</sup> (annual average)

## Table 48: Percentiles of 24-hour PM10 at Inner East Metro (1995–2004)

Year	Data availability	No. of exceedences	Max conc.	99th %ile	98th %ile	95th %ile	90th %ile	75th %ile	50th %ile
	(% of days)	(days)	(µg/m³)	(µg/m³)	(µg/m³)	(µg/m³)	(µg/m³)	(µg/m³)	(µg/m³)
1995	63.0	0	<i>43.3</i>	37.3	35.1	30.4	26.1	21.2	17.0
1996	97.0	0	41.7	39.6	37.8	30.4	26.1	21.5	17.2
1997	98.1	2	68.6	44.3	37.8	33.4	29.5	23.0	18.1
1998	90.1	1	53.5	46.0	42.1	36.6	31.8	24.4	18.5
1999	84.7	0	43.7	34.1	32.7	30.3	26.3	21.6	17.4
2000	95.1	2	56.5	43.6	34.8	31.6	26.8	21.4	16.8
2001	91.0	2	72.6	39.6	35.1	32.8	27.9	23.4	17.2
2002	97.5	1	66.2	35.9	34.5	30.4	27.9	22.4	17.2
2003	95.9	10	181.7	80.9	56.4	38.3	30.9	22.9	17.2
2004	97.0	1	51.6	45.2	36.8	30.9	27.6	22.0	16.5

AAQ NEPM standard:  $50 \mu g/m^3$  (24-hour average)

Years with data availability below 75% shown in italics. Exceedences shown in bold.

## Table 49: Percentiles of 24-hour PM<sub>10</sub> at Inner West Metro (1996–2004)

Year	Data availability	No. of exceedences	Max conc.	99th %ile	98th %ile	95th %ile	90th %ile	75th %ile	50th %ile
	(% of days)	(days)	(µg/m³)	(µg/m³)	(µg/m³)	(µg/m³)	(µg/m³)	(µg/m³)	(µg/m³)
1996	13.1	0	34.5	33.9	33.3	30.9	26.7	24.3	19.4
1997	98.9	4	65.5	50.1	41.5	38.2	32.5	25.7	19.8
1998	94.8	4	59.8	50.5	43.9	41.4	34.7	26.9	19.8
1999	96.7	1	50.7	41.2	38.0	32.8	28.4	23.9	19.1
2000	89.0	2	57.8	43.6	40.7	36.6	30.0	23.9	17.6
2001	40.5	0	38.9	33.7	28.4	26.3	23.5	18.2	15.1
2002	98.4	2	79.1	42.9	38.7	32.2	28.3	22.1	17.5
2003	87.7	10	314.5	89.1	66.0	41.0	32.2	23.4	17.6
2004	93.2	3	58.1	48.4	40.4	33.5	29.1	22.3	16.1

## AAQ NEPM standard: $50 \mu g/m^3$ (24-hour average)

Years with data availability below 75% shown in italics. Exceedences shown in bold.

# APPENDIX 3: DESCRIPTION OF CIRCUMSTANCES WHICH LED TO EXCEEDENCES

## Ozone

Ozone is generated by chemical reactions in strong sunlight as precursor chemicals are transported from the point of emission. In 2004 ozone exceeded the standards less frequently than in 2003 and was similar to previous years. The recorded exceedences of the one-hour and four-hour standards are shown in Table 50. Each of these occurred on typical ozone days, when emissions from Melbourne were recirculated on a bay breeze.

There were no exceedences of the ozone standards in the Latrobe Valley.

#### Particles as PM<sub>10</sub>

In 2004 PM<sub>10</sub> exceedences occurred on the days listed in Table 51. Most exceedences have been attributed to windblown dust from the ground, typically in high winds and high coarse-to-fine particle ratios. Geelong station had the most exceedence days; this station was influenced by local earthworks, which were difficult to distinguish from dust transported on a larger scale. The result on 20 October is attributed to these local sources because high levels were not shown by other monitoring in Geelong, which was conducted by an industrial licence holder in the latter part of the year. Calm conditions on 14 May caused elevated levels of pollution throughout the Port Phillip region, from sources such as wood heaters and traffic.

## Particles as PM<sub>2.5</sub>

Only one exceedence of the advisory reporting standard for  $PM_{2.5}$  was recorded: 26.4 µg/m<sup>3</sup> at Inner East Metro on 13 May. This is attributed to wood smoke and traffic emissions accumulating in cold, calm conditions.

#### Table 50: Ozone exceedences

AAQ NEPM standard: 0.10 ppm (1-hour average); 0.08 ppm (4-hour average)

Region	Location	14 Feb		26 Nov	23 Dec
Performance monitoring station		1h	4h	4h	4h
Port Phillip					
Inner West Metro	Footscray	0.106	0.083		
South Metro	Brighton	0.106	0.092		
Outer West Metro	Point Cook				0.082
<u>Geelong</u>					
Geelong	Geelong South			0.085	
Outer Geelong	Point Henry				0.085

All readings in parts per million.

EPA Victoria-

## Table 51: PM<sub>10</sub> exceedences

AAQ NEPM standard: 50  $\mu$ g/m<sup>3</sup> (24-hour average)

Date			<u>Pc</u>	ort Phillip		<u>Latrobe</u> <u>Valley</u>	<u>Bendigo</u>	<u>Shepparton</u>	<u>Mildura</u>	Cause	
	CBD	Inner East Metro	Inner West Metro	South East Metro	Outer East Metro	Geelong	LV West Central	Bendigo	Shepparton	Mildura	
	RMIT	Alphington	Footscray	Dandenong	Mooroolbark	Geelong South	Мое	Bendigo	Shepparton	Mildura	
20 Jan 04						54.1					Dust
28 Jan 04						53.2					Dust
20 Feb 04						149.0					Dust
o4 Mar o4						82.1					Dust
25 Mar 04			58.1		63.9	89.4					Dust
28 Mar 04				50.1							Dust
14 Apr 04		51.6	51.1			52.5	56.3				Dust Prescribed burning
22 Apr 04	50.9					59.0					Dust
14 May 04			53.1			55.5					Regional
15 May 04	79.8										Dust
28 Jun 04								59.2			Wood smoke
20 Oct 04						64.3					Local dust
27 Nov 04									54.7		Dust
o6 Dec o4						51.1					Dust
19 Dec 04										50.1	Dust
23 Dec 04										102.3	Dust
24 Dec 04						52.0					Dust

All readings in µg/m<sup>3</sup>. Measured by TEOM except at Shepparton. Monitoring by high-volume samplers at other stations yielded no additional exceedences.